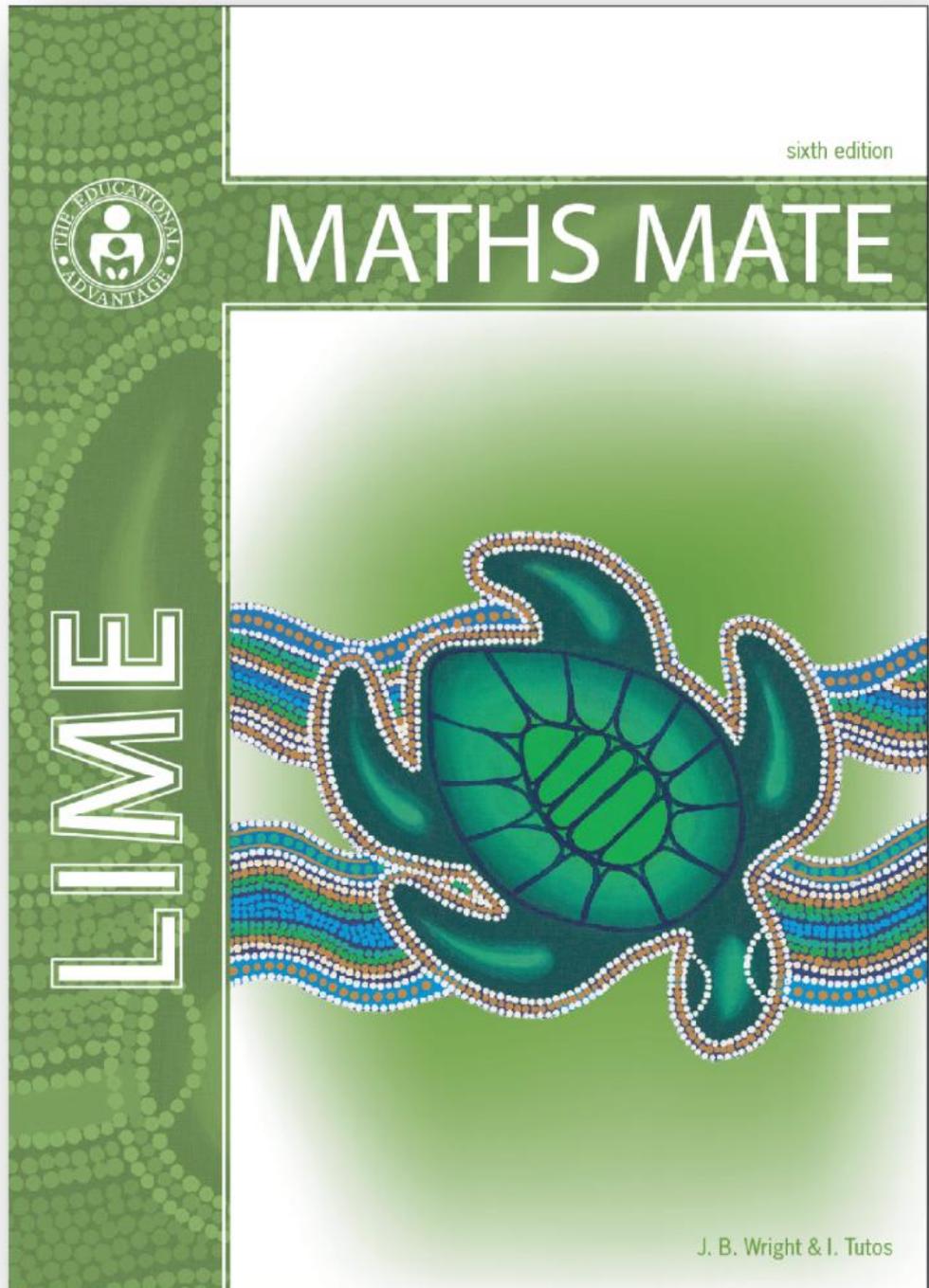


# MATHS MATE

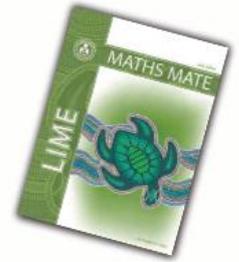


sixth edition



# MATHS MATE

## Teacher Resource Lime (Maths Mate year 10)



- ▶ Teacher's Guide to the Use of Maths Mate
- ▶ Student Pad Answers
- ▶ Student Pad Short Answers
- ▶ Problem Solving Hints & Solutions
- ▶ Test Masters
- ▶ Test Answers
- ▶ Record Keeping Sheets

For your free Skill Builder Mauve/Lime contact us:

▶ [info@mathsmate.net](mailto:info@mathsmate.net)

LIME

# MATHS MATE



## Teacher Resource



### **Teacher's Guide to the Use of Maths Mate**

pages i - viii



### **Student Pad Answers**

pages 3 - 72



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### **Problem Solving Hints & Solutions**

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### **Test Masters**

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### **Test Answers**

pages 1 - 32



### **Record Keeping Sheets**

pages 1 - 10

This Teacher Resource PDF  
comes with a limited  
**Lifetime Update Guarantee.**

Each time a new edition of the  
Maths Mate Program is released,  
an **upgrade** for your  
**Teacher Resource PDF is available**  
**FREE \* of charge**  
when you contact us direct.

This ensures that each teacher can have the latest edition without your school having to incur any further costs. We have chosen to do this to demonstrate the strength of our belief that access to a Teacher Resource PDF is important in the smooth running and success of the program.

\* The free Teacher Resource PDF is limited to schools that continue to purchase at least 25 student workbooks.





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J. B. Wright & I. Tutos

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### Preface

The Maths Mate Review Program is designed to be used in schools by students from years 3 to 10 (Australia) and years 4 to 11 (New Zealand). Emphasis is placed on the review and gradual development of basic skills.

It is not expected that all students will be able to complete every question from week one. Some questions have been designed to offer a real challenge. However, a major strength of the program is that students are consistently confronted with problems relating to their understanding of the same basic skill, encouraging them to see the need to master that skill in order to progress.

### RECOMMENDED GRADE / YEAR LEVEL INDICATOR

		AUS 1	2	3	4	5	6	7	8	9	10	11	12
Orange	Student Workbook - 2nd Ed.												
Rose	Student Workbook - 2nd Ed.												
Yellow	Student Workbook - 5th Ed.												
Red	Student Workbook - 5th Ed.												
Blue	Student Workbook - 6th Ed.												
Green	Student Workbook - 6th Ed.												
Mauve	Student Workbook - 6th Ed.												
Coffee	Student Workbook - 3rd Ed.												
Lime	Student Workbook - 6th Ed.												
Silver	Student Workbook - 3rd Ed.												

NZ Y2 Y3 Y4 Y5 Y6 Y7 Y8 Y9 Y10 Y11 Y12 Y13

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### Maths Mate Lime cover painting

Turtle Reef - 2003  
 Acrylic on canvas 50 × 60 cm  
 by Australian artist Susan Betts - Kokata, Mirning and Wirangu.

'Turtle Reef' was purchased by The Educational Advantage who have been kindly given permission to reproduce the painting. This contemporary Aboriginal artwork combines traditional and modern techniques. Susan's rich and vibrant art reflects the Australian landscape and wildlife, both flora and fauna.

# PREFACE

## The Author

Joseph Wright has taught in a number of schools throughout Australia and also in the United States of America. His experiences led him to the firm belief that there was a real need for a Mathematics program which was based on a constant review of the basic skills which students acquire. The Maths Mate Program was designed to meet that need.

## Acknowledgements

"The completion of this project was made possible by the hard work and inspiration of Joanna Tutos, Lou McKenna and Julie Moyle. Thanks to John and Wilma McCormack and the many colleagues and friends who contribute to the overall program. Special thanks to my wife Trish and our children, Peter, David, Rebecca, Paul and Anthony for their investment of time, energy, encouragement and faith."



## Preface

The Maths Mate Program has been designed to be used in schools by students from Years 3 to 10 (Australia) and Years 4 to 11 (New Zealand). Emphasis is placed on the review and gradual development of basic skills so that students keep their skills up to date and teachers need to spend less class time on revision when starting new or subsequent topics.

The program is designed to have students complete eight worksheets each term. It is not expected that all students will be able to complete every question from week one. Some questions have been designed to offer a real challenge. However, a major strength of the program is that students are consistently confronted with problems dealing with their understanding of the same basic skills, encouraging them to see the need to master those skills in order to progress.

Maths Mate is a very comprehensive program which is not only structured to help students see a logical progression in their work but also to make life easier for teachers. Easy to use record keeping sheets have been provided on the Teacher Resource PDF. The tests, which are given twice a term, provide a very good indication of individual student strengths and weaknesses and this information can also be very valuable for addressing specific problems as well as assessing progress.

## Aims of the Maths Mate Program

- Provide students with regular work that helps maintain and develop skills acquired throughout the year.
- Present a structured approach so that students can see their development in specific skill areas.
- Encourage students to take responsibility for their own learning.
- Provide a challenging level of work for all students.
- Encourage parental involvement in the learning process.
- Assist teachers in the diagnosis of student strengths and weaknesses.
- Provide teachers with a concrete method of assessing students' effort and progress on a regular basis.
- Provide a consistent review program which ensures students are regularly being exposed to the Mathematical skills appropriate to their ability level.

A Teacher's Guide to the successful Implementation of the  
**MATHS MATE PROGRAM**

The Maths Mate Program offers many valuable benefits, including the aspects of parental involvement, systemised revision, individual and group diagnostics, enhanced professional standing for teachers, and most importantly, improved efficiency in student learning. However, a number of these factors may be negated or even lost if an individual teacher or school does not effectively implement the program. The Maths Mate Program was designed with an awareness of the increasing time demands placed on classroom teachers by ever-changing curriculum development and more involved assessment and reporting procedures. Maths Mate is a dynamic tool for classroom teachers designed to effectively improve student outcomes in Mathematics, to report accurately on these and to do so within a manageable time frame.

This guide was written to assist with the implementation of Maths Mate. This first page sets out the planning and preparation required by the Head of Mathematics and/or Maths Mate Coordinator, where one is appointed, before beginning the program. The following pages are a guide for classroom teachers using the program.

**SUGGESTIONS FOR PREPARATION AND ORGANISATION:**

**Make sure parents are given advanced notice of the implementation of the Program.** This might include an introduction at Parent Information meetings at the end of the year in preparation for the next.

**At the start of the new school year a letter should be sent home to parents** (see PDF ~ Teacher's Guide to the use of Maths Mate, or the editable word.doc, or [www.mathsmate.co.nz](http://www.mathsmate.co.nz) ~ Downloads). Parental involvement should be encouraged. Their checking to see that work is completed weekly, and their signing of each sheet, should be stressed as important to the program's success. (A follow up reminder later in the year should also be considered.)

**If you are fortunate enough to have audio visual screens in your classrooms, you might consider showing the answers from the Student Workbook Answers PDF files.**

**Thoroughly brief teachers on the use and advantages to them of the Maths Mate Program.** Greater commitment will be given by all teachers if they are aware of the goals underlying the program and have a thorough understanding of the most efficient ways of implementation.

**Give a demonstration of marking and recording procedures, and the potential use of Skill Builders, as an inservice exercise prior to the start of the school year.** The pages that follow may be of assistance here.

**Important:** If the school has purchased the student workbooks for the students, you may be able to organise the separation of the workbooks (see page iv) prior to the start of the year, perhaps even at the end of the current year.

**Reminder:** The Teacher Resource PDF will be replaced free of charge when a class set of a revised edition is purchased.



It is often possible for The Educational Advantage to send a representative of the Maths Mate Program to visit your school. Should you consider this assistance advantageous, please contact us to arrange a visit.

Phone: 03 9899 9065 (Australia)

Email: [info@mathsmate.net](mailto:info@mathsmate.net)

Phone: 07 929 4063 (New Zealand)

Email: [info@mathsmate.co.nz](mailto:info@mathsmate.co.nz)

A Teacher's Guide to the Use of the  
**MATHS MATE PROGRAM**

The effective use of Maths Mate requires some good house-keeping on the part of teachers involved.

**STARTING THE YEAR:**

Each student will receive a Maths Mate Student Workbook appropriate to his or her level. This workbook will contain 32 worksheets of increasing difficulty. (Having 8 worksheets per term allows some flexibility to schools.) Each student is also entitled to a complimentary Maths Mate Skill Builder appropriate to their level.

**Collect the workbooks from the students on the first day of the year.** Use a class list to be sure that any student who has not yet obtained a copy is identified.

**Organise for the pages of the student workbooks to be separated so that class sets of each worksheet can be placed in manila folders or plastic pockets for distribution to students on a weekly basis.** (The help of teacher assistants, students or a parent support group may be useful here.) This avoids problems with a student losing a workbook and having trouble completing Maths Mate work for the remainder of the year. The covers can be used as a colourful divider to mark a section for Maths Mate work should the students be using a binder.

**At the start of the year, brief your class on the advantages of the program.** 'Sell' them the gains they can make with its effective use. Emphasise that, because of the nature of human memory, this program with its systematic, cyclic revision allows for maximum 'absorption' of learned procedures and for the strong reinforcement of important skills. These skills are a necessary prerequisite to problem-solving. Also explain that this is one of their responsibilities in the 'Teaching-Learning Process' and that as they progress further through the educational system, they will need to accept greater personal responsibility for their own learning.

**Ensure that you take the time to fully explain the use of the program, how it will be marked, the recording process of results and the diagnostic benefits of those results for identification of appropriate Skill Builders.**

**See that each child receives a letter to parents informing them of the Maths Mate Program.** Stress the parental involvement and the need for signatures on each sheet and see that you collect all the return slips for your class.

**When submitting work, students might be asked to attach a separate sheet showing appropriate steps in their working.** If the question can be answered in a single step, there is little to be gained from asking students to copy the question. If an intermediate step is required to obtain the answer, the student should set the question out appropriately. Such questions are marked with an asterisk ' \* ' to indicate to students that working is expected to be shown.

**Emphasise that all problems on the worksheets and test sheets are designed to be attempted without the aid of a calculator.** Students are unlikely to become confident Mathematicians if they do not have a reasonable background of basic skills.

**It is important to explain your expectations to the class.** Naturally these will be relative to their level of mathematical ability. Some class members may be expected to attempt all questions including the problems at the end whereas others may only be expected to complete the sheets in part (but encouraged to go further when possible).

**Also explain that the material covered in each worksheet may not necessarily reflect the work being undertaken in class at the time.** The work covered by the Maths Mate Program should, with minor exceptions, be revision of work introduced in previous years of study. The exceptions will depend to some degree on the background of your students.

STARTING EACH TERM:

**At the start of every term give each student a new *Worksheet Results* sheet located at the beginning of each term in the Student Pad.** Explain the importance of the upkeep of this document and how it may be used to identify which skills they have acquired and which skills they still need to learn and practise. Introduce the availability of *Skill Builders*. Providing a new sheet each term gives you a chance to further encourage students to make a fresh start and to set new goals for the term.

**A hard copy of this profile sheet is best kept by the class teacher and handed back to the students every week for them to update during the correction process.** Extra copies can be made for those students who would like to have a copy of their own to show their parents (see PDF ~ Record Keeping Sheets, pages 1 to 4).

WEEK - TO - WEEK:

**Get the students into a routine early. Assign the Maths Mate worksheet at the same time each week and have it returned on the same day the following week.**

**On the date worksheets are due, the teacher and students correct answers together in class.** When marking, have students correct their own work by reading the answers to them or use an overhead screen. Having students correct their own work is less about saving the teacher's time for more important work, but more about building the process of developing in students responsibility for their own learning. It also means that students end up with a much clearer idea of the areas in which they need to concentrate their efforts.

**When giving the answers, avoid pausing to discuss the answers at this stage.** By using the numbered circles at the base of the worksheets to record correct responses, the time taken to transfer results to the *Worksheet Results* sheet can be minimised (see Fig. 1). The circles at the base of each worksheet can be rotated and aligned with those on the *Worksheet Results* sheet to enable a quick transfer of the correct responses.

MATHS MATE		Name: <i>Brendan Moyle</i>	
		Class: <i>10J</i>	
		Teacher: <i>Mr Jacques</i>	
Worksheet Results		Skill Builder links	
Term 1		Sheet 1	Sheet 2
1. [Long $\times$ , -]	<input type="radio"/>	<input type="radio"/>	1.1
2. [Decimal +, -]	<input type="radio"/>	<input type="radio"/>	2.1
3. [Decimal $\times$ , -]	<input type="radio"/>	<input type="radio"/>	3.2
4. [Fraction +, -]	<input type="radio"/>	<input type="radio"/>	4.1,2
5. [Fraction $\times$ , -]	<input type="radio"/>	<input type="radio"/>	5.2
6. [Percentages]	<input type="radio"/>	<input type="radio"/>	6.3,4
7. [Decimals / Fractions / Percentages]	<input type="radio"/>	<input type="radio"/>	7.3
8. [Integer +, -]	<input type="radio"/>	<input type="radio"/>	8.1
9. [Integer $\times$ , -]	<input type="radio"/>	<input type="radio"/>	9.1
10. [Rates / Ratios]	<input type="radio"/>	<input type="radio"/>	10.2,3,4
11. [Indices]	<input type="radio"/>	<input type="radio"/>	11.1,2
12. [Square Roots]	<input type="radio"/>	<input type="radio"/>	12.2
13. [Exploring Number]	<input type="radio"/>	<input type="radio"/>	13.1,2
14. [Financial Mathematics]	<input type="radio"/>	<input type="radio"/>	14.1,3
15. [Number Patterns]	<input type="radio"/>	<input type="radio"/>	15.2
16. [Expressions]	<input type="radio"/>	<input type="radio"/>	16.1
17. [Substitution]	<input type="radio"/>	<input type="radio"/>	17.2,3
18. [Expansion]	<input type="radio"/>	<input type="radio"/>	18.1
19. [Factorisation]	<input type="radio"/>	<input type="radio"/>	19.1
20. [Equations]	<input type="radio"/>	<input type="radio"/>	20.3
21. [Coordinate Geometry]	<input type="radio"/>	<input type="radio"/>	21.3,5
22. [Units of Measurement / Time]	<input type="radio"/>	<input type="radio"/>	22.3
23. [Perimeter / Area]	<input type="radio"/>	<input type="radio"/>	23.1,2
24. [Surface Area]	<input type="radio"/>	<input type="radio"/>	24.2
25. [Volume]	<input type="radio"/>	<input type="radio"/>	25.1,2
26. [Pythagoras / Trigonometry]	<input type="radio"/>	<input type="radio"/>	26.3
27. [Angles]	<input type="radio"/>	<input type="radio"/>	27.2,3
28. [Geometric Reasoning]	<input type="radio"/>	<input type="radio"/>	28.5,6
29. [Statistics]	<input type="radio"/>	<input type="radio"/>	29.5,6,7,8
30. [Probability]	<input type="radio"/>	<input type="radio"/>	30.2
31. [Problem Solving 1]	<input type="radio"/>	<input type="radio"/>	Hints & Solutions
32. [Problem Solving 2]	<input type="radio"/>	<input type="radio"/>	Hints & Solutions
Total Correct	<input type="radio"/>	<input type="radio"/>	

Fig. 1 - Sample *Worksheet Results* sheet

**Should there be need for explanation of one or more answers or perhaps how a problem was solved, you can decide on the relative worth to the class and commit appropriate time on that basis.** After the correction has been completed, it can be valuable to spend time on a problem that has clearly attracted the class's attention while they are focused on it and their interest is high. On the other hand, care needs to be taken to ensure extended periods of time are not spent catering to individual needs with the bulk of the class waiting.

**Remember to check the *Problem Solving Hints & Solutions*** (see PDF ~ Problem Solving Hints & Solutions, pages 1 to 15). They supply you with ready answers to the more challenging problem solving questions found at the end of each Maths Mate worksheet. They also contain helpful hints for developing students' problem solving skills.

**Have the students fill in their *Worksheet Results* sheets and select a relevant *Skill Builder* sheet if appropriate.** *Skill Builder* links are listed beside each set of four worksheets (see Fig. 1). Students should work through the *Skill Builders* in order. Where possible the skills are arranged in increasing degree of difficulty. Be aware that some skills may require the knowledge of previous skills. Generally when a student has several areas of weakness, he or she should work on the lowest numbered question first. For example, students struggling with Q5 and Q7 will need to build skills required for Q5 before they can improve Q7.

**11. [Indices]**

Skill 11.1 Explain the rules and laws for indices

Observe the index. The index tells you how many times to multiply the base.

5 to the power of 4  
Base 5<sup>4</sup> Index  
 $5^4 = 5 \times 5 \times 5 \times 5$  (5 multiplied by itself 4 times)

$6^0 = 1$  number to the power of 0 = 1  
 $3^1 = 3$  number to the power of 1 = itself  
 $4^2 = 4 \times 4 = 16$  (4 squared)  
 $2^3 = 2 \times 2 \times 2 = 8$  (2 cubed)

Q.  $2^5 =$       A.  $2^5 =$   
 $= 2 \times 2 \times 2 \times 2 \times 2$   
 $= 32$  (2 multiplied by itself 5 times)

a)  $3^4 =$       b)  $2^3 =$       c)  $2^6 =$   
 $= 3 \times 3 \times 3 \times 3 = 81$        $= 2 \times 2 \times 2 =$        $=$        $=$

d)  $5^2 =$       e)  $1^7 =$       f)  $4^2 =$   
 $=$        $=$        $=$

g)  $7^2 =$       h)  $6^3 =$       i)  $10^3 =$   
 $=$        $=$        $=$

j)  $3^5 =$       k)  $7^3 =$       l)  $9^2 =$   
 $=$        $=$        $=$

m)  $8^1 =$       n)  $9^0 =$       o)  $0^7 =$   
 $=$        $=$        $=$

p)  $4^3 =$       q)  $1^{10} =$       r)  $10^4 =$   
 $=$        $=$        $=$

page 168      www.mathsmate.net      © Maths Mate Mauve/Lime Skill Builder 11

Fig. 2 - Sample Skill Builder sheet

Understand that any question on the Maths Mate worksheets is part of a set of four similar questions in the term. For example, consider sheets 1, 2, 3 and 4 in Lime (Year 10) term 1. Question 12 on each sheet is similar in design, content and degree of difficulty. This grouping of question style is also true for the next set of four worksheets and so on. Thus the Maths Mate tests (see PDF ~ Test Masters, pages 1 to 32) also reflect this grouping of question style and substance. Generally too, the Skill Builders can be linked to each set of four similar questions. These links are identified, not only on the Worksheet Results sheet but also on the grid at the title of each Skill Builder (see Fig. 2). Both references should be helpful for the allocation of Skill Builders to students.

Collect the students' Maths Mate worksheets and attached working, the Worksheet Results sheets and any completed Skill Builders.

Enter Maths Mate results onto your Worksheet Record, see Fig. 3 (see also PDF ~ Record Keeping Sheets, pages 7 to 10). Firstly, a record of the total number of correct answers for each week can be written. The presence of a parent's signature may also be noted to monitor whether work was attempted by the student at home. Late work can also be noted. This system is explained at the base of the Worksheet Record sheet. Finally, a record of any Skill Builder completed or reward given to the student for good or improving work might be noted.

It is important that students are encouraged to complete every Maths Mate worksheet to maintain the effectiveness of the program.

Complimentary Maths Mate Skill Builders have been provided to students who have purchased a Maths Mate Student Pad. The Skill Builders extensively target, through instruction and practice, all skills within the Maths Mate Program except the problem solving questions. The Skill Builders also contain a Glossary of important facts and reference material that will provide instant help when students experience difficulties.

**MATHS MATE**      Worksheet Record      Term 1

Class: 10J      Teacher: Mr Jacques

Worksheet Number	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
1 ASHTON Darcy	15 ✓							
2 BAKER Stobhan	28 × L 1							
3 BOURKE Louise	26 ✓ 6							
4 CROSS Chris	14 ✓ 4							
5 DWYER Jim	31 × 15							
6 FIORE Ella	22 ✓							
7 FREEMAN Warren	17 ✓ 19							
8 HAHN Kim	21 ✓							
9 HU Joanna	26 ✓							
10 JILBERT Luke	19 × L 12							
11 KEUNEMAN John	22 ✓ 11							
12 McKENNA Joseph	18 ✓ 13							
13 MOYLE Brendan	24 ✓ 11							
14 MOYLE Emily	27 ✓ 8							
15 NESBIT Peter	32 ✓ 17							
16 RYAN Jacinta	21 × L 4							
17 RYAN Madeline	19 ✓ 14							
18 SETON Elizabeth	24 ×							
19 TUTOS Alexander	22 ✓ 12							
20 WINKELS Tim	19 × 5							
21 WRIGHT Anthony	28 ✓ 9							
22 WRIGHT Paul	20 ✓ 8							
23 YEO Tania	27 ✓							
24								
25								
26								
27								
28								
29								
30								
31								
32								
33								
34								

✓ - Signed by parent      L - Work handed in late      × - Not signed by parent

page 7      © Maths Mate Lime - Record Keeping Sheets

Fig. 3 - Sample Worksheet Record sheet

AFTER EVERY FOUR WORKSHEETS:

**Tests are given twice a term.** These tests take the same format as the worksheets and are based on the previous four worksheets. A and B tests are provided to allow alternate students to have a different test, thereby ensuring scores accurately reflect the student's own work. (The two tests can be distinguished by their label at the base of the second page, e.g. Lime~Test 3A and Lime~Test 3B.) The tests serve a number of purposes. They give the teacher a more accurate indication of the student's abilities in conditions where the child does not have the assistance of a parent or tutor. They also help to motivate students to correct their work accurately and increase their desire to learn the required skills. Without the tests, students may become comfortable with seeking assistance to achieve high scores, unaware of the importance of fully understanding their work.

**It is at this point that teachers record accurately how students are performing in each area of skill.** A *Test Results* sheet is provided (see PDF ~ Record Keeping Sheets, page 5). It is expected that one of these forms be completed for each student in the class when recording test results. Again, the numbering system at the bottom of each page helps speed up this process. When administering the tests, it is advisable to have an assignment of some form or a *Skill Builder* worksheet available for students to begin as soon as they complete the test, which may only take 30 minutes for an able student.

TOPIC - TO - TOPIC:

**A periodic check of the *Test Results* sheets will assist you in evaluating individual or possible class areas of concern.** You can then plan appropriate *Skill Builder* work or advise individual students of concerns (perhaps as a guide to tutoring). It will also give you a valuable indication of the background skills students have before beginning a new topic, allowing you to tailor your lessons appropriately. In fact you are saved from having to pre-test students before each topic. This will result in a considerable saving of class time.

END OF SEMESTER:

**Combined, the *Worksheet Results* sheet, the *Test Results* sheet and the *Worksheet Record* sheet become invaluable for writing reports and for preparing for parent / teacher interviews.** They give a good indication to parents, not only of the child's skills but also of the consistency of their effort and the degree of responsibility they have assumed for their learning. At the end of the year, particularly when moving into a level where streaming occurs or into senior Mathematics classes, these records allow clear comparisons of students to be made across class groups.

MERIT CERTIFICATES:

**Merit Certificates can be used to encourage and reward selected students for consistent work, outstanding results or best of all, for significant improvement.** A Merit Certificate master can be found on the Teacher Resource PDF and can be printed and presented to students at the teacher's discretion.



We are confident you will find the Maths Mate Program a valuable asset to your teaching. We thank all those teachers who have provided feedback on this program and we value further comments and suggestions. Please direct all correspondence to:

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Website: www.mathsmate.net

Learning Works  
408 Anglesea Street  
Hamilton 3240  
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Phone: 07 929 4063  
Email: info@mathsmate.co.nz  
Website: www.mathsmate.co.nz

Dear Parents,

This year, as part of their Mathematics program, all Year 10/11 students will be given a Maths Mate worksheet on a regular basis. There will be 8 worksheets to be completed each term, generally one per week, the exceptions being short or disrupted weeks.

The Maths Mate worksheets have been designed to allow students to attempt all questions without the aid of a calculator, and this should be encouraged at home.

Don't be too concerned if your child finds the initial worksheet difficult. It is not expected that students will be able to complete every question from week one; in fact Q32 has been included to offer a real challenge to all students. Each worksheet is built around a common framework of questions aimed at covering the Australian Mathematics Curriculum.

While there is room on the worksheet for the recording of answers, this is only intended as a summary of the student's work. An asterisk ' \* ' has been used to indicate those questions where each student has been asked to show his or her working. In these cases the detail normally expected in Mathematics should be included, with all steps in the development of answers clearly shown. This working should be attached to the worksheet and submitted with it.

Corresponding questions on each worksheet cover the same skill area; that is, Q1 always tests long multiplication or division, Q2, addition or subtraction of decimals, and so on with the questions within each category becoming progressively more difficult from week to week.

Students will be confronted by the same type of question on a regular basis. The diagnostic nature of the worksheets will help students and teachers to identify areas of strength and weakness. This should also help to motivate students to make another attempt at mastering skills that they may have found too difficult in the past. As well, the results sheet, if completed accurately, will allow students to enjoy monitoring their own improvement.

If your child is having difficulty with a certain skill, complimentary Maths Mate Skill Builders have been provided. The Skill Builders also contain a Glossary of important facts and reference material that will provide students with instant help.

It would be appreciated if you would complete the tear off slip at the bottom of this page so that we can be sure that you are aware of our expectations. We ask also that you sign the completed worksheet each week to acknowledge that your child is working independently and regularly but with your support.

We thank you in anticipation of your involvement and remind you that you are encouraged to call and discuss your child's progress at any time.

Yours sincerely,

Class Teacher

Principal



Maths Mate Program - Return Slip

Student's Name: ..... Class: .....

As a parent / guardian I have signed this form to indicate that I am aware of the Maths Mate requirements expected of my child.

Parent's Signature: ..... Date: .....

Dear Parents,

This year, as part of their Mathematics program, all Year 5/6 students will be given a Maths Mate worksheet on a regular basis. There will be 8 worksheets to be completed each term, generally one per week, the exceptions being short or disrupted weeks.

The Maths Mate worksheets have been designed to allow students to attempt all questions without the aid of a calculator, and this should be encouraged at home.

Don't be too concerned if your child finds the initial worksheet difficult. It is not expected that students will be able to complete every question from week one; in fact Q24 has been included to offer a real challenge to all students. Each worksheet is built around a common framework of questions aimed at covering the current Mathematics Curriculum.

While there is room on the worksheet for the recording of answers, this is only intended as a summary of the student's work. An asterisk ' \* ' has been used to indicate those questions where each student has been asked to show his or her working. In these cases the detail normally expected in Mathematics should be included, with all steps in the development of answers clearly shown. This working should be attached to the worksheet and submitted with it.

Corresponding questions on each worksheet cover the same skill area; that is, Q1 always tests adding whole numbers to 10, Q2, subtracting whole numbers to 10, and so on with the questions within each category becoming progressively more difficult from week to week.

Students will be confronted by the same type of question on a regular basis. The diagnostic nature of the worksheets will help students and teachers to identify areas of strength and weakness. This should also help to motivate students to make another attempt at mastering skills that they may have found too difficult in the past. As well, the results sheet, if completed accurately, will allow students to enjoy monitoring their own improvement.

If your child is having difficulty with a certain skill, Skill Builders are available to students, teachers and parents from the Maths Mate websites [www.mathsmate.net](http://www.mathsmate.net) and [www.mathsmate.co.nz](http://www.mathsmate.co.nz). The Skill Builders also contain a Glossary of important facts and reference material that will provide students with instant help.

It would be appreciated if you would complete the tear off slip at the bottom of this page so that we can be sure that you are aware of our expectations. We ask also that you sign the completed worksheet each week to acknowledge that your child is working independently and regularly but with your support.

We thank you in anticipation of your involvement and remind you that you are encouraged to call and discuss your child's progress at any time.

Yours sincerely,

Class Teacher

Principal



---

Maths Mate Program - Return Slip

Student's Name: ..... Class: .....

As a parent / guardian I have signed this form to indicate that I am aware of the Maths Mate requirements expected of my child.

Parent's Signature: ..... Date: .....

# MATHS MATE



## Teacher Resource



### Teacher's Guide to the Use of Maths Mate

pages i - viii



### Student Pad Answers

pages 3 - 72



### Student Pad Short Answers

pages 1 - 8



### Problem Solving Hints & Solutions

pages 1 - 15



### Test Masters

pages 1 - 32



### Test Answers

pages 1 - 32



### Record Keeping Sheets

pages 1 - 10



# MATHS MATE

## Term 1 - Sheet 1



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times$ ,+]  
 $902 \times 1000 =$

902 000

2. [Decimal +, -] \*  
 $13.87 + 6.9 =$

20.77

3. [Decimal  $\times$ ,+]  
 $10 \times 0.064 =$

0.64

4. [Fraction +, -] \*  
 $\frac{4}{15} + \frac{1}{15} =$

$\frac{1}{3}$

5. [Fraction  $\times$ ,+]  
 $\frac{2}{5} \times \frac{2}{7} =$

$\frac{4}{35}$

6. [Percentages] \*  
40% of 600 =

240

7. [Decimals / Fractions / Percentages] \*  
Complete the equivalent fractions:

$$\frac{3}{5} = \frac{9}{15} = \frac{36}{60}$$

8. [Integer +, -]  
 $(-14) + (+11) =$

-3

9. [Integer  $\times$ ,+]  
 $(-7) \times (+11) =$

-77

10. [Rates / Ratios] \*  
Simplify \$4 : 50¢ : \$2.50

8 : 1 : 5

11. [Indices] \*  
 $4^4 =$

256

12. [Square Roots] \*  
 $\sqrt{\frac{25}{64}} =$

$\frac{5}{8}$

13. [Exploring Number] \*  
 $6 + 8 - (11 - 5) =$

8

14. [Financial Mathematics] \*  
Charlie paid a \$200 deposit for a lay-by on a \$2500 computer as the store demanded. What percentage of the sale price does the store expect on lay-by?

8%

15. [Number Patterns]  
Complete the pattern:  
0, 2, 6, 12, 20, 30, 42

16. [Expressions]  
Write as an expression:  
3 times the product of  $m$  and  $n$

or  $3 \times m \times n$  **3mn**

17. [Substitution] \*  
If  $x = 3$ , find the value of  $5x - 8$

7

18. [Expansion]  
Expand  $4(k - 5)$

**4k - 20**

19. [Factorisation]  
Factorise  $3r + 9s$

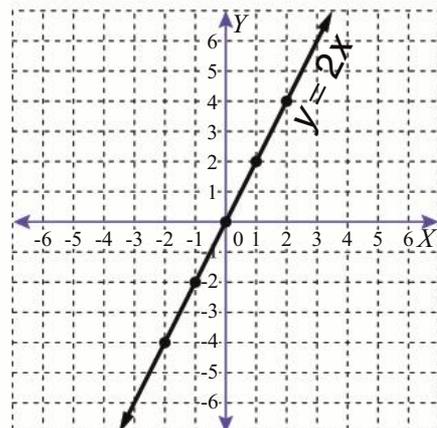
**3(r + 3s)**

20. [Equations] \*  
Solve for  $x$ :  $4x - 3 = 0$

$\frac{3}{4}$

21. [Coordinate Geometry] \*  
Graph the line of equation  $y = 2x$  by first completing this table of values.  
[Label the line with the rule.]

$x$	-2	-1	0	1	2
$y$	-4	-2	0	2	4



22. [Units of Measurement / Time]  
Which metric prefix is used to describe 1000 standard units?

kilo

23. [Perimeter / Area] \*  
Find the perimeter of the polygon.

15 cm

24. [Surface Area] \*  
Find the total surface area of a detergent box of width 80 mm, length 200 mm and height 150 mm.

116 000 mm<sup>2</sup>

25. [Volume] \*  
Using  $V = Bh$  find the volume of the prism.

825 mm<sup>3</sup>

26. [Pythagoras / Trigonometry] \*  
For this triangle use Pythagoras' theorem  $c^2 = a^2 + b^2$ . Find the length of the hypotenuse.

34

27. [Angles] \*  
Find the value of  $x^\circ$ .

42°

28. [Geometric Reasoning]  
Sketch a hexagonal pyramid. How many edges does a hexagonal pyramid have?

edges = 12

29. [Statistics] \*  
Find the median and range of this set of data: 3.1, 3.1, 3.6, 3.6, 3.8, 4, 4.2, 4.5, 4.8, 4.9

median = 3.9    range = 1.8

30. [Probability] \*  
A 52-card deck of playing cards is shuffled, and one card is dealt from the top of the deck. What is the probability that it is a red court card? [Give your answer as a fraction in simplest form.]

$\frac{3}{26}$

31. [Problem Solving 1] \*  
A farmer wishes to make a rectangular pen using an existing section of straight fence and 36 m of relocatable fencing materials. What is the largest possible area of the pen?

162 m<sup>2</sup>

32. [Problem Solving 2] \*  
The lines of a multiplication table are shown jumbled below. Which times table is it?

C × A = DI  
C × F = ID  
C × E = GE  
C × H = C  
C × C = FH  
C × I = BA  
C × G = AB  
C × B = EG  
C × D = HF

9

# MATHS MATE

## Term 1 - Sheet 2



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times$ ,+] \*  
 $268 \times 200 =$

53 600

2. [Decimal +,-]  
 $8.074 + 0.705 =$

8.779

3. [Decimal  $\times$ ,+]  
 $100 \times 0.35 =$

35

4. [Fraction +,-] \*  
 $\frac{5}{16} - \frac{1}{16} =$

$\frac{1}{4}$

5. [Fraction  $\times$ ,+]  
 $\frac{3}{10} \times \frac{1}{2} =$

$\frac{3}{20}$

6. [Percentages] \*  
24% of 25 =

6

7. [Decimals / Fractions / Percentages] \*  
Complete the equivalent fractions:

$$\frac{24}{36} = \frac{8}{12} = \frac{2}{3}$$

8. [Integer +,-]  
 $(-10) + (-7) =$

-17

9. [Integer  $\times$ ,+]  
 $(+3) \times (+13) =$

39

10. [Rates / Ratios] \*  
On average a horse needs 3 hours of sleep per day, while a python needs 18 hours of sleep per day. What is the ratio of the hours of sleep needed by a horse to the hours of sleep needed by a python?

1 : 6

11. [Indices]  
 $10^0 =$

1

12. [Square Roots] \*  
 $\sqrt{1\frac{24}{25}} =$

$1\frac{2}{5}$

13. [Exploring Number] \*  
 $5 \times 8 + 6 \div 6 - 12 \times 2 =$

17

14. [Financial Mathematics] \*  
Which parking option is cheaper for a 5 hour stay?

Option	Car Parking Rates	Cost
A	Day Rate	\$18.00
B	1st hour	\$5.00
	Per hour thereafter	\$3.00

B

15. [Number Patterns]  
Complete the pattern:

54, 53, 51, 48, 44, 39, 33

16. [Expressions]  
Write as an expression:  
 $t$  subtracted from the product of  $c$  and  $d$

or  $c \times d - t$   $cd - t$

17. [Substitution] \*  
If  $w = 5$ , find the value of  $36 - 4w$

16

18. [Expansion]  
Expand  $6(6 + h)$

$36 + 6h$

19. [Factorisation]  
Factorise  $4j - 10k$

$2(2j - 5k)$

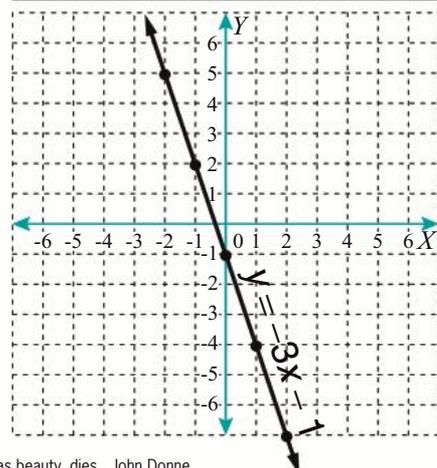
20. [Equations] \*  
Solve for  $x$ :  $2 + 3x = -1$

-1

21. [Coordinate Geometry] \*  
Graph the line of equation  $y = -3x - 1$  by first completing this table of values.

[Label the line with the rule.]

$x$	-2	-1	0	1	2
$y$	5	2	-1	-4	-7

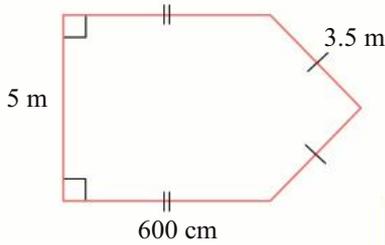


QUOTE OF THE WEEK: Love built on beauty, soon as beauty, dies. John Donne

22. [Units of Measurement / Time]  
The symbol 'M' represents which metric prefix of 1 000 000 in value?

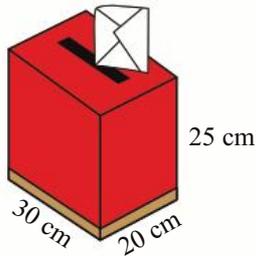
Mega

23. [Perimeter / Area] \*  
Find the perimeter of the shape in centimetres.



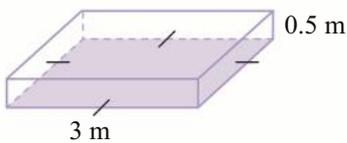
2400 cm

24. [Surface Area] \*  
What is the total surface area of the mailbox if the letter opening has an area of  $44 \text{ cm}^2$ ?  
[Hint: External area of six faces less opening.]



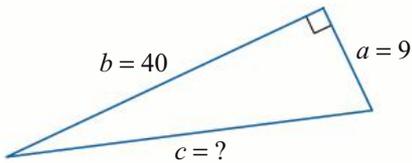
3656  $\text{cm}^2$

25. [Volume] \*  
Find the volume of the square prism.



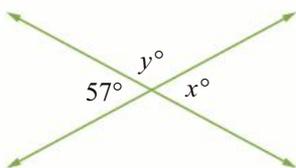
4.5  $\text{m}^3$

26. [Pythagoras / Trigonometry] \*  
For this triangle use Pythagoras' theorem  $c^2 = a^2 + b^2$ . Find the length of the hypotenuse.



41

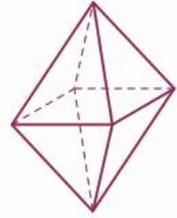
27. [Angles] \*  
Find the values of  $x^\circ$  and  $y^\circ$ .



$x^\circ = 57^\circ$   $y^\circ = 123^\circ$

28. [Geometric Reasoning]  
Euler's formula,  $E = V + F - 2$  defines the relationship between Edges, Vertices and Faces of any polyhedron. Verify Euler's formula for an octahedron:

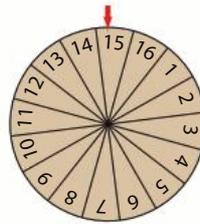
12 = 6 + 8 - 2



29. [Statistics] \*  
Calculate the mean and mode of this set of data:  
12, 8, 12, 13, 12, 8, 13, 8, 10, 13, 9, 8

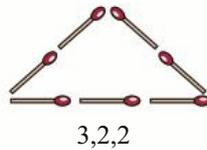
mean = 10.5      mode = 8

30. [Probability] \*  
This spinner is spun once. What is the probability of spinning a multiple of 5?  
[Give your answer as a fraction.]



$\frac{3}{16}$

31. [Problem Solving 1] \*  
Seven matchsticks can be used to form a triangular enclosure in two different ways,  $\{3,2,2\}$  and  $\{1,3,3\}$  as shown below. How many different triangles can be formed using 10 matchsticks?



2

32. [Problem Solving 2] \*  
Fill in the missing digits in the multiplication.

$$\begin{array}{r}
 \boxed{1} \boxed{1} 5 \\
 \times \quad \quad 4 \boxed{1} \\
 \hline
 \boxed{1} 1 5 \\
 \boxed{4} 6 \boxed{0} 0 \\
 \hline
 4 7 \boxed{1} \boxed{5}
 \end{array}$$

# MATHS MATE

## Term 1 - Sheet 3



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times$ ,+] \*  
 $150 \times 4000 =$

600 000

2. [Decimal +,-] \*  
 $0.006 + 3.95 =$

3.956

3. [Decimal  $\times$ ,+]  
 $1000 \times 8.9 =$

8900

4. [Fraction +,-] \*  
 $\frac{19}{10} - \frac{7}{10} =$

$1\frac{1}{5}$

5. [Fraction  $\times$ ,+] \*  
 $\frac{4}{5} \times \frac{3}{4} =$

$\frac{3}{5}$

6. [Percentages] \*  
80% of 5 =

4

7. [Decimals / Fractions / Percentages] \*  
 $\frac{6 \times 10}{7 \times 10} = \frac{6}{7}$  True or false?

true

8. [Integer +,-] \*  
 $(+17) + (-12) =$

5

9. [Integer  $\times$ ,+] \*  
 $(-23) \times (-2) =$

46

10. [Rates / Ratios] \*  
In his career, Pete Sampras won 14 Grand Slam titles in 18 finals. What is the ratio of wins to finals played?

7 : 9

11. [Indices]  
 $\left(\frac{3}{8}\right)^2 =$

$\frac{9}{64}$

12. [Square Roots] \*

$$\sqrt{30\frac{1}{4}} =$$

$5\frac{1}{2}$

13. [Exploring Number] \*

$$20 - 3 \times (3 + 5) \div 4 + 2 =$$

16

14. [Financial Mathematics] \*

There is a deal that if you buy books of equal value, the second is half price. This deal costs \$17.85. How much does the deal save compared to the original price?

\$ 5.95

15. [Number Patterns]

Complete the pattern:

1, 12, 21, 28, 33,

36, 37

16. [Expressions]

Write as an expression:

5 subtracted from a quarter of  $s$

$\frac{s}{4} - 5$

17. [Substitution] \*

If  $a = 3$  and  $b = 5$ ,  
find the value of  $2a + 3b$

21

18. [Expansion]

Expand  $2(7r + 9)$

$14r + 18$

19. [Factorisation]

Factorise  
 $2a + 4b + 8$

$2(a + 2b + 4)$

20. [Equations] \*

Solve for  $x$ :  $\frac{4x}{3} + 5 = 4$

$-\frac{3}{4}$

21. [Coordinate Geometry] \*

Which line does the point  $(-1, 6)$  lie on?

A)  $y = 5x + 8$

B)  $y = -2x - 4$

C)  $y = -x + 5$

C

QUOTE OF THE WEEK: A lot of people get what they want, but they don't always want what they get.

22. [Units of Measurement / Time]

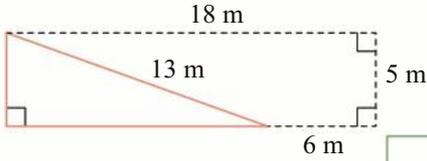
Which number represents the metric prefix 'centi'?

- A) 0.1                      B)  $\frac{1}{100}$   
 C)  $\frac{1}{1000}$                   D) 100

B

23. [Perimeter / Area] \*

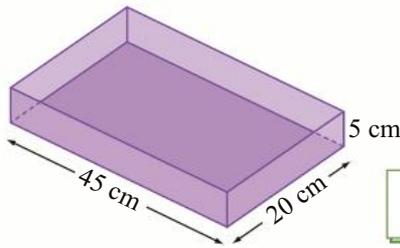
Find the perimeter of the right-angled triangle.



30 m

24. [Surface Area] \*

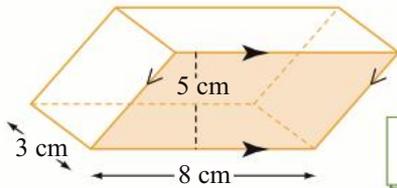
Gina wants to paint this open cardboard box on the inside and the outside. How many square centimetres of cardboard will Gina paint?



3100 cm<sup>2</sup>

25. [Volume] \*

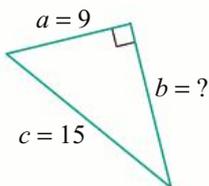
Find the volume of the prism.



120 cm<sup>3</sup>

26. [Pythagoras / Trigonometry] \*

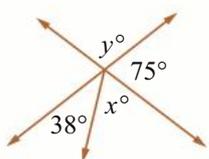
Using Pythagoras' theorem find the length of the side labelled *b*.



12

27. [Angles] \*

Find the values of  $x^\circ$  and  $y^\circ$ .



$x^\circ = 67^\circ$   $y^\circ = 105^\circ$

28. [Geometric Reasoning]

Circle the net that **cannot** be folded to make a model of a three-dimensional shape.



29. [Statistics] \*

Which set of data has the same mean, median and mode?

- A) 98, 99, 100, 100, 102, 103  
 B) 23, 25, 25, 25, 26, 26

B

30. [Probability] \*

A fly lands on one square of the crossword. What is the probability that the fly lands on a black square? [Give your answer as a fraction in simplest form.]



$\frac{1}{3}$

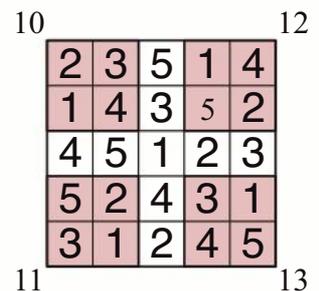
31. [Problem Solving 1] \*

Simplify  $\frac{5}{1 + \frac{1}{1+3}}$

4

32. [Problem Solving 2]

Place all the digits 1 to 5 in each row and column, so that they are not repeated in any of the rows, columns, diagonals and shaded squares. The numbers outside the big square represent the sums of the four digits in each shaded square.



# MATHS MATE

## Term 1 - Sheet 4



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times$ ,+] \*  
 $2067 \times 300 =$

620 100

2. [Decimal +,-] \*  
 $1.21 + 12.012 =$

13.222

3. [Decimal  $\times$ ,+] \*  
 $0.004 \times 1000 =$

4

4. [Fraction +,-] \*  
 $\frac{9}{5} + \frac{6}{5} =$

3

5. [Fraction  $\times$ ,+] \*  
 $\frac{5}{7} \times \frac{7}{8} =$

$\frac{5}{8}$

6. [Percentages] \*  
15% of 90 =

13.5

7. [Decimals / Fractions / Percentages] \*  
 $\frac{12}{15} = \frac{12 \div 3}{15 \div 3}$  True or false?

true

8. [Integer +,-] \*  
 $(-13) + (+21) =$

8

9. [Integer  $\times$ ,+] \*  
 $(+12) \times (-9) =$

-108

10. [Rates / Ratios] \*  
Plain chocolate is 60% carbohydrates, 35% fat and 5% other components. Find the ratio of carbohydrates to fat to other components.

12 : 7 : 1

11. [Indices] \*  
 $\left(\frac{2}{5}\right)^3 =$

$\frac{8}{125}$

12. [Square Roots] \*  
 $\sqrt{3\frac{1}{16}} =$

$1\frac{3}{4}$

13. [Exploring Number] \*  
 $(10 - 4)^2 \div (30 - 12) =$

2

14. [Financial Mathematics] \*  
The printing costs \$1309 including GST. If the GST is 10%, how much is the cost excluding GST?

\$ 1190

15. [Number Patterns]  
Complete the pattern:

45, 43, 39, 33, 25, 15, 3

16. [Expressions]  
To hire a car costs \$70 per day plus a \$40 fee. How much will it be to hire a car for  $x$  days?

or  $70 \times x + 40$   $70x + 40$

17. [Substitution] \*  
If  $a = 2$  and  $b = 6$ , find the value of  $12 - ab$

0

18. [Expansion]  
Expand  $5(6 - 3e + 2f)$   $30 - 15e + 10f$

19. [Factorisation]  
Factorise  $12j^2 + 18k - 9l$   $3(4j^2 + 6k - 3l)$

20. [Equations] \*  
Solve for  $x$ :  $\frac{9 + 6x}{7} = 2$

$\frac{5}{6}$

21. [Coordinate Geometry] \*  
Which of these points lie on the line defined by the rule  $y = -2x - 3$ ?

A(3,-9)

B(0,3)

C(-2,1)

A and C

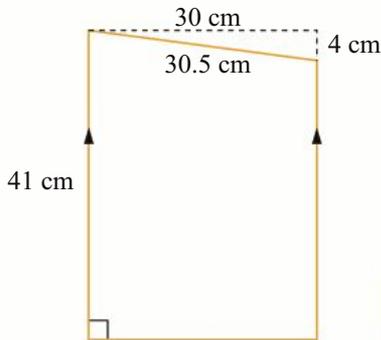
QUOTE OF THE WEEK: When people cease to believe in God, they will believe in anything. G. K. Chesterton

22. [Units of Measurement / Time]  
Which number represents the metric prefix 'milli'?

- A) 0.001      B)  $\frac{1}{100}$   
C)  $\frac{1}{10}$       D) 1000

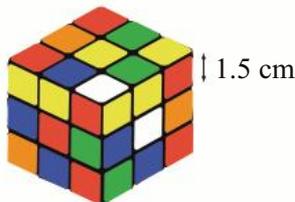
A

23. [Perimeter / Area] \*  
Find the perimeter of the trapezium.



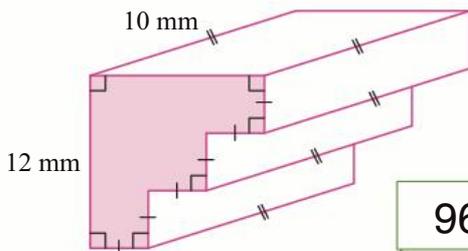
138.5 cm

24. [Surface Area] \*  
The faces of a Rubik's cube are covered by square stickers of one of six colours. What is the total surface area covered by the stickers?



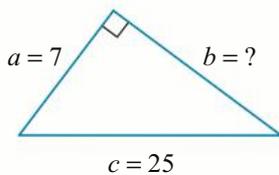
121.5 cm<sup>2</sup>

25. [Volume] \*  
Find the volume of the prism.



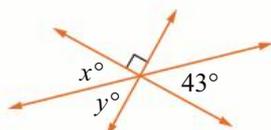
960 mm<sup>3</sup>

26. [Pythagoras / Trigonometry] \*  
Using Pythagoras' theorem find the length of the side labelled  $b$ .



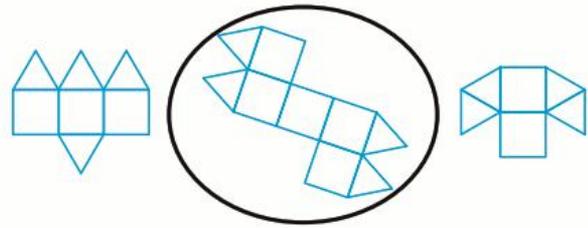
24

27. [Angles] \*  
Find the values of  $x^\circ$  and  $y^\circ$ .



$x^\circ = 43^\circ$   $y^\circ = 47^\circ$

28. [Geometric Reasoning]  
Circle the net that **can** be folded to make a model of a three-dimensional shape.



29. [Statistics] \*  
Which set of data has the same mean, median and mode?

- A) 12, 14, 15, 15, 15  
B) 10, 10, 11, 11, 12, 12

B

30. [Probability] \*  
A dart board has sections of identical size, numbered 1 to 20. A dart is thrown and hits the board. What is the probability that the dart lands inside a prime number section?  
[Give your answer as a fraction in simplest form.]



$\frac{2}{5}$

31. [Problem Solving 1] \*  
Spanner's average rose from 7 goals per match to 8 after the fifth match. How many goals did Spanner kick in the fifth match?

12

32. [Problem Solving 2] \*  
Rod works for 15 days and Mary for 10 days to arrange a total of 1300 books on the library's shelves. They both work at different rates. Over the same period of time, Rod arranges 4 books for every 7 books that Mary arranges. How many books did Mary arrange altogether?

700

# MATHS MATE

## Term 1 - Sheet 5



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

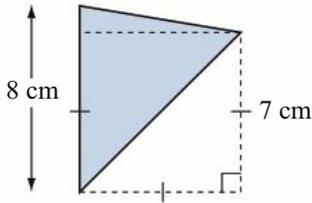
1. [Long  $\times, \div$ ] \*  
 $390\,800 \div 200 =$  **1954**
2. [Decimal  $+, -$ ] \*  
 $4.123 - 0.234 =$  **3.889**
3. [Decimal  $\times, \div$ ]  
 $126.5 \times 0.1 =$  **12.65**
4. [Fraction  $+, -$ ] \*  
 $5\frac{5}{6} - 2\frac{1}{6} =$   **$3\frac{2}{3}$**
5. [Fraction  $\times, \div$ ] \*  
 $\frac{7}{10} \div \frac{2}{5} =$   **$1\frac{3}{4}$**
6. [Percentages] \*  
In 2002 the average Australian family shopped once a week and used 15 plastic bags per trip. By 2005 plastic bag usage had fallen by 45%. How many plastic bags did an average family use over the full year in 2005? **429**
7. [Decimals / Fractions / Percentages] \*  
Write 10% as a decimal. **0.1**
8. [Integer  $+, -$ ]  
 $(-14) - (+17) =$  **-31**
9. [Integer  $\times, \div$ ]  
 $(-30) \div (+15) =$  **-2**
10. [Rates / Ratios] \*  
The maximum cruise speed of a Boeing 747 is around 950 km/h or 0.855 Mach. At this speed, what distance can a Boeing 747 travel in 8 hours? **7600 km**
11. [Indices] \*  
Evaluate  $2^2 \times 2^6$  **256**
12. [Square Roots]  
 $\sqrt{1.44} =$  **1.2**
13. [Exploring Number]  
Round 2.145 to 2 decimal places. **2.15**
14. [Financial Mathematics] \*  
Mae sells a car for \$33 000 and earns 6% commission. What is Mae's commission? **\$ 1980**
15. [Number Patterns]  
Complete the pattern:  
15, 11, 7, 3, -1, **-5, -9**
16. [Expressions]  
Simplify  $2 \times w \times w$   **$2w^2$**
17. [Substitution] \*  
If  $y = 2x - 8$ , find  $y$  when  $x = 4$  **0**
18. [Expansion]  
Expand  $k(k + 9)$   **$k^2 + 9k$**
19. [Factorisation] \*  
Factorise and evaluate  
 $101 \times 19 - 101 \times 18$  **101**
20. [Equations] \*  
Solve the inequality:  
 $2(9 - 3x) \leq 6$   **$x \geq 2$**
21. [Coordinate Geometry] \*  
Find the  $x$ -intercept of the line defined by the equation  $y = -2x + 6$  **(3,0)**

QUOTE OF THE WEEK: Beauregard's Law - When you're up to your nose, keep your mouth shut. Rossiter

22. [Units of Measurement / Time]  
Regulations require shafts to have a diameter of  $10 \pm 0.018$  mm. What is the minimum acceptable diameter?

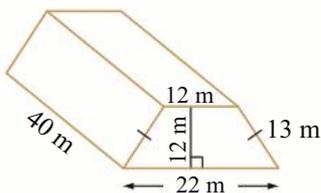
9.982 mm

23. [Perimeter / Area] \*  
Find the area of the shaded triangle.



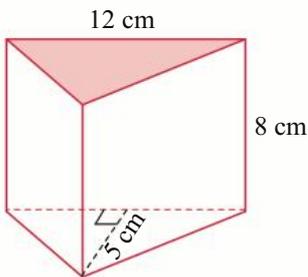
28 cm<sup>2</sup>

24. [Surface Area] \*  
Find the total surface area of the prism.



2808 m<sup>2</sup>

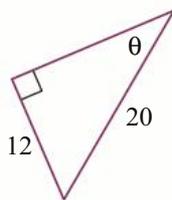
25. [Volume] \*  
Find the volume of the triangular prism.



240 cm<sup>3</sup>

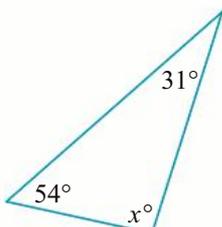
26. [Pythagoras / Trigonometry]  
Which trigonometric ratio would be used to find angle  $\theta$ ?

- A)  $\sin \theta = \frac{12}{20}$   
B)  $\cos \theta = \frac{12}{20}$   
C)  $\tan \theta = \frac{12}{20}$



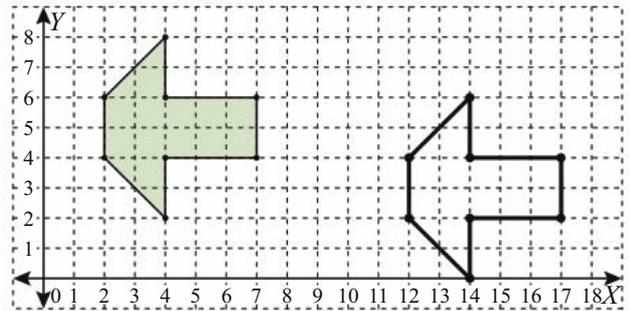
A

27. [Angles] \*  
Find the value of  $x^\circ$ .



95°

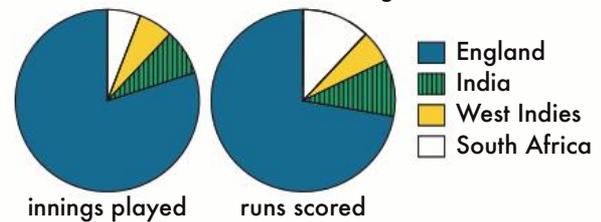
28. [Geometric Reasoning]  
Redraw the shape after translating it 10 units horizontally and  $-2$  units vertically.



29. [Statistics]  
Against which country did Don Bradman have the highest test batting average?

[Hint: Batting average = runs per innings]

Don Bradman's Test Cricket Batting



South Africa

30. [Probability] \*  
What is the probability of getting a consonant when a letter is chosen randomly from the word TRIGONOMETRY? [Give your answer as a fraction in simplest form.]

$\frac{2}{3}$

31. [Problem Solving 1]  
Complete the multiplication table.

$\times$	5	8	6	7
5	25	40	30	35
2	10	16	12	14
9	45	72	54	63
7	35	56	42	49

32. [Problem Solving 2] \*  
A farmer in Queensland has a banana plantation of 80 trees. Each tree produces on average 450 bananas. He wants to increase his production and knows that, because of lost space and sunlight, every additional tree that he plants will cause a reduction of 5 bananas from each tree. What is the maximum number of bananas that he will be able to produce on his plantation, and how many trees will he need to reach this maximum?

trees = 85      bananas = 36 125

# MATHS MATE

## Term 1 - Sheet 6



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times$ ,  $\div$ ] \*  
 $12\,420 \div 30 =$

414

2. [Decimal  $+$ ,  $-$ ] \*  
 $2.9 - 1.093 =$

1.807

3. [Decimal  $\times$ ,  $\div$ ] \*  
 $0.01 \times 0.03 =$

0.0003

4. [Fraction  $+$ ,  $-$ ] \*  
 $1\frac{1}{4} + 3\frac{3}{4} =$

5

5. [Fraction  $\times$ ,  $\div$ ] \*  
 $\frac{5}{6} \div \frac{2}{3} =$

$1\frac{1}{4}$

6. [Percentages] \*  
By 2050 the population of New Zealand is predicted to be 20% more than the present, approximate figure of 4.5 million. What will the population be in 2050?

5 400 000

7. [Decimals / Fractions / Percentages] \*  
The top cruise speed of a Boeing Dreamliner 787 is 77% of the speed of sound. Write 77% as a decimal.

0.77

8. [Integer  $+$ ,  $-$ ] \*  
 $(-15) - (-13) =$

-2

9. [Integer  $\times$ ,  $\div$ ] \*  
 $(+32) \div (+4) =$

8

10. [Rates / Ratios] \*  
The Osaka monorail is the second longest monorail in the world, with a length of 22 km. It takes approximately 55 minutes to travel one loop. What is its average speed?

24 km/h

11. [Indices] \*  
Evaluate  $6 \times 6^2$

216

12. [Square Roots]  
 $\sqrt{6.25} =$

2.5

13. [Exploring Number]  
Round 7.53535353... to 3 decimal places.

7.535

14. [Financial Mathematics] \*  
Dianne bought a second-hand car for \$10 500. She then sold it for 15% less. What is the selling price of the car?

\$ 8925

15. [Number Patterns]  
Complete the pattern:

36, 24, 12, 0, -12, -24

16. [Expressions]  
Simplify  $a \times b \times a$

$a^2b$

17. [Substitution] \*  
If  $y = x^2 - 3$ , find  $y$  when  $x = 3$

6

18. [Expansion]  
Expand  $p(7 - 7p)$

$7p - 7p^2$

19. [Factorisation] \*  
Factorise and evaluate  
 $999 \times 999 - 998 \times 999$

999

20. [Equations] \*  
Solve the inequality:  
 $5(-2x + 4) < 40$

$x > -2$

21. [Coordinate Geometry] \*  
Find the  $y$ -intercept of the line defined by the equation  $y - 3x = -4$

(0, -4)

QUOTE OF THE WEEK: When it is dark enough, you can see the stars. Ralph Waldo Emerson

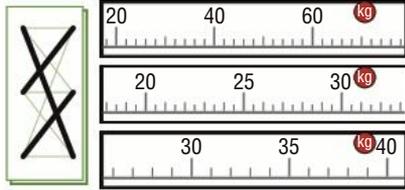
22. [Units of Measurement / Time]

Match the weights to the instruments based on the precision of their scales.

A) 1 kg

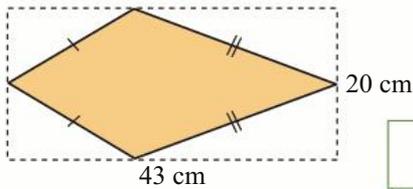
B) 2 kg

C) 0.5 kg



23. [Perimeter / Area] \*

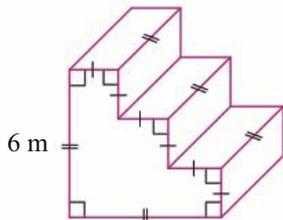
Find the area of the kite.



430 cm<sup>2</sup>

24. [Surface Area] \*

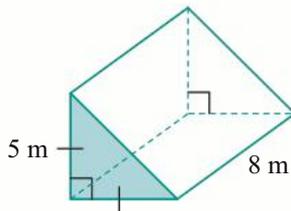
Find the total surface area of the prism.



192 m<sup>2</sup>

25. [Volume] \*

Find the volume of the triangular prism.



100 m<sup>3</sup>

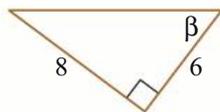
26. [Pythagoras / Trigonometry]

Which trigonometric ratio would be used to find angle  $\beta$ ?

A)  $\sin \beta = \frac{6}{8}$

B)  $\cos \beta = \frac{8}{6}$

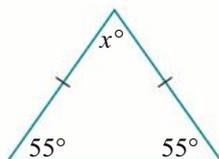
C)  $\tan \beta = \frac{8}{6}$



C

27. [Angles] \*

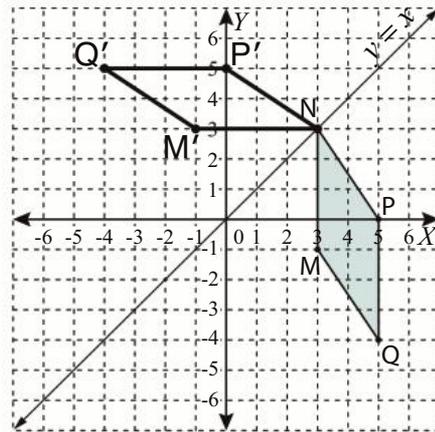
Find the value of  $x^\circ$ .



70°

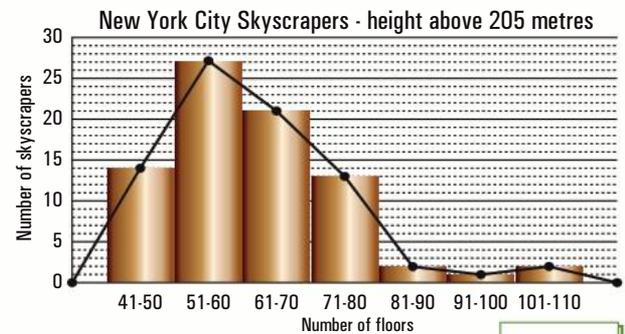
28. [Geometric Reasoning]

Draw the reflection of the parallelogram MNPQ in the line of equation  $y = x$ .



29. [Statistics]

How many New York City skyscrapers with a height above 205 m have more than 70 floors?



18

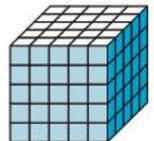
30. [Probability]

A number from 1 to 13 is chosen at random. What is the probability that the number chosen is a multiple of 4?

$\frac{3}{13}$

31. [Problem Solving 1]

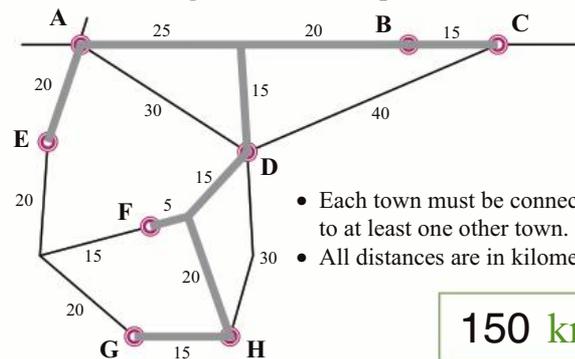
How many of the smaller cubes have faces which touch the faces of exactly four other cubes?



36

32. [Problem Solving 2] \*

A pay television station wishes to lay cables along existing roads to connect each town, A to H, to a fibre optic network. Calculate the minimum length of cable required.



- Each town must be connected to at least one other town.
- All distances are in kilometres.

150 km

# MATHS MATE

## Term 1 - Sheet 7



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times, \div$ ] \*  
 $11\,160 \div 60 =$

186

2. [Decimal  $+, -$ ] \*  
 $7.4 - 3.78 =$

3.62

3. [Decimal  $\times, \div$ ] \*  
 $7.77 \times 0.1 =$

0.777

4. [Fraction  $+, -$ ] \*  
 $2\frac{5}{8} + 1\frac{1}{8} =$

$3\frac{3}{4}$

5. [Fraction  $\times, \div$ ] \*  
 $\frac{3}{11} \div \frac{9}{22} =$

$\frac{2}{3}$

6. [Percentages] \*  
A jellyfish is 95% water. If the water in this jellyfish weighs 190 kg, what is its total weight in kilograms?

200 kg

7. [Decimals / Fractions / Percentages] \*  
Write 1.5 as a percentage.

150%

8. [Integer  $+, -$ ] \*  
 $(+11) - (+17) =$

-6

9. [Integer  $\times, \div$ ] \*  
 $(-45) \div (-9) =$

5

10. [Rates / Ratios] \*  
A garden snail can travel at 0.012 m/s. At this speed, how long does it take a snail to cover 12 m?

1000 s

11. [Indices] \*  
Simplify  $y^3 \times y^4$

$y^7$

12. [Square Roots]  
 $\sqrt{0.49} =$

0.7

13. [Exploring Number]  
 $\phi \approx 1.61803398$  (the golden number). Write the rational approximation of  $\phi$  correct to two decimal places.

1.62

14. [Financial Mathematics] \*  
Ivan bought a house for \$225 000 and renovated it. He then sold it, making a profit of 20%. What was the selling price of the house?

\$270 000

15. [Number Patterns]  
Complete the pattern:  
-18, -10, -2, 6, 14, 22, 30

16. [Expressions]  
Simplify  $y \times x^2 \times -4$

$-4x^2y$

17. [Substitution] \*  
If  $y = 2x^2 - 1$ , find  $y$  when  $x = 0$

-1

18. [Expansion]  
Expand  $2d(6 + 4e)$

$12d + 8de$

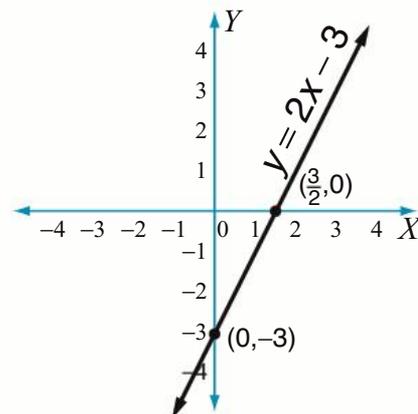
19. [Factorisation] \*  
Factorise and evaluate  
 $50 \times 14 + 50 \times 8$

1100

20. [Equations] \*  
Solve the inequality:  
 $3(3x - 2) - 19 > 20$

$x > 5$

21. [Coordinate Geometry] \*  
Sketch the line of equation  $y = 2x - 3$  by marking the  $x$ -intercept and the  $y$ -intercept. [Label the graph with the rule.]

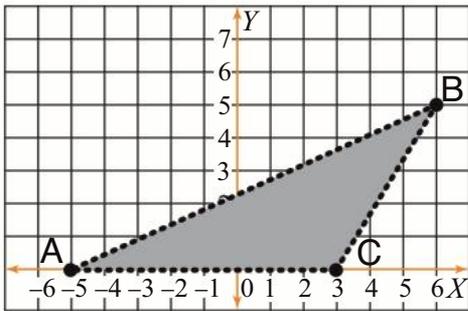


QUOTE OF THE WEEK: Cleverness is not wisdom. Euripides

22. [Units of Measurement / Time]  
 'An emu egg weighs between 10 and 12 hen eggs.'  
 Choose the description for the weight tolerance suggested by this statement.
- A)  $10 \pm 2$  hen eggs
  - B)  $11 \pm 1$  hen eggs
  - C)  $12 \pm 1$  hen eggs

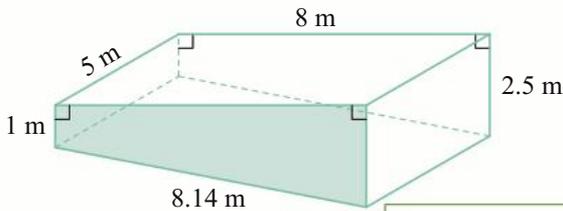
B

23. [Perimeter / Area] \*  
 Plot the points  $A(-5,0)$ ,  $B(6,5)$  and  $C(3,0)$  and use them to find the area of  $\triangle ABC$ .



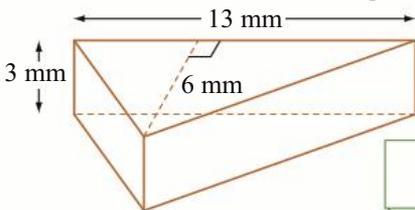
20

24. [Surface Area] \*  
 A swimming pool has the shape of a trapezoidal prism. What is the total surface area of the inside walls and floor of the pool?



86.2 m<sup>2</sup>

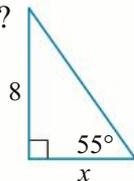
25. [Volume] \*  
 Find the volume of the triangular prism.



117 mm<sup>3</sup>

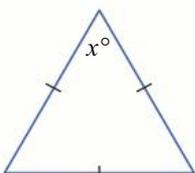
26. [Pythagoras / Trigonometry]  
 Which trigonometric ratio would be used to find the unknown side  $x$ ?

- A)  $\sin 55^\circ$
- B)  $\cos 55^\circ$
- C)  $\tan 55^\circ$



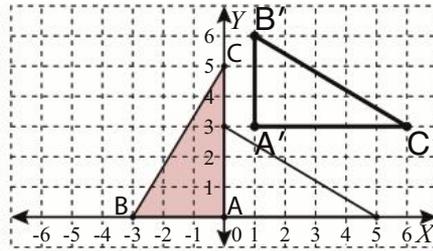
C

27. [Angles] \*  
 Find the value of  $x^\circ$ .



60°

28. [Geometric Reasoning]  
 Redraw the triangle ABC after rotating it  $90^\circ$  clockwise about the origin, and then translating it 1 unit horizontally to the right and 3 units vertically up. Label the transformation  $A'B'C'$ . Are triangles ABC and  $A'B'C'$  congruent or similar?

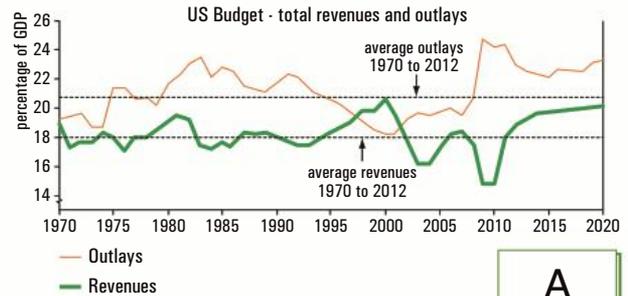


congruent

29. [Statistics] \*  
 Choose the correct statement given this budget data and projection.

- A) Budget surplus lasts for close to 4 years
- B) Budget deficit lasts for close to 4 years
- C) Budget surplus lasts for close to 46 years
- D) There is never a budget surplus

[Hint: Surplus - When revenue is greater than outlay.]

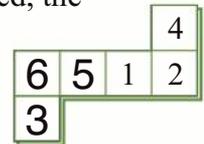


A

30. [Probability]  
 If a standard die is rolled, what is the probability of obtaining an 8?

0

31. [Problem Solving 1]  
 On a standard die, opposite sides add to 7. Fill in the spaces so that, when folded, the net will form a standard die.



32. [Problem Solving 2] \*  
 In a magic square each row, each column and each diagonal add to the same 'magic' number  $X$ . In this magic square the letters  $a$  to  $i$  represent different numbers and  $X = 3e$ . Which is a correct expression for  $h$ ?

- A)  $2e - a$
- B)  $2e - b$
- C)  $2e - g$
- D)  $2e - i$

$a$	$b$	$c$
$d$	$e$	$f$
$g$	$h$	$i$

B

# MATHS MATE

## Term 1 - Sheet 8



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times, \div$ ] \*  
 $1\ 036\ 000 \div 400 =$

2590

2. [Decimal  $+, -$ ] \*  
 $1.009 - 0.19 =$

0.819

3. [Decimal  $\times, \div$ ] \*  
 $0.001 \times 10.2 =$

0.0102

4. [Fraction  $+, -$ ] \*  
 $5\frac{8}{9} - 2\frac{2}{9} =$

$3\frac{2}{3}$

5. [Fraction  $\times, \div$ ] \*  
 $\frac{5}{8} \div \frac{5}{12} =$

$1\frac{1}{2}$

6. [Percentages] \*  
 Within 100 km of the USA border live 28 million Canadians. This is 80% of Canada's population. How many people live in Canada?

35 000 000

7. [Decimals / Fractions / Percentages] \*  
 Write 0.387 as a percentage.

38.7%

8. [Integer  $+, -$ ] \*  
 $(+12) - (-23) =$

35

9. [Integer  $\times, \div$ ] \*  
 $(+42) \div (-7) =$

-6

10. [Rates / Ratios] \*  
 The cheetah can run at a steady speed of 100 km/h over a short distance. At this rate how long will the cheetah take to run 5 km?

3 min

11. [Indices] \*  
 Simplify  $m^6 \times m^5$

$m^{11}$

12. [Square Roots]  
 $\sqrt{0.04} =$

0.2

13. [Exploring Number]  
 $\cos 15^\circ \approx 0.96593$   
 Write the rational approximation of  $\cos 15^\circ$  correct to three decimal places.

0.966

14. [Financial Mathematics] \*  
 A pair of shoes is marked up 25%. If the sale price is \$80, what profit is made?

\$ 16

15. [Number Patterns]  
 Complete the pattern:  
 $-26, -20, -14, -8, -2,$

4, 10

16. [Expressions]  
 Simplify  $m \times 6 \times n \div -p$

$-\frac{6mn}{p}$

17. [Substitution] \*  
 If  $y = \frac{2x}{15}$ , find  $y$  when  $x = 5$

$\frac{2}{3}$

18. [Expansion]  
 Expand  $t(7t - 4u + 2)$

$7t^2 - 4tu + 2t$

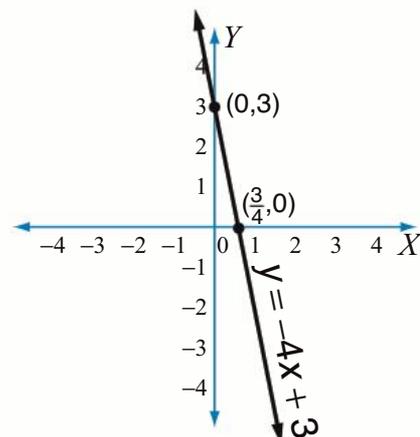
19. [Factorisation] \*  
 Factorise and evaluate  
 $-7 \times 54 - 7 \times 46$

-700

20. [Equations] \*  
 Solve the inequality:  
 $15 \geq 5(7 - 2x) - 60$

$x \geq -4$

21. [Coordinate Geometry] \*  
 Sketch the line of equation  $y = -4x + 3$  by marking the  $x$ -intercept and the  $y$ -intercept. [Label the graph with the rule.]

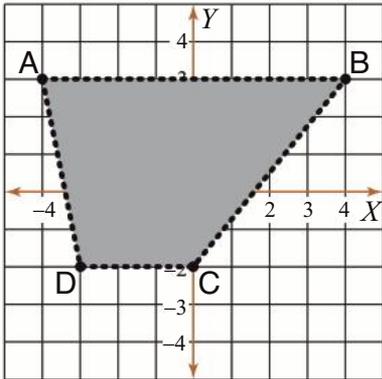


QUOTE OF THE WEEK: April Fools have a day all their own; the rest of us have to muddle along without any recognition at all. Rossiter

22. [Units of Measurement / Time]  
 'A tennis ball must weigh between 57.7 g and 58.5 g.'  
 Choose the description for the weight tolerance of a tennis ball given this statement.
- A)  $58.1 \pm 0.4$  g  
 B)  $57.7 \pm 0.8$  g  
 C)  $58.1 \pm 0.8$  g

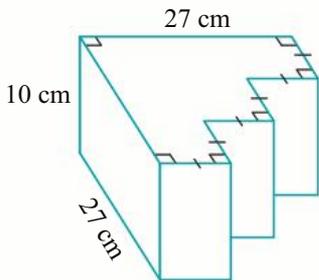
A

23. [Perimeter / Area] \*  
 Plot the points A(-4,3), B(4,3), C(0,-2) and D(-3,-2) and use them to find the area of the trapezium ABCD.



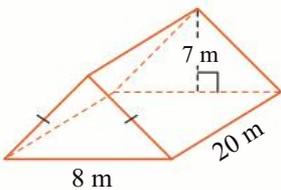
27.5

24. [Surface Area] \*  
 Find the total surface area of the prism.



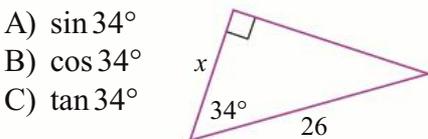
2052 cm<sup>2</sup>

25. [Volume] \*  
 Find the volume of the triangular prism.



560 m<sup>3</sup>

26. [Pythagoras / Trigonometry]  
 Which trigonometric ratio would be used to find the unknown side  $x$ ?



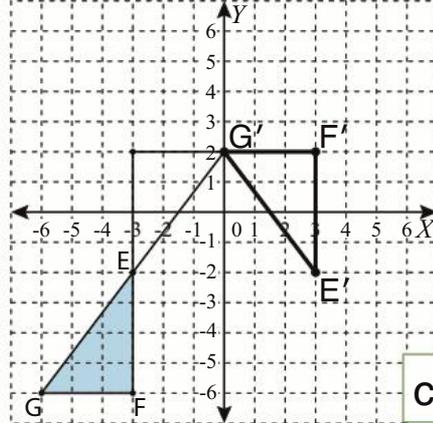
B

27. [Angles] \*  
 Find the value of  $x^\circ$ .



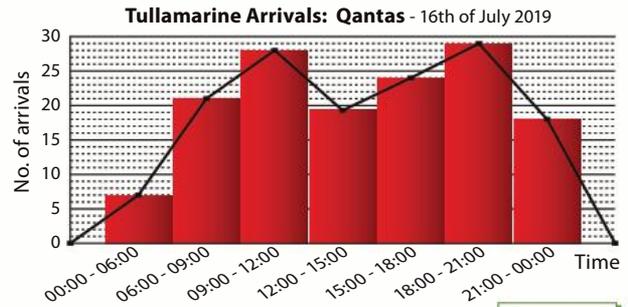
20°

28. [Geometric Reasoning]  
 Redraw the triangle EFG after rotating it 180° about the point of coordinates (-3,-2) and then reflecting it in the  $y$ -axis. Label the transformation E'F'G'. Are triangles EFG and E'F'G' congruent or similar?



congruent

29. [Statistics]  
 How many Qantas flights arrived at the Melbourne Tullamarine airport between 12:00 pm and 6:00 pm, on July 16th 2019?



43

30. [Probability] \*  
 There are 8 choc chip, 12 coconut macadamia, 7 smiley and 5 chocolate dipped cookies in the cookie jar. If a cookie is chosen at random, what is the probability it will be a coconut macadamia? [Give your answer as a fraction in simplest form.]

$\frac{3}{8}$

31. [Problem Solving 1] \*  
 There are 141 rooms in a block of 39 apartments. Each apartment has either 3 or 4 rooms. How many apartments have 4 rooms?

24

32. [Problem Solving 2] \*  
 The diagram on the left below includes 5 triangles (four small and a larger one). How many triangles are there in the diagram on the right?



27

# MATHS MATE

## Term 2 - Sheet 1



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times, \div$ ] \*  
 $269 \times 15 =$

4035

2. [Decimal  $+, -$ ] \*  
 $21.08 - 2.064 =$

19.016

3. [Decimal  $\times, \div$ ]  
 $0.08 \times 0.6 =$

0.048

4. [Fraction  $+, -$ ]  
 $3 - \frac{2}{7} =$

$2\frac{5}{7}$

5. [Fraction  $\times, \div$ ] \*  
 $\frac{2}{3} \times \frac{9}{10} =$

$\frac{3}{5}$

6. [Percentages] \*  
1% of 430 =

4.3

7. [Decimals / Fractions / Percentages] \*  
Write 0.15 as a fraction in simplest form.

$\frac{3}{20}$

8. [Integer  $+, -$ ] \*  
 $(+13) - (+18) + (-21) =$

-26

9. [Integer  $\times, \div$ ] \*  
 $(-3) \times (+5) \times (+2) =$

-30

10. [Rates / Ratios] \*  
In New Zealand, the minimum rate of pay for adults is \$17.70 per hour. At this rate what is the pay for an adult working 8 hours?

\$141.60

11. [Indices]  
Simplify  $a^7 \div a^3 =$

$a^4$

12. [Square Roots] \*  
 $5\sqrt{400} =$

100

13. [Exploring Number]  
 $4.18 \times 10^7$  is the scientific notation for:  
A) 4.1800000 B) 4180 000 C) 41 800 000

C

14. [Financial Mathematics] \*  
Roald, a sales manager, earns \$24 per hour after tax for a 40 hour week. If his pay this fortnight is \$1944, by how much was Roald overpaid?

\$ 24

15. [Number Patterns]  
Complete the pattern:  
 $-2, 10, -50, 250, \underline{-1250}, \underline{6250}$

16. [Expressions]  
Choose the like terms:  
 $4p, -3p^2, 0.5p, 0.5$

$4p, 0.5p$

17. [Substitution] \*  
Use  $P = 2l + 2w$  to find the perimeter  $P$  of a rectangle when  $l = 8$  and  $w = 3$

22

18. [Expansion]  
Expand  $-4h(5 - 4h)$

$-20h + 16h^2$

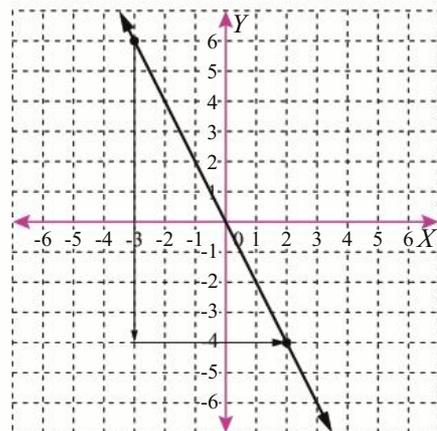
19. [Factorisation]  
Factorise  $3pq - 4p + 2pqr$

$p(3q - 4 + 2qr)$

20. [Equations] \*  
Solve for  $x$ :  $5x + 3(x - 11) = 7$

5

21. [Coordinate Geometry] \*  
Find the gradient of the line passing through the points  $(-3, 6)$  and  $(2, -4)$ .



-2

QUOTE OF THE WEEK: One of the problems in life exists in trying to find out something you should know without letting on you don't already know. P. K. Shaw

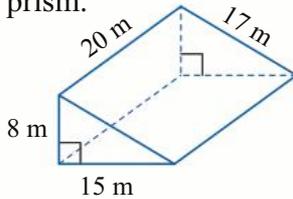
22. [Units of Measurement / Time] \*  
The day and time is Monday, 1815 hours in Cairo, and Tuesday, 0315 hours in Melbourne. By how many hours is Cairo time behind Melbourne time?

9 h

23. [Perimeter / Area] \*  
An Australian \$100 note measures 15.8 cm by 6.5 cm. What is its perimeter in millimetres?

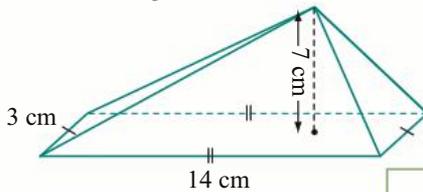
446 mm

24. [Surface Area] \*  
Find the total surface area of the triangular prism.



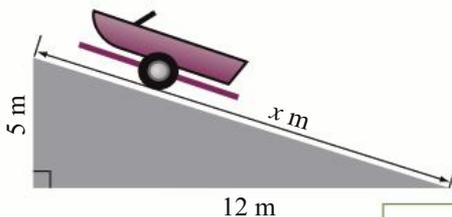
920 m<sup>2</sup>

25. [Volume] \*  
Find the volume of the rectangular pyramid using  $V = \frac{Bh}{3}$



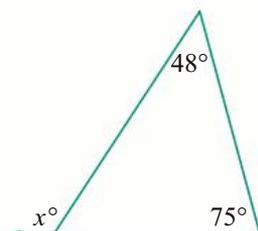
98 cm<sup>3</sup>

26. [Pythagoras / Trigonometry] \*  
How long is the ramp on which the boat descends?



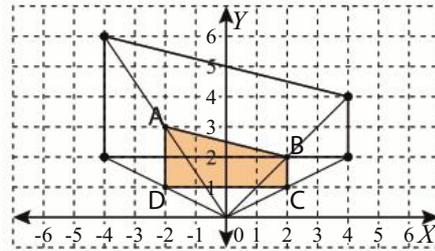
13 m

27. [Angles] \*  
Find the value of  $x^\circ$ .



123°

28. [Geometric Reasoning]  
Find the scale factor of enlargement for trapezium ABCD.



2

29. [Statistics] \*  
The stem-and-leaf plot shows the average monthly minimum temperatures for Pensacola, Florida. Find the median and range of the data.

stem	leaf
4	6 8
5	0 0 2 7
6	1 6
7	2 3 5 5

Key  
7|0 = 70°F

median = 59      range = 29

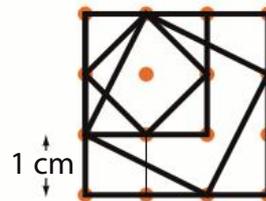
30. [Probability] \*  
A student is chosen at random from a class of 16 girls and 12 boys. What is the probability that the student chosen is not a girl? [Give your answer as a fraction in simplest form.]

$\frac{3}{7}$

31. [Problem Solving 1] \*  
In the Williams family George is twice as old as his son Jack, and Jack is twice as old as his son Alex. If the total of their ages is 147, how old is George?

84

32. [Problem Solving 2] \*  
A square is to be constructed using any 4 of the sixteen points below as corner points. The smallest square that can be constructed in this way has an area of 1 cm<sup>2</sup>. What other areas are possible?



1, 2, 4, 5 & 9 cm<sup>2</sup>

# MATHS MATE

## Term 2 - Sheet 2



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times, \div$ ] \*  
 $374 \times 18 =$

6732

2. [Decimal  $+, -$ ] \*  
 $3.6 - 0.046 =$

3.554

3. [Decimal  $\times, \div$ ] \*  
 $0.07 \times 0.14 =$

0.0098

4. [Fraction  $+, -$ ]  
 $4 - \frac{2}{5} =$

$3\frac{3}{5}$

5. [Fraction  $\times, \div$ ] \*  
 $\frac{3}{4} \times \frac{8}{9} =$

$\frac{2}{3}$

6. [Percentages] \*  
 $66\frac{2}{3}\%$  of 45 =

30

7. [Decimals / Fractions / Percentages] \*  
Write 0.08 as a fraction in simplest form.

$\frac{2}{25}$

8. [Integer  $+, -$ ] \*  
 $(+14) + (-11) - (+15) =$

-12

9. [Integer  $\times, \div$ ] \*  
 $(-4) \times (+3) \times (-6) =$

72

10. [Rates / Ratios] \*  
Italy has an area of just over 300 000 km<sup>2</sup>, and reached a population of 60 000 000 people in 2010. What was the average population density of Italy in 2010?

200 people/km<sup>2</sup>

11. [Indices] \*  
Evaluate  $\frac{8^8}{8^6}$

64

12. [Square Roots] \*  
 $10\sqrt{144} =$

120

13. [Exploring Number]  
 $5.6 \times 10^{-6}$  is the scientific notation for:  
A) 5.600000 B) 0.0000056 C) 0.000056

B

14. [Financial Mathematics] \*  
A salesman earns a monthly salary of \$800 plus 4% commission on sales. What value are his sales if he earns \$4000 for a month?

\$ 80 000

15. [Number Patterns]  
Complete the pattern:  
3, -15, 75, -375, 1875, -9375

16. [Expressions]  
Choose the like terms:  
 $b^2, -2b, -c^2, 2b^2$

$b^2, 2b^2$

17. [Substitution] \*  
Use  $A = \frac{1}{2}(a+b)h$  to find the area  $A$  of a trapezium when  $a = 9$ ,  $b = 4$  and  $h = 5$

32.5

18. [Expansion]  
Expand  $-3x(2 - 3y)$

$-6x + 9xy$

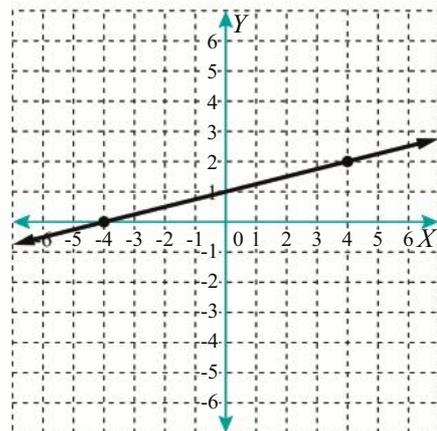
19. [Factorisation]  
Factorise  
 $5g^2 - 10gh - 15gi$

$5g(g - 2h - 3i)$

20. [Equations] \*  
Solve for  $x$ :  $2x + 3(1 - 2x) = 3$

0

21. [Coordinate Geometry] \*  
Graph the line passing through the points  $(-4, 0)$  and  $(4, 2)$ . What is the gradient of the line?



$\frac{1}{4}$

QUOTE OF THE WEEK: My mind is already made up. Don't confuse me with facts! Rossiter

22. [Units of Measurement / Time] \*

Wade departs Perth on Tuesday at 14:30 and arrives in New York on Wednesday at 00:30. If New York time is 12 hours behind Perth, how long was the flight?

22 h

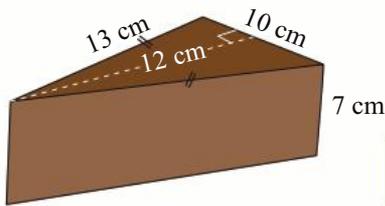
23. [Perimeter / Area] \*

A badminton court measures 6.1 m by 13.4 m. What is the perimeter of the court?

39 m

24. [Surface Area] \*

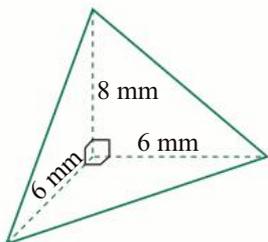
Find the total surface area of the piece of cake.



372 cm<sup>2</sup>

25. [Volume] \*

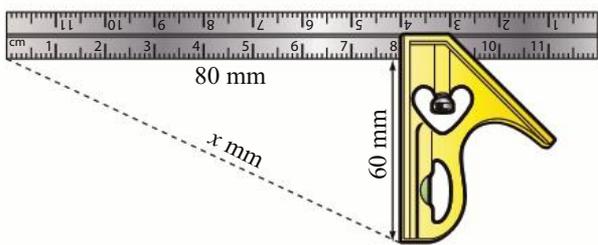
Find the volume of the triangular pyramid.



48 mm<sup>3</sup>

26. [Pythagoras / Trigonometry] \*

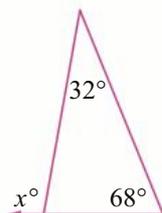
Find the missing length in this diagram showing a T-square.



100 mm

27. [Angles] \*

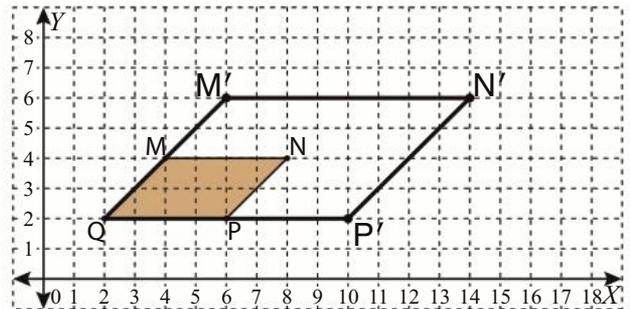
Find the value of  $x^\circ$ .



100°

28. [Geometric Reasoning]

Redraw the parallelogram MNPQ enlarged by a scale factor of 2 about point Q.



29. [Statistics] \*

The stem plot shows the average rainfall (mm) for Queenstown over one year. Find the median and upper quartile (UQ) of the data.

stem	leaves
4	2 3
4	6 6 8
5	0 0
5	
6	0 1 3
6	
7	0 2
7	

Key  
5|0 = 50 mm

median = 50      UQ = 62

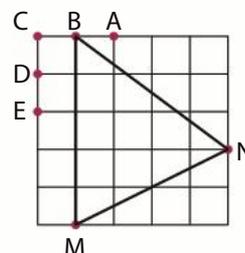
30. [Probability] \*

A 52-card deck of playing cards is shuffled, and one card is dealt from the top of the deck. What is the probability that it is not a club? [Give your answer as a decimal.]

0.75

31. [Problem Solving 1] \*

Points A, B, C, D and E are placed on a square grid as shown. Which of these five points forms an isosceles triangle with the other two vertices M and N?



B

32. [Problem Solving 2] \*

Gino and Pedro are bricklayers. Gino lays 150 bricks in 60 minutes and Pedro lays 20 bricks in 10 minutes. If they work together, how long will it take them to lay 180 bricks?

40 min

# MATHS MATE

## Term 2 - Sheet 3



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times$ ,+] \*  
 $286 \times 24 =$

6864

2. [Decimal +,-] \*  
 $14.74 - 5.038 =$

9.702

3. [Decimal  $\times$ ,+] \*  
 $5.39 \times 0.3 =$

1.617

4. [Fraction +,-]  
 $3 - 2\frac{3}{4} =$

$\frac{1}{4}$

5. [Fraction  $\times$ ,+] \*  
 $\frac{5}{8} \times \frac{4}{15} =$

$\frac{1}{6}$

6. [Percentages] \*  
12.5% of 1000 =

125

7. [Decimals / Fractions / Percentages] \*  
Write  $\frac{21}{25}$  as a decimal.

0.84

8. [Integer +,-] \*  
 $(-24) - (+6) + (-15) =$

-45

9. [Integer  $\times$ ,+] \*  
 $(-2) \times (-4) \times (-30) =$

-240

10. [Rates / Ratios] \*  
In 2010 New Zealand had a population density of 16 people/km<sup>2</sup>. If New Zealand has an area of around 270 000 km<sup>2</sup>, what was its population in 2010?

4 320 000

11. [Indices] \*  
Evaluate  $5^6 \div 5$

3125

12. [Square Roots] \*  
 $4\sqrt{121} =$

44

13. [Exploring Number]  
615 000 000 written in scientific notation is:  
A)  $615 \times 10^8$  B)  $6.15 \times 10^6$  C)  $6.15 \times 10^8$

C

14. [Financial Mathematics] \*  
On a base income of \$34 000 how much superannuation will Kapil be paid when the guarantee reaches 12%?

\$ 4080

15. [Number Patterns]  
Complete the pattern:

$\frac{1}{9}, \frac{1}{3}, 1, 3, 9,$  27, 81

16. [Expressions]  
Choose the like terms:  
 $x, x^2, -3x^2, -x^3$

$x^2, -3x^2$

17. [Substitution] \*  
Use  $C = 2\pi r$  to find the circumference  $C$  of a circle when  $r = 10$  and  $\pi \approx 3.14$

62.8

18. [Expansion]  
Expand  $-qr(4q + 2)$

$-4q^2r - 2qr$

19. [Factorisation]  
Factorise  $a^3b^2 + ab^2$

$ab^2(a^2 + 1)$

20. [Equations] \*  
Solve for  $x$ :  $9(x - 10) = -x$

9

21. [Coordinate Geometry] \*  
Use  $M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$  to find the coordinates of the midpoint  $M$  of the interval joining the points  $(-2,5)$  and  $(6,7)$ .

(2,6)

22. [Units of Measurement / Time]

How much time elapses between high tide on Tuesday evening and the next high tide?

Cape Melville (QLD) Tide data:			
Tuesday 16th July 2019		Wednesday 17th July 2019	
03:51 am	1.0 m Low	04:28 am	1.1 m Low
08:14 am	1.8 m High	08:45 am	1.8 m High
03:00 pm	0.5 m Low	03:30 pm	0.6 m Low
09:22 pm	2.5 m High	09:59 pm	2.5 m High

11 h 23 min

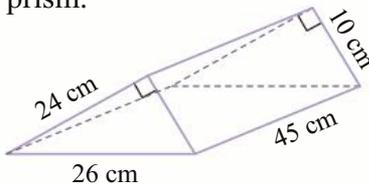
23. [Perimeter / Area] \*

What is the perimeter of a square with an area of  $81 \text{ mm}^2$ ?

36 mm

24. [Surface Area] \*

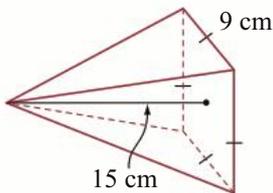
Find the total surface area of the triangular prism.



2940  $\text{cm}^2$

25. [Volume] \*

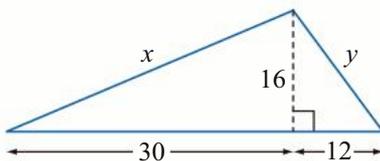
Find the volume of the square pyramid.



405  $\text{cm}^3$

26. [Pythagoras / Trigonometry] \*

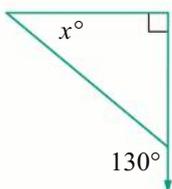
Find the missing lengths in this triangle.



$x = 34$     $y = 20$

27. [Angles] \*

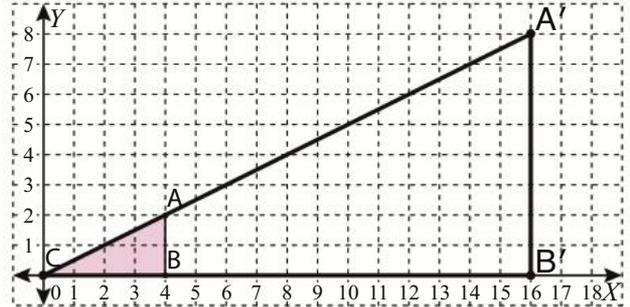
Find the value of  $x^\circ$ .



40°

28. [Geometric Reasoning]

Redraw the triangle ABC enlarged by a scale factor of 4 about the origin of the axes. Label the enlargement A'B'C. Are triangles ABC and A'B'C congruent or similar?



similar

29. [Statistics] \*

The back-to-back stem plot shows the average monthly relative humidity percentages for the Gold Coast and Melbourne in the past 30 years. Find the difference between the medians of the two sets of data.

Gold Coast			Melbourne		
4	3	2	6	4	
9	9	9	7	6	5
	2	1	1	7	0
			7	7	
			8	0	2

Key  
5 | 0 = 50

3

30. [Probability] \*

A jar contains 10 white, 4 yellow and 8 orange jelly beans. Find the probability that a jelly bean drawn at random from the jar will not be yellow. [Give your answer as a fraction in simplest form.]

$\frac{9}{11}$

31. [Problem Solving 1] \*

A 72-page magazine is made up of 18 sheets which have been folded over and stapled down the middle. Pages 1, 2, 71, 72 are on the same sheet. Pages 35, 36, 37, 38 are on the same sheet. What numbers are on the same sheet with 19?

20, 53, 54

32. [Problem Solving 2] \*

I have \$100 with which I wish to buy exactly 100 animals to feed to my snake. Tender succulent mice cost \$5, large juicy fresh cockroaches are \$1, and imported blowflies are only 5¢ each. If I spend every cent buying these animals, and I buy at least one of each, how many cockroaches will I buy?

1

# MATHS MATE

## Term 2 - Sheet 4



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times$ ,+] \*  
 $459 \times 37 =$

16 983

2. [Decimal +,-] \*  
 $0.907 - 0.055 =$

0.852

3. [Decimal  $\times$ ,+] \*  
 $0.09 \times 2.6 =$

0.234

4. [Fraction +,-] \*  
 $5 - 2\frac{5}{6} =$

$2\frac{1}{6}$

5. [Fraction  $\times$ ,+] \*  
 $\frac{8}{15} \times \frac{25}{24} =$

$\frac{5}{9}$

6. [Percentages] \*  
0.5% of 120 =

0.6

7. [Decimals / Fractions / Percentages] \*  
Three quarters of the world's fish stock have been over-exploited. Write this as a decimal.

0.75

8. [Integer +,-] \*  
 $(+20) - (-8) - (+16) =$

12

9. [Integer  $\times$ ,+] \*  
 $(+11) \times (-5) \times (-2) =$

110

10. [Rates / Ratios] \*  
On average in Australia, one person is born every 1 minute and 40 seconds. Approximately how many people is that in 24 hours?

864

11. [Indices] \*  
Simplify  $\frac{c^4}{c^3}$

c

12. [Square Roots] \*  
 $3\sqrt{196} =$

42

13. [Exploring Number]  
0.00000201 written in scientific notation is:  
A)  $2.01 \times 10^{-7}$  B)  $2.1 \times 10^{-6}$  C)  $2.01 \times 10^{-5}$

A

14. [Financial Mathematics] \*  
When the superannuation guarantee was 9%, how much did Kay's employer pay annually into her superannuation if her annual wage, before tax, was \$6500?

\$ 585

15. [Number Patterns]  
Complete the pattern:

$\frac{4}{9}, \frac{4}{3}, 4, 12, 36, \underline{108}, \underline{324}$

16. [Expressions]  
Choose the like terms:  
 $-jk, j^2k, -jk^2, 2kj^2$

$j^2k, 2kj^2$

17. [Substitution] \*  
Use  $F = \frac{9}{5}C + 32$  to find the temperature  $F$  in degrees Fahrenheit when  $C = 40$

104

18. [Expansion]  
Expand  $-2s(5st + 3t)$

$-10s^2t - 6st$

19. [Factorisation]  
Factorise  
 $2de - 8def$

$2de(1 - 4f)$

20. [Equations] \*  
Solve for  $x$ :  $2(3x + 4) = 2(x - 10)$

-7

21. [Coordinate Geometry] \*  
Use  $M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$  to find the coordinates of the midpoint  $M$  of the interval joining the points  $(-6,4)$  and  $(-4,-8)$ .

$(-5, -2)$

22. [Units of Measurement / Time]

What is the earliest week day time you can arrive at the Arts Centre when travelling by tram from Bell Street?

Monday to Friday		East Coburg to South Melbourne Beach								
Route 1		via Brunswick > Carlton > City > Sth Melbourne								
Stop		AM	AM	AM	AM	AM	AM	AM	AM	
135 East Coburg - Bell St								5:40	5:50	6:00
112 Elgin St & Lygon St		4:59	5:11	5:35	5:46	5:56	6:06	6:16	6:26	
1 Melbourne University		5:01	5:13	5:25	5:37	5:48	5:58	6:08	6:18	
13 Federation Square		5:12	5:24	5:36	5:48	5:59	6:09	6:16	6:29	
14 Arts Centre		5:14	5:26	5:38	5:50	6:01	6:11	6:21	6:31	
16 Southbank Blvd & St Kilda Rd		5:15	5:27	5:39	5:51	6:02	6:12	6:22	6:32	
32 South Melbourne Beach		5:27	5:39	5:51	6:03	6:14	6:24	6:34	6:54	

6:11 am

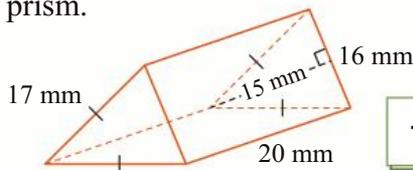
23. [Perimeter / Area] \*

The sport of fencing uses a rectangular space with an area of  $28 \text{ m}^2$ . What is the perimeter of this space if the length measures  $14 \text{ m}$ ?

32 m

24. [Surface Area] \*

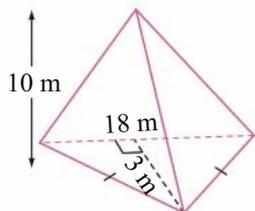
Find the total surface area of the triangular prism.



1240 mm<sup>2</sup>

25. [Volume] \*

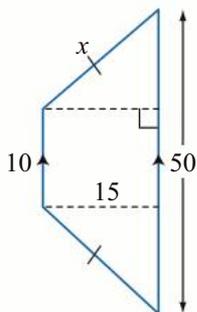
Find the volume of the triangular pyramid.



90 m<sup>3</sup>

26. [Pythagoras / Trigonometry] \*

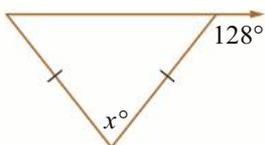
Find the missing side length in this trapezium.



25

27. [Angles] \*

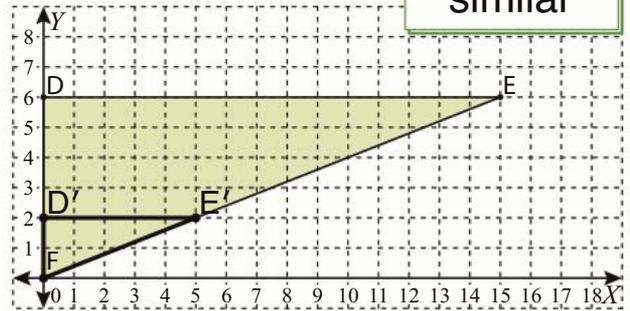
Find the value of  $x^\circ$ .



76°

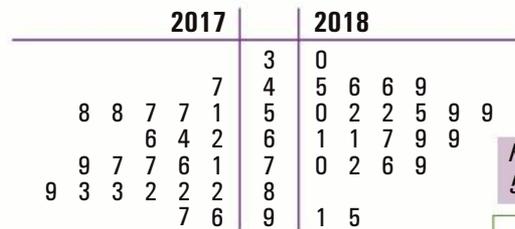
28. [Geometric Reasoning]

Redraw the triangle DEF reduced by a scale factor of 3 about the origin of the axes. Label the reduction D'E'F'. Are triangles DEF and D'E'F' congruent or similar?



29. [Statistics] \*

The back-to-back stem plot shows Carlton's home and away scores in the 2017 and 2018 AFL seasons. Find the difference between the medians of the two sets of data.



Key  
5 | 0 = 50

16.5

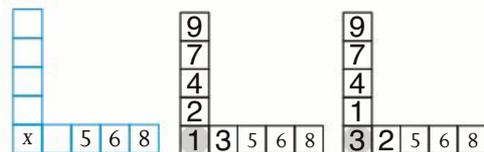
30. [Probability] \*

A bag contains 50 balls, each marked with a number from 1 to 50. A ball is drawn from the bag at random. What is the probability that the number drawn is not a multiple of 5? [Give your answer as a decimal.]

0.8

31. [Problem Solving 1] \*

The digits from 1 to 9 inclusive are placed one per square in this diagram. The total of the five numbers in the vertical column is the same as the total of the five numbers in the horizontal row. How many different possible values of  $x$  are there?

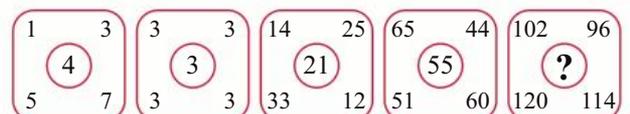


2

32. [Problem Solving 2] \*

The central number is determined by the same rule in each of these shapes. What is the missing number?

108



# MATHS MATE

## Term 2 - Sheet 5



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times, \div$ ] \*  
 $345 \div 15 =$

23

2. [Decimal  $+, -$ ] \*  
 $3.5 + 14.02 - 8 =$

9.52

3. [Decimal  $\times, \div$ ] \*  
 $7.34 \times 20 =$

146.8

4. [Fraction  $+, -$ ] \*  
 $\frac{3}{5} + \frac{3}{10} =$

$\frac{9}{10}$

5. [Fraction  $\times, \div$ ] \*  
 $4 \div \frac{2}{3} =$

6

6. [Percentages] \*  
120% of 500 =

600

7. [Decimals / Fractions / Percentages] \*  
Approximately 35% of the calories in a leg of lamb come from fat. Write this percentage as a fraction in simplest form.

$\frac{7}{20}$

8. [Integer  $+, -$ ] \*  
 $(-16) + (+13) + (-15) =$

-18

9. [Integer  $\times, \div$ ] \*  
 $(+10) \times (20) \div (-2) =$

-100

10. [Rates / Ratios] \*  
Find the missing term in the proportion:

$$\frac{33}{b} = \frac{9}{6}$$

$b = 22$

11. [Indices]  
Simplify  $8b^2 \times 2b^2$

$16b^4$

12. [Square Roots] \*  
 $\sqrt{36} \times \sqrt{36} =$

36

13. [Exploring Number]  
 $22 + 2 \times (5 - 15) =$

2

14. [Financial Mathematics] \*  
Jarad's taxable income is \$41 000. What is the amount of tax payable on his income?

Taxable Income	Tax on this income*
0-\$18 200	Nil
\$18 201 - \$37 000	19¢ for each \$1 over \$18 200
\$37 001 - \$90 000	\$3 572 plus 32.5¢ for each dollar over \$37 000
\$90 001 - \$180 000	\$20 797 plus 37¢ for each dollar over \$90 000
\$180 001 and over	\$54 097 plus 45¢ for each dollar over \$180 000

\*Resident tax rates 2019-2020 (Australia)

\$4872

15. [Number Patterns]  
Complete the pattern:  
 $-2048, 512, -128, 32,$

$-8, 2$

16. [Expressions]  
Simplify  $t^2 + 4t^2 - 2t$

$5t^2 - 2t$

17. [Substitution] \*  
If  $y = x(x - 8)$ , find  $y$  when  $x = 8$

0

18. [Expansion] \*  
Expand and simplify  
 $n(3n - 4) + 2n$

$3n^2 - 2n$

19. [Factorisation]  
Factorise  
 $-2t^2 - 8t$

$-2t(t + 4)$

20. [Equations] \*  
Solve for  $x$ :  $10 - x = \frac{3x}{2}$

4

21. [Coordinate Geometry] \*  
Write the equation  $6x - 2y = 3$  in the gradient-intercept form  $y = mx + c$ , where  $m$  represents the gradient and  $c$  the  $y$ -intercept.

$y = 3x - \frac{3}{2}$

QUOTE OF THE WEEK: Human relations are something we always wish we had. P. K. Shaw

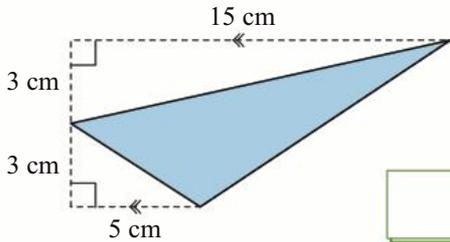
22. [Units of Measurement / Time] \*

Express in centimetres:

2 m and 380 mm = **238 cm**

23. [Perimeter / Area] \*

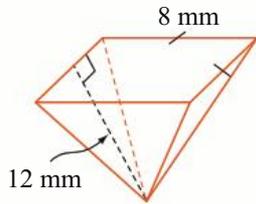
Find the area of the obtuse triangle.



**30 cm<sup>2</sup>**

24. [Surface Area] \*

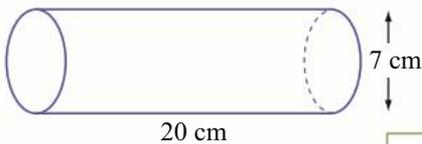
Find the total surface area of the regular square pyramid.



**256 mm<sup>2</sup>**

25. [Volume] \*

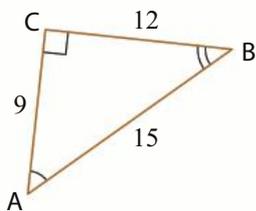
Using  $V = \pi r^2 h$  and  $\pi \approx \frac{22}{7}$ , find the volume of the cylinder.



**770 cm<sup>3</sup>**

26. [Pythagoras / Trigonometry] \*

Calculate the value of  $\sin A$  in this triangle.

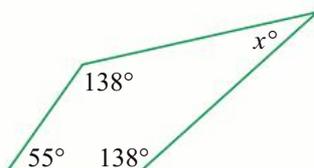


or 0.8

**$\frac{4}{5}$**

27. [Angles] \*

Find the value of  $x^\circ$ .

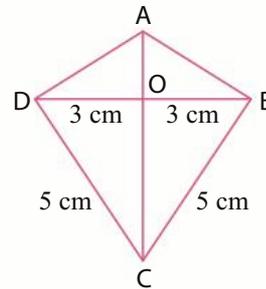


**29°**

28. [Geometric Reasoning]

Which congruence test can be applied to show that  $\triangle COD$  and  $\triangle BOC$  are congruent?

- A) side-side-side (SSS)
- B) side-angle-side (SAS)
- C) angle-angle-side (AAS)
- D) right-hypotenuse-side (RHS)

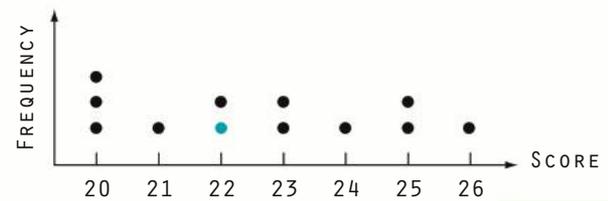


**A**

29. [Statistics] \*

Complete the dot plot and find the median of the following data:

22, 24, 20, 21, 25, 23, 23, 20, 25, 22, 20, 26



**22.5**

30. [Probability] \*

A standard die is tossed, and a spinner labelled 1, 2, 3 and 4 is spun. Complete the table. What is the probability of obtaining at least one odd number when the die is tossed and the spinner is spun once? [Give your answer as a fraction in simplest form.]

Possible outcomes		Die					
		1	2	3	4	5	6
Spinner	1	(1,1)	(1,2)	(1,3)	(1,4)	(1,5)	(1,6)
	2	(2,1)	(2,2)	(2,3)	(2,4)	(2,5)	(2,6)
	3	(3,1)	(3,2)	(3,3)	(3,4)	(3,5)	(3,6)
	4	(4,1)	(4,2)	(4,3)	(4,4)	(4,5)	(4,6)

**$\frac{3}{4}$**

31. [Problem Solving 1] \*

The ratio of \$10 notes to \$20 notes in Luke's wallet is 4 : 5. If he has twenty-seven notes altogether, what is the total value of the twenty-seven notes?

**\$ 420**

32. [Problem Solving 2] \*

A mother is 7 times as old as her son. In 5 years time she will be 4 times her son's age. How old is the mother now?

**35 years**

# MATHS MATE

## Term 2 - Sheet 6



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times, \div$ ] \*  
 $432 \div 16 =$

27

2. [Decimal  $+, -$ ] \*  
 $0.06 + 11.66 - 2.4 =$

9.32

3. [Decimal  $\times, \div$ ] \*  
 $2.5 \times 150 =$

375

4. [Fraction  $+, -$ ] \*  
 $\frac{2}{3} - \frac{7}{12} =$

$\frac{1}{12}$

5. [Fraction  $\times, \div$ ] \*  
 $14 \div \frac{7}{8} =$

16

6. [Percentages] \*  
How much is 200% of 9?

18

7. [Decimals / Fractions / Percentages] \*  
Write 4% as a fraction in simplest form.

$\frac{1}{25}$

8. [Integer  $+, -$ ] \*  
 $(+23) - (-17) + (-14) =$

26

9. [Integer  $\times, \div$ ] \*  
 $(+12) \div (-4) \times (+8) =$

-24

10. [Rates / Ratios] \*  
50 : 33 is in proportion with 5 : 11  
True or false?

false

11. [Indices]  
Simplify  $x^3y \times xy^2$

$x^4y^3$

12. [Square Roots] \*  
 $\sqrt{\frac{1}{4}} \times \sqrt{\frac{1}{100}} =$

$\frac{1}{20}$

13. [Exploring Number] \*  
 $-5 \times (18 + 4) =$

-110

14. [Financial Mathematics]  
Philippe is a foreign resident on a holiday working visa in Australia. His taxable income is \$20 000. What is the amount of tax payable on his income?

Taxable Income	Tax on this income*
0-\$90 000	32%
\$90 001-\$180 000	\$29 250 + 37% of amounts over \$90 000
\$180 000 and over	\$62 550 + 45% of amounts over \$180 000

\*Foreign resident tax rates 2019-2020 (Australia)

\$6400

15. [Number Patterns]  
Complete the pattern:  
1458, -486, 162, -54, 18,

-6, 2

16. [Expressions] \*  
Simplify  $4y + 6z - y - 5z$

$3y + z$

17. [Substitution] \*  
If  $y = (x + 2)(x - 3)$ , find  $y$  when  $x = 3$

0

18. [Expansion]  
Expand and simplify  
 $2r(s + 7) - 5r$

$2rs + 9r$

19. [Factorisation]  
Factorise  
 $-15w + 20$

$-5(3w - 4)$

20. [Equations] \*  
Solve for  $x$ :  $\frac{2x}{3} = x - 2$

6

21. [Coordinate Geometry] \*  
Write the equation  $8x + 2y - 10 = 0$  in the gradient-intercept form  $y = mx + c$ , where  $m$  represents the gradient and  $c$  the  $y$ -intercept.

$y = -4x + 5$

QUOTE OF THE WEEK: Little minds are tamed and subdued by misfortunes; but great minds rise above them. Washington Irving

22. [Units of Measurement / Time] \*  
Which distance is greater?  
A) running 3 heats and the final in the 400 m  
B) swimming 1.5 km

**A**

23. [Perimeter / Area] \*  
Find the area of the polygon.

**408 mm<sup>2</sup>**

24. [Surface Area] \*  
Find the total surface area of the regular square pyramid.

**300 mm<sup>2</sup>**

25. [Volume] \*  
Find the volume of the cylinder using  $\pi \approx \frac{22}{7}$

**18480 cm<sup>3</sup>**

26. [Pythagoras / Trigonometry] \*  
Calculate the value of  $\cos Q$  in this triangle.

**$\frac{12}{13}$**

27. [Angles] \*  
Find the value of  $x^\circ$ .

**70°**

28. [Geometric Reasoning]  
Which congruence test (SSS, SAS, AAS, RHS) can be applied to show that  $\triangle PQS$  is congruent to  $\triangle QRS$ ?

**AAS**

29. [Statistics] \*  
This dot plot shows the number of people living in the houses on our street. What is the median of this distribution?

**3**

30. [Probability] \*  
On school sports day Roger swims in the 50 m, 100 m and 200 m freestyle races. Roger estimates that he has equal chances of winning or losing each race. Complete the tree diagram. What is the probability that he wins at least two races? [Give your answer as a fraction in simplest form.]

**$\frac{1}{2}$**

31. [Problem Solving 1] \*  
A survey of 50 drivers found that 30 people always drive to the speed limit and 25 never talk on their mobile phones while driving. If 17 drivers observe both safety measures, how many drivers observe neither safety measure?

**12**

32. [Problem Solving 2] \*  
 $3x + 4y = 120$   
How many pairs of positive integers make this equation true?  
[Hint: Positive integers are 1, 2, 3, 4, ...]

**9**

# MATHS MATE

## Term 2 - Sheet 7



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times, \div$ ] \*  
 $399 \div 19 =$

21

2. [Decimal  $+, -$ ] \*  
 $13 - 0.08 + 2.9 =$

15.82

3. [Decimal  $\times, \div$ ] \*  
 $0.025 \times 50 =$

1.25

4. [Fraction  $+, -$ ] \*  
 $\frac{1}{6} + \frac{7}{12} =$

$\frac{3}{4}$

5. [Fraction  $\times, \div$ ] \*  
 $12 \div \frac{8}{5} =$

$7\frac{1}{2}$

6. [Percentages] \*  
105% of 240 =

252

7. [Decimals / Fractions / Percentages] \*  
What percentage of the price of a \$200 printer is an \$80 deposit?

40%

8. [Integer  $+, -$ ] \*  
 $(-19) + (+9) + (-16) =$

-26

9. [Integer  $\times, \div$ ] \*  
 $(-4) \times (+200) \div (-25) =$

32

10. [Rates / Ratios] \*  
30 : 12 is in proportion with 45 : 18  
True or false?

true

11. [Indices]  
Simplify  $\frac{9x^3}{3x}$

$3x^2$

12. [Square Roots] \*  
 $\frac{\sqrt{8100}}{\sqrt{100}} =$

9

13. [Exploring Number] \*  
 $7 \times 8 \div (1 - 5) =$

-14

14. [Financial Mathematics] \*  
Harry has a taxable income of \$50 000. His employer has withheld \$10 000 in tax. How much tax refund will he receive at the end of the financial year, if there are no other deductions?

Taxable Income	Tax on this income*
\$0 - \$14 000	10.5%
\$14 001 - \$48 000	\$1470 plus 17.5% for each dollar over \$14 000
\$48 001 - \$70 000	\$7420 plus 30% for each dollar over \$48 000
Over \$70 000	\$14 020 plus 33% for each dollar over \$70 000

\*Resident tax rates 2019-2020 (New Zealand)

\$1980

15. [Number Patterns]  
Complete the pattern:  
96, 48, 24, 12, 6,

$\underline{3}$ ,  $\underline{\frac{3}{2}}$

16. [Expressions] \*  
Simplify  $4hi - 3 + 10 - 3hi$

$hi + 7$

17. [Substitution] \*  
If  $t = 4$  and  $u = 10$ ,  
find the value of  $t(u - 15)$

-20

18. [Expansion] \*  
Expand and simplify  
 $x(yz + 5) + 3(2x + 7)$

$xyz + 11x + 21$

19. [Factorisation]  
Factorise  
 $-m^3 - 2m^2n$

$-m^2(m + 2n)$

20. [Equations] \*  
Solve for  $x$ :  $2x + \frac{x}{4} = 9$

4

21. [Coordinate Geometry] \*  
Complete the table:

equation	gradient ( $m$ )	$x$ -intercept	$y$ -intercept ( $c$ )
$y = -2x + 3$	-2	$(\frac{3}{2}, 0)$	(0,3)

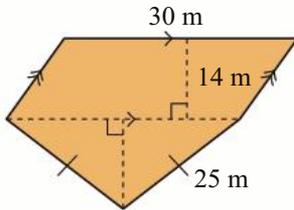
22. [Units of Measurement / Time] \*

The Limpopo River (Africa) is 1 800 000 m in length. The Yangtze River (China) is three and a half times longer. What is the length in kilometres of the Yangtze River?

6300 km

23. [Perimeter / Area] \*

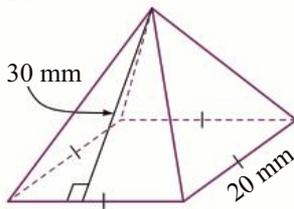
Find the area of the polygon.  
[Hint: Pythagoras' theorem will help.]



720 m<sup>2</sup>

24. [Surface Area] \*

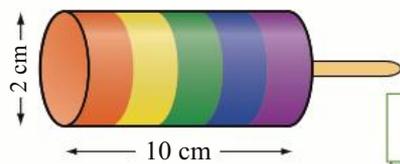
Find the total surface area of the regular square pyramid.



1600 mm<sup>2</sup>

25. [Volume] \*

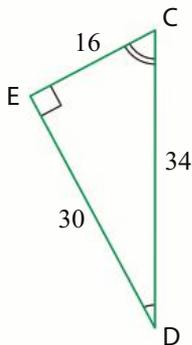
Using  $\pi \approx 3.14$  find the volume of ice in the icy pole.



31.4 cm<sup>3</sup>

26. [Pythagoras / Trigonometry] \*

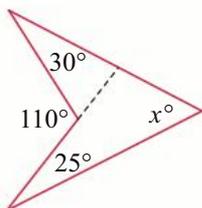
Calculate the value of  $\tan D$  in this triangle.



$\frac{8}{15}$

27. [Angles] \*

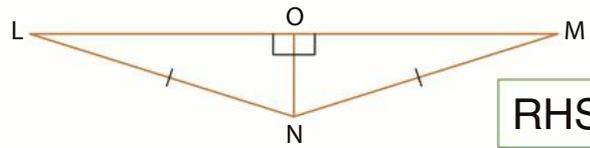
Find the value of  $x^\circ$ .



55°

28. [Geometric Reasoning]

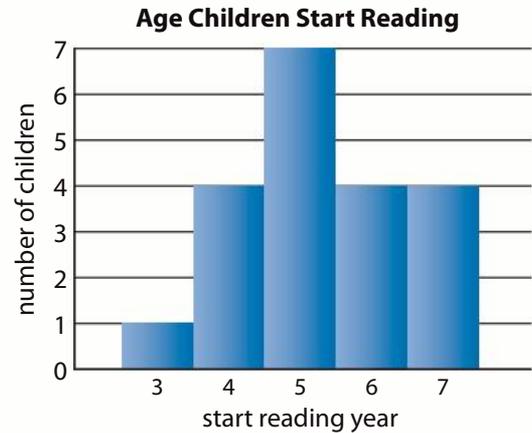
Which congruence test (SSS, SAS, AAS, RHS) can be applied to show that  $\triangle LON$  is congruent to  $\triangle MON$ ?



RHS

29. [Statistics] \*

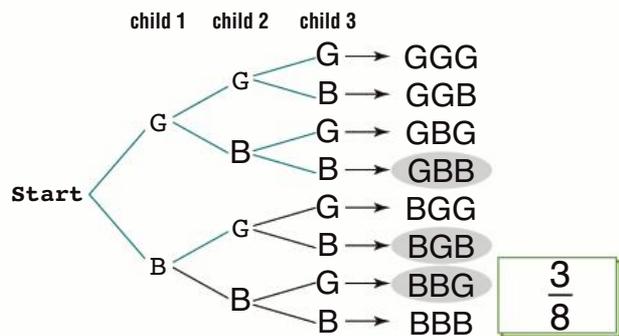
Find the median and mean of the distribution.



median = 5      mean = 5.3

30. [Probability] \*

Joanna and Claude wish to start a family. They plan to have 3 children. Complete the tree diagram. If the chance of having a girl or a boy is equal, find the probability that they have 2 boys and a girl, in any order. [Give your answer as a fraction in simplest form.]



31. [Problem Solving 1] \*

A painted cube is sliced into 27 smaller cubes. How many of these smaller cubes are painted on three sides?

8

32. [Problem Solving 2] \*

Two identical jugs are filled with mixtures of fruit juice and water in the ratio 2 : 1 and 5 : 1 respectively. If the drinks are then mixed in a larger container, what will the ratio of fruit juice to water become?

3 : 1

# MATHS MATE

## Term 2 - Sheet 8



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times, \div$ ] \*  
 $2278 \div 17 =$

134

2. [Decimal  $+, -$ ] \*  
 $0.707 + 0.057 - 0.07 =$

0.694

3. [Decimal  $\times, \div$ ] \*  
 $200 \times 0.0054 =$

1.08

4. [Fraction  $+, -$ ] \*  
 $\frac{1}{2} - \frac{5}{18} =$

$\frac{2}{9}$

5. [Fraction  $\times, \div$ ] \*  
 $15 \div \frac{6}{7} =$

$17\frac{1}{2}$

6. [Percentages] \*  
How much is 110% of 120?

132

7. [Decimals / Fractions / Percentages] \*  
What percentage is 12 out of 240?

5%

8. [Integer  $+, -$ ] \*  
 $(-18) - (+21) - (-27) =$

-12

9. [Integer  $\times, \div$ ] \*  
 $(+10) \div (-5) \times (+20) =$

-40

10. [Rates / Ratios] \*  
Find the missing term in the proportion:

$$\frac{16}{20} = \frac{4}{x}$$

$x = 5$

11. [Indices]  
Simplify  $\frac{c^2 d^3}{cd}$

$cd^2$

12. [Square Roots] \*  
 $\sqrt{256} \div \sqrt{64} =$

2

13. [Exploring Number] \*  
 $-36 \div (-1 - 5) + 19 =$

25

14. [Financial Mathematics] \*  
Suri has a taxable income of \$87 000. He receives a pay rise of \$5000 and moves into the next tax bracket. How much more tax will Suri pay per year?

Taxable Income	Tax on this income*
0-\$18 200	Nil
\$18 201 - \$37 000	19¢ for each \$1 over \$18 200
\$37 001 - \$90 000	\$3572 plus 32.5¢ for each dollar over \$37 000
\$90 001 - \$180 000	\$20 797 plus 37¢ for each dollar over \$90 000
\$180 001 and over	\$54 097 plus 45¢ for each dollar over \$180 000

\*Resident tax rates 2019-2020 (Australia)

\$1715

15. [Number Patterns]  
Complete the pattern:  
64, 16, 4, 1,

$\frac{1}{4}, \frac{1}{16}$

16. [Expressions] \*  
Simplify  $10x + 2x^2 - 4x^2 - 6x$

$4x - 2x^2$

17. [Substitution] \*  
If  $m = 1$  and  $n = 5$ ,  
find the value of  $2m(3m - n)$

-4

18. [Expansion] \*  
Expand and simplify  
 $2e(e + 1) - 4(e + 5)$

$2e^2 - 2e - 20$

19. [Factorisation]  
Factorise  
 $-6s^3 - 21s^2t + 18s$

$-3s(2s^2 + 7st - 6)$

20. [Equations] \*  
Solve for  $x$ :  $\frac{x+2}{5} - \frac{x-1}{2} = 2$

$-\frac{11}{3}$

or  $-3\frac{2}{3}$

21. [Coordinate Geometry] \*  
Complete the table:

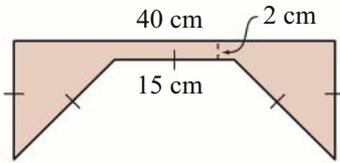
equation	gradient ( $m$ )	$x$ -intercept	$y$ -intercept ( $c$ )
$y = \frac{1}{4}x - 1$	$\frac{1}{4}$	(4,0)	(0,-1)

QUOTE OF THE WEEK: Man blames most accidents on fate - but feels a more personal responsibility when he makes a hole-in-one.

22. [Units of Measurement / Time] \*  
Place in ascending order:  
0.45 km, 54 m and 54 000 cm

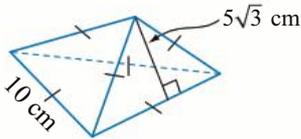
54 m, 0.45 km, 54 000 cm

23. [Perimeter / Area] \*  
Find the area of the polygon.



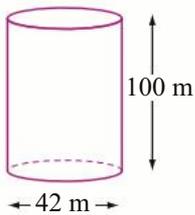
242.5 cm<sup>2</sup>

24. [Surface Area] \*  
Find the total surface area of the regular tetrahedron. [Leave the answer as a surd in simplest form.]



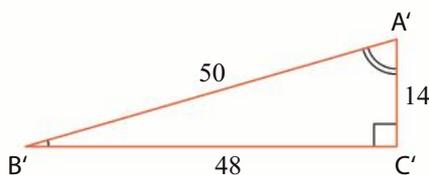
100√3 cm<sup>2</sup>

25. [Volume] \*  
Find the volume of the cylinder using  $\pi \approx \frac{22}{7}$



138 600 m<sup>3</sup>

26. [Pythagoras / Trigonometry] \*  
Calculate the value of  $\sin A'$  in this triangle.



or 0.96

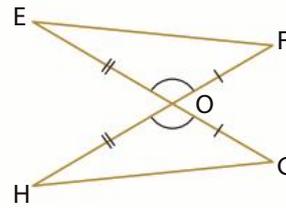
$\frac{24}{25}$

27. [Angles] \*  
Find the value of  $x^\circ$ .



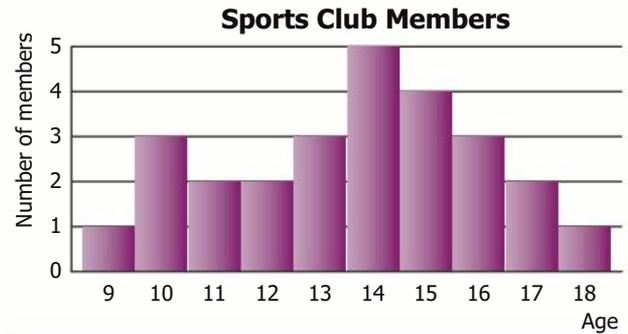
45°

28. [Geometric Reasoning]  
Which congruence test (SSS, SAS, AAS, RHS) can be applied to show that  $\triangle EOF$  is congruent to  $\triangle GOH$ ?



SAS

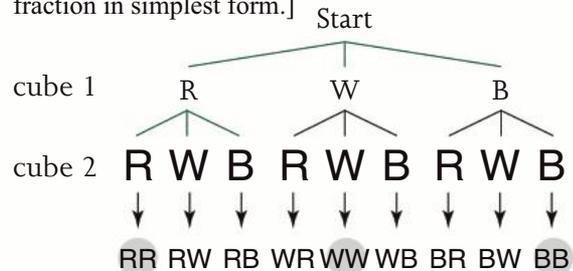
29. [Statistics] \*  
Find the range and median of the distribution.



range = 9

median = 14

30. [Probability] \*  
Two cubes each have two faces painted red, two white and two blue. They are rolled on the floor. Complete the tree diagram. What is the probability that the colours appearing uppermost are the same? [Give your answer as a fraction in simplest form.]



$\frac{1}{3}$

31. [Problem Solving 1] \*  
Larry records the weights of four parcels. He notes that the median is 4.5 kg, the mode is 5 kg, and the mean is 4 kg. What is the weight of each parcel?

2 kg, 4 kg, 5 kg, 5 kg

32. [Problem Solving 2] \*  
My watch is 5 minutes slow, but I think it is 3 minutes fast. I arrive 'on time' according to my calculations to catch the 1:15 pm train. What is the real time when I arrive at the station?

1:23 pm

# MATHS MATE

## Term 3 - Sheet 1



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times$ ,+] \*  
 $1014 \times 130 =$

131 820

2. [Decimal +,-] \*  
 $1 - 0.052 =$

0.948

3. [Decimal  $\times$ ,+] \*  
 $5.9 \div 100 =$

0.059

4. [Fraction +,-] \*  
 $\frac{1}{5} + \frac{2}{3} =$

$\frac{13}{15}$

5. [Fraction  $\times$ ,+] \*  
 $1\frac{2}{3} \times 1\frac{1}{4} =$

$2\frac{1}{12}$

6. [Percentages] \*  
Increase 2400 by 1%.

2424

7. [Decimals / Fractions / Percentages] \*  
Complete the table:

Decimal	Fraction	Percentage
0.025	$\frac{25}{1000} = \frac{1}{40}$	2.5%

8. [Integer +,-] \*  
 $9 + (4 - 8) =$

5

9. [Integer  $\times$ ,+] \*  
 $(2 + 4) \times (-5 + 7) =$

12

10. [Rates / Ratios] \*  
The cruise ship 'Sapphire Princess' has a crew to passenger ratio of 1 : 2.3  
If the ship has a crew of 1000, what is the total number of people on board?  
[Hint: Crew + passengers.]

3300

11. [Indices]  
Simplify  $(ab)^5$

$a^5b^5$

12. [Square Roots] \*  
 $\sqrt{100} - \sqrt{25} =$

5

13. [Exploring Number]  
Write  $1.4 \times 10^9$  km, the diameter of the Sun, as a basic numeral.

1 400 000 000

14. [Financial Mathematics] \*  
Simple Interest = Principal  $\times$  Rate  $\times$  Time.  
How much interest would Jacinta earn if she invests \$200 for 4 years at a simple interest rate of 9% per year?

\$72

15. [Number Patterns] \*  
Find the 25th term in the pattern:  
4, 8, 12, 16, 20, .....

100

16. [Expressions]  
Simplify  $4x \times 5y$

$20xy$

17. [Substitution] \*  
If  $y = 5x - 4$ , find  $y$  when  $x = -2$

-14

18. [Expansion] \*  
Expand and simplify  
 $2(2c - 3) - c(c^2 + 4)$

$-c^3 - 6$

19. [Factorisation]  
Factorise  
 $x(y + 2) + 5(y + 2)$

$(y + 2)(x + 5)$

20. [Equations] \*  
Solve the inequality:  
 $\frac{2(4 + x)}{5} < 4$

$x < 6$

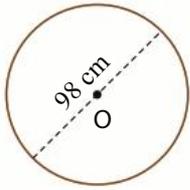
21. [Coordinate Geometry] \*  
Use  $m = \frac{y_2 - y_1}{x_2 - x_1}$  to find the gradient of the line passing through the points  $(-2, 3)$  and  $(0, -1)$ .

-2

22. [Units of Measurement / Time] \*  
Write in kilograms:

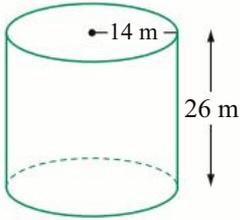
2.05 tonnes and 500 g = 2050.5 kg

23. [Perimeter / Area] \*  
Using  $C = 2\pi r$  where  $\pi \approx \frac{22}{7}$ , find the circumference of the circle.



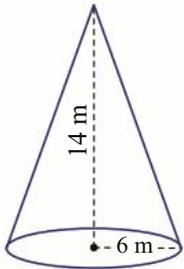
308 cm

24. [Surface Area] \*  
Using  $TSA = 2\pi r(r + h)$  and  $\pi \approx \frac{22}{7}$ , find the total surface area of the cylinder.



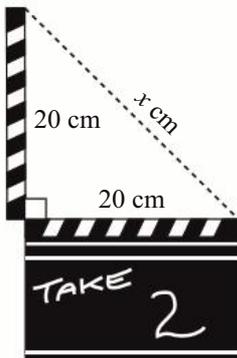
3520 m<sup>2</sup>

25. [Volume] \*  
Using  $V = \frac{\pi r^2 h}{3}$  and  $\pi \approx \frac{22}{7}$ , find the volume of the cone.



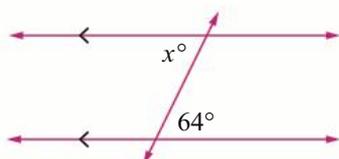
528 m<sup>3</sup>

26. [Pythagoras / Trigonometry] \*  
Find the missing length in this diagram of a clapboard. [Leave your answer in surd form.]



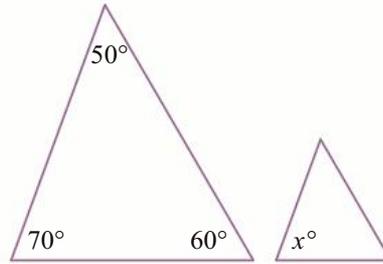
or  $20\sqrt{2}$   
 $\sqrt{800}$  cm

27. [Angles]  
Find the value of  $x^\circ$ .



64°

28. [Geometric Reasoning]  
If these two triangles are similar, what is the value of  $x^\circ$ ?



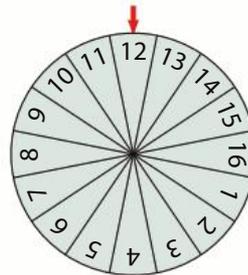
70°

29. [Statistics] \*  
Find the median and range of the following distribution.

Score	4	8	12	16	20
Frequency	3	5	7	3	12

median = 14      range = 16

30. [Probability] \*  
This spinner is spun once. What is the probability of spinning a 7 or an even number?  
[Give your answer as a fraction.]



$\frac{9}{16}$

31. [Problem Solving 1] \*  
Mick's football team has won 60% of the first 10 games, which is half the season. They aim for 75% wins over the whole season. How many of the last 10 games must they win to reach this aim?

9

32. [Problem Solving 2] \*  
Find a four-digit number that when multiplied by nine gives the original number back to front.

$$\begin{array}{r} \text{Hint: } \begin{array}{cccc} A & B & C & D \\ \times & & & 9 \\ \hline & D & C & B & A \end{array} \end{array}$$

1089

# MATHS MATE

## Term 3 - Sheet 2



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times$ ,+] \*  
 $2230 \times 140 =$

312 200

2. [Decimal +,-] \*  
 $10 - 0.108 =$

9.892

3. [Decimal  $\times$ ,+] \*  
 $20.8 \div 1000 =$

0.0208

4. [Fraction +,-] \*  
 $\frac{1}{3} - \frac{1}{10} =$

$\frac{7}{30}$

5. [Fraction  $\times$ ,+] \*  
 $\frac{1}{7} \times 5\frac{3}{5} =$

$\frac{4}{5}$

6. [Percentages] \*  
Increase 550 by 60%.

880

7. [Decimals / Fractions / Percentages] \*  
Complete the table:

Decimal	Fraction	Percentage
0.08	$\frac{8}{100} = \frac{2}{25}$	8%

8. [Integer +,-] \*  
 $5 - (3 - 9) =$

11

9. [Integer  $\times$ ,+] \*  
 $(4 - 3) \times (3 - 4) =$

-1

10. [Rates / Ratios] \*  
The ratio of strings to brass to percussion instruments in a 76 piece orchestra is 15 : 3 : 1  
How many brass instruments are in the orchestra?

12

11. [Indices]  
Simplify  $(2x)^4$

$16x^4$

12. [Square Roots] \*  
 $\sqrt{49} + \sqrt{49} =$

14

13. [Exploring Number]  
Write 22.5 million degrees Fahrenheit, the temperature of the Sun's core, in scientific notation.

$2.25 \times 10^7$

14. [Financial Mathematics] \*  
Using  $SI = PRT$  how much interest must Paddy pay on a loan of \$2500 for 3 years at an interest rate of 13% per year?

\$975

15. [Number Patterns] \*  
Find the 15th term in the pattern:  
2, 7, 12, 17, 22, .....

72

16. [Expressions]  
Simplify  $-5p \times -6q$

$30pq$

17. [Substitution] \*  
If  $a = -2$  and  $b = 3$ ,  
find the value of  $-b - 4a$

5

18. [Expansion] \*  
Expand and simplify  
 $2b(b^2 - a) + 8a(b - 1)$

$2b^3 + 6ab - 8a$

19. [Factorisation] \*  
Factorise  
 $x(z - 4) + y(z - 4)$

$(z - 4)(x + y)$

20. [Equations] \*  
Solve the inequality:  
 $\frac{2(x - 3)}{3} \geq 4$

$x \geq 9$

21. [Coordinate Geometry] \*  
Use  $m = \frac{y_2 - y_1}{x_2 - x_1}$  to find the gradient of the line passing through the points (2,-4) and (-4,-1).

$-\frac{1}{2}$

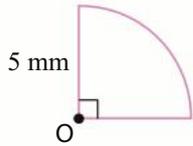
22. [Units of Measurement / Time] \*  
Which has a lesser mass?

- A) paper clip weighing 0.5 g  
B) ten cent piece weighing 5650 mg

A

23. [Perimeter / Area] \*

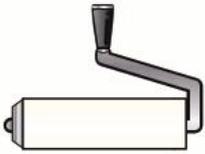
Using  $C = 2\pi r$  where  $\pi \approx 3.14$ , find the perimeter of the shape.



17.85 mm

24. [Surface Area] \*

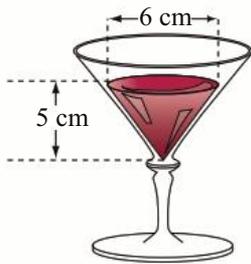
Using  $LA = 2\pi rh$  and  $\pi \approx 3.14$ , find the lateral area of a paint roller of diameter 5 cm and length 15 cm.



235.5 cm<sup>2</sup>

25. [Volume] \*

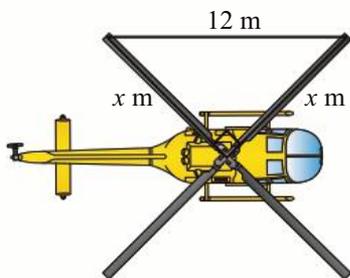
Using  $\pi \approx 3.14$  find how much liquid is in the conical glass. [Hint: 1 mL = 1 cm<sup>3</sup>]



47.1 mL

26. [Pythagoras / Trigonometry] \*

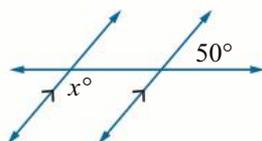
How long is each of the helicopter's blades, if they are all the same length and the distance between the tips of two consecutive blades is 12 m? [Leave your answer in surd form.]



or  $6\sqrt{2}$   
 $\sqrt{72}$  m

27. [Angles] \*

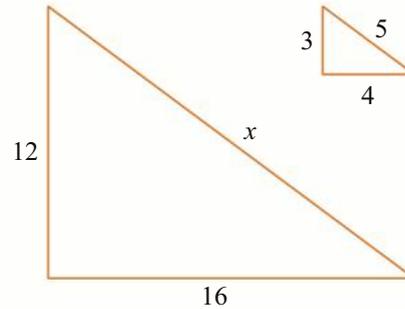
Find the value of  $x^\circ$ .



130°

28. [Geometric Reasoning] \*

If these two triangles are similar, what is the value of  $x$ ? [All measurements are in cm.]



20

29. [Statistics] \*

Find the median and mode of the following distribution.

Score	2	4	6	8	10	12
Frequency	1	2	3	6	2	1

median = 8      mode = 8

30. [Probability] \*

A bag contains 40 balls, each marked with a number from 1 to 40. A ball is drawn from the bag at random. What is the probability that the number drawn is less than 5 or a multiple of 6? [Give your answer as a fraction in simplest form.]

$\frac{1}{4}$

31. [Problem Solving 1] \*

Seven consecutive numbers are listed. The sum of the smallest three numbers is 48. What is the sum of the largest three?

60

32. [Problem Solving 2] \*

Jay (J) and Kay (K) can pack the shelves in one aisle of the supermarket in 30 minutes. Kay and Elle (L) take 35 minutes to do the same job, but, when Jay and Elle work together, the job takes 42 minutes. How long would each person take working individually?

J = 70 min, K = 52.5 min, L = 105 min



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times, \div$ ] \*  
 $205 \times 1700 =$

348 500

2. [Decimal  $+, -$ ] \*  
 $100 - 0.444 =$

99.556

3. [Decimal  $\times, \div$ ] \*  
 $0.007 \div 0.01 =$

0.7

4. [Fraction  $+, -$ ] \*  
 $\frac{3}{4} - \frac{3}{10} =$

$\frac{9}{20}$

5. [Fraction  $\times, \div$ ] \*  
 $1\frac{5}{7} \times \frac{7}{8} =$

$1\frac{1}{2}$

6. [Percentages] \*  
Increase 80 by 12.5%.

90

7. [Decimals / Fractions / Percentages] \*  
Of the 28 European Union countries, one fourteenth have not agreed to adopt the Euro as their currency. How many EU countries will not adopt the Euro?

2

8. [Integer  $+, -$ ] \*  
 $6 - (6 + 7) =$

-7

9. [Integer  $\times, \div$ ] \*  
 $(2 + 5) \times (2 - 5) =$

-21

10. [Rates / Ratios] \*  
The ratio of Italy's gold to silver to bronze medals at the 2016 Rio Olympics was 2 : 3 : 2. If Italy won 28 medals in total, how many medals were gold?

8

11. [Indices] \*  
Simplify  $2(3x)^3$

$54x^3$

12. [Square Roots] \*  
 $3\sqrt{25} - \sqrt{25} =$

10

13. [Exploring Number]  
Write  $6.25 \times 10^{-5}$  m, the size of a sand particle, as a decimal number.

0.0000625

14. [Financial Mathematics] \*  
Cheryl invested \$7000 for 5 years at a simple interest rate of 11%. How much does Cheryl get back?  
[Hint: Principal + interest.]

\$10 850

15. [Number Patterns] \*  
Find the 20th term in the pattern:  
1, 4, 9, 16, 25, .....

400

16. [Expressions]  
Simplify  $s \times -2s$

$-2s^2$

17. [Substitution] \*  
If  $r = 2$  and  $s = -5$ ,  
find the value of  $r(2r + s)$

-2

18. [Expansion] \*  
Expand and simplify  
 $-3(d^2 - e) + 4d(d - 1)$

$d^2 - 4d + 3e$

19. [Factorisation] \*  
Factorise  
 $2a - 4 + ab - 2b$

$(a - 2)(2 + b)$

20. [Equations] \*  
Solve the inequality:  
 $\frac{4x}{3} - x > 1$

$x > 3$

21. [Coordinate Geometry] \*  
Use  $y - y_1 = m(x - x_1)$  where  $m = \frac{y_2 - y_1}{x_2 - x_1}$  to write the equation of the line passing through the points  $(-2, 0)$  and  $(-1, 4)$ .

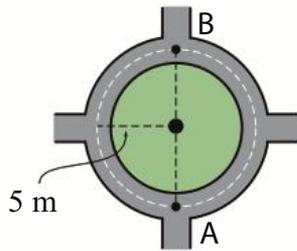
$y = 4x + 8$

22. [Units of Measurement / Time] \*  
The average adult human heart has a mass of 0.3 kg. If a human brain is four and a half times bigger, what is its mass in grams?

1350 g

23. [Perimeter / Area] \*

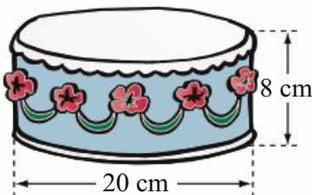
How much further must a driver travel from A to B by going around the roundabout rather than straight across the intersection?  
(Use  $\pi \approx 3.14$ )



5.7 m

24. [Surface Area] \*

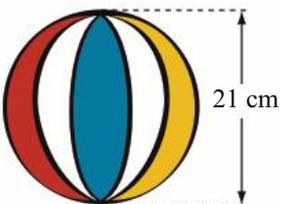
This cake is covered in icing, except for the base. Using  $\pi \approx 3.14$  find the total surface area of the icing.



816.4 cm<sup>2</sup>

25. [Volume] \*

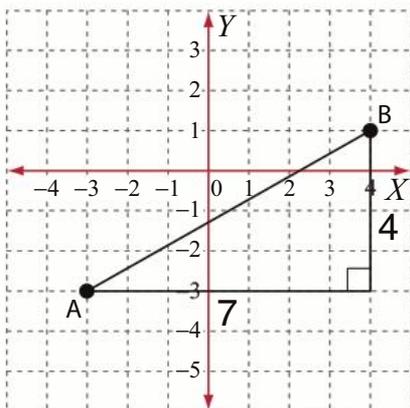
Using  $V = \frac{4\pi r^3}{3}$  and  $\pi \approx \frac{22}{7}$ , find the volume of air in the beach ball.



4851 cm<sup>3</sup>

26. [Pythagoras / Trigonometry] \*

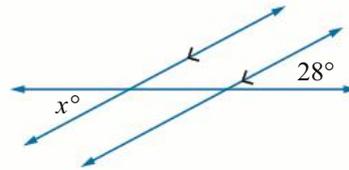
Find the distance AB in this Cartesian plane.  
[Leave your answer in surd form.]



$\sqrt{65}$

27. [Angles]

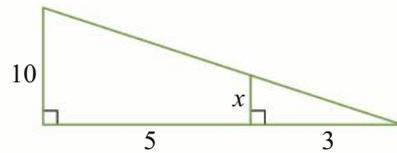
Find the value of  $x^\circ$ .



28°

28. [Geometric Reasoning] \*

Find the value of  $x$ . [All measurements are in cm.]



3.75

29. [Statistics] \*

Find the mean of the following distribution.

Score	0	10	20	30	50
Frequency	10	15	5	20	10

22.5

30. [Probability] \*

A 52-card deck of playing cards is shuffled, and one card is dealt from the top of the deck. What is the probability that it is an even number or a diamond? [Give your answer as a fraction in simplest form.]

$\frac{7}{13}$

31. [Problem Solving 1] \*

Lisa had a box of apples. She gave  $\frac{1}{3}$  of them to Henry and  $\frac{1}{4}$  of the remainder to Alex. If there were still 30 apples left, how many did she have at the start?

60

32. [Problem Solving 2] \*

A 4 litre, 20% alcohol-water mixture will be upgraded by adding to it a certain amount of a 70% alcohol-water mixture. How many litres of the 70% mixture must be added to make the new solution a 50% alcohol-water mixture?

6 litres

# MATHS MATE

## Term 3 - Sheet 4



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

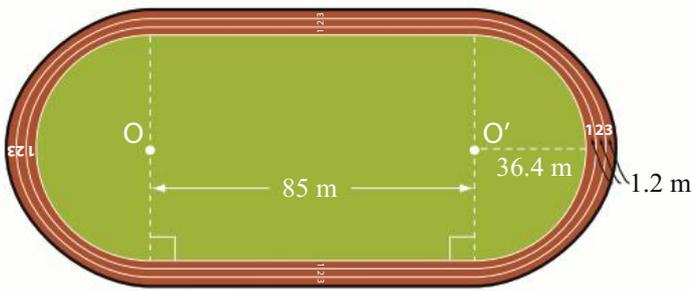
1. [Long  $\times$ ,  $\div$ ] \*  
 $461 \times 1800 =$  829 800
2. [Decimal  $+$ ,  $-$ ] \*  
 $100 - 0.073 =$  99.927
3. [Decimal  $\times$ ,  $\div$ ] \*  
 $1.61 \div 0.001 =$  1610
4. [Fraction  $+$ ,  $-$ ] \*  
 $\frac{1}{6} + \frac{3}{8} =$   $\frac{13}{24}$
5. [Fraction  $\times$ ,  $\div$ ] \*  
 $1\frac{1}{11} \times 4\frac{1}{8} =$   $4\frac{1}{2}$
6. [Percentages] \*  
Increase 320 by 45%. 464
7. [Decimals / Fractions / Percentages] \*  
The longest bone in the human body is the femur (thigh), which is about one quarter of a person's height. How long is the femur of a person 1.92 m high? 48 cm
8. [Integer  $+$ ,  $-$ ] \*  
 $2 + (-4 - 7) =$  -9
9. [Integer  $\times$ ,  $\div$ ] \*  
 $(9 - 4) \times (-2 - 2) =$  -20
10. [Rates / Ratios] \*  
Disinfectant should be diluted with water in a ratio of 1 : 20. How much water is needed to dilute 800 mL of disinfectant? 16 L
11. [Indices] \*  
Simplify  $3(gh)^2$   $3g^2h^2$
12. [Square Roots] \*  
 $5\sqrt{81} + 6\sqrt{4} =$  57
13. [Exploring Number]  
Write 0.000000000753 kg, the mass of a dust particle, in scientific notation.  $7.53 \times 10^{-10}$
14. [Financial Mathematics] \*  
Chi lent to Phi \$12 000 for 5 years at a simple interest rate of 7% per year. How much will Chi be repaid? [Hint: Principal + interest.] \$16 200
15. [Number Patterns] \*  
Find the 20th term in the pattern:  
 $\frac{1}{2}, \frac{1}{4}, \frac{1}{6}, \frac{1}{8}, \frac{1}{10}, \dots$   $\frac{1}{40}$
16. [Expressions]  
Simplify  $-3b \times 2ab$   $-6ab^2$
17. [Substitution] \*  
If  $j = 1$  and  $k = -4$ ,  
find the value of  $10 - 2j + 3k$  -4
18. [Expansion] \*  
Expand and simplify  
 $-2gh(g - 2h) - 4h(gh - 1)$   $-2g^2h + 4h$
19. [Factorisation] \*  
Factorise  
 $6gh - 4g + 3h - 2$   $(3h - 2)(2g + 1)$
20. [Equations] \*  
Solve the inequality:  
 $\frac{2x}{5} + x < 14$   $x < 10$
21. [Coordinate Geometry] \*  
Use  $y - y_1 = m(x - x_1)$  where  $m = \frac{y_2 - y_1}{x_2 - x_1}$  to  
write the equation of the line passing through  
the points (2, -1) and (-7, 4).  $y = -\frac{5}{9}x + \frac{1}{9}$
22. [Units of Measurement / Time] \*  
Place in descending order:  
76 700 g, 7.67 kg and 0.767 t  
0.767 t, 76 700 g, 7.67 kg

QUOTE OF THE WEEK: Blessed is the man who having nothing to say, abstains from giving us wordy evidence of the fact. George Eliot

23. [Perimeter / Area] \*

Using  $\pi \approx 3.14$  find the perimeter around the outside of lane 3 of an athletics track.

**Standard 400 m athletics track**  
(3 lanes shown)



421.2 m

24. [Surface Area] \*

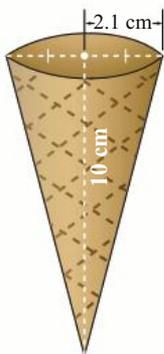
Using  $\pi \approx \frac{22}{7}$  find the lateral area of the glue stick label.



5500 mm<sup>2</sup>

25. [Volume] \*

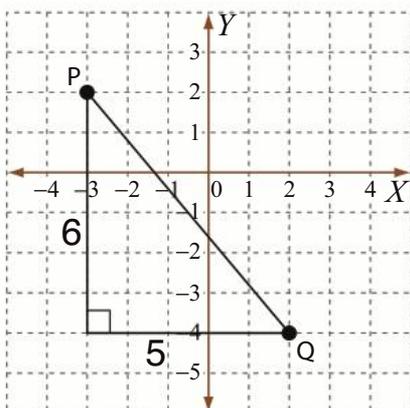
Find the volume of ice cream in the cone using  $\pi \approx \frac{22}{7}$



46.2 cm<sup>3</sup>

26. [Pythagoras / Trigonometry] \*

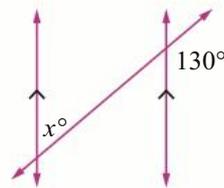
Find the distance PQ in this Cartesian plane.  
[Leave your answer in surd form.]



$\sqrt{61}$

27. [Angles] \*

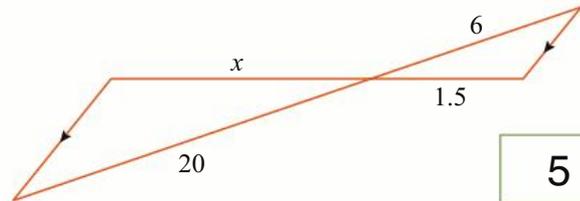
Find the value of  $x^\circ$ .



50°

28. [Geometric Reasoning] \*

Find the value of  $x$ . [All measurements are in cm.]



5

29. [Statistics] \*

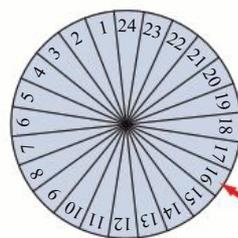
Find the mean of the following distribution.

Score	5	10	15	20	25	30
Frequency	3	6	4	3	3	1

15

30. [Probability] \*

This spinner is spun once. What is the probability of spinning a multiple of 3 or a multiple of 4? [Give your answer as a fraction in simplest form.]



$\frac{1}{2}$

31. [Problem Solving 1] \*

A computer drawing was enlarged using a scale factor of 250%. What scale factor is required if the drawing is now to be reduced to its original size?

40%

32. [Problem Solving 2] \*

Each letter stands for a different digit. What number does SIXTY represent?

$$\begin{array}{r} \text{F O R T Y} \\ \text{T E N} \\ + \text{T E N} \\ \hline \text{S I X T Y} \end{array}$$

31 486

# MATHS MATE

## Term 3 - Sheet 5



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times, \div$ ] \*  
 $1134 \div 12 =$

94.5

2. [Decimal  $+, -$ ] \*  
 $24 - 6.87 =$

17.13

3. [Decimal  $\times, \div$ ] \*  
 $4.8 \div 0.6 =$

8

4. [Fraction  $+, -$ ] \*  
 $3\frac{2}{7} - 1\frac{5}{7} =$

$1\frac{4}{7}$

5. [Fraction  $\times, \div$ ] \*  
 $\frac{4}{7} \div 8 =$

$\frac{1}{14}$

6. [Percentages] \*  
Decrease 5500 by 9%.

5005

7. [Decimals / Fractions / Percentages] \*  
Place in ascending order:  
 $\frac{2}{5}$ , 0.45, 43%

$\frac{2}{5}$ , 43%, 0.45

8. [Integer  $+, -$ ] \*  
 $(3 - 7) - (7 - 3) =$

-8

9. [Integer  $\times, \div$ ] \*  
 $\frac{5 - 8}{5 - 8} =$

1

10. [Rates / Ratios] \*  
Michael Milton is the fastest Australian skier with a record of nearly 60 m/s. What is this speed in kilometres per hour?

216 km/h

11. [Indices]  
Simplify  $(a^y)^z$

$a^{yz}$

12. [Square Roots] \*  
 $27\sqrt{36} \div 3\sqrt{4} =$

27

13. [Exploring Number]  
Which is **not** a rational number?

- A) 1.75                      B) 3.14  
C) 0.87878787...        D)  $\pi$

D

14. [Financial Mathematics] \*  
A 15% increase followed by a 10% discount on the same item is  $>$ ,  $<$  or  $=$  a 5% increase of the original value?

$<$

15. [Number Patterns] \*  
If the general rule of a sequence is  $-3(n + 2)$  find the 18th term ( $n = 18$ ).

-60

16. [Expressions]  
Simplify  $8f \div 6f$

$\frac{4}{3}$

17. [Substitution] \*  
If  $c = 5$  and  $d = -4$ , find the value of  $\frac{c}{3}(11 - d)$

25

18. [Expansion]  
Expand  $(6 - a)(3 - b)$

$18 - 6b - 3a + ab$

19. [Factorisation]  
Factorise  $m^2 - n^2$

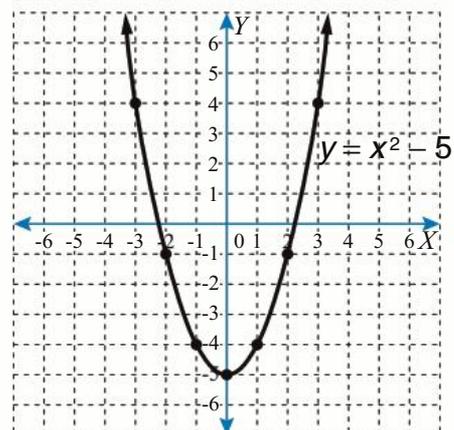
$(m + n)(m - n)$

20. [Equations] \*  
Solve for  $x$ :  
 $(x + 8)(x + 3) = 0$

-8, -3

21. [Coordinate Geometry] \*  
Sketch the non-linear rule  $y = x^2 - 5$  (parabola) by first completing this table of values.

$x$	-3	-2	-1	0	1	2	3
$y$	4	-1	-4	-5	-4	-1	4



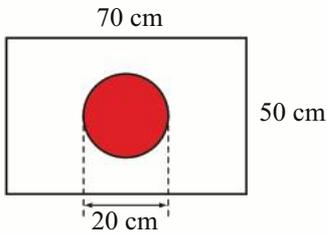
22. [Units of Measurement / Time] \*

Express in litres:

2 L and 50 mL = **2.05 L**

23. [Perimeter / Area] \*

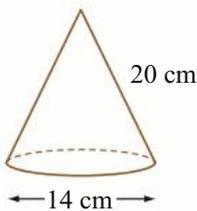
Use  $A = \pi r^2$  where  $\pi \approx 3.14$ , to find the area of the white background on this Japanese flag.



**3186 cm<sup>2</sup>**

24. [Surface Area] \*

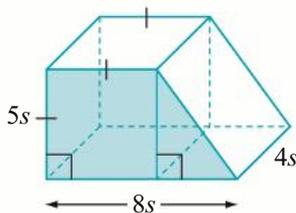
Use  $TSA = \pi r(r + s)$  and  $\pi \approx \frac{22}{7}$  to find the total surface area of the cone.



**594 cm<sup>2</sup>**

25. [Volume] \*

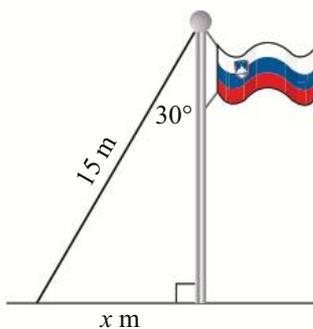
Write an algebraic expression for the volume  $V$  of the prism. [Express the answer in terms of  $s$ .]



**$V = 130s^3$**

26. [Pythagoras / Trigonometry] \*

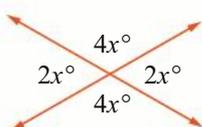
A 15 m long support wire is attached to a flagpole and makes an angle of  $30^\circ$  with the pole. If  $\sin 30^\circ = 0.5$ , find the distance from the end of the wire to the base of the flagpole.



**7.5 m**

27. [Angles] \*

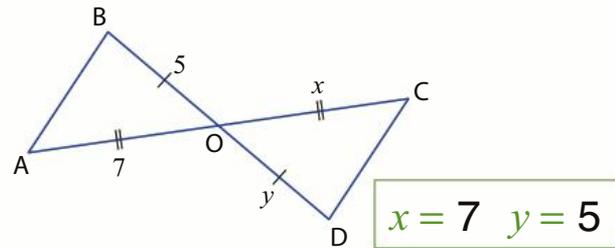
Find the value of  $x^\circ$ .



**30°**

28. [Geometric Reasoning]

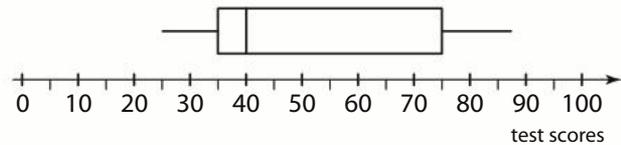
Find the value of  $x$  and  $y$  in this pair of congruent triangles.



**$x = 7$   $y = 5$**

29. [Statistics]

The box-and-whisker plot shows a set of English test scores. Find the median and lower quartile (LQ).



**median = 40**

**LQ = 35**

30. [Probability] \*

The unemployment rate in Australia at the end of March 2019 was approximately 5.1%. Based on this figure, how many people were expected to be unemployed in a population sample of 10 000 people?

**510**

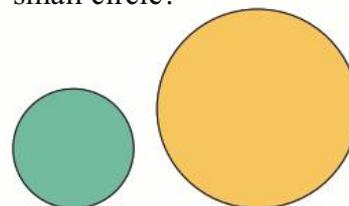
31. [Problem Solving 1] \*

In a quiz show, Clara won 20 points for each correct answer and lost 30 points for each incorrect answer. After 30 questions her score was zero. How many correct answers did she have?

**18**

32. [Problem Solving 2] \*

The diameter of the small circle is 60% of the diameter of the large circle. What percentage of the area of the large circle is the area of the small circle?



**36%**

# MATHS MATE

## Term 3 - Sheet 6



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times, \div$ ] \*  
 $9135 \div 14 =$

652.5

2. [Decimal  $+, -$ ] \*  
 $15 - 0.041 =$

14.959

3. [Decimal  $\times, \div$ ] \*  
 $3.05 \div 0.05 =$

61

4. [Fraction  $+, -$ ] \*  
 $2\frac{9}{11} + 4\frac{5}{11} =$

$7\frac{3}{11}$

5. [Fraction  $\times, \div$ ] \*  
 $\frac{4}{5} \div 2 =$

$\frac{2}{5}$

6. [Percentages] \*  
Reduce 120 by 70%.

36

7. [Decimals / Fractions / Percentages] \*  
Place in descending order:  
 $0.09, 91\%, \frac{9}{10}$

91%,  $\frac{9}{10}, 0.09$

8. [Integer  $+, -$ ] \*  
 $(1 + 4) + (3 - 8) =$

0

9. [Integer  $\times, \div$ ] \*  
 $\frac{4 + 5}{2 - 5} =$

-3

10. [Rates / Ratios] \*  
During normal breathing the air travels at about 90 km/h. What is this speed in metres per second?

25 m/s

11. [Indices]  
Simplify  $(b^3)^2$

$b^6$

12. [Square Roots] \*  
 $4\sqrt{100} \times 3\sqrt{9} =$

360

13. [Exploring Number]  
Which numbers are rational?  
A)  $\sqrt{36}$  B)  $\sqrt{45}$   
C) 3.141592653... D)  $-2.\dot{3}$

A and D

14. [Financial Mathematics] \*  
After receiving a 25% discount, Ellie paid \$240 for a bookcase. What was the original marked price of the bookcase?

\$320

15. [Number Patterns] \*  
If the general rule of a sequence is  $\frac{n}{3} - 6$  find the 60th term ( $n = 60$ ).

14

16. [Expressions]  
Simplify  $5bc \div bc$

5

17. [Substitution] \*  
If  $x = 3, y = 4$  and  $z = -5$ , find the value of  $\frac{6}{x}(xy + z)$

14

18. [Expansion]  
Expand  $(p - 3)(5 + 2q)$

$5p + 2pq - 15 - 6q$

19. [Factorisation]  
Factorise  $9y^2 - 64$

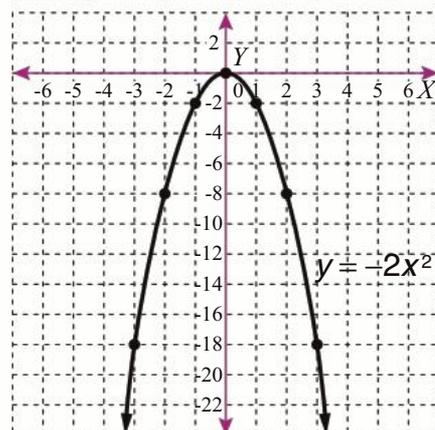
$(3y + 8)(3y - 8)$

20. [Equations] \*  
Solve for  $x$ :  
 $(x + 5)(x - 2) = 0$

-5, 2

21. [Coordinate Geometry] \*  
Sketch the non-linear rule  $y = -2x^2$  (parabola) by first completing this table of values.

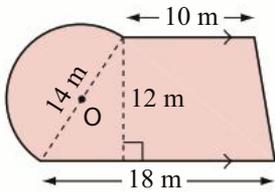
$x$	-3	-2	-1	0	1	2	3
$y$	-18	-8	-2	0	-2	-8	-18



22. [Units of Measurement / Time] \*  
The pool built in Melbourne's Rod Laver Arena for the 2007 world swimming championships held 3750 million  $\text{cm}^3$  of water. Is this  $<$ ,  $=$  or  $>$   $3750 \text{ m}^3$ ?

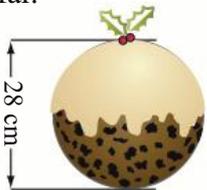
=

23. [Perimeter / Area] \*  
Use  $\pi \approx \frac{22}{7}$  to find the area of the shape.



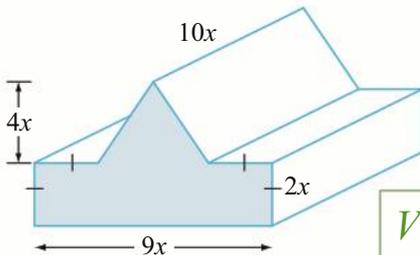
245  $\text{m}^2$

24. [Surface Area] \*  
Using  $TSA = 4\pi r^2$  and  $\pi \approx \frac{22}{7}$ , find how much area still needs to be iced to cover the whole pudding, given that  $1400 \text{ cm}^2$  has been iced so far.



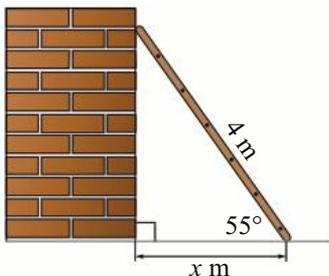
1064  $\text{cm}^2$

25. [Volume] \*  
Write an algebraic expression for the volume  $V$  of the prism. [Express the answer in terms of  $x$ .]



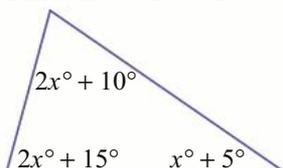
$V = 280x^3$

26. [Pythagoras / Trigonometry] \*  
A 4 m long ladder is leaning against a wall and makes an angle of  $55^\circ$  with the ground. If  $\cos 55^\circ \approx 0.57$ , how far out from the base of the wall is the end of the ladder?



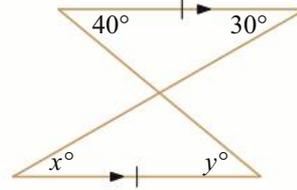
2.28 m

27. [Angles] \*  
Find the value of  $x^\circ$ .



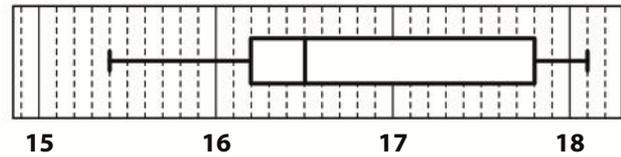
30°

28. [Geometric Reasoning]  
Find the value of  $x^\circ$  and  $y^\circ$  in this pair of congruent triangles.



$x^\circ = 30^\circ$   $y^\circ = 40^\circ$

29. [Statistics]  
Draw a box-and-whisker plot for the set of data whose lowest value is 15.4, greatest value is 18.1, median is 16.5, lower quartile is 16.2 and upper quartile is 17.8.



30. [Probability] \*  
A school survey found that 3 out of 5 students travel to school by bus. There are 600 students in the school. How many students would you expect to travel to school by bus?

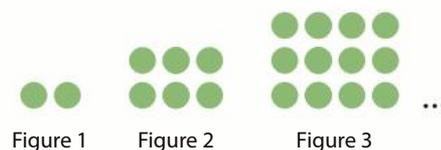
360

31. [Problem Solving 1] \*  
If car plates were to have four digits separated in the centre by any letter of the alphabet, how many different plates would be available? [Digits can be repeated.]

05 - X - 68

260 000

32. [Problem Solving 2] \*  
A pattern is made using circles as shown. Two circles were required to make the first figure, and six circles were required to make the second. How many circles are required to make the twentieth figure in the pattern?



420

# MATHS MATE

## Term 3 - Sheet 7



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times, \div$ ] \*  
 $996 \div 16 =$

62.25

2. [Decimal  $+, -$ ] \*  
 $12 - 3.456 =$

8.544

3. [Decimal  $\times, \div$ ] \*  
 $12.3 \div 1.23 =$

10

4. [Fraction  $+, -$ ] \*  
 $3\frac{8}{9} + 1\frac{4}{9} =$

$5\frac{1}{3}$

5. [Fraction  $\times, \div$ ] \*  
 $\frac{7}{10} \div 14 =$

$\frac{1}{20}$

6. [Percentages] \*  
Decrease 300 by 51%.

147

7. [Decimals / Fractions / Percentages] \*  
Place in ascending order:  
 $35\%$ ,  $0.38$ ,  $\frac{3}{8}$

$35\%$ ,  $\frac{3}{8}$ ,  $0.38$

8. [Integer  $+, -$ ] \*  
 $(6 - 12) - (-4 + 6) =$

-8

9. [Integer  $\times, \div$ ] \*  
 $\frac{-6 - 2}{2 - 6} =$

2

10. [Rates / Ratios] \*  
 $40\,000 \text{ m/h} =$  40 km/h

11. [Indices]  
Simplify  $(x^4)^2$

$x^8$

12. [Square Roots] \*  
 $6\sqrt{25} \times 2\sqrt{81} =$

540

13. [Exploring Number]  
Which is an irrational number?

- A)  $\sqrt{36}$       B)  $\sqrt{100}$   
C)  $-\sqrt{6}$       D)  $\frac{12}{17}$

C

14. [Financial Mathematics]  
A dress is reduced by 30%. If the sale price is \$140, what is the discount on the dress?

\$60

15. [Number Patterns] \*  
If the general rule of a sequence is  $10 - 3n$  find the 25th term.

-65

16. [Expressions]  
Simplify  $-32xy \div -4y$

8x

17. [Substitution] \*  
If  $a = -2$ , find the value of  $\frac{a^2 - 2a}{5}$

$1\frac{3}{5}$

18. [Expansion] \*  
Expand and simplify  
 $(j - 7)(j + 7)$

$j^2 - 49$

19. [Factorisation] \*  
Factorise  $7z^2 - 63$

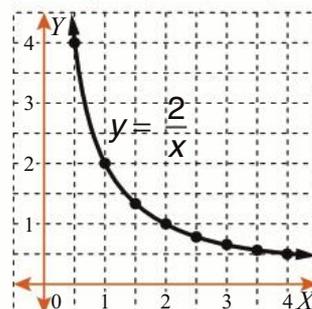
$7(z + 3)(z - 3)$

20. [Equations] \*  
Solve for  $x$ :  
 $x(x - 2) = 0$

0, 2

21. [Coordinate Geometry] \*  
Sketch the non-linear rule  $y = \frac{2}{x}$  (hyperbola) by first completing this table of values.

$x$	0	$\frac{1}{2}$	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4
$y$		4	2	$\frac{4}{3}$	1	$\frac{4}{5}$	$\frac{2}{3}$	$\frac{4}{7}$	$\frac{1}{2}$



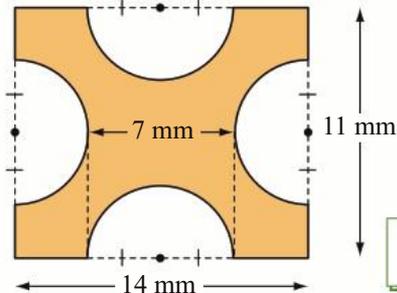
22. [Units of Measurement / Time] \*

An average washing machine uses approximately 120 L of water per load and an average dishwasher 25 000 mL. Express the difference in millilitres.

95 000 mL

23. [Perimeter / Area] \*

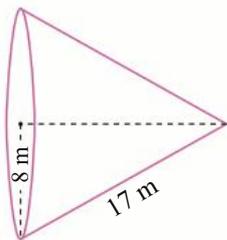
Use  $A = \pi r^2$  where  $\pi \approx \frac{22}{7}$ , to find the area of the shaded shape.



77 mm<sup>2</sup>

24. [Surface Area] \*

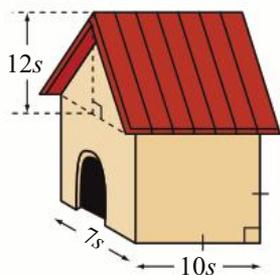
Use  $\pi \approx 3.14$  to find the total surface area of the cone.



628 m<sup>2</sup>

25. [Volume] \*

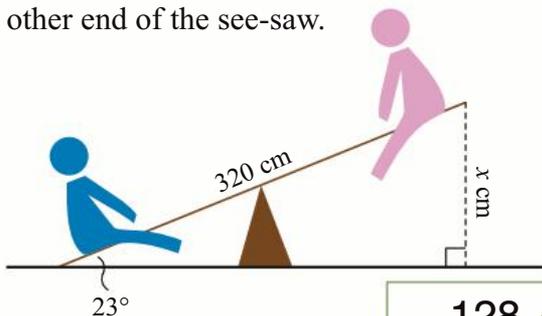
Write an algebraic expression for the volume of air inside the dog house.



$V = 1120s^3$

26. [Pythagoras / Trigonometry] \*

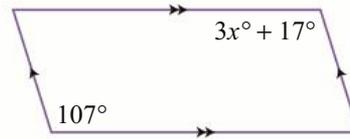
A see-saw is 320 cm long. When one end touches the ground, it makes an angle of  $23^\circ$  with the ground. If  $\sin 23^\circ \approx 0.4$ , find the approximate height from the ground of the other end of the see-saw.



128 cm

27. [Angles] \*

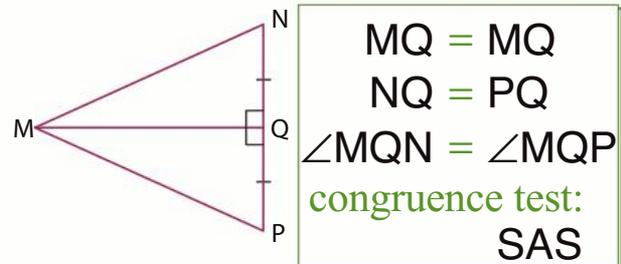
Find the value of  $x^\circ$ .



30°

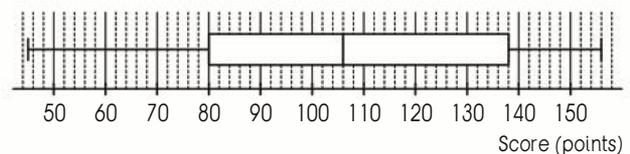
28. [Geometric Reasoning]

Write the pairs of equal sides and angles to prove that  $\triangle MNQ$  and  $\triangle MPQ$  are congruent. Which congruence test did you use?



29. [Statistics] \*

What is the median and interquartile range (IQR) of these scores?



median = 106

IQR = 58

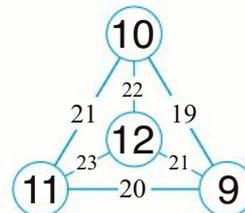
30. [Probability] \*

A standard die is rolled 300 times. How many numbers greater than 4 would you expect as a result?

100

31. [Problem Solving 1] \*

Enter numbers in the circles so that the numbers on each line equal the sum of the numbers at each end.



32. [Problem Solving 2] \*

A long strip of paper was folded in half then in half again. It then had three crease lines in the strip. If the paper was folded in half six more times (eight altogether), how many creases would there be when it was unfolded?

[Note: When unfolded all the crease lines should be parallel to each other.]

255

# MATHS MATE

## Term 3 - Sheet 8



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times, \div$ ] \*  
 $1608 \div 30 =$

53.6

2. [Decimal  $+, -$ ] \*  
 $68 - 0.907 =$

67.093

3. [Decimal  $\times, \div$ ] \*  
 $1.28 \div 0.8 =$

1.6

4. [Fraction  $+, -$ ] \*  
 $3\frac{1}{12} - 1\frac{7}{12} =$

$1\frac{1}{2}$

5. [Fraction  $\times, \div$ ] \*  
 $\frac{4}{9} \div 12 =$

$\frac{1}{27}$

6. [Percentages] \*  
Reduce 480 by 35%.

312

7. [Decimals / Fractions / Percentages] \*  
Place in descending order:  
 $0.6, 66\%, \frac{2}{3}$

$\frac{2}{3}, 66\%, 0.6$

8. [Integer  $+, -$ ] \*  
 $(-9 - 15) + (3 - 8) =$

-29

9. [Integer  $\times, \div$ ] \*  
 $\frac{30}{-2 \times 3} =$

-5

10. [Rates / Ratios] \*  
300 beats/min = 5 beats/s

11. [Indices]  
Simplify  $3(y^5)^2$

$3y^{10}$

12. [Square Roots] \*  
 $\frac{8\sqrt{144}}{2\sqrt{16}} =$

12

13. [Exploring Number]  
Which numbers are rational?

- A)  $-0.727272\dots$     B)  $\sqrt{3}$   
C)  $\pi$     D)  $-\frac{1}{5}$

A and D

14. [Financial Mathematics] \*  
There is a discount of \$50 on a fish tank for purchasing by cash. If the original marked price of the tank is \$125, what is the percentage discount given on the marked price?

40%

15. [Number Patterns] \*  
If the general rule of a sequence is  $-\frac{3n}{5}$  find the 45th term.

-27

16. [Expressions]  
Simplify  $-18g^2h \div 6h$

$-3g^2$

17. [Substitution] \*  
If  $x = -3$  and  $y = -5$ ,  
find the value of  $x^2 + \frac{3y}{2}$  or 1.5

$\frac{3}{2}$

18. [Expansion] \*  
Expand and simplify  
 $(q - 4)(q - 6)$

$q^2 - 10q + 24$

19. [Factorisation] \*  
Factorise  $a^2b^2 - 9c^2$

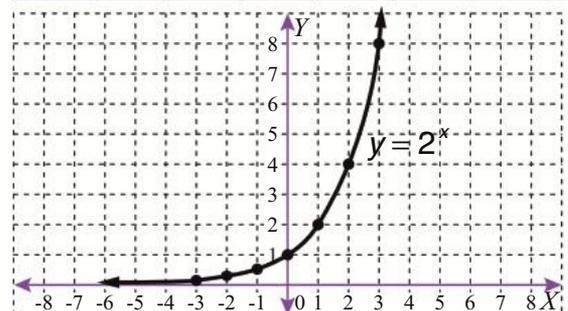
$(ab + 3c)(ab - 3c)$

20. [Equations] \*  
Solve for  $x$ :  
 $x(9 + x) = 0$

-9, 0

21. [Coordinate Geometry] \*  
Sketch the non-linear rule  $y = 2^x$  (exponential function) by first completing this table of values.

$x$	-3	-2	-1	0	1	2	3
$y$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	8

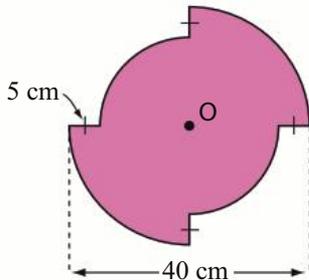


QUOTE OF THE WEEK: Question: "Which is worse - ignorance or apathy?" Response: "I don't know and I don't care."

22. [Units of Measurement / Time] \*  
Place in order from largest to smallest:  
0.0025 ML, 25 L and 250 000 mL

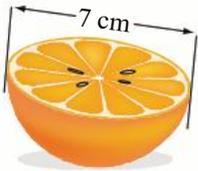
0.0025 ML, 250 000 mL, 25 L

23. [Perimeter / Area] \*  
Use  $A = \pi r^2$  where  $\pi \approx 3.14$ , to find the area of the shape.



981.25 cm<sup>2</sup>

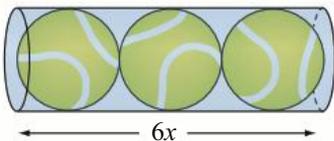
24. [Surface Area] \*  
Use  $\pi \approx \frac{22}{7}$  to find the total surface area of the orange half including the peel and cut surface.



115.5 cm<sup>2</sup>

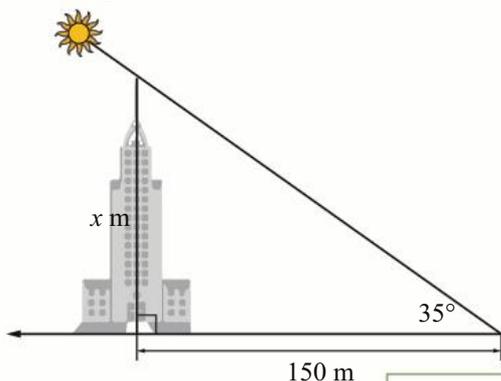
25. [Volume] \*  
A can contains three tennis balls, with no room for the balls to move. Write an algebraic expression in terms of  $x$  for the volume of the can which is not occupied by the balls.

[Hint:  $V_{\text{sphere}} = \frac{4\pi r^3}{3}$ ,  $V_{\text{cylinder}} = \pi r^2 h$ ]



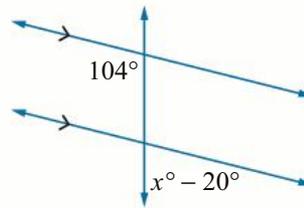
$V = 2\pi x^3$

26. [Pythagoras / Trigonometry] \*  
A skyscraper casts a shadow which is 150 m long when the sun is at an angle of 35° in the sky. If  $\tan 35^\circ = 0.7$ , find the height of the skyscraper.



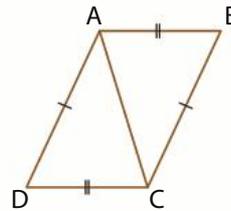
105 m

27. [Angles] \*  
Find the value of  $x^\circ$ .



96°

28. [Geometric Reasoning]  
Write the pairs of equal sides and angles to prove that  $\triangle ABC$  and  $\triangle ADC$  are congruent. Which congruence test did you use?



$AB = CD$

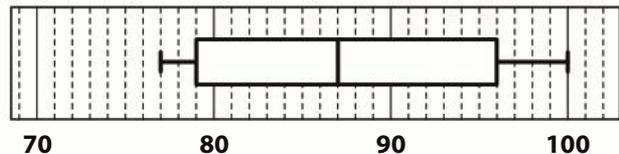
$BC = AD$

$AC = AC$

congruence test:  
SSS

29. [Statistics]  
Draw a box-and-whisker plot for this set of data:

77, 78, 80, 86, 87, 87, 94, 98, 100



30. [Probability] \*  
Based on 50 practice kicks for goal, the probability of a certain result is shown. How many points were scored?

Result	GOALS	POINTS	Out of Bounds	Falls short
Probability	0.5	0.3	0.1	0.1

15

31. [Problem Solving 1] \*  
A bag contains 100 balls and 95% are blue. Some blue balls are taken out. After this 75% of the balls in the bag are blue. How many balls were removed?

80

32. [Problem Solving 2] \*  
It is 5 km from Millie's house to Irene's house. Millie and Irene started to walk to each other's house at noon, meeting at 12:30 pm. If Millie walked 2 km/h faster than Irene, how fast did Irene walk?

4 km/h

# MATHS MATE

## Term 4 - Sheet 1



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times$ ,+] \*  
 $1432 \times 49 =$

70 168

2. [Decimal +,-] \*  
 $2.8 + 15.03 - 0.004 =$

17.826

3. [Decimal  $\times$ ,+] \*  
 $8 \div 0.02 =$

400

4. [Fraction +,-] \*  
 $\frac{1}{3} + \frac{3}{5} - \frac{2}{15} =$

$\frac{4}{5}$

5. [Fraction  $\times$ ,+] \*  
 $\frac{3}{8} \times \frac{1}{2} \times \frac{8}{9} =$

$\frac{1}{6}$

6. [Percentages] \*  
Due to Cyclone Larry, the price of bananas in Queensland increased from \$3.00 per kilogram in 2005 to \$10.50 per kilogram in 2006. What percentage increase was this?

250%

7. [Decimals / Fractions / Percentages] \*  
 $0.2\dot{6}\dot{9}$  is the notation for:

- A) 0.2669966.....  
B) 0.2696969.....  
C) 0.2666999.....

B

8. [Integer +,-]  
 $-1 + -5 =$

-6

9. [Integer  $\times$ ,+]  
 $-54 \div -9 =$

6

10. [Rates / Ratios] \*  
The goal to goal distance at the Melbourne Cricket Ground (MCG) is 160 m. What scale factor was used to build a 20 cm long model of the MCG?

1 : 800

11. [Indices]  
Evaluate  $(-3)^2$

9

12. [Square Roots] \*  
 $\sqrt{169} - \sqrt{144} =$

1

13. [Exploring Number]  
Which classification describes 1.723?

- A) integer and rational  
B) rational and real  
C) irrational and rational  
D) real and integer

B

14. [Financial Mathematics] \*  
Mal loans a friend \$4000 at a compound interest rate of 6% per year. What is the total amount of interest owed to Mal after 2 years?

\$494.40

15. [Number Patterns] \*  
Write an expression for the term in position  $n$  given the table of values for the sequence.

position	1	2	3	4	5	...	$n$
term	7	8	9	10	11	...	$n + 6$

$n + 6$

16. [Expressions] \*  
Simplify  $3x^2 + 2y^2 - x^2 - 3y^2$

$2x^2 - y^2$

17. [Substitution] \*  
If  $y = x^2 - 4x$ , find  $y$  when  $x = 1$

-3

18. [Expansion] \*  
Expand and simplify  $(2u - 4)(u - 3)$

$2u^2 - 10u + 12$

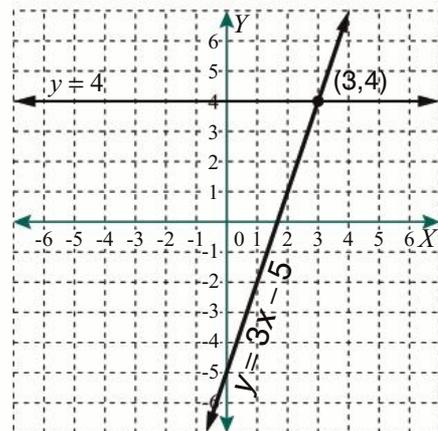
19. [Factorisation] \*  
Factorise  $x^2 + 3x + 4x + 12$

$(x + 4)(x + 3)$

20. [Equations] \*  
Solve the simultaneous equations:  
 $y = 2x + 3$   
 $y = 3$

(0,3)

21. [Coordinate Geometry] \*  
Solve the simultaneous equations  $y = 4$  and  $y = 3x - 5$  by graphing their lines on the Cartesian plane. [The line  $y = 4$  has been drawn.]



(3,4)

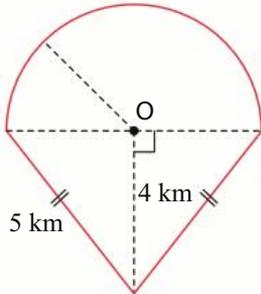
22. [Units of Measurement / Time] \*

Express in square centimetres:

$$1 \text{ m}^2 \text{ and } 5000 \text{ cm}^2 = \boxed{15000 \text{ cm}^2}$$

23. [Perimeter / Area] \*

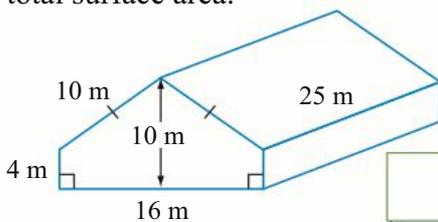
Find the perimeter of the shape.  
(Use  $\pi \approx 3.14$ )



$$\boxed{19.42 \text{ km}}$$

24. [Surface Area] \*

A block of wood has the shape of a triangular prism on top of a rectangular prism. Find its total surface area.



$$\boxed{1324 \text{ m}^2}$$

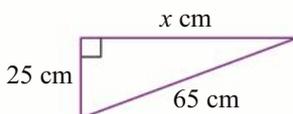
25. [Volume] \*

A rectangular prism with volume  $1080 \text{ m}^3$  has a length of 15 m and a width of 6 m. Calculate the height of the prism.

$$\boxed{12 \text{ m}}$$

26. [Pythagoras / Trigonometry] \*

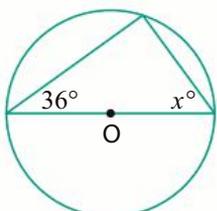
Find the area of the right-angled triangle by first calculating the missing side length.



$$\boxed{750 \text{ cm}^2}$$

27. [Angles] \*

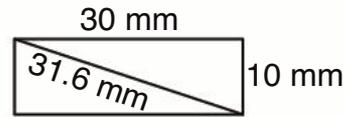
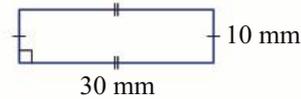
Find the value of  $x^\circ$ .



$$\boxed{54^\circ}$$

28. [Geometric Reasoning]

Redraw the rectangle to scale and estimate the length of its diagonal.

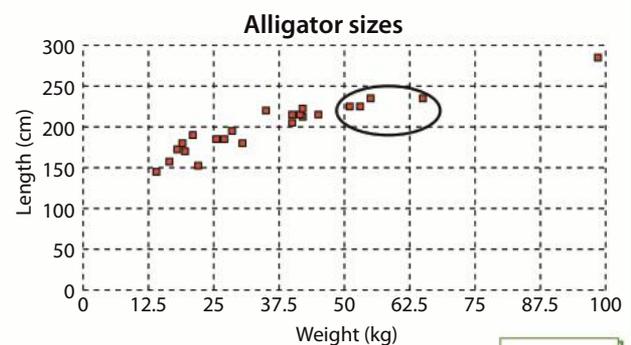


$$\text{diagonal} = \boxed{31.6 \text{ mm}}$$

Accept 31 to 35 mm

29. [Statistics]

Of the alligators sampled, how many have a weight of more than 50 kilograms and a length of less than 250 centimetres?



$$\boxed{4}$$

30. [Probability] \*

A boy and girl class captain are to be chosen at random from a group of 8 boys and 14 girls. Eva and Alan are in the group. What is the probability that they are both chosen?  
[Give your answer as a fraction.]

$$\boxed{\frac{1}{112}}$$

31. [Problem Solving 1] \*

If  $n$  is an even number, which one or more of the following must be odd?

- A)  $n^3$                       B)  $2n$   
C)  $2n + n$                 D)  $2n + 5$

$$\boxed{D}$$

32. [Problem Solving 2] \*

Two cyclists ride towards each other at 20 km/h from opposite ends of a straight stretch of road 40 km long. At the same time, a blowfly flies away from one cyclist towards the other at 30 km/h. When it meets the other cyclist, it is so scared that it turns around and heads back. It continues moving from cyclist to cyclist until the cyclists meet. At this point the fly drops dead with fright. What was the total distance flown by the blowfly?

$$\boxed{30 \text{ km}}$$

# MATHS MATE

## Term 4 - Sheet 2



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times, \div$ ] \*  
 $3917 \times 26 =$  101 842

2. [Decimal  $+, -$ ] \*  
 $26 - 13.904 + 3.05 =$  15.146

3. [Decimal  $\times, \div$ ] \*  
 $14 \div 0.7 =$  20

4. [Fraction  $+, -$ ] \*  
 $\frac{2}{3} - \frac{5}{18} + \frac{1}{6} =$   $\frac{5}{9}$

5. [Fraction  $\times, \div$ ] \*  
 $\frac{1}{3} \times \frac{6}{10} \times \frac{5}{2} =$   $\frac{1}{2}$

6. [Percentages] \*  
 In 1960 Australians each used 200 L per day of water. By 2013 Australians each used 175 L per day. What percentage decrease was this? 12.5%

7. [Decimals / Fractions / Percentages] \*  
 $0.4\dot{3}\dot{1}$  is the notation for:  
 A) 0.431431431.....  
 B) 0.4443111.....  
 C) 0.4333331.....  
A

8. [Integer  $+, -$ ]  
 $-4 - -7 =$  3

9. [Integer  $\times, \div$ ]  
 $14 \times -3 =$  -42

10. [Rates / Ratios] \*  
 The superjumbo jet Airbus A 380 has a wingspan of 80 m. What scale factor was used to build a model that has a wingspan of 20 cm? 1 : 400

11. [Indices]  
 Evaluate  $(-5)^3$  -125

12. [Square Roots] \*  
 $\sqrt{144} + \sqrt{81} =$  21

13. [Exploring Number]  
 Which classification describes  $0.\dot{6}\dot{3}$ ?  
 A) integer and rational  
 B) rational and real  
 C) irrational and rational  
 D) real and integer  
B

14. [Financial Mathematics] \*  
 Ollie borrowed \$5000 for 3 years at a compound interest rate of 10%. How much did Ollie pay back?  
 [Hint: Principal + interest.] \$6655

15. [Number Patterns] \*  
 Write an expression for the term in position  $n$  given the table of values for the sequence.

position	1	2	3	4	5	...	$n$
term	4	7	10	13	16	...	$3n + 1$

$3n + 1$

16. [Expressions] \*  
 Simplify  $a^2b - 2a - 4a^2b + a$   $-3a^2b - a$

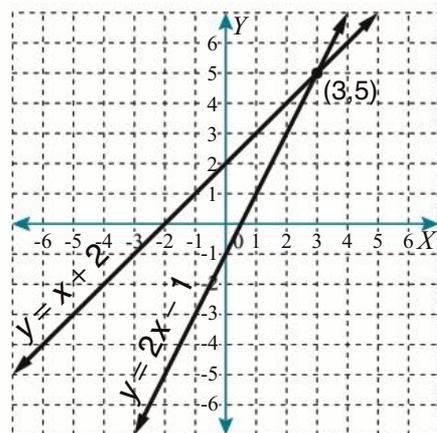
17. [Substitution] \*  
 If  $y = 2x^2 - 3x - 4$ , find  $y$  when  $x = 0$  -4

18. [Expansion] \*  
 Expand and simplify  $(4y - 6)(y + 7)$   $4y^2 + 22y - 42$

19. [Factorisation] \*  
 Factorise  $u^2 + 2u + 5u + 10$   $(u + 5)(u + 2)$

20. [Equations] \*  
 Solve the simultaneous equations:  
 $x + y = 4$   
 $y = 2x + 1$   
(1, 3)

21. [Coordinate Geometry] \*  
 Solve the simultaneous equations  $y = x + 2$  and  $y = 2x - 1$  by graphing their lines on the Cartesian plane.

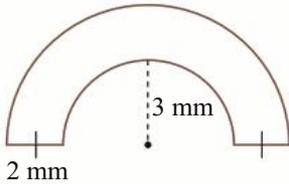


(3, 5)

22. [Units of Measurement / Time] \*  
A 2019, 50th anniversary stamp commemorating the Apollo 11 moon landing has an area of  $986 \text{ mm}^2$ . Is the stamp  $<$ ,  $=$  or  $>$   $10 \text{ cm}^2$ ?

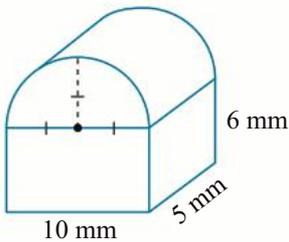
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23. [Perimeter / Area] \*  
Using  $C = 2\pi r$  where  $\pi \approx 3.14$ , find the perimeter of the shape.



29.12 mm

24. [Surface Area] \*  
Use  $\pi \approx 3.14$  to find the total surface area of the shape.

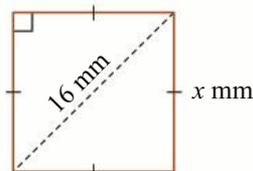


387 mm<sup>2</sup>

25. [Volume] \*  
A rectangular swimming pool contains 800 000 L of water. The pool is 24 m long and 16 m wide. If its average depth is supposed to be 2.5 m, how many more litres of water need to be added to the pool? [Hint:  $1000 \text{ L} = 1 \text{ m}^3$ ]

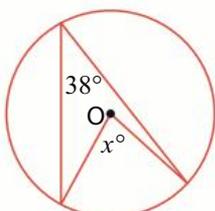
160 000 L

26. [Pythagoras / Trigonometry] \*  
Find the area of the square by first calculating the missing side length.



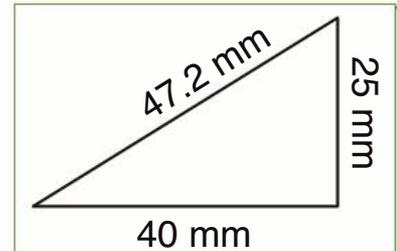
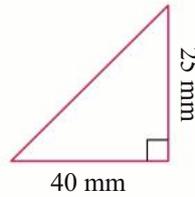
128 mm<sup>2</sup>

27. [Angles] \*  
Find the value of  $x^\circ$ .



76°

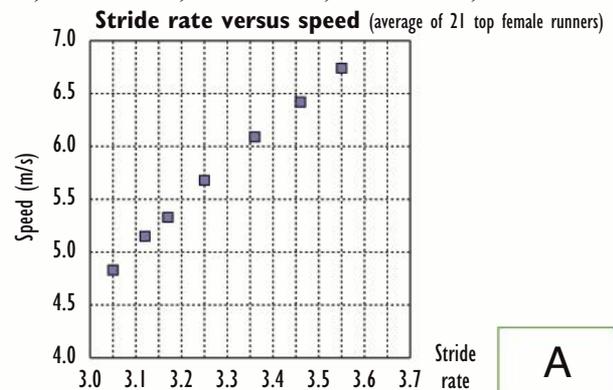
28. [Geometric Reasoning]  
Redraw the triangle to scale and estimate the length of its hypotenuse.



Accept 45 to 50 mm hypotenuse = 47.2 mm

29. [Statistics]  
If the speed is 6.5 metres per second, what is the stride rate most likely to be?

A) 3.5    B) 3.9    C) 3.4    D) 3.6

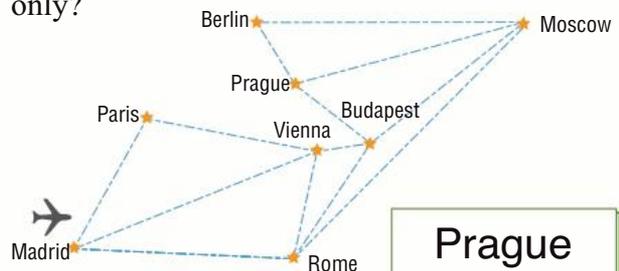


A

30. [Probability] \*  
In Australia it is estimated that 60% of drivers are distracted by their mobile phones. If two drivers are chosen at random, what is the probability that they are both distracted by their mobiles? or 36%

0.36

31. [Problem Solving 1] \*  
Beginning at Madrid, where will you end up if you travel every flight path once and once only?



Prague

32. [Problem Solving 2] \*  
In a small town there are five straight streets, none of which is parallel to the other. What is the maximum number of intersections there could be in this town?



Three streets,  
three intersections

10

# MATHS MATE

## Term 4 - Sheet 3



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times, \div$ ] \*  
 $4026 \times 38 =$  152 988

2. [Decimal  $+, -$ ] \*  
 $15.094 + 2.7 - 4.703 =$  13.091

3. [Decimal  $\times, \div$ ] \*  
 $40 \div 0.25 =$  160

4. [Fraction  $+, -$ ] \*  
 $\frac{1}{2} + \frac{2}{5} - \frac{7}{9} =$   $\frac{11}{90}$

5. [Fraction  $\times, \div$ ] \*  
 $\frac{2}{3} \times \frac{7}{10} \times \frac{6}{7} =$   $\frac{2}{5}$

6. [Percentages] \*  
 In 2013 the value of a Google Inc. share was approximately \$800. By 2019 a Google Inc (now Alphabet Inc) share was selling for around \$1600 per share. Find the percentage increase. 100%

7. [Decimals / Fractions / Percentages] \*  
 Write  $\frac{2}{3}$  as a recurring decimal. 0.6̇

8. [Integer  $+, -$ ] \*  
 $-7 - 9 + -4 =$  -20

9. [Integer  $\times, \div$ ] \*  
 $48 \div -12 \times 2 =$  -8

10. [Rates / Ratios]  
 On a map the scale ratio is 1 : 10 000 000. What is the real life distance between Napier and Invercargill (New Zealand), if they are 13 cm apart on the map? 1300 km

11. [Indices]  
 Evaluate  $(-1)^9$  -1

12. [Square Roots] \*  
 $\sqrt{25} - \sqrt{16} = \sqrt{9}$   
 True or false? false

13. [Exploring Number]  
 Use true and false to complete this table:

	Integer	Rational	Irrational	Real
$3\frac{2}{7}$	false	true	false	true

14. [Financial Mathematics] \*  
 April invests \$1000 at a compound interest rate of 12% per year. How much does she get back after 2 years?  
 [Hint: Principal + interest.] \$1254.40

15. [Number Patterns] \*  
 Write an expression for the term in position  $n$  given the table of values for the sequence.

position	1	2	3	4	5	...	$n$
term	7	9	11	13	15	...	$2n + 5$

$2n + 5$

16. [Expressions] \*  
 Simplify  $-5q - q^2 + 2q + 3q^2$   $-3q + 2q^2$

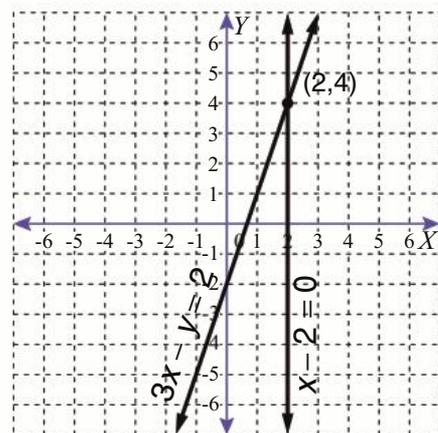
17. [Substitution] \*  
 If  $y = 3x^2 + x - 6$ , find  $y$  when  $x = 2$  8

18. [Expansion] \*  
 Expand and simplify  $(x + 4)(3x - 5)$   $3x^2 + 7x - 20$

19. [Factorisation] \*  
 Factorise  $3q + q^2 + 18 + 6q$   $(q + 6)(q + 3)$

20. [Equations] \*  
 Solve the simultaneous equations:  
 $7 = 3x - y$   
 $7 = x + 2y$  (3,2)

21. [Coordinate Geometry] \*  
 Solve the simultaneous equations  $x - 2 = 0$  and  $3x - y = 2$  by graphing their lines on the Cartesian plane.



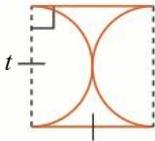
(2,4)

QUOTE OF THE WEEK: Genius is one percent inspiration and ninety-nine percent perspiration. Thomas A. Edison

22. [Units of Measurement / Time] \*  
The area of a Maths Mate sheet is  $62\,370 \text{ mm}^2$ .  
Express this in square centimetres.

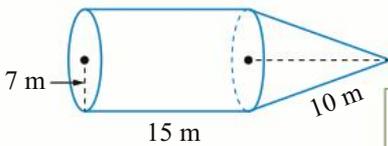
$623.7 \text{ cm}^2$

23. [Perimeter / Area] \*  
Write an algebraic expression for the perimeter  $P$  of the shape. [Express the answer in terms of  $t$  and  $\pi$ .]



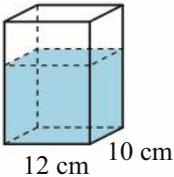
or  $t(2 + \pi)$   
 $P = 2t + \pi t$

24. [Surface Area] \*  
Use  $\pi \approx \frac{22}{7}$  to find the total surface area of the shape.



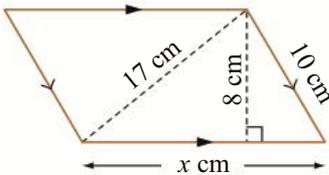
$1034 \text{ m}^2$

25. [Volume] \*  
The vase has 1.8 litres of water in it. Find the depth of the water. [Hint:  $1000 \text{ cm}^3 = 1 \text{ L}$ ]



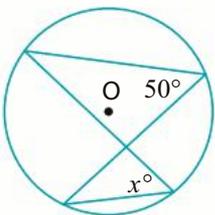
$15 \text{ cm}$

26. [Pythagoras / Trigonometry] \*  
Find the area of the parallelogram by first calculating the missing side length.



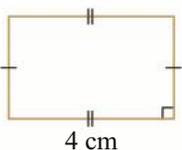
$168 \text{ cm}^2$

27. [Angles] \*  
Find the value of  $x^\circ$ .



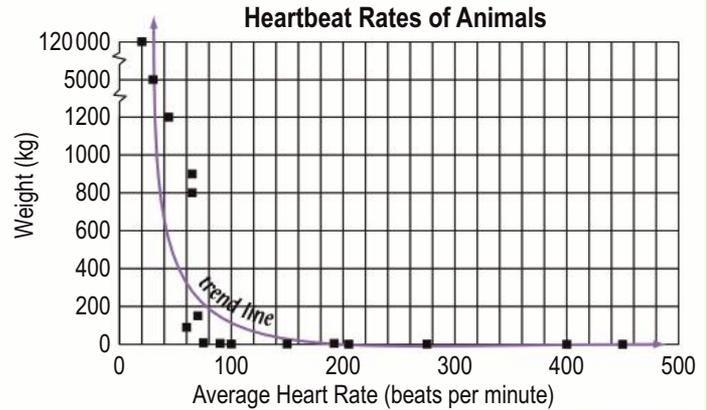
$50^\circ$

28. [Geometric Reasoning] \*  
Determine the scale factor used when the rectangle represents the plan of a house block of length 80 m.



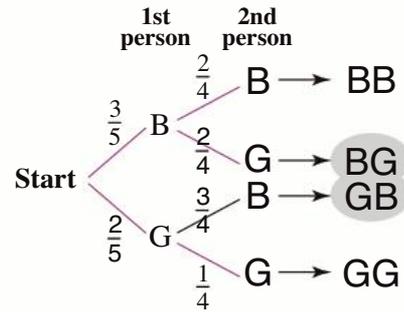
$1 : 2000$

29. [Statistics] \*  
Which best describes the sample?  
A) Heavier animals have a faster heart rate  
B) Heavier animals have a slower heart rate  
C) Heart rates are not related to weight



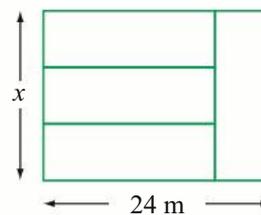
**B**

30. [Probability] \*  
A pair of students must be selected from 2 girls and 3 boys. Complete the probability tree diagram. What is the probability of selecting a mixed pair? [Give your answer as a fraction in simplest form.]



$\frac{3}{5}$

31. [Problem Solving 1] \*  
A rectangle is divided into 4 identical rectangles as shown. If the original rectangle is 24 m long, how wide is it?



$18 \text{ m}$

32. [Problem Solving 2] \*  
Three boys, Peter, David and Sam, each have one sister and one pet. Peter has a parrot. The horse belongs to the boy whose sister is Rebecca. If Sam's sister is Tess and the other girl is Veronica, who is David's sister?

**Rebecca**

# MATHS MATE

## Term 4 - Sheet 4



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times, \div$ ] \*  
 $5309 \times 74 =$  392 866

2. [Decimal  $+, -$ ] \*  
 $0.306 - 0.098 + 0.88 =$  1.088

3. [Decimal  $\times, \div$ ] \*  
 $9 \div 0.5 =$  18

4. [Fraction  $+, -$ ] \*  
 $\frac{1}{2} - \frac{1}{3} + \frac{2}{7} =$   $\frac{19}{42}$

5. [Fraction  $\times, \div$ ] \*  
 $\frac{9}{11} \times \frac{2}{3} \times \frac{22}{6} =$  2

6. [Percentages] \*  
 Koala numbers were surveyed in the Gunnedah area. Their numbers fell from an estimated 15 000 in 1993 to 1500 in 2013. What percentage decrease was this?  
90%

7. [Decimals / Fractions / Percentages] \*  
 Write  $\frac{5}{6}$  as a recurring decimal.  
0.8 $\dot{3}$

8. [Integer  $+, -$ ] \*  
 $3 - -19 + -12 =$  10

9. [Integer  $\times, \div$ ] \*  
 $-5 \times -4 \div 2 =$  10

10. [Rates / Ratios] \*  
 On a map the distance between Wanganui and Rotorua (New Zealand) is 15 cm. What is the scale factor of the map, if the real life distance is 300 km?  
1 : 2 000 000

11. [Indices] \*  
 Evaluate  $(-4)^4$  256

12. [Square Roots] \*  
 $\sqrt{36} + \sqrt{36} + \sqrt{36} + \sqrt{36} = \sqrt{144}$   
 True or false? false

13. [Exploring Number]  
 Use true and false to complete this table:

	Integer	Rational	Irrational	Real
$\sqrt{15}$	false	false	true	true

14. [Financial Mathematics] \*  
 What is the total amount repaid on a loan of \$500 at a compound interest rate of 10% after 3 years? [Hint: Principal + interest.]  
\$665.50

15. [Number Patterns] \*  
 Write an expression for the term in position  $n$  given the table of values for the sequence.

position	1	2	3	4	5	...	$n$
term	4	3	2	1	0	...	$5 - n$

$5 - n$

16. [Expressions] \*  
 Simplify  $4g^2h - 5gh^2 + gh^2 - 3g^2h$   $g^2h - 4gh^2$

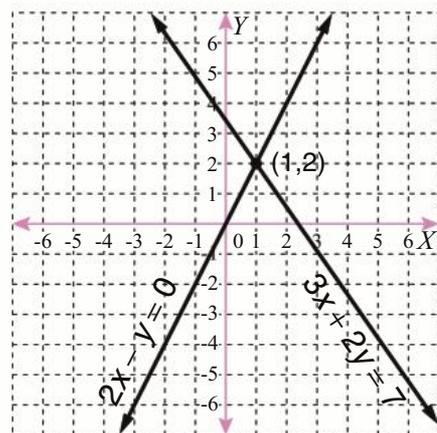
17. [Substitution] \*  
 If  $y = x^2 + 2x + 1$ , find  $y$  when  $x = -1$  0

18. [Expansion] \*  
 Expand and simplify  $(2k - 2)(2k - 3)$   $4k^2 - 10k + 6$

19. [Factorisation] \*  
 Factorise  $3r + 3 - r^2 - r$   $(3 - r)(r + 1)$

20. [Equations] \*  
 Solve the simultaneous equations:  
 $x + y = 1$   
 $x + 3 = y$   
(-1, 2)

21. [Coordinate Geometry] \*  
 Solve the simultaneous equations  $2x - y = 0$  and  $3x + 2y = 7$  by graphing their lines on the Cartesian plane.



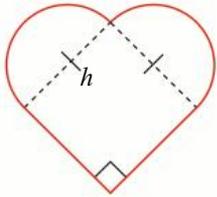
(1, 2)

QUOTE OF THE WEEK: One of the greatest achievements in a materialistic society is to be content with what we have. P. K. Shaw

22. [Units of Measurement / Time] \*  
Place in order from smallest to largest:  
100 m<sup>2</sup>, 100 000 cm<sup>2</sup> and 0.001 km<sup>2</sup>

100 000 cm<sup>2</sup>, 100 m<sup>2</sup>, 0.001 km<sup>2</sup>

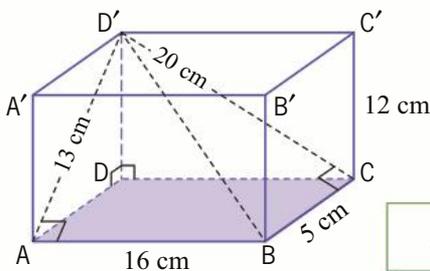
23. [Perimeter / Area] \*  
Write an algebraic expression for the perimeter  $P$  of the shape. [Express the answer in terms of  $h$  and  $\pi$ .]



or  $h(2 + \pi)$

$P = 2h + \pi h$

24. [Surface Area] \*  
In this rectangular prism, what is the total surface area of the pyramid of base ABCD and vertex D'?

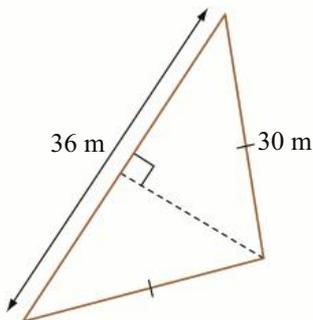


360 cm<sup>2</sup>

25. [Volume] \*  
If the total surface area of a cube is 600 cm<sup>2</sup>, what is the volume of the cube?

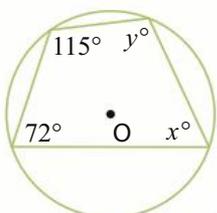
1000 cm<sup>3</sup>

26. [Pythagoras / Trigonometry] \*  
Find the area of this triangle.



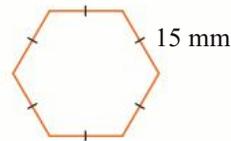
432 m<sup>2</sup>

27. [Angles] \*  
Find the values of  $x^\circ$  and  $y^\circ$ .



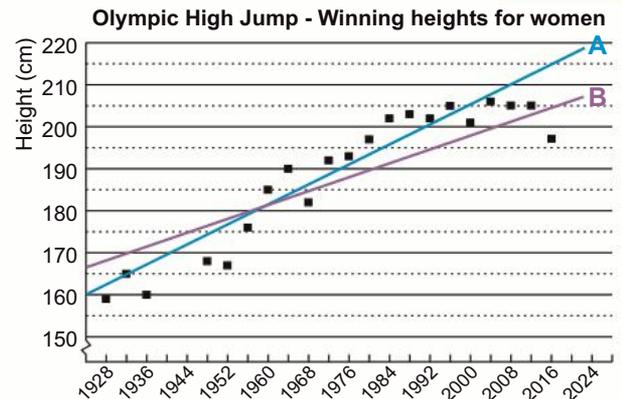
$x^\circ = 65^\circ$   $y^\circ = 108^\circ$

28. [Geometric Reasoning] \*  
Determine the scale factor used when the regular hexagon represents the plan of a bike track of perimeter 9 km.



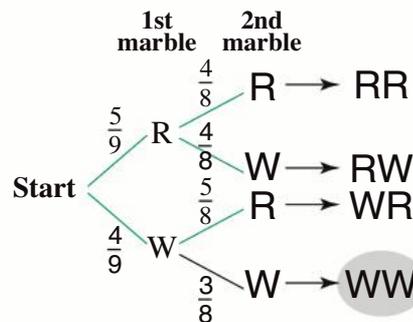
1 : 100 000

29. [Statistics] \*  
Select the most appropriate trend line for this scatter plot. [Hint: The sums of the distances from the points above and below the line, to the line, are approximately equal.]



A

30. [Probability] \*  
Two marbles are taken out in succession, without replacing, from a bag containing 5 red and 4 white marbles. Complete the probability tree diagram. What is the probability of choosing two white marbles? [Give the answer as a fraction in simplest form.]



$\frac{1}{6}$

31. [Problem Solving 1] \*  
If  $1 \clubsuit 3 = 8$   
 $2 \clubsuit 4 = 6$   
 $2 \clubsuit 9 = 1$   
and  $3 \clubsuit 6 = 3$

(This rather difficult problem was found on a grade three test! Can you solve it?)

what does  $4 \clubsuit 4 = ?$  all three parts add to 12

4

32. [Problem Solving 2] \*  
The excavator at the mine uses a litre of fuel every 3 minutes. The truck uses a litre of fuel every 6 minutes. How long will 100 litres of fuel last if both machines are being used?

200 min

# MATHS MATE

## Term 4 - Sheet 5



Name: .....

Due Date: ..... / ..... / .....

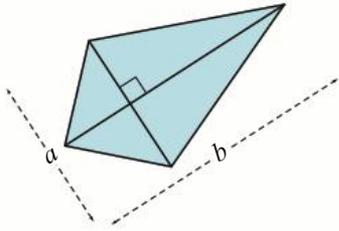
Parent's Signature: .....

1. [Long  $\times, \div$ ] \*  
 $800 \div 3 =$  266. $\dot{6}$
2. [Decimal  $+, -$ ] \*  
 $34.09 + 13.3 - 0.087 =$  47.303
3. [Decimal  $\times, \div$ ] \*  
 $0.2 \div 0.4 =$  0.5
4. [Fraction  $+, -$ ] \*  
 $1\frac{1}{8} + 1\frac{1}{6} =$   $2\frac{7}{24}$
5. [Fraction  $\times, \div$ ] \*  
 $2\frac{1}{4} \div \frac{3}{8} =$  6
6. [Percentages] \*  
40% of 200 = 80
7. [Decimals / Fractions / Percentages] \*  
Which fraction is approximately equal to 0.333?  
A)  $\frac{1}{6}$    B)  $\frac{1}{3}$    C)  $\frac{1}{10}$  B
8. [Integer  $+, -$ ] \*  
 $-7 +$  15 = 8
9. [Integer  $\times, \div$ ] \*  
 $-6 \times$  -8 = 48
10. [Rates / Ratios] \*  
Which wing-beat has a higher rate?  
A) 50 beats/s  
B) 2000 beats/min A
11. [Indices] \*  
Evaluate  $3^{-2}$   $\frac{1}{9}$
12. [Square Roots] \*  
Between which two consecutive whole numbers does  $\sqrt{7}$  lie? 2 and 3
13. [Exploring Number]  
Which number is greater?  
3.14 or  $\pi$   $\pi$
14. [Financial Mathematics] \*  
A computer depreciates in value at an annual rate of 25%. If it cost \$3200 when new, calculate its value after 2 years. \$1800
15. [Number Patterns]  
Complete the pattern:  
2.5, 3.5, 5, 7, 9.5, 12.5, 16
16. [Expressions] \*  
Simplify  $-3a \times 4b \times 2a$   $-24a^2b$
17. [Substitution] \*  
Use  $TSA = 2\pi r(r + h)$  to find the total surface area  $TSA$  of a cylinder when  $\pi \approx 3.14$ ,  $r = 5$  and  $h = 15$  628
18. [Expansion] \*  
Expand and simplify  $(r + 2)^2$   $r^2 + 4r + 4$
19. [Factorisation] \*  
Find the missing factor in the factorisation of  $h^2 + 8h + 7$   $(h + 7)(h + 1)$
20. [Equations] \*  
Solve for  $x$ :  
 $x^2 - 5x = 0$  0, 5
21. [Coordinate Geometry] \*  
Use  $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$  to find the distance between the points (2,1) and (5,5). 5

22. [Units of Measurement / Time] \*  
Convert 10 000 cubic centimetres to litres.

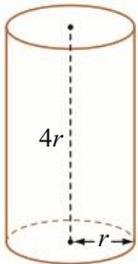
10 L

23. [Perimeter / Area] \*  
Write an algebraic expression for the area  $A$  of the kite. [Express the answer in terms of  $a$  and  $b$ .]



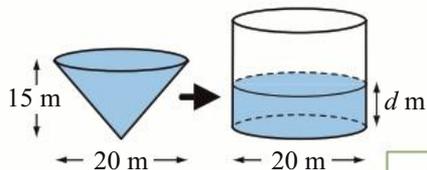
$A = \frac{ab}{2}$

24. [Surface Area] \*  
Write an algebraic expression for the total surface area  $TSA$  of the cylinder. [Express the answer in terms of  $r$  and  $\pi$ .]



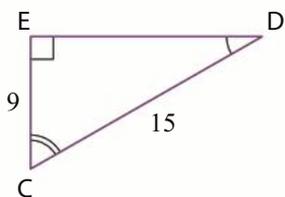
$TSA = 10\pi r^2$

25. [Volume] \*  
A cone full of water has been poured into a cylinder as shown. What is the depth ( $d$ ) of water in the cylinder?



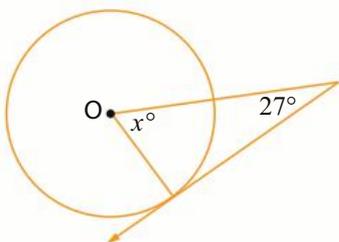
$d = 5 \text{ m}$

26. [Pythagoras / Trigonometry] \*  
Calculate the value of  $\tan D$  in this triangle. [Hint: Pythagoras' theorem will help.]



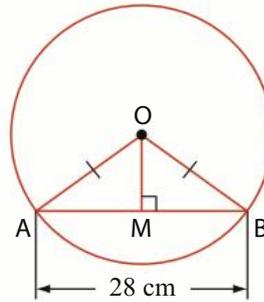
or 0.75  
 $\frac{3}{4}$

27. [Angles] \*  
Find the value of  $x^\circ$ .



$63^\circ$

28. [Geometric Reasoning]  
Find the length of the segment AM in this diagram.



14 cm

29. [Statistics] \*  
Calculate the median and upper quartile (UQ) for the data displayed in this frequency table.

Rio, 2016 - gold medal winning countries

Number of medals	1	2	3	4	5	6	7	8	9	10
Frequency	21	11	6	3	2	2	2	4	1	1

median = 2      UQ = 4

30. [Probability] \*  
Complete the two-way table. If one person is selected at random, find the probability that it is a man who voted 'No' at the referendum. [Give your answer as a fraction in simplest form.]

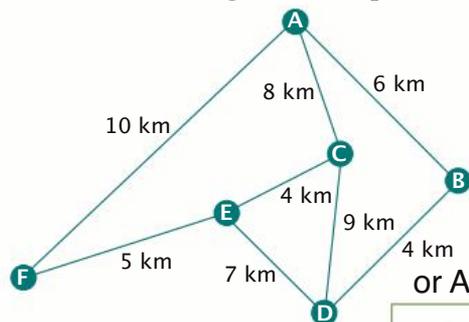
	Women	Men	Total
Yes	620	530	1150
No	380	410	790
Total	1000	940	1940

$\frac{41}{194}$

31. [Problem Solving 1] \*  
Deena has three children and one of them is a teenager. When Deena multiplies her children's ages together the result is 1155. How old is the teenager?

15

32. [Problem Solving 2] \*  
List a letter sequence for the path that allows you to travel to each letter and covers the greatest distance starting at A and ending at F, without travelling the same path twice.



or ABDECAF  
ACEDBAF



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times, \div$ ] \*  
 $308 \div 6 =$

51.3

2. [Decimal  $+, -$ ] \*  
 $32 - 4.029 - 6.13 =$

21.841

3. [Decimal  $\times, \div$ ] \*  
 $0.28 \div 0.08 =$

3.5

4. [Fraction  $+, -$ ] \*  
 $3\frac{1}{4} - 1\frac{5}{6} =$

$1\frac{5}{12}$

5. [Fraction  $\times, \div$ ] \*  
 $4\frac{1}{5} \div 1\frac{4}{10} =$

3

6. [Percentages] \*  
95% of 800 = 760

7. [Decimals / Fractions / Percentages] \*  
Which fraction does  $0.\dot{1}$  equal?  
A)  $\frac{1}{10}$    B)  $\frac{1}{6}$    C)  $\frac{1}{9}$

C

8. [Integer  $+, -$ ] \*  
5  $- -2 = 7$

9. [Integer  $\times, \div$ ] \*  
28  $\div -4 = -7$

10. [Rates / Ratios] \*  
Which density is higher?  
A)  $1000 \text{ kg/m}^3$  (water)  
B)  $0.8 \text{ g/cm}^3$  (oil)

A

11. [Indices] \*  
Evaluate  $2^{-3}$

$\frac{1}{8}$

12. [Square Roots] \*  
Between which two consecutive whole numbers does  $\sqrt{15}$  lie?

3 and 4

13. [Exploring Number]  
Which number is greater?  
 $\sqrt{15}$  or 4

4

14. [Financial Mathematics] \*  
A car depreciates in value at an annual rate of 10%. If it cost \$30 000 when new, calculate its value after 4 years.

\$19 683

15. [Number Patterns]  
Complete the pattern:  
 $2\frac{1}{4}, 4\frac{1}{2}, 9, 18,$

36, 72

16. [Expressions] \*  
Simplify  $-30x^2y \div 3y$

-10x<sup>2</sup>

17. [Substitution] \*  
Use  $A = \pi r^2$  to find the area  $A$  of a circle when  $\pi \approx 3\frac{1}{7}$  and  $r = 7$

154

18. [Expansion] \*  
Expand and simplify  $(g - 7)^2$

$g^2 - 14g + 49$

19. [Factorisation] \*  
Find the missing factor in the factorisation of  $a^2 + 3a - 10$

$(a + 5)(a - 2)$

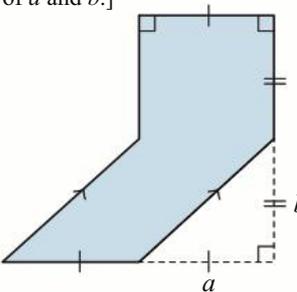
20. [Equations] \*  
Solve for  $x$ :  
 $x^2 - 9 = 0$

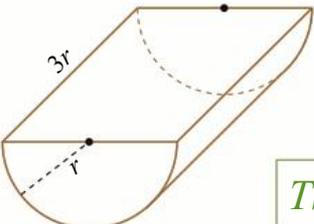
-3, 3

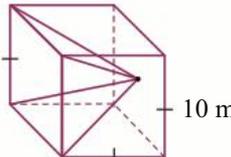
21. [Coordinate Geometry] \*  
Use  $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$  to find the distance between the points (6,2) and (1,1).  
[Leave the answer in surd form.]

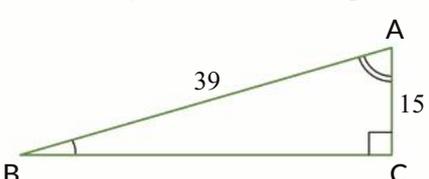
$\sqrt{26}$

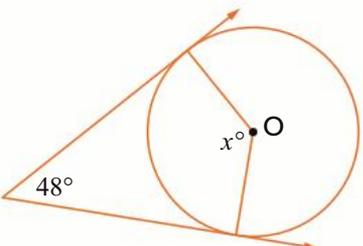
22. [Units of Measurement / Time] \*  
 The volume of a chainsaw's petrol tank is  $550 \text{ cm}^3$ . Is this  $<$ ,  $=$  or  $>$   $5500 \text{ mL}$ ?  $<$

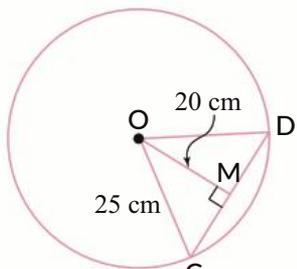
23. [Perimeter / Area] \*  
 Write an algebraic expression for the area  $A$  of the shaded shape. [Express the answer in terms of  $a$  and  $b$ .]  
  
 $A = 2ab$

24. [Surface Area] \*  
 Write an algebraic expression for the total surface area  $TSA$  of the half cylinder. [Express the answer in terms of  $r$  and  $\pi$ .]  
  
 or  $2r^2(2\pi + 3)$   
 $TSA = 4\pi r^2 + 6r^2$

25. [Volume] \*  
 How many times greater is the volume of a  $10 \text{ m} \times 10 \text{ m} \times 10 \text{ m}$  cube than the volume of a  $10 \text{ m} \times 10 \text{ m} \times 10 \text{ m}$  pyramid?  
  
3

26. [Pythagoras / Trigonometry] \*  
 Calculate the value of  $\sin A$  in this triangle. [Hint: Pythagoras' theorem will help.]  
  
 $\frac{12}{13}$

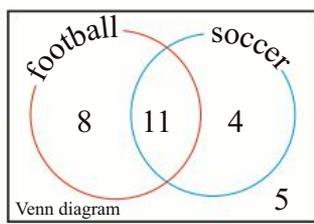
27. [Angles] \*  
 Find the value of  $x^\circ$ .  
  
 $132^\circ$

28. [Geometric Reasoning] \*  
 Find the length of the chord  $CD$  in this diagram. [Hint: Pythagoras' theorem will help.]  
  
30 cm

29. [Statistics] \*  
 Calculate the median and lower quartile (LQ) for the data displayed in this frequency table.  
**Jason Day - PGA, 2018** rounds 72 or less  

Score	63	65	66	67	68	69	70	71	72
Frequency	1	2	2	5	4	12	9	7	4

  
 $\text{median} = 69$ 
 $\text{LQ} = 68$

30. [Probability] \*  
 If one student is selected at random, find the probability that he or she plays only soccer. [Give your answer as a fraction in simplest form.]  
  
 $\frac{1}{7}$

31. [Problem Solving 1] \*  
 Use the digits 1, 2, 3, 4, 5 and 6 (once each) to complete this multiplication, so that the answer is as large as possible.  

$$\begin{array}{r} \boxed{6} \boxed{3} \boxed{1} \\ \times \boxed{5} \boxed{4} \boxed{2} \\ \hline \phantom{0} 1 \phantom{0} 2 \phantom{0} 6 \phantom{0} 2 \\ \phantom{0} 2 \phantom{0} 5 \phantom{0} 5 \phantom{0} 4 \phantom{0} 0 \\ 3 \phantom{0} 1 \phantom{0} 5 \phantom{0} 5 \phantom{0} 0 \phantom{0} 0 \\ \hline \boxed{3} \boxed{4} \boxed{2} \boxed{0} \boxed{0} \boxed{2} \end{array}$$

32. [Problem Solving 2] \*  
 Chan's kitchen clock stopped at 2:00 pm. Not knowing the correct time, he replaced the battery but did not adjust the time. He then rode to visit Avon, arriving at 3:15 pm and leaving at 4:45 pm. If the ride each way took the same time, and when he arrived home the kitchen clock showed 5:30 pm, how long had the clock been stopped for?  
 $15 \text{ min}$

# MATHS MATE

## Term 4 - Sheet 7



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times, \div$ ] \*  
 $1840 \div 9 =$

204. $\dot{4}$

2. [Decimal  $+, -$ ] \*  
 $44 - 7.008 - 13.07 =$

23.922

3. [Decimal  $\times, \div$ ] \*  
 $1.5 \div 1.2 =$

1.25

4. [Fraction  $+, -$ ] \*  
 $1\frac{5}{12} - 1\frac{1}{8} =$

$\frac{7}{24}$

5. [Fraction  $\times, \div$ ] \*  
 $3\frac{1}{3} \div \frac{5}{6} =$

4

6. [Percentages] \*  
15% of 500 = 75

7. [Decimals / Fractions / Percentages] \*  
Which fraction does  $0.1\dot{6}$  equal?  
A)  $\frac{1}{6}$    B)  $\frac{1}{5}$    C)  $\frac{1}{3}$

A

8. [Integer  $+, -$ ] \*  
-8 +  $-4 = -12$

9. [Integer  $\times, \div$ ] \*  
 $-26 \div$  -13 = 2

10. [Rates / Ratios] \*  
Which density is lower?  
A)  $0.9 \text{ g/cm}^3$  (ice)  
B)  $1.2 \text{ kg/m}^3$  (air)

B

11. [Indices] \*  
Evaluate  $3^{-4}$

$\frac{1}{81}$

12. [Square Roots] \*  
Between which two consecutive whole numbers does  $\sqrt{40}$  lie?

6 and 7

13. [Exploring Number]  
Which number is smaller?  
 $\sqrt{3}$  or 3

$\sqrt{3}$

14. [Financial Mathematics]  
The population of a town compounded annually at a rate of 10% per year. The population was initially 12 000. What was the population after 3 years?

15 972

15. [Number Patterns]  
Complete the pattern:  
 $24, 12, 6, 3, \frac{3}{2},$

$\frac{3}{4}, \frac{3}{8}$

16. [Expressions] \*  
Simplify  $-2xy \times 3x \times -y$

$6x^2y^2$

17. [Substitution] \*  
Use  $c^2 = a^2 + b^2$  to find the value of  $c > 0$  when  $a = 5$  and  $b = 12$

13

18. [Expansion] \*  
Expand and simplify  
 $(b + 5)^2 + 6$

$b^2 + 10b + 31$

19. [Factorisation] \*  
Factorise  
 $b^2 + b - 12$

$(b - 3)(b + 4)$

20. [Equations] \*  
Solve for  $x$ :  
 $x^2 + 8x = 0$

-8, 0

21. [Coordinate Geometry] \*  
Use  $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$  to find the distance between the points  $(-2, 0)$  and  $(8, -5)$ .  
[Leave the answer in surd form.]

$\sqrt{125}$

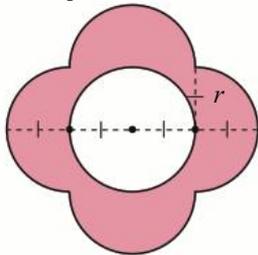
22. [Units of Measurement / Time] \*

How many cubic metres of uncompressed air could be contained in a SCUBA tank with a 12.2 L capacity?

$$0.0122 \text{ m}^3$$

23. [Perimeter / Area] \*

Write an algebraic expression for the area  $A$  of the shaded shape. [Express the answer in terms of  $r$  and  $\pi$ .]

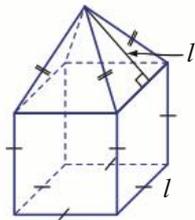


$$\text{or } r^2(4 + \pi)$$

$$A = 4r^2 + \pi r^2$$

24. [Surface Area] \*

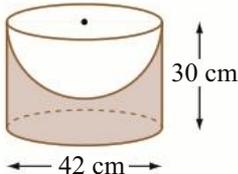
Write an algebraic expression for the total surface area  $TSA$  of the obelisk. [Express the answer in terms of  $l$ .]



$$TSA = 7l^2$$

25. [Volume] \*

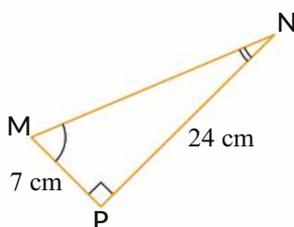
A hemisphere of diameter 42 cm is removed from this cylinder. Using  $\pi \approx \frac{22}{7}$  find the volume of the remaining shape.



$$22\,176 \text{ cm}^3$$

26. [Pythagoras / Trigonometry] \*

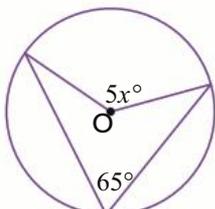
Calculate the value of  $\cos M$  in this triangle.



$$\frac{7}{25}$$

27. [Angles] \*

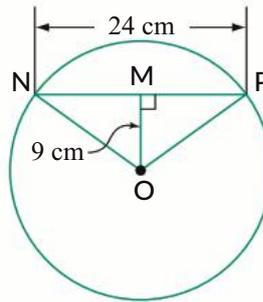
Find the value of  $x^\circ$ .



$$26^\circ$$

28. [Geometric Reasoning] \*

Find the length of the radius of the circle in this diagram. [Hint: Pythagoras' theorem will help.]



$$15 \text{ cm}$$

29. [Statistics] \*

Calculate the median and interquartile range (IQR) for the data displayed in this frequency table.

Scrabble tiles

Value	0	1	2	3	4	5	6	7	8	9	10
Frequency	1	10	2	4	5	1	0	0	2	0	2

$$\text{median} = 3 \quad \text{IQR} = 3$$

30. [Probability] \*

If one ticket is selected at random, find the probability that it is an adult ticket for the second night performance. [Complete the two-way table and give your answer as a fraction in simplest form.]

	Adult	Child	Total
1st night	65	80	145
2nd night	25	30	55
3rd night	80	70	150
Total	170	180	350

$$\frac{1}{14}$$

31. [Problem Solving 1] \*

What is the smallest positive integer, other than 1, which when divided by 2, 3, 4 or 5 always leaves a remainder of 1?

$$61$$

32. [Problem Solving 2] \*

There are some vases and flowers in a reception hall. If you place 5 flowers in each vase, you end up with some full vases, 1 empty vase and 1 vase with 3 flowers. If you place 7 flowers in each vase, you end up with some full vases, 4 empty vases and 1 vase with 4 flowers. How many vases and flowers are there?

$$\text{vases} = 12 \quad \text{flowers} = 53$$

# MATHS MATE

## Term 4 - Sheet 8



Name: .....

Due Date: ..... / ..... / .....

Parent's Signature: .....

1. [Long  $\times, \div$ ] \*  
 $6054 \div 11 =$

550.36

2. [Decimal  $+, -$ ] \*  
 $0.037 + 0.606 - 0.094 =$

0.549

3. [Decimal  $\times, \div$ ] \*  
 $0.1 \div 0.25 =$

0.4

4. [Fraction  $+, -$ ] \*  
 $2\frac{3}{4} - 1\frac{7}{9} =$

$\frac{35}{36}$

5. [Fraction  $\times, \div$ ] \*  
 $4\frac{2}{7} \div 1\frac{19}{21} =$

$2\frac{1}{4}$

6. [Percentages] \*  
 5% of 600 = 30

7. [Decimals / Fractions / Percentages] \*  
 Which fraction does  $0.\dot{1}\dot{8}$  equal?  
 A)  $\frac{18}{10}$    B)  $\frac{18}{99}$    C)  $\frac{18}{100}$

B

8. [Integer  $+, -$ ] \*  
 $-3 -$  7  $= -10$

9. [Integer  $\times, \div$ ] \*  
12  $\times -7 = -84$

10. [Rates / Ratios] \*  
 Which density is higher?  
 A)  $2700 \text{ kg/m}^3$  (aluminium)  
 B)  $19.3 \text{ g/cm}^3$  (gold)

B

11. [Indices] \*  
 Evaluate  $5^{-3}$

$\frac{1}{125}$

12. [Square Roots] \*  
 Between which two consecutive whole numbers does  $\sqrt{83}$  lie? 9 and 10

13. [Exploring Number]  
 Place in ascending order:  
 $\sqrt{3}, \frac{5}{3}, 1.5, \sqrt{5}, 1.3$  1.3, 1.5,  $\frac{5}{3}, \sqrt{3}, \sqrt{5}$

14. [Financial Mathematics] \*  
 A printer depreciates in value at an annual rate of 20%. If it cost \$200 when new, calculate its value after 3 years. \$102.40

15. [Number Patterns]  
 Complete the pattern:  
 $\frac{5}{12}, \frac{2}{3}, \frac{11}{12}, 1\frac{1}{6}, 1\frac{5}{12},$   $1\frac{2}{3}, 1\frac{11}{12}$

16. [Expressions] \*  
 Simplify  $25ab \div 5a \times ac$  5abc

17. [Substitution] \*  
 Use  $a^2 = c^2 - b^2$  to find the value of  $a > 0$  when  $c = 15$  and  $b = 9$  12

18. [Expansion] \*  
 Expand and simplify  $(d+3)^2 - 7d$   $d^2 - d + 9$

19. [Factorisation] \*  
 Factorise  $w^2 - 2w - 24$   $(w+4)(w-6)$

20. [Equations] \*  
 Solve for  $x$ :  
 $x^2 - 100 = 0$  -10, 10

21. [Coordinate Geometry] \*  
 Use  $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$  to find the distance between the points  $(-3, 2)$  and  $(-7, 3)$ .  
 [Leave the answer in surd form.]  $\sqrt{17}$

QUOTE OF THE WEEK: A period of living it up is usually followed by a period of living it down. P. K. Shaw

22. [Units of Measurement / Time] \*

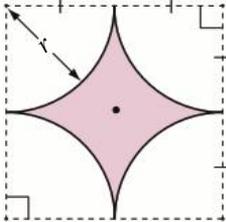
Place in ascending order:

425 cm<sup>3</sup> schooner, 1.125 L jug and 200 mL glass

200 mL, 425 cm<sup>3</sup>, 1.125 L

23. [Perimeter / Area] \*

Write an algebraic expression for the area  $A$  of the shaded shape. [Express the answer in terms of  $r$  and  $\pi$ .]

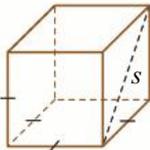


or  $r^2(4 - \pi)$

$A = 4r^2 - \pi r^2$

24. [Surface Area] \*

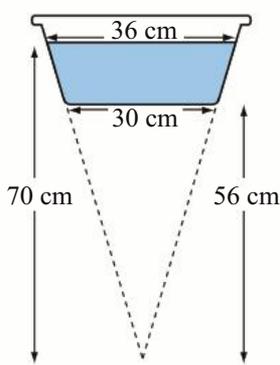
Write an algebraic expression for the total surface area  $TSA$  of the cube with side diagonals of length  $s$ . [Express the answer in terms of  $s$ .]



$TSA = 3s^2$

25. [Volume] \*

Using  $\pi \approx \frac{22}{7}$  find the volume of water in the dish which has the shape of a truncated cone.

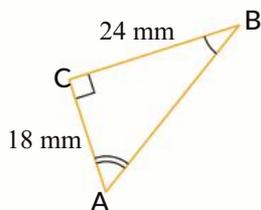


[Hint:  $V_{\text{cone}} = \frac{\pi r^2 h}{3}$ ]

10560 cm<sup>3</sup>

26. [Pythagoras / Trigonometry] \*

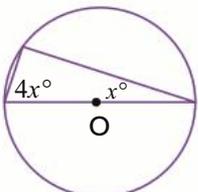
Calculate the value of  $\sin B$  in this triangle.



$\frac{3}{5}$

27. [Angles] \*

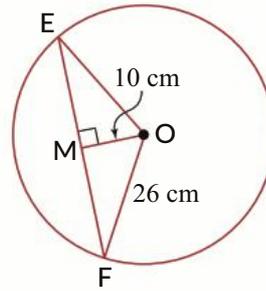
Find the value of  $x^\circ$ .



18°

28. [Geometric Reasoning] \*

A chord EF is 10 cm from the centre of a circle of radius 26 cm. Find the length of chord EF.



48 cm

29. [Statistics] \*

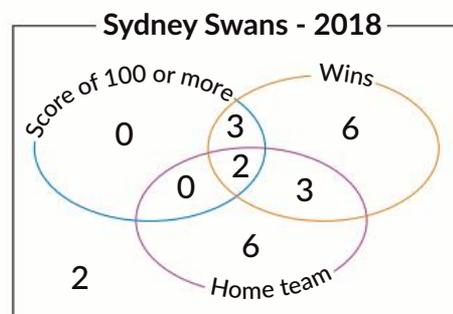
This stem-and-leaf plot shows the ages of the 20th century American Presidents when they were first elected. Find the interquartile range (IQR) for the set of data.

STEM	LEAF
4	3 4 7
5	1 1 2 3 5 5 6 6 7
6	1 1 3 5
7	0

IQR = 10

30. [Probability] \*

If one match is selected at random, what is the probability that the Swans scored 100 points or more as an away team, and won? [Give your answer as a fraction in simplest form.]



$\frac{3}{22}$

31. [Problem Solving 1] \*

Find the sum:

$(-1)^{2n} + (-1)^{4n} + (-1)^{6n} + (-1)^{8n}$   
given that  $n$  is a natural number.

4

32. [Problem Solving 2] \*

Charles Sturt wishes to cross the desert, a seven day trip. Charles and each of his helpers are able to carry supplies for a maximum of five days. How many helpers must start out with Charles if he is to cross the desert, and his helpers are to either cross with him or return safely to the starting point?

2

# MATHS MATE



## Teacher Resource



### **Teacher's Guide to the Use of Maths Mate**

pages i - viii



### **Student Pad Answers**

pages 3 - 72



### **Student Pad Short Answers**

pages 1 - 8



### **Problem Solving Hints & Solutions**

pages 1 - 15



### **Test Masters**

pages 1 - 32



### **Test Answers**

pages 1 - 32



### **Record Keeping Sheets**

pages 1 - 10





### 1.1

- 902 000
- 20.77
- 0.64
- $\frac{1}{3}$
- $\frac{4}{35}$
- 240
- $\frac{3}{5} = \frac{9}{15} = \frac{36}{60}$
- 3
- 77
- 8 : 1 : 5
- 256
- $\frac{5}{8}$
- 8
- 8%
- 30, 42
- $3mn$  or  $3 \times m \times n$
- 7
- $4k - 20$
- $3(r + 3s)$
- $\frac{3}{4}$
- |   |    |    |   |   |   |
|---|----|----|---|---|---|
| x | -2 | -1 | 0 | 1 | 2 |
| y | -4 | -2 | 0 | 2 | 4 |
- kilo
- 15 cm
- $116\,000 \text{ mm}^2$
- $825 \text{ mm}^3$
- 34
- $42^\circ$
- 12
- median = 3.9  
range = 1.8
- $\frac{3}{26}$
- $162 \text{ m}^2$
- 9

### 1.2

- 53 600
- 8.779
- 35
- $\frac{1}{4}$
- $\frac{3}{20}$
- 6
- $\frac{24}{36} = \frac{8}{12} = \frac{2}{3}$
- 17
- 39
- 1 : 6
- 1
- $1\frac{2}{5}$
- 17
- B
- 39, 33
- $cd - t$  or  $c \times d - t$
- 16
- $36 + 6h$
- $2(2j - 5k)$
- 1
- |   |    |    |    |    |    |
|---|----|----|----|----|----|
| x | -2 | -1 | 0  | 1  | 2  |
| y | 5  | 2  | -1 | -4 | -7 |
- Mega
- 2400 cm
- $3656 \text{ cm}^2$
- $4.5 \text{ m}^3$
- 41
- $x^\circ = 57^\circ$   $y^\circ = 123^\circ$
- $12 = 6 + 8 - 2$
- mean = 10.5  
mode = 8
- $\frac{3}{16}$  or 0.1875
- |   |   |   |
|---|---|---|
| 1 | 1 | 5 |
| 1 | 1 | 5 |
| 4 | 6 | 0 |
| 4 | 7 | 1 |
- |   |   |   |
|---|---|---|
| 4 | 6 | 0 |
| 4 | 7 | 1 |

### 1.3

- 600 000
- 3.956
- 8900
- $1\frac{1}{5}$
- $\frac{3}{5}$
- 4
- true
- 5
- 46
- 7 : 9
- $\frac{9}{64}$
- $5\frac{1}{2}$
- 16
- \$5.95
- 36, 37
- $\frac{s}{4} - 5$
- 21
- $14r + 18$
- $2(a + 2b + 4)$
- $-\frac{3}{4}$
- C
- B
- 30 m
- $3100 \text{ cm}^2$
- $120 \text{ cm}^3$
- 12
- $x^\circ = 67^\circ$   $y^\circ = 105^\circ$
- 
- B
- $\frac{1}{3}$  or  $0.\dot{3}$
- 4
- |   |   |   |   |   |
|---|---|---|---|---|
| 2 | 3 | 5 | 1 | 4 |
| 1 | 4 | 3 | 5 | 2 |
| 4 | 5 | 1 | 2 | 3 |
| 5 | 2 | 4 | 3 | 1 |
| 3 | 1 | 2 | 4 | 5 |

### 1.4

- 620 100
- 13.222
- 4
- 3
- $\frac{5}{8}$
- 13.5
- true
- 8
- 108
- 12 : 7 : 1
- $\frac{8}{125}$
- $1\frac{3}{4}$
- 2
- \$1190
- 15, 3
- $70x + 40$  or  $70 \times x + 40$
- 0
- $30 - 15e + 10f$
- $3(4j^2 + 6k - 3l)$
- $\frac{5}{6}$
- A and C
- A
- 138.5 cm
- $121.5 \text{ cm}^2$
- $960 \text{ mm}^3$
- 24
- $x^\circ = 43^\circ$   $y^\circ = 47^\circ$
- 
- B
- $\frac{2}{5}$  or 0.4
- 12
- 700



### 1.5

- 1954
- 3.889
- 12.65
- $3\frac{2}{3}$
- $1\frac{3}{4}$
- 429
- 0.1
- 31
- 2
- 7600 km
- 256
- 1.2
- 2.15
- \$1980
- 5, -9
- $2w^2$
- 0
- $k^2 + 9k$
- 101
- $x \geq 2$
- (3,0)
- 9.982 mm
- $28 \text{ cm}^2$
- $2808 \text{ m}^2$
- $240 \text{ cm}^3$
- A
- $95^\circ$
- 
- South Africa
- $\frac{2}{3}$  or  $0.\dot{6}$
- |   |    |    |    |    |
|---|----|----|----|----|
| × | 5  | 8  | 6  | 7  |
| 5 | 25 | 40 | 30 | 35 |
| 2 | 10 | 16 | 12 | 14 |
| 9 | 45 | 72 | 54 | 63 |
| 7 | 35 | 56 | 42 | 49 |
- trees = 85  
bananas = 36 125

### 1.6

- 414
- 1.807
- 0.0003
- 5
- $1\frac{1}{4}$
- 5 400 000
- 0.77
- 2
- 8
- 24 km/h
- 216
- 2.5
- 7.535
- \$8925
- 12, -24
- $a^2b$
- 6
- $7p - 7p^2$
- 999
- $x > -2$
- (0, -4)
- 1 kg
  - 2 kg
  - 0.5 kg
- $430 \text{ cm}^2$
- $192 \text{ m}^2$
- $100 \text{ m}^3$
- C
- $70^\circ$
- 
- 18
- $\frac{3}{13}$
- 36
- 150 km
- 

### 1.7

- 186
- 3.62
- 0.777
- $3\frac{3}{4}$
- $\frac{2}{3}$
- 200 kg
- 150%
- 6
- 5
- 1000 s
- $y^7$
- 0.7
- 1.62
- \$270 000
- 22, 30
- $-4x^2y$
- 1
- $12d + 8de$
- 1100
- $x > 5$
- 
- B
- 20
- 
- $86.2 \text{ m}^2$
- $117 \text{ mm}^3$
- C
- $60^\circ$
- congruent
- 
- A
- 0
- |   |   |   |   |
|---|---|---|---|
| 6 | 5 | 1 | 2 |
| 3 |   |   |   |
- B

### 1.8

- 2590
- 0.819
- 0.0102
- $3\frac{2}{3}$
- $1\frac{1}{2}$
- 35 000 000
- 38.7%
- 35
- 6
- 3 min
- $m^{11}$
- 0.2
- 0.966
- \$16
- 4, 10
- $-\frac{6mn}{p}$
- $\frac{2}{3}p$
- $7t^2 - 4tu + 2t$
- 700
- $x \geq -4$
- 
- A
- 27.5
- 
- $2052 \text{ cm}^2$
- $560 \text{ m}^3$
- B
- $20^\circ$
- congruent
- 
- 43
- $\frac{3}{8}$  or 0.375
- 24
- 27



### 2.1

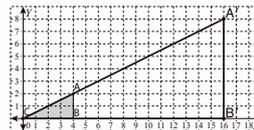
1. 4035
2. 19.016
3. 0.048
4.  $2\frac{5}{7}$
5.  $\frac{3}{5}$
6. 4.3
7.  $\frac{3}{20}$
8. -26
9. -30
10. \$141.60
11.  $a^4$
12. 100
13. C
14. \$24
15. -1250, 6250
16.  $4p, 0.5p$
17. 22
18.  $-20h + 16h^2$
19.  $p(3q - 4 + 2qr)$
20. 5
21. -2
22. 9 h
23. 446 mm
24.  $920 \text{ m}^2$
25.  $98 \text{ cm}^3$
26. 13 m
27.  $123^\circ$
28. 2
29. median = 59  
range = 29
30.  $\frac{3}{7}$
31. 84
32. 1, 2, 4, 5 &  $9 \text{ cm}^2$

### 2.2

1. 6732
2. 3.554
3. 0.0098
4.  $3\frac{3}{5}$
5.  $\frac{2}{3}$
6. 30
7.  $\frac{2}{25}$
8. -12
9. 72
10. 200 people/ $\text{km}^2$
11. 64
12. 120
13. B
14. \$80 000
15. 1875, -9375
16.  $b^2, 2b^2$
17. 32.5
18.  $-6x + 9xy$
19.  $5g(g - 2h - 3i)$
20. 0
21.  $\frac{1}{4}$
22. 22 h
23. 39 m
24.  $372 \text{ cm}^2$
25.  $48 \text{ mm}^3$
26. 100 mm
27.  $100^\circ$
- 28.
29. median = 50  
UQ = 62
30. 0.75
31. B
32. 40 min

### 2.3

1. 6864
2. 9.702
3. 1.617
4.  $\frac{1}{4}$
5.  $\frac{1}{6}$
6. 125
7. 0.84
8. -45
9. -240
10. 4 320 000
11. 3125
12. 44
13. C
14. \$4080
15. 27, 81
16.  $x^2, -3x^2$
17. 62.8
18.  $-4q^2r - 2qr$
19.  $ab^2(a^2 + 1)$
20. 9
21. (2,6)
22. 11 h 23 min
23. 36 mm
24.  $2940 \text{ cm}^2$
25.  $405 \text{ cm}^3$
26.  $x = 34 \quad y = 20$
27.  $40^\circ$
28. similar
29. 3
30.  $\frac{9}{11}$
31. 20, 53, 54
32. 1



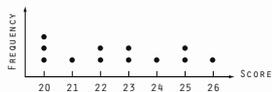
### 2.4

1. 16983
2. 0.852
3. 0.234
4.  $2\frac{1}{6}$
5.  $\frac{5}{9}$
6. 0.6
7. 0.75
8. 12
9. 110
10. 864
11.  $c$
12. 42
13. A
14. \$585
15. 108, 324
16.  $j^2k, 2kj^2$
17. 104
18.  $-10s^2t - 6st$
19.  $2de(1 - 4f)$
20. -7
21. (-5, -2)
22. 6:11 am
23. 32 m
24.  $1240 \text{ mm}^2$
25.  $90 \text{ m}^3$
26. 25
27.  $76^\circ$
28. similar
29. 16.5
30. 0.8
31. 2
32. 108



### 2.5

1. 23
2. 9.52
3. 146.8
4.  $\frac{9}{10}$
5. 6
6. 600
7.  $\frac{7}{20}$
8. -18
9. -100
10.  $b = 22$
11.  $16b^4$
12. 36
13. 2
14. \$4872
15. -8, 2
16.  $5t^2 - 2t$
17. 0
18.  $3n^2 - 2n$
19.  $-2t(t + 4)$
20. 4
21.  $y = 3x - \frac{3}{2}$
22. 238 cm
23.  $30 \text{ cm}^2$
24.  $256 \text{ mm}^2$
25.  $770 \text{ cm}^3$
26.  $\frac{4}{5}$  or 0.8
27.  $29^\circ$
28. A
29. 22.5



30.  $\frac{3}{4}$  or 0.75
31. \$420
32. 35 years

### 2.6

1. 27
2. 9.32
3. 375
4.  $\frac{1}{12}$
5. 16
6. 18
7.  $\frac{1}{25}$
8. 26
9. -24
10. false
11.  $x^4y^3$
12.  $\frac{1}{20}$
13. -110
14. \$6400
15. -6, 2
16.  $3y + z$
17. 0
18.  $2rs + 9r$
19.  $-5(3w - 4)$
20. 6
21.  $y = -4x + 5$
22. A
23.  $408 \text{ mm}^2$
24.  $300 \text{ mm}^2$
25.  $18480 \text{ cm}^3$
26.  $\frac{12}{13}$
27.  $70^\circ$
28. ASA
29. 3
30.  $\frac{1}{2}$  or 0.5
31. 12
32. 9  
(36,3) (32,6) (28,9)  
(24,12) (20,15) (16,18)  
(12,21) (8,24) (4,27)

### 2.7

1. 21
2. 15.82
3. 1.25
4.  $\frac{3}{4}$
5.  $7\frac{1}{2}$
6. 252
7. 40%
8. -26
9. 32
10. true
11.  $3x^2$
12. 9
13. -14
14. \$1980
15.  $3, \frac{3}{2}$
16.  $hi + 7$
17. -20
18.  $xyz + 11x + 21$
19.  $-m^2(m + 2n)$
20. 4
21. 

equation	gradient (m)	x-intercept	y-intercept (c)
$y = -2x + 3$	-2	$(\frac{3}{2}, 0)$	(0,3)
22. 6300 km
23.  $720 \text{ m}^2$
24.  $1600 \text{ mm}^2$
25.  $31.4 \text{ cm}^3$
26.  $\frac{8}{15}$
27.  $55^\circ$
28. RHS
29. median = 5  
mean = 5.3
30.  $\frac{3}{8}$  or 0.375
31. 8
32. 3 : 1

### 2.8

1. 134
2. 0.694
3. 1.08
4.  $\frac{2}{9}$
5.  $17\frac{1}{2}$
6. 132
7. 5%
8. -12
9. -40
10.  $x = 5$
11.  $cd^2$
12. 2
13. 25
14. \$1715
15.  $\frac{1}{4}, \frac{1}{16}$
16.  $4x - 2x^2$
17. -4
18.  $2e^2 - 2e - 20$
19.  $-3s(2s^2 + 7st - 6)$
20.  $-\frac{11}{3}$  or  $-3\frac{2}{3}$
21. 

equation	gradient (m)	x-intercept	y-intercept (c)
$y = \frac{1}{4}x - 1$	$\frac{1}{4}$	(4,0)	(0,-1)
22. 54 m, 0.45 km, 54 000 cm
23.  $198 \text{ cm}^2$
24.  $100\sqrt{3} \text{ cm}^2$
25.  $138600 \text{ m}^3$
26.  $\frac{24}{25}$  or 0.96
27.  $45^\circ$
28. SAS
29. range = 9  
median = 14
30.  $\frac{1}{3}$  or 0.3
31. 2 kg, 4 kg, 5 kg, 5 kg
32. 1:23 pm



### 3.1

1. 131 820
2. 0.948
3. 0.059
4.  $\frac{13}{15}$
5.  $2\frac{1}{12}$
6. 2424
7. 

Decimal	Fraction	Percentage
0.025	$\frac{25}{1000} = \frac{1}{40}$	2.5%
8. 5
9. 12
10. 3300
11.  $a^5b^5$
12. 5
13. 1 400 000 000
14. \$72
15. 100
16.  $20xy$
17. -14
18.  $-c^3 - 6$
19.  $(y + 2)(x + 5)$
20.  $x < 6$
21. -2
22. 2050.5 kg
23. 308 cm
24.  $3520 \text{ m}^2$
25.  $528 \text{ m}^3$
26.  $\sqrt{800} \text{ cm}$  or  $20\sqrt{2}$
27.  $64^\circ$
28.  $70^\circ$
29. median = 14  
range = 16
30.  $\frac{9}{16}$
31. 9
32. 1089

### 3.2

1. 312 200
2. 9.892
3. 0.0208
4.  $\frac{7}{30}$
5.  $\frac{4}{5}$
6. 880
7. 

Decimal	Fraction	Percentage
0.08	$\frac{8}{100} = \frac{2}{25}$	8%
8. 11
9. -1
10. 12
11.  $16x^4$
12. 14
13.  $2.25 \times 10^7$
14. \$975
15. 72
16.  $30pq$
17. 5
18.  $2b^3 + 6ab - 8a$
19.  $(z - 4)(x + y)$
20.  $x \geq 9$
21.  $-\frac{1}{2}$
22. A
23. 17.85 mm
24.  $235.5 \text{ cm}^2$
25. 47.1 mL
26.  $\sqrt{72} \text{ m}$  or  $6\sqrt{2}$
27.  $130^\circ$
28. 20
29. median = 8  
mode = 8
30.  $\frac{1}{4}$  or 0.25
31. 60
32. J = 70 min  
K = 52.5 min  
L = 105 min

### 3.3

1. 348 500
2. 99.556
3. 0.7
4.  $\frac{9}{20}$
5.  $1\frac{1}{2}$
6. 90
7. 2
8. -7
9. -21
10. 8
11.  $54x^3$
12. 10
13. 0.0000625
14. \$10 850
15. 400
16.  $-2s^2$
17. -2
18.  $d^2 - 4d + 3e$
19.  $(a - 2)(2 + b)$
20.  $x > 3$
21.  $y = 4x + 8$
22. 1350 g
23. 5.7 m
24.  $816.4 \text{ cm}^2$
25.  $4851 \text{ cm}^3$
26.  $\sqrt{65}$
27.  $28^\circ$
28. 3.75
29. 22.5
30.  $\frac{7}{13}$
31. 60
32. 6 litres

### 3.4

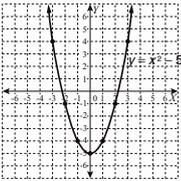
1. 829 800
2. 99.927
3. 1610
4.  $\frac{13}{24}$
5.  $4\frac{1}{2}$
6. 464
7. 48 cm
8. -9
9. -20
10. 16 L
11.  $3g^2h^2$
12. 57
13.  $7.53 \times 10^{-10}$
14. \$16200
15.  $\frac{1}{40}$
16.  $-6ab^2$
17. -4
18.  $-2g^2h + 4h$
19.  $(3h - 2)(2g + 1)$
20.  $x < 10$
21.  $y = -\frac{5}{9}x + \frac{1}{9}$
22. 0.767 t, 76 700 g,  
7.67 kg
23. 421.2 m
24.  $5500 \text{ mm}^2$
25.  $46.2 \text{ cm}^3$
26.  $\sqrt{61}$
27.  $50^\circ$
28. 5
29. 15
30.  $\frac{1}{2}$  or 0.5
31. 40%
32. 31 486



### 3.5

1. 94.5
2. 17.13
3. 8
4.  $1\frac{4}{7}$
5.  $\frac{1}{14}$
6. 5005
7.  $\frac{2}{5}$ , 43%, 0.45
8. -8
9. 1
10. 216 km/h
11.  $a^{yz}$
12. 27
13. D
14. <
15. -60
16.  $\frac{4}{3}$
17. 25
18.  $18 - 6b - 3a + ab$
19.  $(m + n)(m - n)$
20. -8, -3

x	-3	-2	-1	0	1	2	3
y	4	-1	-4	-5	-4	-1	4

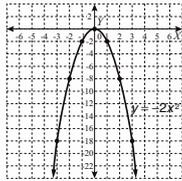


22. 2.05 L
23.  $3186 \text{ cm}^2$
24.  $594 \text{ cm}^2$
25.  $V = 130s^3$
26. 7.5 m
27.  $30^\circ$
28.  $x = 7$   $y = 5$
29. median = 40  
LQ = 35
30. 510
31. 18
32. 36%

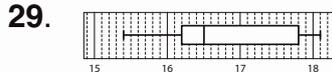
### 3.6

1. 652.5
2. 14.959
3. 61
4.  $7\frac{3}{11}$
5.  $\frac{2}{5}$
6. 36
7. 91%,  $\frac{9}{10}$ , 0.09
8. 0
9. -3
10. 25 m/s
11.  $b^6$
12. 360
13. A and D
14. \$320
15. 14
16. 5
17. 14
18.  $5p + 2pq - 15 - 6q$
19.  $(3y + 8)(3y - 8)$
20. -5, 2

x	-3	-2	-1	0	1	2	3
y	-18	-8	-2	0	-2	-8	-18



22. =
23.  $245 \text{ m}^2$
24.  $1064 \text{ cm}^2$
25.  $V = 280x^3$
26. 2.28 m
27.  $30^\circ$
28.  $x^\circ = 30^\circ$   $y^\circ = 40^\circ$

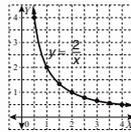


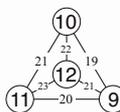
30. 360
31. 260 000
32. 420

### 3.7

1. 62.25
2. 8.544
3. 10
4.  $5\frac{1}{3}$
5.  $\frac{1}{20}$
6. 147
7. 35%,  $\frac{3}{8}$ , 0.38
8. -8
9. 2
10. 40 km/h
11.  $x^8$
12. 540
13. C
14. \$60
15. -65
16.  $8x$
17.  $1\frac{3}{5}$
18.  $j^2 - 49$
19.  $7(z + 3)(z - 3)$
20. 0, 2

x	0	$\frac{1}{2}$	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4
y	X	4	2	$\frac{4}{3}$	1	$\frac{4}{5}$	$\frac{2}{3}$	$\frac{4}{7}$	$\frac{1}{2}$

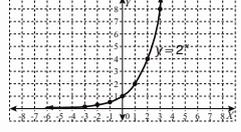


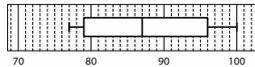
22. 95 000 mL
23.  $77 \text{ mm}^2$
24.  $628 \text{ m}^2$
25.  $V = 1120s^3$
26. 128 cm
27.  $30^\circ$
28. MQ = MQ NQ = PQ  
 $\angle MQN = \angle MQP$   
SAS
29. median = 106  
IQR = 58
30. 100
31. 
32. 255

### 3.8

1. 53.6
2. 67.093
3. 1.6
4.  $1\frac{1}{2}$
5.  $\frac{1}{27}$
6. 312
7.  $\frac{2}{3}$ , 66%, 0.6
8. -29
9. -5
10. 5 beats/s
11.  $3y^{10}$
12. 12
13. A and D
14. 40%
15. -27
16.  $-3g^2$
17.  $\frac{3}{2}$  or 1.5
18.  $q^2 - 10q + 24$
19.  $(ab + 3c)(ab - 3c)$
20. -9, 0

x	-3	-2	-1	0	1	2	3
y	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	8

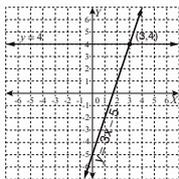


22. 0.0025 ML,  
250 000 mL, 25 L
23.  $981.25 \text{ cm}^2$
24.  $115.5 \text{ cm}^2$
25.  $V = 2\pi x^3$
26. 105 m
27.  $96^\circ$
28. AB = CD BC = AD  
AC = AC  
SSS
29. 
30. 15
31. 80
32. 4 km/h



### 4.1

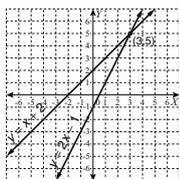
1. 70 168
2. 17.826
3. 400
4.  $\frac{4}{5}$
5.  $\frac{1}{6}$
6. 250%
7. B
8. -6
9. 6
10. 1 : 800
11. 9
12. 1
13. B
14. \$494.40
15.  $n + 6$
16.  $2x^2 - y^2$
17. -3
18.  $2u^2 - 10u + 12$
19.  $(x + 4)(x + 3)$
20. (0,3)
21. (3,4)



22. 15 000 cm<sup>2</sup>
  23. 19.42 km
  24. 1324 m<sup>2</sup>
  25. 12 m
  26. 750 cm<sup>2</sup>
  27. 54°
  28. 31.6 mm  
Accept 31 to 35 mm
- 
29. 4
  30.  $\frac{1}{112}$
  31. D
  32. 30 km

### 4.2

1. 101 842
2. 15.146
3. 20
4.  $\frac{5}{9}$
5.  $\frac{1}{2}$
6. 12.5%
7. A
8. 3
9. -42
10. 1 : 400
11. -125
12. 21
13. B
14. \$6655
15.  $3n + 1$
16.  $-3a^2b - a$
17. -4
18.  $4y^2 + 22y - 42$
19.  $(u + 5)(u + 2)$
20. (1,3)
21. (3,5)



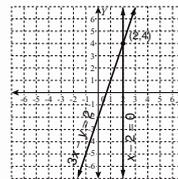
22. <
  23. 29.12 mm
  24. 387 mm<sup>2</sup>
  25. 160 000 L
  26. 128 mm<sup>2</sup>
  27. 76°
  28. 47.2 mm  
Accept 45 to 50 mm
- 
29. A
  30. 0.36 or 36%
  31. Prague
  32. 10

### 4.3

1. 152 988
2. 13.091
3. 160
4.  $\frac{11}{90}$
5.  $\frac{2}{5}$
6. 100%
7.  $0.\dot{6}$
8. -20
9. -8
10. 1300 km
11. -1
12. false
- 13.

	Integer	Rational	Irrational	Real
$3\frac{2}{7}$	false	true	false	true

14. \$1254.40
15.  $2n + 5$
16.  $-3q + 2q^2$
17. 8
18.  $3x^2 + 7x - 20$
19.  $(q + 6)(q + 3)$
20. (3,2)
21. (2,4)



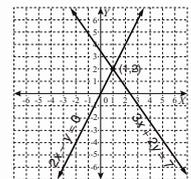
22. 623.7 cm<sup>2</sup>
23.  $P = 2t + \pi t$  or  $t(2 + \pi)$
24. 1034 m<sup>2</sup>
25. 15 cm
26. 168 cm<sup>2</sup>
27. 50°
28. 1 : 2000
29. B
30.  $\frac{3}{5}$  or 0.6
31. 18 m
32. Rebecca

### 4.4

1. 392 866
2. 1.088
3. 18
4.  $\frac{19}{42}$
5. 2
6. 90%
7.  $0.8\dot{3}$
8. 10
9. 10
10. 1 : 2 000 000
11. 256
12. false
- 13.

	Integer	Rational	Irrational	Real
$\sqrt{15}$	false	false	true	true

14. \$665.50
15.  $5 - n$
16.  $g^2h - 4gh^2$
17. 0
18.  $4k^2 - 10k + 6$
19.  $(3 - r)(r + 1)$
20. (-1,2)
21. (1,2)



22. 100 000 cm<sup>2</sup>,  
100 m<sup>2</sup>, 0.001 km<sup>2</sup>
23.  $P = 2h + \pi h$  or  $h(2 + \pi)$
24. 360 cm<sup>2</sup>
25. 1000 cm<sup>3</sup>
26. 432 m<sup>2</sup>
27.  $x^\circ = 65^\circ$   $y^\circ = 108^\circ$
28. 1 : 100 000
29. A
30.  $\frac{1}{6}$
31. 4 [all three parts add to 12]  
 $a \clubsuit b = 12 - (a + b)$
32. 200 min



4.5	4.6	4.7	4.8																													
1. 266. $\dot{6}$	1. 51. $\dot{3}$	1. 204. $\dot{4}$	1. 550. $\dot{3}\dot{6}$																													
2. 47.303	2. 21.841	2. 23.922	2. 0.549																													
3. 0.5	3. 3.5	3. 1.25	3. 0.4																													
4. $2\frac{7}{24}$	4. $1\frac{5}{12}$	4. $\frac{7}{24}$	4. $\frac{35}{36}$																													
5. 6	5. 3	5. 4	5. $2\frac{1}{4}$																													
6. 200	6. 800	6. 500	6. 600																													
7. B	7. C	7. A	7. B																													
8. 15	8. 5	8. -8	8. 7																													
9. -8	9. 28	9. -13	9. 12																													
10. A	10. A	10. B	10. B																													
11. $\frac{1}{9}$	11. $\frac{1}{8}$	11. $\frac{1}{81}$	11. $\frac{1}{125}$																													
12. 2 and 3	12. 3 and 4	12. 6 and 7	12. 9 and 10																													
13. $\pi$	13. 4	13. $\sqrt{3}$	13. 1.3, 1.5, $\frac{5}{3}$ , $\sqrt{3}$ , $\sqrt{5}$																													
14. \$1800	14. \$19683	14. 15972	14. \$102.40																													
15. 12.5, 16	15. 36, 72	15. $\frac{3}{4}$ , $\frac{3}{8}$	15. $1\frac{2}{3}$ , $1\frac{11}{12}$																													
16. $-24a^2b$	16. $-10x^2$	16. $6x^2y^2$	16. $5abc$																													
17. 628	17. 154	17. 13	17. 12																													
18. $r^2 + 4r + 4$	18. $g^2 - 14g + 49$	18. $b^2 + 10b + 31$	18. $d^2 - d + 9$																													
19. $(h + 7)(h + 1)$	19. $(a + 5)(a - 2)$	19. $(b - 3)(b + 4)$	19. $(w + 4)(w - 6)$																													
20. 0,5	20. -3,3	20. -8,0	20. -10,10																													
21. 5	21. $\sqrt{26}$	21. $\sqrt{125}$	21. $\sqrt{17}$																													
22. 10 L	22. <	22. $0.0122 \text{ m}^3$	22. 200 mL, $425 \text{ cm}^3$ , $1.125 \text{ L}$																													
23. $A = \frac{ab}{2}$	23. $A = 2ab$	23. $A = 4r^2 + \pi r^2$ OR $r^2(4 + \pi)$	23. $A = 4r^2 - \pi r^2$ OR $r^2(4 - \pi)$																													
24. $TSA = 10\pi r^2$	24. $TSA = 4\pi r^2 + 6r^2$ OR $2r^2(2\pi + 3)$	24. $TSA = 7l^2$	24. $TSA = 3s^2$																													
25. $d = 5 \text{ m}$	25. 3	25. $22\,176 \text{ cm}^3$	25. $10\,560 \text{ cm}^3$																													
26. $\frac{3}{4}$ or 0.75	26. $\frac{12}{13}$	26. $\frac{7}{25}$	26. $\frac{3}{5}$																													
27. $63^\circ$	27. $132^\circ$	27. $26^\circ$	27. $18^\circ$																													
28. 14 cm	28. 30 cm	28. 15 cm	28. 48 cm																													
29. median = 2 UQ = 4	29. median = 69 LQ = 68	29. median = 3 IQR = 3	29. IQR = 10																													
30. $\frac{41}{194}$	30. $\frac{1}{7}$	30. $\frac{1}{14}$	30. $\frac{3}{22}$																													
31. 15	31. <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>6</td><td>3</td><td>1</td></tr><tr><td>×</td><td>5</td><td>4</td><td>2</td></tr><tr><td colspan="4"> </td></tr><tr><td>3</td><td>1</td><td>5</td><td>5</td><td>0</td><td>0</td></tr><tr><td colspan="6"> </td></tr><tr><td>3</td><td>4</td><td>2</td><td>0</td><td>0</td><td>2</td></tr></table>	6	3	1	×	5	4	2					3	1	5	5	0	0							3	4	2	0	0	2	31. 61	31. 4
6	3	1																														
×	5	4	2																													
3	1	5	5	0	0																											
3	4	2	0	0	2																											
32. ACEDBAF or ABDECAF	32. 15 min	32. vases = 12 flowers = 53	32. 2																													

# MATHS MATE



## Teacher Resource



### **Teacher's Guide to the Use of Maths Mate**

pages i - viii



### **Student Pad Answers**

pages 3 - 72



### **Student Pad Short Answers**

pages 1 - 8



### **Problem Solving Hints & Solutions**

pages 1 - 15



### **Test Masters**

pages 1 - 32



### **Test Answers**

pages 1 - 32



### **Record Keeping Sheets**

pages 1 - 10



A Teacher's Guide to approaching  
**PROBLEM SOLVING**

*Dear Educator*

*The following Problem Solving Hints & Solutions have been designed to support users of the Maths Mate Program.*

*The Maths Mate problem solving questions at each level have proved challenging for many.*

*Within these Hints & Solutions only one or two alternative strategies have been presented to show how the problem may be solved. Often many other approaches are both practical and possible; after all, "the human race has not really started to 'think'." - Edward De Bono*

*Outlined on this page is a general problem solving approach that may help you to develop the problem solving skills of your students.*

*Inevitably, students are more likely to be successful if they:*

- *have the courage to try,*
- *can find a place to start and*
- *have approach options to choose from.*

*Best wishes*

*The Maths Mate Team*

**FIRST:**

- \* Accept the challenge.
- \* Read the problem.
- \* Read the problem out loud.

**THEN:**

- \* Find out the meaning of any unknown terms.
- \* Highlight the essential truths.
- \* Restate the problem in your own words.
- \* Break the problem up into parts.

**BE SURE ABOUT:**

- \* What you know from the problem. (Given)
- \* What you need to find out. (Goal)

**CHOOSE YOUR SOLUTION STRATEGY/STRATEGIES:**

1. Write a numerical/algebraic equation deciding which operations to use, given the word statements.
2. Look for a pattern then make and test generalisations/conjectures that describe the relationship between variables.
3. Draw a diagram: sketch  
table  
graph  
number line  
  
OR Make a model.
4. Apply standard techniques or models.  
e.g. Pythagoras' Theorem
5. Simplify the problem and work on a reduced version.  
Extrapolate back to the original problem.
6. Be systematic. Make a list. Progress step by step.
7. Work backwards if you have the answer.
8. Use trial and error. Estimate, check against the facts and then refine your estimation.

**WHERE TO START:**

- \* Start: with what is known  
with an odd or distinctive feature  
with the smallest  
with the easiest.

**FINALLY:**

- \* Double check your answer against the original statements. Does your answer satisfy all the conditions of the problem?

**PRESENTATION:**

- \* Choose suitable modes of communication to present and explain your outcomes and results.



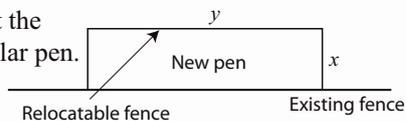


### 1.1

31. **Hint:** Determine what is the best way to use the existing fence. Use trial and error.

**Solution:**

Let  $x$  and  $y$  represent the sides of the rectangular pen.



To best use the existing fence  $y \geq x$ .

We need to find the largest possible value of  $x \times y$  knowing  $2x + y = 36$

Trial	$x$	$y$	$2x + y$	Area $x \times y$
1	12	12	36	144
2	11	14	36	154
3	10	16	36	160
4	9	18	36	162
5	8	20	36	160
6	7	22	36	154
7	6	24	36	144

So the largest possible area of the pen is **162 m<sup>2</sup>**.

32. **Hint:** Compare the number of single digit to double digit answers. What happens when you multiply by 1? Work on the lines with distinctive features.

**Solution:**

We know that H must be 1 because  $C \times H = C$ .

$C \times C = FH$  or  $F1$ . The only two-digit perfect square that ends in a 1 is 81.

So  $C = 9$  and the table represents the  $9 \times$  multiplication table.

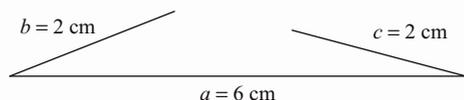
### 1.2

31. **Hint:** List all the different triplets of whole numbers  $\{a, b, c\}$  that add to 10. Establish the rule:

**RULE:** In any triangle with side lengths  $a, b, c$ , any one side must always be smaller than the sum of the other two sides.

$a < b + c$ ,  $b < c + a$  and  $c < a + b$  must all be true.

e.g. A triangle with side lengths of 2, 2, 6 results in  $a < b + c$  being false, so it is an impossible triangle.



**Solution:** The different triplets of whole numbers that add to 10 are:  $\{1, 1, 8\}$   $\{2, 2, 6\}$   $\{3, 3, 4\}$

$\{1, 2, 7\}$   $\{2, 3, 5\}$

$\{1, 3, 6\}$   $\{2, 4, 4\}$

$\{1, 4, 5\}$

Using the rule, impossible triangles have been eliminated.

The only possible triangles are

$\{2, 4, 4\}$ , and  $\{3, 3, 4\}$ . Using 10 matchsticks,

2 different triangles can be formed.

32. **Hint:** Try to find the numbers where you have the most information. Use trial and error.

**Solution:** Consider the general form of the multiplication, where A to H can be any digit from 0 to 9.

$$5 + 0 = H, \text{ so } H = 5$$

$$4 \times 5 = 20, \text{ so } F = 0 \text{ with 2 carried over}$$

$$G = 1$$

$$4 \times B + 2 \text{ ends in 6, so } B = 1$$

$$D + 6 = 7, \text{ so } D = 1$$

$$E = 4$$

$$4 \times A = 4, \text{ so } A = 1$$

$$\text{That leads to } C = 1$$

$$\begin{array}{r} \text{A B } 5 \\ \times \quad 4 \text{ C} \\ \hline \text{D } 1 \text{ 5} \\ \text{E } 6^2 \text{ F } 0 \\ \hline 4 \text{ 7 } \text{G H} \end{array}$$

$$\begin{array}{r} 1 \text{ 1 } 5 \\ \times \quad 4 \text{ 1} \\ \hline 1 \text{ 1 } 5 \\ 4 \text{ 6 } 0 \text{ 0} \\ \hline 4 \text{ 7 } 1 \text{ 5} \end{array}$$

### 1.3

31. **Hint:** Start by calculating the denominator.

**Solution:**

$$1 + \frac{1}{1+3} = 1 + \frac{1}{4} = \frac{5}{4}$$

$$\therefore \frac{5}{1 + \frac{1}{1+3}} = \frac{5}{\frac{5}{4}} = 5 \times \frac{4}{5} = 4$$

32. **Hint:** Find the 4 digits whose sums are listed in the corners. After filling in everything you can deduce from these sums, work the central cross.

**Solution:** The sums must be:

$$1 + 2 + 3 + 4 = 10$$

$$1 + 2 + 4 + 5 = 12$$

$$1 + 2 + 3 + 5 = 11$$

$$1 + 3 + 4 + 5 = 13$$

We can also deduce that because

1 is in every shaded square

the 1 in the central cross must be in the central position.

In the top two shaded squares there is only one 3 and one 5 so they must also be located in the top of the central cross as shown.

Looking at the marked diagonal

the top right corner must be 4,

as it can't be anywhere else

on this diagonal.

(No 4 in bottom left shaded square.)

Looking at this next diagonal, the bottom right corner

must be 5, as it can't be anywhere

else on that diagonal. (No 5 is in

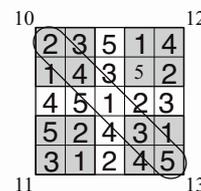
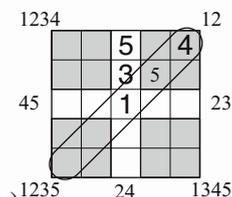
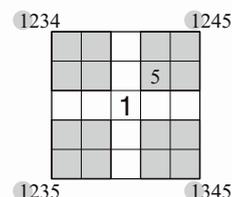
the top left shaded square.) The

remaining 5's can be filled in

and then the 1's.

Continue working systematically

and place the numbers as shown.





31. **Hint:** How many goals did Spanner kick for the season?

**Solution:**

$$\text{No. of matches} \times \text{Average goals scored} = \text{Total no. of goals}$$

At the end of the 4<sup>th</sup> match the average number of goals was 7.

So the total number of goals scored by the end of the 4<sup>th</sup> match was  $4 \times 7 = 28$

At the end of the 5<sup>th</sup> match the average number of goals was 8.

So the total number of goals scored by the end of the 5<sup>th</sup> match was  $5 \times 8 = 40$ .

Taking the 4<sup>th</sup> match total from the 5<sup>th</sup> match total gives  $40 - 28 = 12$

Spanner kicked **12** goals in the 5<sup>th</sup> match.

32. **Hint:** First find the rate at which they each work. Use Algebra.

**Solution:**

Let  $x$  = the number of books Mary arranges per day

So  $\frac{4x}{7}$  = the number of books Rod arranges per day

Together:

$$\text{Mary} \times 10 \text{ days} + \text{Rod} \times 15 \text{ days} = 1300 \text{ books}$$

$$10x + \frac{4x \times 15}{7} = 1300$$

$$10x + \frac{60x}{7} = 1300$$

$$70x + 60x = 1300 \times 7$$

$$130x = 1300 \times 7$$

$$x = 10 \times 7$$

$$x = 70$$

So the number of books Mary arranges per day is 70.

Given she works for 10 days then

$$70 \times 10 = 700$$

Mary arranges **700** books altogether.

1.5

31. **Hint:** The multiplication table has the numbers to be multiplied in the first row and the first column. Their products go in the corresponding intersecting spaces. Look for products where 2 of these 3 facts are known.

**Solution:**

×	5	8	6	7
5	25	40	30	35
2	10	16	12	14
9	45	72	54	63
7	35	56	42	49

32. **Hint:** Start with what you know and proceed step by step. A table format may help.

**Solution:**

trees	bananas/tree	bananas
80	450	36000
81	445	36045
82	440	36080
83	435	36105
84	430	36120
85	425	36125
86	420	36120
87	415	36105



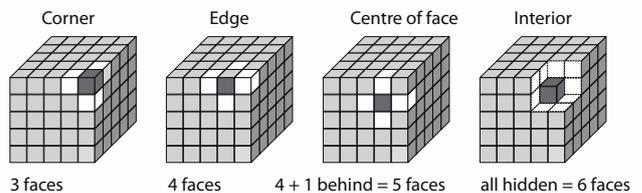
The maximum number of bananas that the farmer can produce on his plantation is **36 125** on **85** trees.

1.6

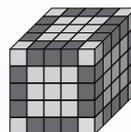
31. **Hint:** Consider the different positions of the smaller cubes within the larger cube, and count the number of touching faces for a cube in these positions.

**Solution:** The larger cube has smaller cubes in 4 different positions relative to number of faces that touch other cubes.

The number of faces that touch other cubes are shown below.



The edge cubes touch 4 other faces.



So **36** small cubes touch the faces of exactly 4 other cubes.

1.5

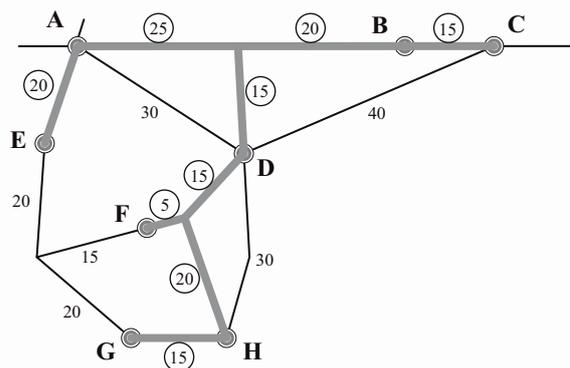
31. **Hint:** The multiplication table has the numbers to be multiplied in the first row and the first column. Their products go in the corresponding intersecting spaces. Look for products where 2 of these 3 facts are known.

**Solution:**

×	5	8	6	7
5	25	40	30	35
2	10	16	12	14
9	45	72	54	63
7	35	56	42	49

32. **Hint:** You can start at any point. Try to find the shortest path to connect two neighbouring towns. Progress step by step, comparing the paths. Use trial and error.

**Solution:**

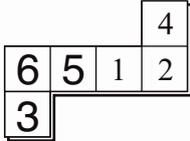


## 1.6 (cont.)

Join the two closest towns BC (or GH). Now add the closest of the remaining towns as economically as possible: D to B.  
Continue adding the closest town to the network till all towns are added: F to D, H to F/D, G to H, A to B/C then E to A.  
The minimum length of cable required is **150 km**.

## 1.7

31. **Hint:** Make a model. Otherwise visualise.  
**Solution:**



32. **Hint:** Write a relationship involving  $h$  and  $e$ .  
**Solution:**

$a$	$b$	$c$
$d$	$e$	$f$
$g$	$h$	$i$

The only row, column or diagonal containing  $h$  and  $e$  is the middle column.  
The numbers in the middle column add to  $X$ :  
 $b + e + h = X$   
Substitute  $X = 3e$   
 $b + e + h = 3e$   
Express  $h$  from this relation:  
 $h = 3e - b - e$   
 $h = 2e - b$   
The correct expression for  $h$  is  $2e - b$ , so the answer is **B**.

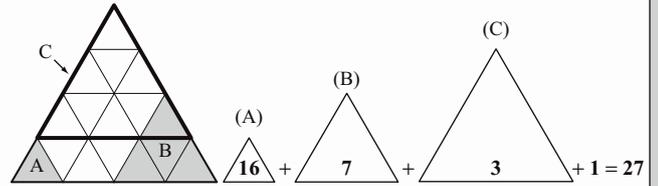
## 1.8

31. **Hint:** Use trial and error. A table format may help.  
**Solution:** Let  $x$  = number of 4-room apartments  
 $y$  = number of 3-room apartments  
and  $a$  = total number of apartments.  
Trials should consider that  $a = x + y = 39$

Trials	4-room apartments		3-room apartments		Total		Result
	$x$	rooms	$y$	rooms	$a$	rooms	
1	20	80	19	57	39	137	$\times$
2	22	88	17	51	39	139	$\times$
3	24	96	15	45	39	141	$\checkmark$

OR If each apartment had 3 rooms, there would be 117 rooms. The extra 24 rooms tell us that there must be 24 apartments with 4 rooms.  
There are **24** apartments with 4 rooms.

32. **Hint:** Be systematic. Use a colour coded diagram or count by size.  
**Solution:** There are 16 (A) triangles, 7 (B) triangles, 3 (C) triangles and 1 exterior triangle in the diagram.



The total number of triangles in the diagram is **27**.

## 2.1

31. **Hint:** Draw a diagram OR Use algebra.  
**Solution:**

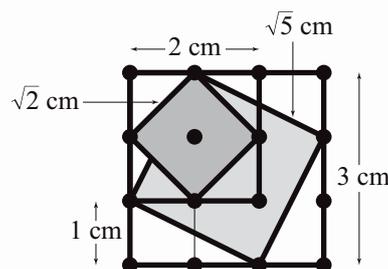
Alex

Jack

George

Looking at the diagram, seven equal lengths add to 147, so therefore one length equals  
 $147 \div 7 = 21$   
So Alex is 21.  
Jack must be 42 and George, the oldest is **84** years of age.  
OR  
If George ( $g$ ) is twice as old as Jack ( $j$ ) then Jack's age is  $\frac{g}{2}$ . Similarly if Jack is twice as old as Alex ( $a$ ), then Alex's age is  $\frac{j}{2}$  or  $\frac{g}{4}$ .  
 $g + \frac{g}{2} + \frac{g}{4} = 147$   
 $\frac{4g + 2g + g}{4} = 147$   
 $7g = 147 \times 4$   
 $g = \frac{588}{7}$   
 $g = 84$

32. **Hint:** Draw all the possible squares in the diagram.  
Use Pythagoras' theorem:  $a^2 = b^2 + c^2$   
and the formula for the area of a square:  $A = l^2$   
**Solution:** Squares with side lengths of 1 cm, 2 cm, 3 cm,  $\sqrt{2}$  cm and  $\sqrt{5}$  cm can be drawn in the diagram.

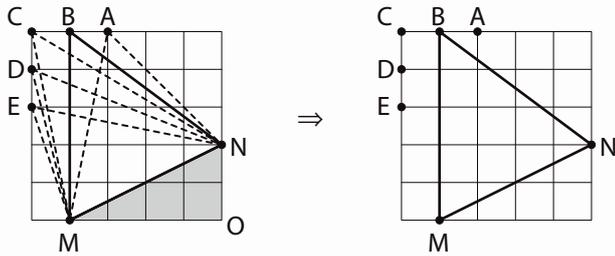


Their areas, in ascending order, are:  
 $1 \text{ cm}^2, 2 \text{ cm}^2, 4 \text{ cm}^2, 5 \text{ cm}^2, 9 \text{ cm}^2$



31. **Hint:** Use trial and error. OR Use Pythagoras' theorem.

**Solution:** Draw each triangle. Use the definition of an isosceles triangle i.e. that 2 sides are of equal length. Compare the side lengths using the grid or a ruler.



Point **B** forms an isosceles triangle with the other 2 vertices M and N.

OR

Using Pythagoras in  $\Delta MON$ ,  $MN = \sqrt{20}$  Similarly,  
 $ME = \sqrt{10}$ ,  $MD = \sqrt{17}$ ,  $MC = \sqrt{26}$ ,  $MB = 5$ ,  $MA = \sqrt{26}$   
 $NE = \sqrt{26}$ ,  $ND = \sqrt{29}$ ,  $NC = \sqrt{34}$ ,  $NB = 5$ ,  $NA = \sqrt{18}$   
 The only point to form an isosceles triangle with M and N is **B**, because  $MB = NB = 5$

32. **Hint:** Determine the rate of brick laying for each person, in bricks/minute.

**Solution:** The brick laying rates of Gino ( $g$ ) and Pedro ( $p$ ) are:

$$g = \frac{150}{60} \text{ bricks/min and } p = \frac{20}{10} \text{ bricks/min}$$

Together they lay bricks at a rate of:

$$\frac{150}{60} + \frac{20}{10} = \frac{15 + 12}{6} = \frac{27}{2} \text{ bricks/min}$$

$$\begin{aligned} \text{Therefore } 180 \div \frac{27}{2} \\ = 180 \times \frac{2}{27} = 40 \text{ min} \end{aligned}$$

If they work together it will take **40** min to lay 180 bricks.

2.3

31. **Hint:** Consider the positioning of odd and even numbers. Find out on which sheet is number 19.

**Solution:** Page 19 would team with page 20 as the book starts with pages 1 (odd front) teamed with page 2 (even back).

This is the 10th sheet. Counting backwards from pages 71 and 72 ten sheets gets you to 53 and 54.

The numbers on the same sheet as 19 would be **20, 53, 54**.

32. **Hint:** Use trial and error. A table format may help.

**Solution:** Let  $m$  - number of mice @ \$5 each

$c$  - number of cockroaches @ \$1 each

$b$  - number of blowflies @ 5¢ each

Trials should consider that:

- 1)  $100 \text{ animals} = m + c + b$
- 2)  $m < 20$ , because if  $m \geq 20$  the cost would be  $\geq \$100$  and I couldn't buy at least one of each animal
- 3)  $b$  must be a multiple of 20 but less than 100:

Trials	mice \$5		cockroaches \$1		blowflies 5¢		Total		Result
	$m$	\$	$c$	\$	$b$	\$	animals	\$	
1	10	50	30	30	60	3	100	83	✗
2	15	75	5	5	80	4	100	84	✗
3	19	95	1	1	80	4	100	100	✓

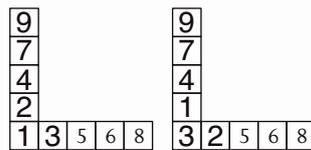
The answer is **1** cockroach.

2.4

31. **Hint:** Find the greatest amount that the column can add to. Use trial and error to list the possibilities. Be systematic. A table may help.

**Solution:**

Trials	x	vertical (v)	v total	horizontal (h)	h total
1	1	9,7,4,3	24	2,5,6,8	22
2	1	9,7,4,2	23	3,5,6,8	23
3	2	9,7,3,1	22	4,5,6,8	25
4	3	9,7,4,2	25	1,5,6,8	23
5	3	9,7,4,1	24	2,5,6,8	24
6	4	9,7,3,2	25	1,5,6,8	24
7	4	9,7,3,1	24	2,5,6,8	25
8	7	9,2,3,4	25	1,5,6,8	27



The answer is **2**.

32. **Hint:** Look for a relationship between the exterior numbers and the central number. What does the square with all 3's tell you?

**Solution:** Notice that the number in the centre of each box is also a mid way number in the collection in each square.

Given the "all 3's" square excludes the standard +, -, × and ÷ option, try finding the mean of each square.

$$1 + 3 + 5 + 7 = 16$$

$$\text{Mean } 16 \div 4 = 4 \checkmark$$

$$3 + 3 + 3 + 3 = 12$$

$$\text{Mean } 12 \div 4 = 3 \checkmark$$

$$14 + 25 + 33 + 12 = 84$$

$$\text{Mean } 84 \div 4 = 21 \checkmark$$

$$65 + 44 + 51 + 60 = 220$$

$$\text{Mean } 220 \div 4 = 55 \checkmark$$

$$102 + 96 + 120 + 114 = 432$$

$$\text{Mean } 432 \div 4 = 108$$

The missing number is **108**.

31. **Hint:** Consider equivalent ratios.

**Solution:** If Luke has 27 notes then the factors of the ratio need to add to 27.

Find equivalent ratios:

$$4 : 5 \Rightarrow 4 + 5 = 9$$

$$8 : 10 \Rightarrow 8 + 10 = 18$$

$$12 : 15 \Rightarrow 12 + 15 = 27$$

So

$$12 \times \$10 = \$120$$

$$15 \times \$20 = \$300$$

$$\$300 + \$120 = \$420$$

The total value of the notes is **\$420**.

32. **Hint:** Consider what you know. Use trial and error.

OR Use algebra.

**Solution:** If the mother is 7 times older than her son then the mother's age must be a multiple of 7. The choices are 21, 28, 35, 42, 49, etc.

Trial for remaining condition:

$$21 + 5 = 26 \Rightarrow 26 \div 4 = 6 \text{ and } 2 \text{ remaining}$$

$$28 + 5 = 33 \Rightarrow 33 \div 4 = 8 \text{ and } 1 \text{ remaining}$$

$$35 + 5 = 40 \Rightarrow 40 \div 4 = 10$$

The mother is now **35** years old.

OR Algebraically

The mother ( $m$ ) is 7 times as old as her son ( $s$ ).

$$(1) \quad m = 7s$$

We know: In 5 years time  $m$  will be 4 times as old as  $s$ .

$$(2) \quad m + 5 = 4(s + 5)$$

$$m + 5 = 4s + 20$$

$$m = 4s + 15$$

Substituting (1) into (2)

$$7s = 4s + 15$$

$$3s = 15$$

$$s = 5$$

Substituting  $s = 5$  into (1)

$$m = 7 \times 5$$

$$m = 35$$

The mother is now **35** years old.

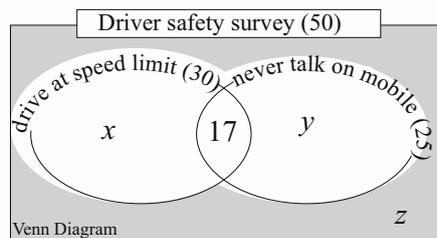
## 2.6

31. **Hint:** Draw a Venn diagram.

**Solution:** There are:

17 people observing both safety measures

(They are at the intersection of the two sets as shown.)



There are:

$$17 + x = 30 \text{ people driving at the speed limit}$$

$$\Rightarrow x = 13$$

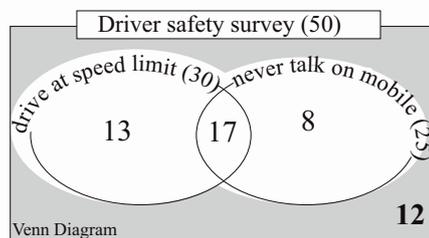
$$17 + y = 25 \text{ people who never talk on their mobile}$$

$$\Rightarrow y = 8$$

$$13 + 17 + 8 + z = 50 \text{ people in total}$$

$$\Rightarrow z = 50 - 38$$

$$\Rightarrow z = 12$$



**12** people observe neither safety measure.

32. **Hint:** Re-write the equation in terms of  $y$ . Try values for  $x$ . Look for a pattern.

**Solution:**

$$3x + 4y = 120$$

$$y = \frac{120 - 3x}{4}$$

$$y = 30 - \frac{3x}{4}$$

$$\text{If } x = 1 \quad y = 30 - \frac{3 \times 1}{4}$$

$$y = 29\frac{1}{4}$$

$y$  is not an integer

$$\text{If } x = 2 \quad y = 30 - \frac{3 \times 2}{4}$$

$$y = 28\frac{1}{2}$$

$y$  is not an integer

So  $x$  needs to be 4 or a multiple of 4 for  $y$  to be an integer.

$$\text{If } x = 4 \quad y = 30 - \frac{3 \times 4}{4}$$

$$y = 30 - 3$$

$$y = 27$$

$y$  is a positive integer

$$\text{If } x = 8 \quad y = 30 - \frac{3 \times 8}{4}$$

$$y = 30 - 6$$

$$y = 24$$

$y$  is a positive integer

$$\text{If } x = 12 \quad y = 30 - \frac{3 \times 12}{4}$$

$$y = 30 - 9$$

$$y = 21$$

$y$  is a positive integer

So we know as  $x$  increases by 4,  $y$  decreases by 3.

The pairs of positive integers are:

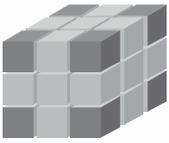
(4,27), (8, 24), (12,21), (16,18), (20,15), (24,12), (28,9), (32,6), (36,3)

There are **9** pairs of positive integers that make this equation true.



31. **Hint:** Draw a diagram and try to locate the positions of the small cubes painted on three sides.

**Solution:**



The 8 smaller cubes that form the corners of the big cube are painted on three sides.

32. **Hint:** Try for a capacity of the jugs, e.g. 600 mL and do your reasoning. Calculate how you divide 600 mL into the ratios 2 : 1 and 5 : 1.

**Solution:**

First jug	Second jug
<b>Juice : Water = 2 : 1</b> 2 + 1 = 3 parts 600 mL ÷ 3 = 200 mL Juice = 2 × 200 = 400 mL Water = 1 × 200 = 200 mL	<b>Juice : Water = 5 : 1</b> 5 + 1 = 6 parts 600 mL ÷ 6 = 100 mL Juice = 5 × 100 = 500 mL Water = 1 × 100 = 100 mL

Mixing the jugs together:

$$\text{Juice} = 400 + 500 = 900 \text{ mL}$$

$$\text{Water} = 200 + 100 = 300 \text{ mL}$$

The ratio becomes:

$$\text{Juice : Water} = 900 \text{ mL} : 300 \text{ mL} \\ = 3 : 1$$

OR

After mixing the average juice content in any one jug is:

$$\frac{1}{2} \left( \frac{2}{3} + \frac{5}{6} \right) \\ = \frac{1}{2} \times \frac{3}{2} = \frac{3}{4}$$

The water content in one jug is therefore:  $1 - \frac{3}{4} = \frac{1}{4}$

The ratio becomes Juice : Water =  $\frac{3}{4} : \frac{1}{4} = 3 : 1$

## 2.8

31. **Hint:** Consider each restriction one by one. Use trial and error.

**Solution:** A mode of 5 tells us that of the 4 parcels, at least 2 weigh 5 kg.

If the mean is 4 then the sum of the 4 parcels is 16 kg.

Assuming 2 parcels do weigh 5 kg, then the other 2 parcels must weigh 6 kg in total.

If these other 2 parcels weigh 5 kg and 1 kg, then the parcel weights are 1 kg, 5 kg, 5 kg, 5 kg so the median is 5 kg ⇒ incorrect

If they weigh 4 kg and 2 kg, then the parcel weights are 2 kg, 4 kg, 5 kg, 5 kg so the median is 4.5 kg ⇒ correct

The weights of the parcels are 2 kg, 4 kg, 5 kg and 5 kg.

32. **Hint:** Write what you know in a table format.

**Solution:** There are 3 times possible for a 1:15 pm time result: watch time, real time and time I think.

	Watch time	Real time	Time I think
actual train time	1:10	1:15	1:07
train@watch time	1:15	1:20	1:12
train@my time	1:18	1:23	1:15

Between my calculations and the real time there is always 8 minutes difference. So when I think I arrive at the station at 1:15 pm it is actually 8 minutes later in reality. The real time when I arrive at the station is **1:23 pm**.

## 3.1

31. **Hint:** Calculate the number of wins so far and compare that to the number of wins required.

**Solution:** In the first half of the season (10 games) Mick's team has won 60% of the games or 6 wins.

There are  $10 \times 2 = 20$  games in the season.

The team wants to win 75% of 20 games.

$$\frac{75}{100} \times \frac{20}{1} = 15$$

$$\text{So } 15 - 6 = 9$$

Mick's team must win **9** of the last 10 games.

32. **Hint:** Consider this diagram:

$$\begin{array}{r} \boxed{A} \boxed{B} \boxed{C} \boxed{D} \\ \times \quad \quad \quad \boxed{9} \\ \hline \boxed{D} \boxed{C} \boxed{B} \boxed{A} \end{array}$$

**Solution:**

**Thousands**  $9 \times A = D$  means **A = 1** and **D = 9**

**Hundreds** There must be no carry over from the hundreds, so **B = 0**

$$\begin{array}{r} \boxed{1} \boxed{0} \boxed{C} \boxed{9} \\ \times \quad \quad \quad \boxed{9} \\ \hline \boxed{9} \boxed{C} \boxed{0} \boxed{1} \end{array}$$

**Tens**  $9 \times C + 8$  ends in 0, so by trial and error:

$$C = 8 \quad (9 \times 8 = 72 \text{ and } 72 + 8 = 80)$$

ABCD represents 1089.

A four-digit number that when multiplied by nine gives the original number back to front is **1089**.

31. **Hint:** Find the average of the sequence of the first 3 numbers. Use trial and error. OR Use algebra.  
**Solution:** The middle term of a sequence of consecutive numbers will equal the average value of the sequence.

$$\text{Average} = \frac{\text{sum of all terms of the sequence}}{\text{number of terms}}$$

$$\text{Average} = \frac{48}{3} = 16 = \text{middle term}$$

Therefore the solution for the first 3 numbers is:

15, 16, 17

and the 7 consecutive numbers are:

15, 16, 17, 18, 19, 20, 21

So  $19 + 20 + 21 = 60$

The sum of the largest 3 consecutive numbers is **60**.

OR

Let  $x$  represent the first number of the sequence of 3 consecutive numbers.

The 3 numbers and their sum form the equation:

$$x + (x + 1) + (x + 2) = 48$$

$$3x + 3 = 48$$

$$3x = 45$$

$$x = 15$$

So the seven consecutive numbers are:

15, 16, 17, 18, 19, 20, 21

So  $19 + 20 + 21 = 60$

The sum of the largest 3 consecutive numbers is **60**.

32. **Hint:** Express the rates of packing, in shelves per minute if two girls work together, then if all three girls work together. Finally find the rates of packing if each girl works alone.

**Solution:** We can assume there are 210 shelves to be packed. Any number can be chosen, but for convenience we chose 210, which is the LCM of 30, 35 and 42.

If they work in pairs:

$$(1) \text{ Jay and Kay can pack } \frac{210}{30} = 7 \text{ shelves/min}$$

$$(2) \text{ Kay and Elle can pack } \frac{210}{35} = 6 \text{ shelves/min}$$

$$(3) \text{ Jay and Elle can pack } \frac{210}{42} = 5 \text{ shelves/min}$$

$$(1) + (2) + (3) \rightarrow 7 + 6 + 5 = 18 \text{ shelves/min}$$

If they work together:

$$(4) \text{ Jay, Kay and Elle can pack } \frac{18}{2} = 9 \text{ shelves/min}$$

If they work alone:

$$(4) - (1) \quad \text{Elle can pack } 9 - 7 = 2 \text{ shelves/min}$$

210 shelves at a rate of 2 shelves/min take

$$\frac{210}{2} = \mathbf{105 \text{ min}}$$

$$(4) - (2) \quad \text{Jay can pack } 9 - 6 = 3 \text{ shelves/min}$$

210 shelves at a rate of 3 shelves/min take

$$\frac{210}{3} = \mathbf{70 \text{ min}}$$

$$(4) - (3) \quad \text{Kay can pack } 9 - 5 = 4 \text{ shelves/min}$$

210 shelves at a rate of 4 shelves/min take

$$\frac{210}{4} = 52 \frac{1}{2} \text{ min} = \mathbf{52.5 \text{ min}}$$

OR Algebraically,

Let  $x$  = shelves to be packed and

$J, K, L$  = rates in shelves/min, if each girl works alone:

$$\frac{x}{30} = \text{shelves/min packed by Jay and Kay}$$

$$\frac{x}{35} = \text{shelves/min packed by Kay and Elle}$$

$$\frac{x}{42} = \text{shelves/min packed by Jay and Elle}$$

Write the simultaneous equations:

$$(1) J + K = \frac{x}{30}$$

$$(2) K + L = \frac{x}{35} \xrightarrow{(1)+(2)+(3)} 2(J + K + L) = \frac{x}{30} + \frac{x}{35} + \frac{x}{42}$$

$$(3) J + L = \frac{x}{42}$$

$$(4) J + K + L = \frac{1}{2} \times \frac{18x}{210} = \frac{3x}{70}$$

$$(4) - (1) \quad L = \frac{3x}{70} - \frac{x}{30} = \frac{2x}{210} = \frac{x}{105} \rightarrow L = \mathbf{105 \text{ min}}$$

$$(4) - (2) \quad J = \frac{3x}{70} - \frac{x}{35} = \frac{x}{70} \rightarrow J = \mathbf{70 \text{ min}}$$

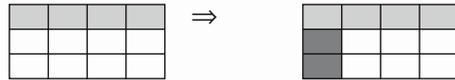
$$(4) - (3) \quad K = \frac{3x}{70} - \frac{x}{42} = \frac{4x}{210} = \frac{x}{52.5} \rightarrow K = \mathbf{52.5 \text{ min}}$$

### 3.3

31. **Hint:** Draw a diagram. OR Use algebra.

**Solution:**

$$\blacksquare \text{ Henry} = \frac{1}{3} \quad \blacksquare \text{ Alex} = \frac{1}{4} \text{ of the rest}$$



If there are 30 apples left, then  $\frac{6}{12}$  of the box equals 30 or a half of the box equals 30  $\Rightarrow$  box = **60** apples.

OR

Let  $a$  represent the apples in the box.

Henry got  $\frac{a}{3}$  apples. The remainder is  $\frac{2a}{3}$

Alex got  $\frac{1}{4}$  of the remainder which is  $\frac{1}{4} \times \frac{2a}{3} = \frac{a}{6}$

The algebraic equation is:  $a = \frac{a}{3} + \frac{a}{6} + 30$

$$a = \frac{3a}{6} + 30$$

$$6a = 3a + 180$$

$$3a = 180$$

$$a = 60$$

So Lisa had **60** apples at the start.

### 3.3 (cont.)

32. **Hint:** Calculate the amount of each liquid in the 20% alcohol-water mixture. Add the upgraded mixture 1 litre at a time. A table may help. OR Use algebra.

**Solution:**

Water	20% alcohol-water mixture (4 L) $A = \frac{2}{10}$
Alcohol	

**Alcohol : Water = 2 : 8**

$$2 + 8 = 10 \text{ parts}$$

$$4 \text{ L} \div 10 = 0.4 \text{ L}$$

$$\text{Alcohol} = 2 \times 0.4 = 0.8 \text{ L}$$

$$\text{Water} = 8 \times 0.4 = 3.2 \text{ L}$$

In the first 4 L mixture there are 0.8 L of alcohol and 3.2 L of water. If you have 50% of each liquid then the amount of alcohol and water needs to be the same.

In the 70% alcohol-water mixture, any 1 L is made up of 0.7 L of alcohol and 0.3 L of water.

Combining the mixtures:

Total (pt)	70% A-W mixture addition by alcohol (pt)	20% A-W mixture		70% A-W mixture addition by water (pt)
		Alcohol (pt)	Water (pt)	
4	start	0.8	3.2	start
5	+ 0.7	1.5	3.5	+ 0.3
6	+ 0.7	2.2	3.8	+ 0.3
7	+ 0.7	2.9	4.1	+ 0.3
8	+ 0.7	3.6	4.4	+ 0.3
9	+ 0.7	4.3	4.7	+ 0.3
10	+ 0.7	5	5	+ 0.3

$$10 - 4 = 6$$

**6 L** of the 70% mixture must be added to make the new solution a 50% alcohol-water mixture.

OR Algebraically in terms of water

Let  $x$  = the amount of mixture of 70% concentration

$$4 \times 0.8 + x \times 0.3 = (x + 4) \times 0.5$$

$$3.2 + 0.3x = 0.5x + 2$$

$$0.2x = 1.2$$

$$x = \mathbf{6 \text{ litres}}$$

OR Algebraically in terms of alcohol

Let  $x$  = the amount of mixture of 70% concentration

$$4 \times 0.2 + x \times 0.7 = (x + 4) \times 0.5$$

$$0.8 + 0.7x = 0.5x + 2$$

$$0.2x = 1.2$$

$$x = \mathbf{6 \text{ litres}}$$

### 3.4



### 3.3 - 3.4

31. **Hint:** Solve algebraically.

**Solution:**

Original size	$x$
Enlarged size (apply a scale factor of 250%)	250% of $x$ means $\frac{250}{100} \times x$
Original size (apply a scale factor of $y\%$ to return to the original size $x$ )	$\frac{y}{100} \times \left( \frac{250}{100} \times x \right) = x$ <div style="text-align: right; margin-right: 20px;">Divide both sides by <math>x</math></div> $\frac{y}{100} \times \frac{250}{100} = 1$ $y = \frac{10000}{250} = 40\%$

The drawing must be changed by **40%** to return it to its original size.

32. **Hint:** Start by trying to find the numbers where you have the most information. Use trial and error.

**Solution:** There are 10 different letters that represent the digits 0 to 9.

$$\begin{array}{r}
 \text{F O R T Y} \\
 \text{   T E N} \\
 + \text{   T E N} \\
 \hline
 \text{S I X T Y}
 \end{array}$$

**Units**       $Y + N + N$  ends in Y

or           $N + N$  ends in 0

so           $N = 0$  or  $N = 5$

If  $N = 5$ ,     $Y + 5 + 5 = 1Y$ , so 1 is carried over to tens

**Tens**       $T + E + E + 1$  ends in T

or           $E + E + 1$  ends in 0 (false)

so           $N = \mathbf{0}$

$T + E + E$  ends in T

or           $E + E$  ends in 0

so           $E = \mathbf{5}$

**Thousands**    1 must be carried over to tens of thousands

so           $\mathbf{O} = \mathbf{9}$  and  $\mathbf{I} = \mathbf{1}$  is the only possibility.

$$(9 + 2 = 11)$$

$$\begin{array}{r}
 \text{F } \mathbf{9} \text{ R T Y} \\
 \text{   T } \mathbf{5} \mathbf{0} \\
 + \text{   T } \mathbf{5} \mathbf{0} \\
 \hline
 \text{S } \mathbf{1} \text{ X T Y}
 \end{array}$$

**Tens of thousands:**

$F + 1 = S$ , so the only possible pairs are (2,3), (3,4), (6,7) or (7,8) without repeating the digits already used above.

By trial and error we find  $F = \mathbf{2}$  and  $S = \mathbf{3}$

**Units:**      By trial and error we find  $Y = \mathbf{6}$

**Tens:**      By trial and error we find  $T = \mathbf{8}$

**Hundreds:**    By trial and error we find  $R = \mathbf{7}$  and  $X = \mathbf{4}$

The solution is **31486**.

### 3.5

31. **Hint:** Use trial and error. A table format may help.  
OR Use algebra.

**Solution:** Let  $c$  = number of correct answer  
 $i$  = number of incorrect answers  
 $t$  = total answers.

Trials should consider that  $t = c + i = 30$

Trials	Correct answers		Incorrect answers		Total		Result
	$c$	points	$i$	points	$t$	points	
1	15	+300	15	-450	30	-150	✗
2	16	+320	14	-420	30	-100	✗
3	17	+340	13	-390	30	-50	✗
4	18	+360	12	-360	30	0	✓

OR Using simultaneous equations:

(1)  $c + i = 30$

(2)  $20c - 30i = 0$

Using (1)

$i = 30 - c$

Substituting in (2)

$20c - 30(30 - c) = 0$

$20c - 900 + 30c = 0$

$50c = 900$

$c = 18$

Clara had **18** correct answers.

32. **Hint:** Consider the formula for the area of a circle.  
Use Algebra.

**Solution:** The area of a circle is:  $A = \pi r^2$

The radius of any circle is half of the diameter, so the area of the large circle is:

$$A_{large} = \pi \left(\frac{d}{2}\right)^2 = \pi \frac{d^2}{4}$$

The diameter of the small circle is 60% of the diameter of the large circle or  $\frac{3}{5}$  of  $d$  or  $\frac{3d}{5}$

The radius of the small circle is half of this or  $\frac{3d}{10}$

The area of the small circle is:

$$A_{small} = \pi \left(\frac{3d}{10}\right)^2 = \pi \frac{9d^2}{100}$$

To find what percentage of the area of the large circle is the area of the small circle, divide  $A_{small}$  by  $A_{large}$ :

$$\begin{aligned} \frac{A_{small}}{A_{large}} &= \left(\pi \frac{9d^2}{100}\right) \div \left(\pi \frac{d^2}{4}\right) \\ &= \frac{9d^2}{100} \times \frac{4}{d^2} \\ &= \frac{36}{100} = 36\% \end{aligned}$$

The area of the small circle is **36%** of the area of the large circle.

### 3.6

### 3.5 - 3.7

31. **Hint:** Consider the options at each of the 5 places on the number plate.

**Solution:** There are 10 digits and 26 letters of the alphabet available at each of their respective places.  
 $10 \times 10 \times 26 \times 10 \times 10 = 260\,000$   
There would be **260 000** plates available.

32. **Hint:** For each figure, establish relationships between the figure number, the number of rows and the number of columns. A table format may help.

**Solution:**

A. The number of rows and the number of columns increase by 1 with any new figure.

B. The number of rows equals the figure number.

C. The number of columns is 1 greater than the number of rows.

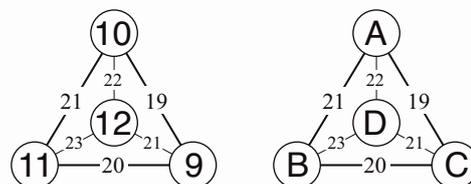
Figure number	Rows	Columns	Circles
1	1	2	$1 \times 2 = 2$
2	2	3	$2 \times 3 = 6$
3	3	4	$3 \times 4 = 12$
.....	.....	.....	.....
20	20	21	$20 \times 21 = 420$

The 20th figure requires **420** circles.

### 3.7

31. **Hint:** Solve the exterior triangle first. Try any reasonable guess in the top circle and observe your results. OR Use algebra.

**Solution:** Whatever you place in the top circle to get 21 and 19 on the sides, your base circles must have the same difference, which is 2. So you require two numbers that have a difference of 2 but add to 20. By trial and error we get to 11 and 9. The 11 must go on the left where the largest number is required for the 21. The 9 goes on the right and this leads to a 10 at the top. The central number must be 12.



OR Algebraically write the simultaneous equations:

(1)  $A + B = 21$  or (1)  $A = 21 - B$

(2)  $B + C = 20$  or (2)  $C = 20 - B$

(3)  $A + C = 19$

Substitute equations (1) and (2) into equation (3):

$(21 - B) + (20 - B) = 19$

$-2B = -22$

$B = 11$

Substitute  $B = 11$  into equation (2):

$C = 20 - 11$

$C = 9$

Substitute  $B = 11$  into equation (1):

$A = 21 - 11$

$A = 10$

### 3.7 (cont.)



### 3.7 - 4.2

- 32. Hint:** Play with a strip of paper. Make an organised list. Look for a pattern. A table format may help.  
**Solution:** Any time the paper is folded, find a relationship between the number of folds, the number of parts into which the paper is divided and the number of creases formed.

Number of folds	Number of parts	Number of creases
1	$2 = 2^1$	1 ( $2^1 - 1$ )
2	$4 = 2^2$	3 ( $2^2 - 1$ )
3	$8 = 2^3$	7 ( $2^3 - 1$ )
4	$16 = 2^4$	15 ( $2^4 - 1$ )
5	$32 = 2^5$	31 ( $2^5 - 1$ )
6	$64 = 2^6$	63 ( $2^6 - 1$ )
7	$128 = 2^7$	127 ( $2^7 - 1$ )
8	$256 = 2^8$	255 ( $2^8 - 1$ )

The number of creases is 1 less than the number of parts. Paper folded in half eight times would have **255** creases.

### 3.8

- 31. Hint:** Consider the percentage of 'not blue' balls in the bag when 75% are blue.  
**Solution:** You know that to start with there are 95 blue balls so there must be 5 'not blue' balls to make up the 100 balls. When 75% of the balls are blue then the 'not blue' balls make up 25%.  
 If 5 balls = 25% then 75% = 15 balls.  
 $95 - 15 = 80$   
**80** balls were removed.

- 32. Hint:** Calculate the walking rate of each person in km/h. Then calculate the rate they walk together. Use Algebra.  
**Solution:** Consider that Irene (I) walks at a speed of  $x$  km/h, then Millie (M) walks at a speed of  $x + 2$  km/h. Distances travelled in 1 hour:  
 (1)  $I = x$  km  
 (2)  $M = x + 2$  km  
 Together Millie and Irene travel 5 km in 30 minutes. So in 1 hour they would travel twice this or 10 km.  
 $I + M = 10$   
 Substituting (1) and (2) into this equation:  
 $x + 2 + x = 10$   
 $2x = 8$   
 $x = 4$   
 Irene walked at a speed of **4** km/h.

### 4.1

- 31. Hint:** Establish the rules:

RULE 1  
 Even number  $\times$  Even number = Even number  
RULE 2  
 Even number  $\times$  Odd number = Even number  
RULE 3  
 Even number + Odd number = Odd number

**Solution:**  $n$  is an even number so:

- A)  $n^3$  is always an even number (RULE 1)  
 B)  $2n$  is always an even number (RULE 1)  
 C)  $2n + n = 3n$  is always an even number (RULE 2)  
 D)  $2n + 5$  means that 5 is added to an even number, so the result is an odd number (RULE 3)

So **D** must be odd.

- 32. Hint:** Distance travelled = Speed  $\times$  Time  
 Consider this: For how long does the blowfly travel?

**Solution:** The blowfly keeps flying till the two cyclists meet.

The cyclists meet after 1 hour, having travelled 20 km each.

Distance travelled by the blowfly =  $30 \text{ km/h} \times 1 \text{ h}$   
 = **30 km**

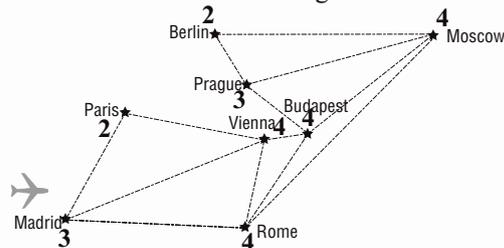
### 4.2

- 31. Hint:** Use trial and error.

**Solution:** Madrid (3) and Prague (3) are the only two nodes or points with an odd number of paths meeting. Prague is the only other odd node.

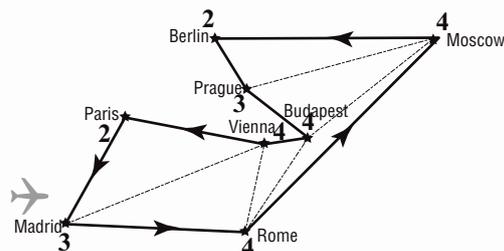
Euler's rule for networks:

'You can travel on any path of a network once and once only if that network has exactly 2 odd nodes by starting at one odd node and finishing at the other.'



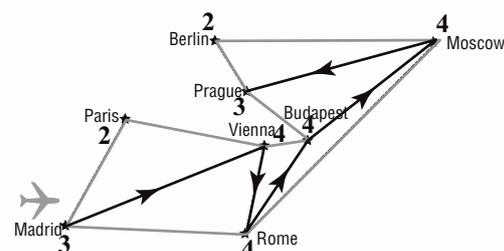
There are many possible routes but this is an alternative: Travel from Madrid around the outside back to Madrid.

**Path:** Madrid, Rome, Moscow, Berlin, Prague, Budapest, Vienna, Paris, Madrid



Travel from Madrid, zig-zagging through the middle and back to Prague.

**Path:** Madrid, Vienna, Budapest, Moscow, Prague



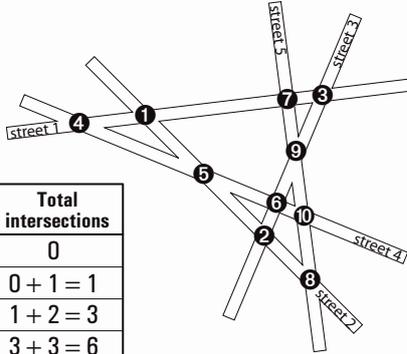
If you travel every path once and once only, you will finish at **Prague**.

## 4.2 (cont.)

32. **Hint:** Draw a diagram. Look for a pattern. Establish the relationship between the number of streets and the number of intersections. A table format may help.

**Solution:** Every time a new street is added, each existing street gains a new intersection.  
i.e. The 3<sup>rd</sup> street adds 2 new intersections.

Streets	New intersections	Total intersections
1	0	0
2	1	0 + 1 = 1
3	2 (2 & 3)	1 + 2 = 3
4	3 (4, 5 & 6)	3 + 3 = 6
5	4 (7, 8, 9 & 10)	6 + 4 = 10

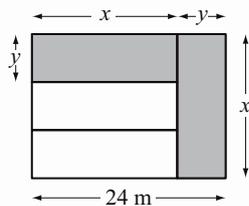


The maximum number of intersections is **10**.

## 4.3

31. **Hint:** Draw a diagram. Use algebra.

**Solution:**



Write the simultaneous equations:

(1)  $x + y = 24$

(2)  $x = 3y$

Substitute equation (2) into equation (1) to eliminate  $x$ :

(1)  $3y + y = 24$                       add like terms  
 $4y = 24$                                   divide both sides by 4  
 $y = 6$

Then  $x = 18$

So the width of the original rectangle is **18 m**.

32. **Hint:** Draw a table to help your reasoning.

**Solution:** From the given information we can immediately put into the table:

Peter has a *parrot*

Sam's sister is *Tess*

Boy	Pet	Sister
Peter	<i>parrot</i>	
David		
Sam		<i>Tess</i>

## 4.2 - 4.4

We are also given:

The *horse* belongs to the boy whose sister is *Rebecca*.

Only David still needs both a pet and a sister so they must be his.

David's sister is **Rebecca** and the table can be completed.

Boy	Pet	Sister
Peter	<i>parrot</i>	<i>Veronica</i>
David	<i>horse</i>	<i>Rebecca</i>
Sam	<i>other</i>	<i>Tess</i>

## 4.4

31. **Hint:** Look for a relation between the numbers on both sides of the equations. Found on a grade 3 test means that is nothing tougher than +, -, ×, ÷

**Solution:** All three numbers in each equation add to 12:  
 $1 + 3 + 8 = 12$                $2 + 4 + 6 = 12$                $3 + 6 + 3 = 12$

We can write a general formula for this case:

$$a \clubsuit b = 12 - (a + b)$$

Then  $4 \clubsuit 4 = 12 - (4 + 4)$

$$4 \clubsuit 4 = 4$$

The answer is **4**.

32. **Hint:** Determine the rate, in L/min, of fuel consumption for each machine. Then find the rate, in L/min, of fuel consumption if both machines work together.

**Solution:**

The excavator uses 1 litre of fuel every 3 minutes so its rate of fuel consumption is  $\frac{1}{3}$  L per minute.

The truck uses 1 litre of fuel every 6 minutes so its rate of fuel consumption is  $\frac{1}{6}$  L per minute.

Working together, the rate of fuel consumption is  $\frac{1}{3} + \frac{1}{6} = \frac{1}{2}$  or 0.5 L per minute.

So 100 litres of fuel at a rate of 0.5 L/min last  $100 \text{ L} \div 0.5 \text{ L/min} = \mathbf{200}$  min

## 4.5

31. **Hint:** Consider the possible ages that will give a 5 as the last digit in the result. Use trial and error. OR Write 1155 as a product of its prime factors.

**Solution:** We know that one child is aged between 13 and 19. Given that the product of the children's ages is 1155 we can also deduce that one of the numbers ends in, or is, a 5.

Try 5:

$$1155 \div 5 = 231$$

231 is divisible by 3. So 3 and 5 are factors of 1155.

$$231 \div 3 = 77$$

The pairs of factors of 77 are (1,77) and (7,11).

Now we know that the prime factors of 1155 are 3, 5, 7 and 11. The only possible multiplication to result in a teenager is  $3 \times 5 = 15$

The ages of Deena's 3 children therefore are 7, 11 and 15.

The teenager is **15** years old.

32. **Hint:** Work out the possible routes for travelling to each letter without travelling the same path twice. Add the distances.

**Solution:** Starting at A, try C first as it is further from A to C than from A to B. From C the longest route is 9 km to D. However if you go this way you can't get back to B without doubling up on a path. So from C go to E which leads to D, B, A and finally F.

A, C, E, D, B, A, F

$$8 + 4 + 7 + 4 + 6 + 10 = 39 \text{ km}$$

The other possibility is going from A to B which logically follows as either:

A, B, D, C, E, F

$$6 + 4 + 9 + 4 + 5 = 28 \text{ km}$$

or

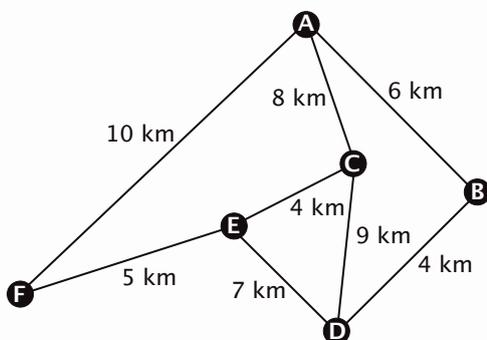
A, B, D, E, C, A, F

$$6 + 4 + 7 + 4 + 8 + 10 = 39 \text{ km}$$

The longest route is 39 km.

The sequences that allows you to travel to each letter and covers the greatest distance starting at A and ending in F, without travelling the same path twice is

**ACEDBAF** or **ABDECAF**.



## 4.6

31. **Hint:** Place the largest digits in the hundreds and the smallest digits in the units. Use trial and error.

**Solution:**

$$\begin{array}{r} \overset{3}{\downarrow} \overset{2}{\downarrow} \\ \boxed{6} \boxed{\phantom{0}} \boxed{\phantom{0}} \\ \times \boxed{5} \boxed{\phantom{0}} \boxed{\phantom{0}} \\ \hline \end{array}$$

There are four combinations to try

$\begin{array}{r} 642 \\ \times 531 \\ \hline 19260 \\ 321000 \\ \hline 340902 \end{array}$	$\begin{array}{r} 641 \\ \times 532 \\ \hline 1282 \\ 19230 \\ \hline 320500 \\ \hline 341012 \end{array}$	$\begin{array}{r} 632 \\ \times 541 \\ \hline 632 \\ 25280 \\ \hline 316000 \\ \hline 341912 \end{array}$	$\begin{array}{r} 631 \\ \times 542 \\ \hline 1262 \\ 25240 \\ \hline 315500 \\ \hline 342002 \end{array}$
---	--	---	--

The combination that gives the largest product is  **$631 \times 542 = 342002$**

32. **Hint:** Work out the total amount of time Chan was away according to the incorrect clock. Consider this compared to the amount of time Chan spent at Avon's house.

**Solution:** The incorrect clock restarted reveals that Chan was away from 2:00 pm until 5:30 pm or  $3\frac{1}{2}$  h.

Chan was at Avon's house from 3:15 pm until 4:45 pm or  $1\frac{1}{2}$  hours.

$$3\frac{1}{2} - 1\frac{1}{2} = 2$$

This leaves 2 hours of riding time so each trip must have taken 1 hour.

If he left Avon's house at 4:45 pm then one hour later would be 5:45 pm, not 5:30 pm as shown on the clock. When Chan arrived home the clock had been stopped for **15 min**.

## 4.7

31. **Hint:** First find the Lowest Common Multiple (LCM) of 2, 3, 4 and 5 and then consider the remainder.

**Solution:** To find the LCM (smallest positive integer that evenly divides by 2, 3, 4 and 5) list the multiples of the largest number 5, and restrict the list considering the divisibility rules of the other numbers.

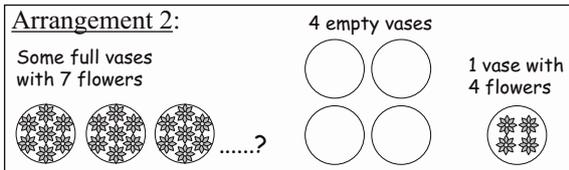
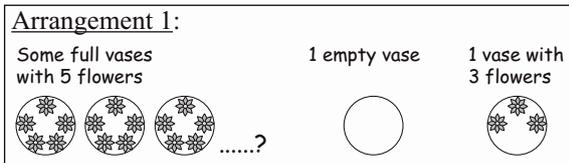
Multiples of 5 must end in 0 or 5, but considering the divisibility by 2, it means that these numbers must only end in a 0, because numbers ending in 5 cannot be divided by 2. The list of multiples is 10, 20, 30, 40, 50, 60, etc. When you also consider dividing by 3 and 4, then the LCM is 60.

We then add 1 to 60 to obtain the necessary remainder. Therefore the requested number is **61**.

## 4.7 (cont.)

32. **Hint:** Remember the number of vases and flowers in both arrangements is the same. Try redistributing Arrangement 1 to make Arrangement 2. Start with the empty vases. Be systematic.  
OR Use algebra.

**Solution:**



In moving from Arrangement 1 to Arrangement 2:  
Firstly we need 4 empty vases so empty 3 full vases.  
This gives  $3 \times 5 = 15$  spare flowers and **4 empty vases**.  
Secondly we need 1 vase with 4 flowers so add 1 flower to the vase with 3 flowers in it.  
This gives  $15 - 1 = 14$  spare flowers and **1 vase with 4 flowers**.  
Finally we need vases with 7 flowers in each so add 2 flowers to each full vase of 5 flowers.  
This gives  $14 \div 2 = 7$  **full vases with 7 flowers in each**.  
We have thus reached Arrangement 2.  
Total number of vases =  $4 + 1 + 7 = 12$   
Total number of flowers =  $4 \times 0 + 1 \times 4 + 7 \times 7 = 53$   
There are **12 vases** and **53 flowers**.

OR Algebraically let

$x$  = number of vases with 5 flowers in each  
and  $y$  = number of vases with 7 flowers in each

	VASES	FLOWERS
<b>First arrangement</b> (5 flowers in each vase)	$x + 1 + 1$	$5x + 0 + 3$
<b>Second arrangement</b> (7 flowers in each vase)	$y + 4 + 1$	$7y + 0 + 4$

In terms of vases:  $x + 2 = y + 5$

In terms of flowers:  $5x + 3 = 7y + 4$

or (1)  $x - y = 3$  multiply by  $-7$

(2)  $5x - 7y = 1$

or  $-7x + 7y = -21$

+  $5x - 7y = 1$  add the equations

$-2x = -20$

$x = 10$

Substituting  $x = 10$  into equation (1), we find  $y = 7$

Substituting these values in the table above we find:

Total number of vases =  $10 + 1 + 1 = 12$

Total number of flowers =  $5 \times 10 + 0 + 3 = 53$

## 4.8

## 4.7 - 4.8

31. **Hint:** Establish the facts:

For even indices, the expansion of  $(-1)^n$  is always  $+1$   
For odd indices, the expansion of  $(-1)^n$  is always  $-1$   
Whole number  $n$  multiplied by 2, 4, 6 or 8 is always an even number.

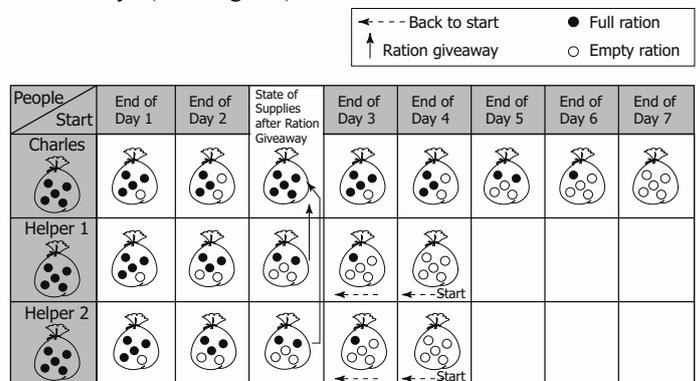
**Solution:**  $(-1)^{2n} + (-1)^{4n} + (-1)^{6n} + (-1)^{8n}$   
 $= 1 + 1 + 1 + 1$   
 $= 4$

32. **Hint:** Draw a diagram. OR Draw a number line.

OR Use Algebra.

**Solution:** One helper is not enough to help Charles to cross the desert. In the case of two helpers, one option is that both Helper 1 (H1) and Helper 2 (H2) give Charles (C) 1 ration each at the end of day 2.

Thus they saved their 2 days trip back to the starting point. Charles now has 5 full rations for the remaining 5 days (see diagram).



Charles needs **2** helpers to safely cross the desert.

OR H2 gives 1 ration to each of C and H1 after day 1 and he returns safely to the starting point.

Then H1 gives 1 ration to C after day 2, thus saving 2 days walking back to the starting point for H1.

# MATHS MATE



## Teacher Resource



### **Teacher's Guide to the Use of Maths Mate**

pages i - viii



### **Student Pad Answers**

pages 3 - 72



### **Student Pad Short Answers**

pages 1 - 8



### **Problem Solving Hints & Solutions**

pages 1 - 15



### **Test Masters**

pages 1 - 32



### **Test Answers**

pages 1 - 32



### **Record Keeping Sheets**

pages 1 - 10



# MATHS MATE



## Test 1

Covering worksheets 1.1 - 1.4

Name: .....

1. [Long  $\times$ ,+]  $347 \times 300 =$

2. [Decimal +,-]  $0.547 + 11.06 =$

3. [Decimal  $\times$ ,+]  $0.37 \times 1000 =$

4. [Fraction +,-]  $\frac{7}{4} + \frac{9}{4} =$

5. [Fraction  $\times$ ,+]  $\frac{1}{5} \times \frac{5}{6} =$

6. [Percentages] 12% of 80 =

7. [Decimals / Fractions / Percentages]  $\frac{2+10}{3+10} = \frac{2}{3}$  True or false?

8. [Integer +,-]  $(-16) + (+7) =$

9. [Integer  $\times$ ,+]  $(-6) \times (+10) =$

10. [Rates / Ratios] Of the 206 bones in the human body 14 are in the face. Find the ratio of bones in the face to the total number of bones.

11. [Indices]  $\left(\frac{4}{5}\right)^2 =$

12. [Square Roots]  $\sqrt{1\frac{9}{16}} =$

13. [Exploring Number]  $36 - 2 \times (3 + 5) \div 4 + 6 =$

14. [Financial Mathematics] The printing costs \$1353 including GST. If the GST is 10%, how much is the cost excluding GST?

15. [Number Patterns] Complete the pattern:  
28, 27, 25, 22, 18, ,

16. [Expressions] Write as an expression:  
5 more than the product of  $g$  and  $h$

17. [Substitution] If  $a = 1$  and  $b = 4$ , find the value of  $6b - a$

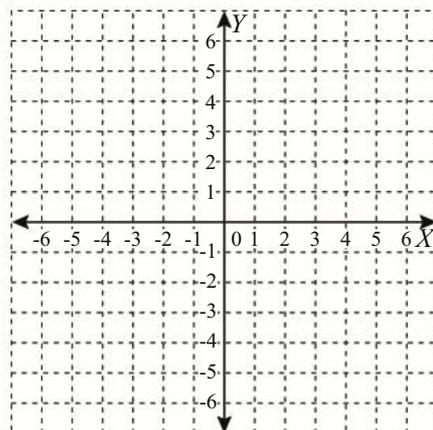
18. [Expansion] Expand  $3(6a - 5)$

19. [Factorisation] Factorise  $3x - 15y + 9$

20. [Equations] Solve for  $x$ :  $\frac{5x}{2} - 1 = 1$

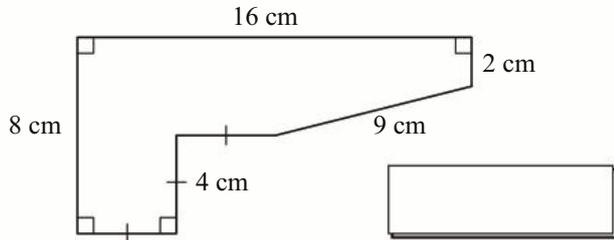
21. [Coordinate Geometry] Graph the line of equation  $y = 2x + 1$  by first completing this table of values.  
[Label the line with the rule.]

$x$	-2	-1	0	1	2
$y$	-3				

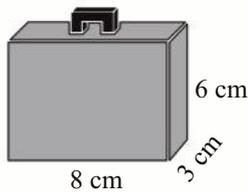


22. [Units of Measurement / Time]  
Which metric prefix is used to describe one hundredth of a standard unit?

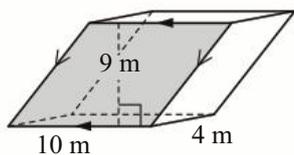
23. [Perimeter / Area]  
Find the perimeter of the shape in centimetres.



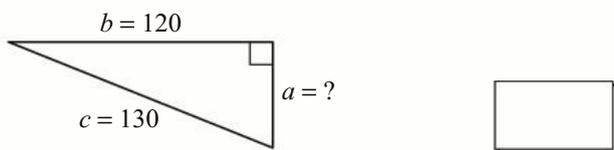

24. [Surface Area]  
Find the total surface area of the suitcase.



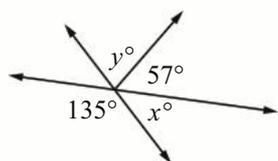

25. [Volume]  
Find the volume of the prism using  $V = Bh$ .



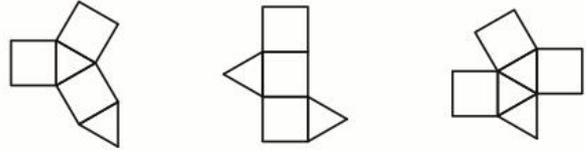

26. [Pythagoras / Trigonometry]  
For this triangle use Pythagoras' theorem  $a^2 + b^2 = c^2$ . Find the length of the hypotenuse.




27. [Angles]  
Find the values of  $x^\circ$  and  $y^\circ$ .



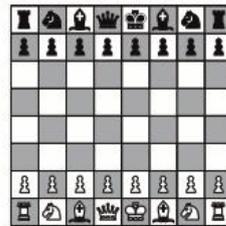

28. [Geometric Reasoning]  
Circle the net that **cannot** be folded to make a model of a triangular prism.



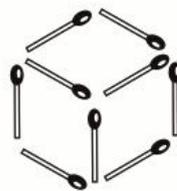
29. [Statistics]  
Which set of data has the same mean, median and mode?

- A) 5, 7, 8, 10, 10
- B) 1, 3, 3, 3, 5

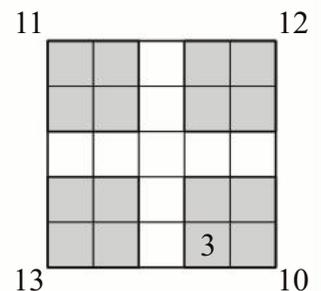
30. [Probability]  
A fly lands on one square of the chess board. What is the probability that it lands on an empty square? [Give the answer as a fraction in simplest form.]




31. [Problem Solving 1]  
Nine matchsticks are used to represent a cube as shown. Show how you would move three matches to form 3 equilateral triangles.




32. [Problem Solving 2]  
Place all the digits 1 to 5 in each row and column, so that they are not repeated in any of the rows, columns, diagonals and shaded squares. The numbers outside the big square represent the sums of the four digits in each shaded square.



# MATHS MATE



## Test 1

Covering worksheets 1.1 - 1.4

Name: .....

1. [Long  $\times$ ,+]  $459 \times 200 =$

2. [Decimal +,-]  $0.093 + 13.74 =$

3. [Decimal  $\times$ ,+]  $1000 \times 2.8 =$

4. [Fraction +,-]  $\frac{5}{6} + \frac{7}{6} =$

5. [Fraction  $\times$ ,+]  $\frac{6}{7} \times \frac{5}{6} =$

6. [Percentages] 9% of 30 =

7. [Decimals / Fractions / Percentages]  $\frac{3 \times 6}{5 \times 6} = \frac{3}{5}$  True or false?

8. [Integer +,-]  $(-14) + (+8) =$

9. [Integer  $\times$ ,+]  $(-3) \times (+21) =$

10. [Rates / Ratios] Of the 206 bones in the human body 106 are in the hands and feet. Find the ratio of bones in the hands and feet to the total number of bones.

11. [Indices]  $\left(\frac{3}{10}\right)^3 =$

12. [Square Roots]  $\sqrt{3\frac{6}{25}} =$

13. [Exploring Number]  $8 + 4 \times 6 - 2 \times (3 + 4) =$

14. [Financial Mathematics] The printing costs \$968 including GST. If the GST is 10%, how much is the cost excluding GST? \$

15. [Number Patterns] Complete the pattern: 50, 49, 46, 41, 34, ,

16. [Expressions] Write as an expression: 8 more than seven lots of x

17. [Substitution] If  $a = 7$  and  $b = 3$ , find the value of  $4b - 3a$

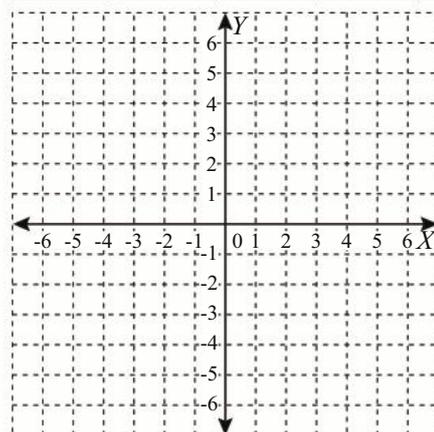
18. [Expansion] Expand  $4(4z - 3)$

19. [Factorisation] Factorise  $4d - 12e + 4$

20. [Equations] Solve for x:  $\frac{3x}{2} + 6 = 7$

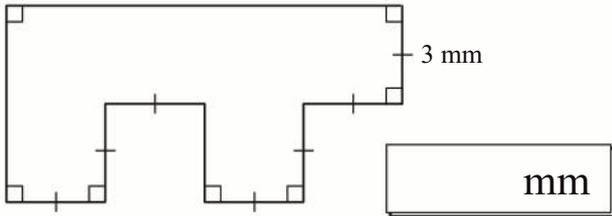
21. [Coordinate Geometry] Graph the line of equation  $y = 2x - 3$  by first completing this table of values. [Label the line with the rule.]

x	-2	-1	0	1	2
y	-7				

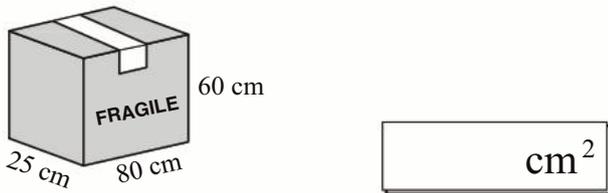


22. [Units of Measurement / Time]  
Which metric prefix is used to describe one thousandth of a standard unit?

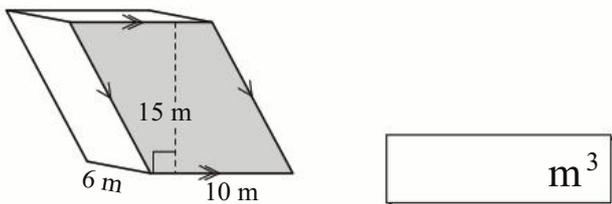
23. [Perimeter / Area]  
Find the perimeter of the polygon.



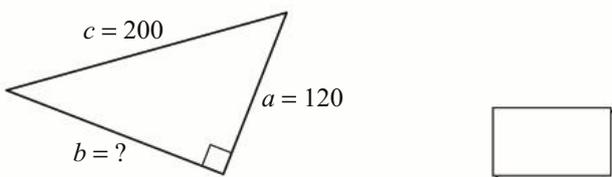
24. [Surface Area]  
What is the total surface area of the cardboard box?



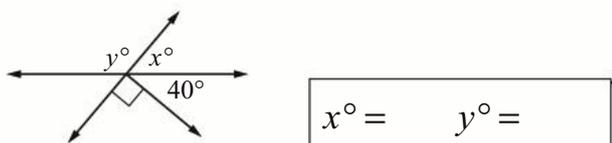

25. [Volume]  
Find the volume of the prism using  $V = Bh$ .



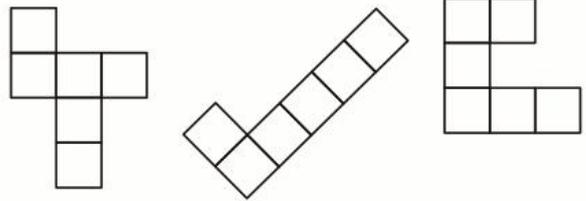

26. [Pythagoras / Trigonometry]  
For this triangle use Pythagoras' theorem  $a^2 + b^2 = c^2$ . Find the length of the side labelled  $b$ .




27. [Angles]  
Find the values of  $x^\circ$  and  $y^\circ$ .




28. [Geometric Reasoning]  
Circle the net that **can** be folded to make a model of a cube.



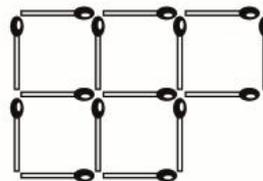
29. [Statistics]  
Which set of data has the same mean, median and mode?

- A) 6, 7, 8, 8, 11
- B) 5, 5, 8, 11, 11

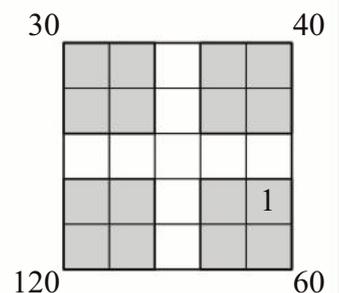
30. [Probability]  
A dart board has 20 numbered sections of identical size. A dart is thrown and hits the board. What is the probability that the dart lands inside a section with a number less than 12? [Give the answer as a fraction in simplest form.]




31. [Problem Solving 1]  
Which four matches should you remove to leave exactly two squares?




32. [Problem Solving 2]  
Place all the digits 1 to 5 in each row and column, so that they are not repeated in any of the rows, columns, diagonals and shaded squares. The numbers outside the big square represent the products of the four digits in each shaded square.



# MATHS MATE



## Test 2

Covering worksheets 1.5 - 1.8

Name: .....

1. [Long  $\times, \div$ ]  
 $14\,700 \div 60 =$

2. [Decimal  $+, -$ ]  
 $2.035 - 0.78 =$

3. [Decimal  $\times, \div$ ]  
 $0.001 \times 8.7 =$

4. [Fraction  $+, -$ ]  
 $3\frac{7}{12} - 1\frac{3}{12} =$

5. [Fraction  $\times, \div$ ]  
 $\frac{9}{10} \div \frac{3}{5} =$

6. [Percentages]  
A 175 gram meat pie contains 24% carbohydrate. How many grams of carbohydrate does the pie contain?

7. [Decimals / Fractions / Percentages]  
Write 0.412 as a percentage.

8. [Integer  $+, -$ ]  
 $(+9) - (-18) =$

9. [Integer  $\times, \div$ ]  
 $(-36) \div (+9) =$

10. [Rates / Ratios]  
Australian Michael Milton is the world's fastest skier on one leg. He can ski 6.5 km in around 2 minutes. What is his average speed?

km/h

11. [Indices]  
Simplify  $x^3 \times x^7$

12. [Square Roots]  
 $\sqrt{0.16} =$

13. [Exploring Number]  
 $\sin 60^\circ \approx 0.86603$   
Write the rational approximation of  $\sin 60^\circ$  correct to two decimal places.

14. [Financial Mathematics]  
Roller blades are marked up 20%. If the sale price is \$120, what profit is made?

15. [Number Patterns]  
Complete the pattern:  
18, 13, 8, 3, ,

16. [Expressions]  
Simplify  $3 \times y \times y$

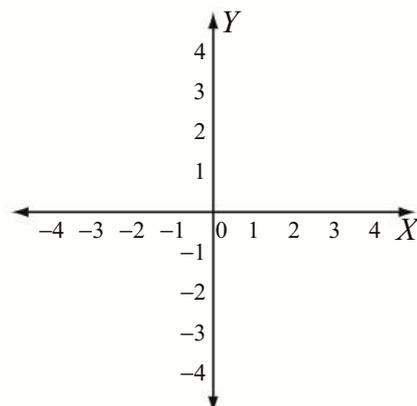
17. [Substitution]  
If  $y = x^2 - 6$ , find  $y$  when  $x = 4$

18. [Expansion]  
Expand  $3f(4f - 8)$

19. [Factorisation]  
Factorise and evaluate  
 $-8 \times 73 - 8 \times 27$

20. [Equations]  
Solve the inequality:  
 $-4(2x + 3) > 12$

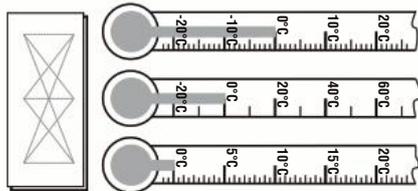
21. [Coordinate Geometry]  
Sketch the line of equation  $y = -2x + 4$  by marking the  $x$ -intercept and the  $y$ -intercept.  
[Label the graph with the rule.]



22. [Units of Measurement / Time]

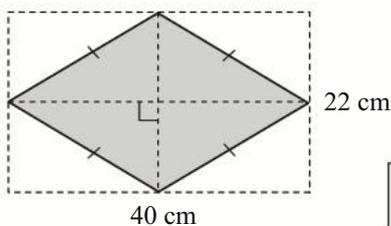
Match the temperature to the thermometer based on the precision of their scales.

- A)  $10^{\circ}\text{C}$
- B)  $0.5^{\circ}\text{C}$
- C)  $1^{\circ}\text{C}$



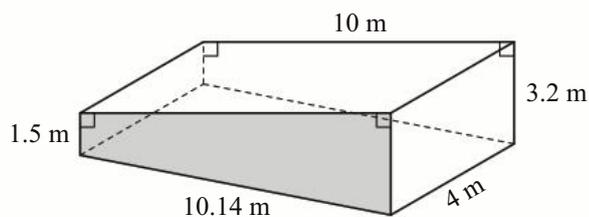
23. [Perimeter / Area]

Find the area of the rhombus.



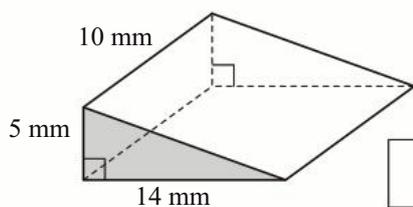

24. [Surface Area]

A swimming pool has the shape of a trapezoidal prism. What is the total surface area of the inside walls and floor of the pool?




25. [Volume]

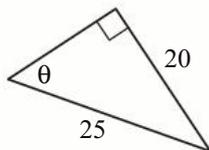
Find the volume of the triangular prism.




26. [Pythagoras / Trigonometry]

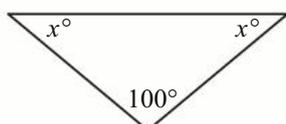
Which trigonometric ratio would be used to find angle  $\theta$ ?

- A) sine
- B) cosine
- C) tangent



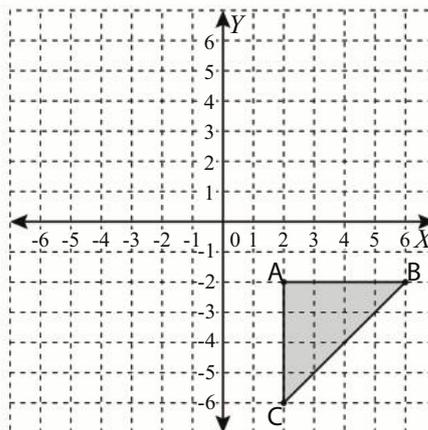

27. [Angles]

Find the value of  $x^{\circ}$ .



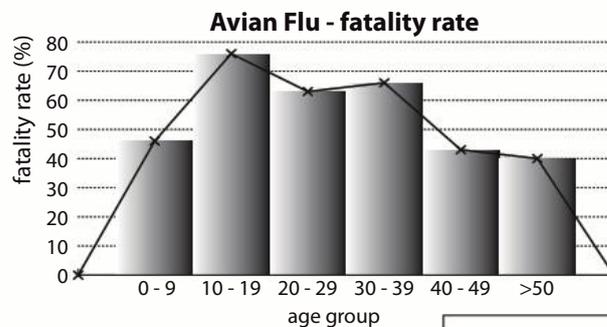

28. [Geometric Reasoning]

Redraw the triangle ABC after rotating it  $180^{\circ}$  about the point of coordinates  $(2, -2)$  and then translating it  $-3$  units horizontally and  $4$  units vertically.



29. [Statistics]

Which age group has the highest fatality rate from avian flu?

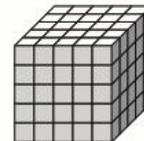



30. [Probability]

A money bag has forty 1-dollar coins, fifty 2-dollar coins and thirty 50-cent coins. Find the probability that the first coin taken at random from the bag will be a 50-cent coin. [Give your answer as a decimal.]

31. [Problem Solving 1]

How many of the smaller cubes have faces which touch the faces of exactly six other cubes?




32. [Problem Solving 2]

Paul and Anthony live 20 km from each other. They both start walking towards each other's house at the same time and meet after 2 hours. If Paul's speed is  $x$  km/h, which expression represents Anthony's speed?

- A)  $10 - 2x$
- B)  $10 - x$
- C)  $20 - 2x$
- D)  $20 - x$



## Test 2

Covering worksheets 1.5 - 1.8

Name: .....

1. [Long  $\times, \div$ ]  
 $29\,680 \div 40 =$

2. [Decimal  $+, -$ ]  
 $5.465 - 0.67 =$

3. [Decimal  $\times, \div$ ]  
 $6.3 \times 0.001 =$

4. [Fraction  $+, -$ ]  
 $5\frac{7}{10} - 1\frac{1}{10} =$

5. [Fraction  $\times, \div$ ]  
 $\frac{4}{7} \div \frac{2}{21} =$

6. [Percentages]  
 A 250 g chocolate bar is 52% sugar. How many grams of sugar are in the bar?

7. [Decimals / Fractions / Percentages]  
 Write 0.099 as a percentage.

8. [Integer  $+, -$ ]  
 $(+8) - (-17) =$

9. [Integer  $\times, \div$ ]  
 $(-32) \div (+16) =$

10. [Rates / Ratios]  
 The highest speed on a ski bob to date is approximately 200 km/h. It was achieved by R. Bonvin, in 2003. At this speed, how long would it take a ski bob to travel 50 km?  
 min

11. [Indices]  
 Simplify  $g^4 \times g^5$

12. [Square Roots]  
 $\sqrt{0.25} =$

13. [Exploring Number]  
 $\tan 30^\circ \approx 0.57735$   
 Write the rational approximation of  $\tan 30^\circ$  correct to two decimal places.

14. [Financial Mathematics]  
 A mobile phone is marked up 30%. If the sale price is \$130, what profit is made?  
 \$

15. [Number Patterns]  
 Complete the pattern:  
 18, 14, 10, 6, 2, ,

16. [Expressions]  
 Simplify  $5 \times b \times b$

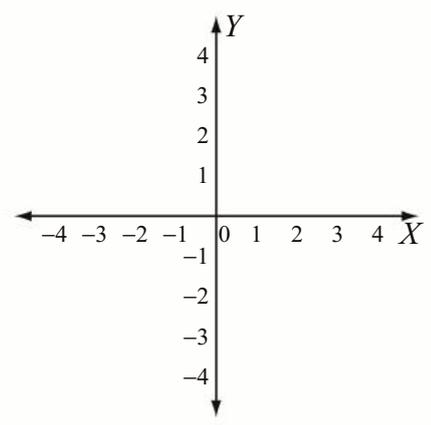
17. [Substitution]  
 If  $y = x^2 - 8$ , find  $y$  when  $x = 5$

18. [Expansion]  
 Expand  $4n(4n - 5)$

19. [Factorisation]  
 Factorise and evaluate  
 $-9 \times 42 - 9 \times 58$

20. [Equations]  
 Solve the inequality:  
 $2(4x + 5) \leq -6$

21. [Coordinate Geometry]  
 Sketch the line of equation  $y = -2x + 2$  by marking the  $x$ -intercept and the  $y$ -intercept.  
 [Label the graph with the rule.]



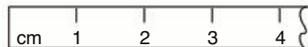
22. [Units of Measurement / Time]

Match the length to the ruler based on the precision of their scales.

A) 1 cm



B) 0.2 cm

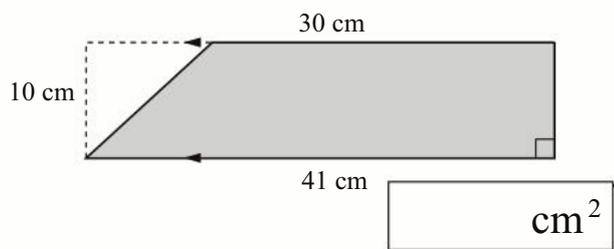


C) 0.1 cm



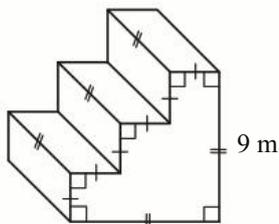
23. [Perimeter / Area]

Find the area of the trapezium.



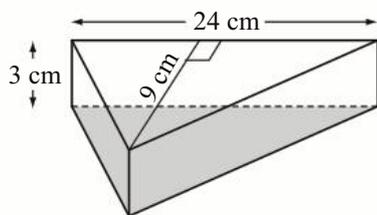
24. [Surface Area]

Find the total surface area of the prism.



25. [Volume]

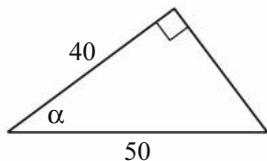
Find the volume of the triangular prism.



26. [Pythagoras / Trigonometry]

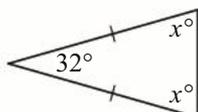
Which trigonometric ratio would be used to find angle  $\alpha$ ?

- A) sine
- B) cosine
- C) tangent



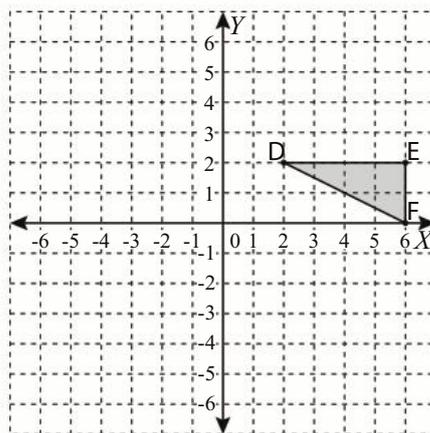
27. [Angles]

Find the value of  $x^\circ$ .



28. [Geometric Reasoning]

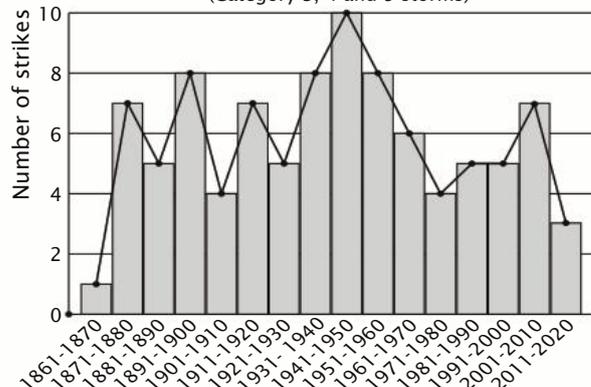
Redraw the triangle DEF after rotating it 180° about the point of coordinates (2,2) and then reflecting it in the x-axis.



29. [Statistics]

Which decade registered the most major hurricane strikes?

US Major Hurricane Strikes by decade  
(Category 3, 4 and 5 storms)

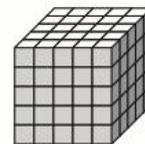


30. [Probability]

A bag contains 7 green, 15 red and 3 blue marbles. Find the probability that a marble drawn at random from the bag will be red. [Give your answer as a decimal.]

31. [Problem Solving 1]

How many of the smaller cubes have faces which touch the faces of exactly five other cubes?



32. [Problem Solving 2]

John ran  $x$  m on his first day of training for the marathon. On each following day, John ran 100 m more than he had run on the previous day. Which is an expression for the number of metres John ran on his 7<sup>th</sup> day of training?

- A)  $x + 700$
- B)  $7(x + 100)$
- C)  $x + 600$
- D)  $100x + 7$



## Test 3

Covering worksheets 2.1 - 2.4

Name: .....

1. [Long  $\times, +$ ]  
 $578 \times 13 =$

2. [Decimal  $+, -$ ]  
 $12.5 - 0.69 =$

3. [Decimal  $\times, +$ ]  
 $1.8 \times 0.04 =$

4. [Fraction  $+, -$ ]  
 $6 - 3\frac{5}{7} =$

5. [Fraction  $\times, +$ ]  
 $\frac{2}{7} \times \frac{7}{10} =$

6. [Percentages]  
 $33\frac{1}{3}\% \text{ of } 24 =$

7. [Decimals / Fractions / Percentages]  
 Write  $\frac{27}{50}$  as a decimal.

8. [Integer  $+, -$ ]  
 $(-13) - (+7) + (-18) =$

9. [Integer  $\times, +$ ]  
 $(-5) \times (-4) \times (-7) =$

10. [Rates / Ratios]  
 The USA has an area of nearly 10 million  $\text{km}^2$ , and reached a population of 330 million people in July 2019. What was the average population density of the USA at that time?  
 people/ $\text{km}^2$

11. [Indices]  
 Evaluate  $\frac{7^9}{7^6}$

12. [Square Roots]  
 $6\sqrt{81} =$

13. [Exploring Number]  
 0.0000024 written in scientific notation is:  
 A)  $2.4 \times 10^5$  B)  $2.4 \times 10^{-6}$  C)  $2.04 \times 10^{-5}$

14. [Financial Mathematics]  
 On a base income of \$50 000 how much superannuation will Ronan be paid when the guarantee reaches 10%?  
 \$

15. [Number Patterns]  
 Complete the pattern:  
 $\frac{2}{25}, \frac{2}{5}, 2, 10, 50,$

16. [Expressions]  
 Choose the like terms:  
 $4a, a, -4a^2, 4b$

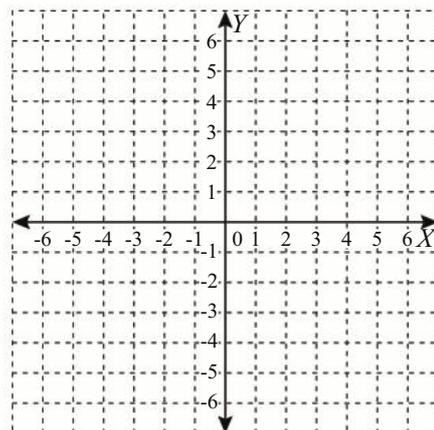
17. [Substitution]  
 Use  $C = \frac{5}{9}(F - 32)$  to find the temperature  $C$  in degrees Celsius when  $F = 113$

18. [Expansion]  
 Expand  $-2y(4yz + 7)$

19. [Factorisation]  
 Factorise  $m^3n^2 + m^2n + mn$

20. [Equations]  
 Solve for  $x$ :  $5(3x - 2) - 4x = 12$

21. [Coordinate Geometry]  
 Graph the line passing through the points  $(-2, -4)$  and  $(0, 6)$ . What is the gradient of the line?



22. [Units of Measurement / Time]

At what time would you take a tram from Lygon St to get to South Melbourne Beach for a swim at 6:00 am?

Monday to Friday		East Coburg to South Melbourne Beach							
Route 1		via Brunswick > Carlton > City > Sth Melbourne							
Stop		AM	AM	AM	AM	AM	AM	AM	
135 East Coburg - Bell St							5:40	5:50	6:00
112 Elgin St & Lygon St		4:59	5:11	5:35	5:46	5:56	6:06	6:16	6:26
1 Melbourne University		5:01	5:13	5:25	5:37	5:48	5:58	6:08	6:18
13 Federation Square		5:12	5:24	5:36	5:48	5:59	6:09	6:16	6:29
14 Arts Centre		5:14	5:26	5:38	5:50	6:01	6:11	6:21	6:31
16 Southbank Blvd & St Kilda Rd		5:15	5:27	5:39	5:51	6:02	6:12	6:22	6:32
32 South Melbourne Beach		5:27	5:39	5:51	6:03	6:14	6:24	6:34	6:54

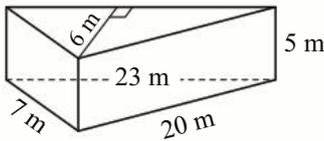
23. [Perimeter / Area]

What is the perimeter of a rectangle with an area of  $28 \text{ cm}^2$  if its length is  $7 \text{ cm}$ ?

 cm

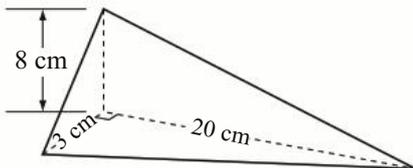
24. [Surface Area]

Find the total surface area of the triangular prism.


  $\text{m}^2$ 

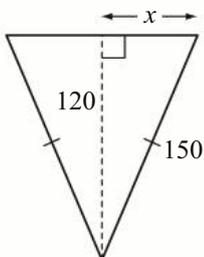
25. [Volume]

Calculate the volume of the triangular pyramid of height  $8 \text{ cm}$ .


  $\text{cm}^3$ 

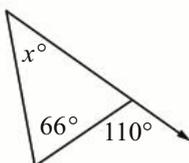
26. [Pythagoras / Trigonometry]

Find the missing length in this triangle.



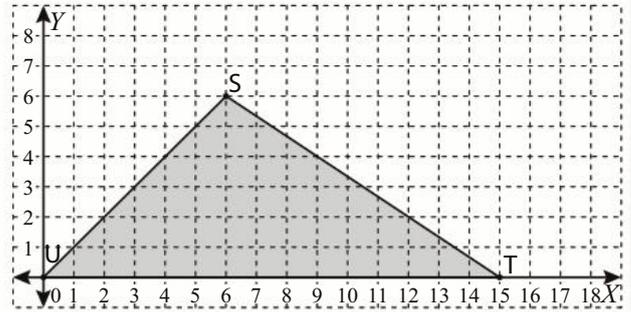

27. [Angles]

Find the value of  $x^\circ$ .




28. [Geometric Reasoning]

Redraw the triangle STU reduced by a scale factor of  $\frac{1}{3}$  about the origin of the axes. Label the reduction S'T'U. Are triangles STU and S'T'U congruent or similar?




29. [Statistics]

The back-to-back stem plot shows the number of medals won by the United Kingdom and Australia at each of the Olympics between 1912 and 2016. Find the difference between the medians of the two sets of data.

United Kingdom	Australia
	0   1 3 4 5 5 6 6 9
9 8 8 6 5 4 3 3 1	1   1 3 4 7 7 8
8 4 4 3 1 0 0	2   2 4 7 9
7 4 0	3   5 4
7 5 2 2	4   1 6 9
	5   8
	7   6

Key  
1 | 4 = 14

30. [Probability]

All 18 employees walk part of the way to work. Four of these employees also catch a tram, another two ride the train and another three cycle part way. What is the probability that an employee chosen at random does not catch a tram? [Give the answer as a fraction in simplest form.]

31. [Problem Solving 1]

A 64-page magazine is made up of 16 sheets which have been folded over and stapled down the middle. Pages 1, 2, 63, 64 are on the same sheet. Pages 31, 32, 33, 34 are on the same sheet. What numbers are on the same sheet with 22?

32. [Problem Solving 2]

Sam and Kevin are bricklayers. Sam lays 100 bricks in 40 minutes and Kevin lays 30 bricks in 10 minutes. If they work together, how many minutes will it take them to lay 220 bricks?



## Test 3

Covering worksheets 2.1 - 2.4

Name: .....

1. [Long  $\times, +$ ]  
 $196 \times 26 =$

2. [Decimal  $+, -$ ]  
 $14.4 - 0.58 =$

3. [Decimal  $\times, +$ ]  
 $1.7 \times 0.03 =$

4. [Fraction  $+, -$ ]  
 $4 - 2\frac{3}{8} =$

5. [Fraction  $\times, +$ ]  
 $\frac{3}{4} \times \frac{4}{9} =$

6. [Percentages]  
 0.5% of 100 =

7. [Decimals / Fractions / Percentages]  
 Write  $\frac{9}{20}$  as a decimal.

8. [Integer  $+, -$ ]  
 $(-15) - (+11) + (-13) =$

9. [Integer  $\times, +$ ]  
 $(-4) \times (-5) \times (-6) =$

10. [Rates / Ratios]  
 The average web surfer types around 450 words in 15 minutes. What is this rate in words per minute?

11. [Indices]  
 Evaluate  $\frac{6^8}{6^5} =$

12. [Square Roots]  
 $9\sqrt{49} =$

13. [Exploring Number]  
 89 000 000 000 written in scientific notation is:  
 A)  $8.9 \times 10^8$  B)  $8.9 \times 10^9$  C)  $8.9 \times 10^{10}$

14. [Financial Mathematics]  
 On a base income of \$20 000 how much superannuation will Jennifer be paid when the guarantee reaches 10%?  
 \$

15. [Number Patterns]  
 Complete the pattern:  
 $\frac{5}{36}, \frac{5}{6}, 5, 30, 180,$   ,

16. [Expressions]  
 Choose the like terms:  
 $6c, 6d, -d^2, -2d$

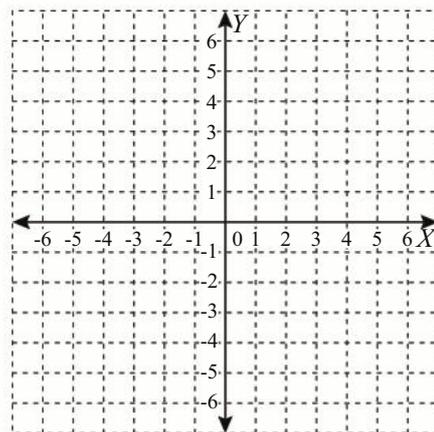
17. [Substitution]  
 Use  $S = (n - 2) \times 180^\circ$  to find the sum of all interior angles when  $n = 8$  (octagon)

18. [Expansion]  
 Expand  $-4j(3jk + 6)$

19. [Factorisation]  
 Factorise  $t^3u^2 - tu + tu^2$

20. [Equations]  
 Solve for  $x$ :  $6(2x - 2) - 3x = 15$

21. [Coordinate Geometry]  
 Graph the line passing through the points (2,5) and (0,-3). What is the gradient of the line?



22. [Units of Measurement / Time]

At what time would you take a tram from NewQuay Docklands to be at the Epworth Hospital by 3:30 pm?

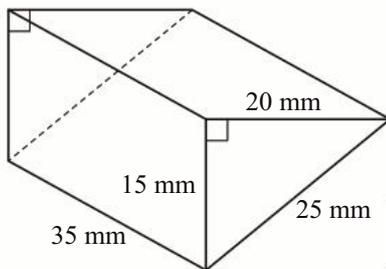
Saturday NewQuay Docklands to North Balwyn								
Route 48 via City > Richmond > Hawthorn > Kew								
Stop	PM							
D11 NewQuay Docklands	2:05	2:17	2:29	2:41	2:53	3:05	3:17	3:29
D2 Central Pier	2:09	2:21	2:33	2:45	2:57	3:09	3:21	3:33
4 Elizabeth St & Flinders St	2:20	2:32	2:44	2:56	3:08	3:20	3:32	3:44
15 Epworth Hospital	2:32	2:44	2:56	3:08	3:20	3:32	3:44	3:56
23 Hawthorn Bridge	2:41	2:53	3:05	3:17	3:29	3:41	3:53	4:05
32 Kew Junction	2:46	2:58	3:10	3:22	3:34	3:46	3:58	4:10
51 North Balwyn - Balwyn Rd	3:01	3:13	3:25	3:37	3:49	4:01	4:13	4:25

23. [Perimeter / Area]

What is the perimeter of a rectangle with an area of  $90 \text{ mm}^2$  if its length is  $10 \text{ mm}$ ?

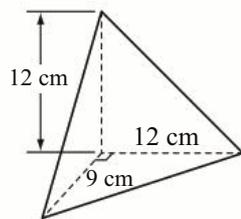
24. [Surface Area]

Find the total surface area of the triangular prism.



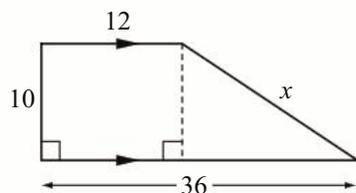

25. [Volume]

Calculate the volume of the triangular pyramid of height  $12 \text{ cm}$ .



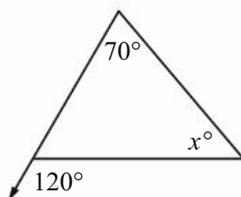

26. [Pythagoras / Trigonometry]

Find the missing length in this trapezium.



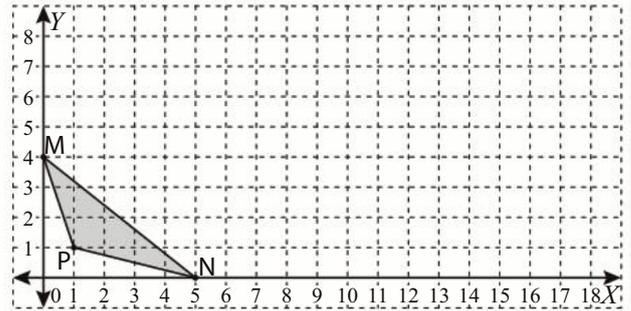

27. [Angles]

Find the value of  $x^\circ$ .




28. [Geometric Reasoning]

Redraw the triangle MNP enlarged by a scale factor of 2 about the origin of the axes. Label the enlargement M'N'P'. Are triangles MNP and M'N'P' congruent or similar?




29. [Statistics]

The back-to-back stem plot shows the number of medals won by the United Kingdom and Romania at each of the Olympics between 1952 and 2016. Find the difference between the medians of the two sets of data.

United Kingdom		Romania
	0	4 5 8 9
9 8 8 5 3 3 1	1	0 2 3 5 6 8 8 9
8 4 4 1 0	2	4 4 6 7
	3	
	4	
	5	3
	6	

Key  
1 | 4 = 14

30. [Probability]

All thirty students in Maria's class speak English. Six of these students speak Chinese, another two Japanese and another four Russian. What is the probability that a student selected at random does not speak Russian? [Give the answer as a fraction in simplest form.]

31. [Problem Solving 1]

A 64-page magazine is made up of 16 sheets which have been folded over and stapled down the middle. Pages 1, 2, 63, 64 are on the same sheet. Pages 31, 32, 33, 34 are on the same sheet. What numbers are on the same sheet with 18?

32. [Problem Solving 2]

Rufus and Wade are bricklayers. Rufus lays 75 bricks in 45 minutes and Wade lays 20 bricks in 15 minutes. If they work together, how many minutes will it take them to lay 150 bricks?

# MATHS MATE



## Test 4

Covering worksheets 2.5 - 2.8

Name: .....

1. [Long  $\times, \div$ ]  
 $288 \div 16 =$

2. [Decimal  $+, -$ ]  
 $10 - 3.8 + 2.49 =$

3. [Decimal  $\times, \div$ ]  
 $60 \times 2.45 =$

4. [Fraction  $+, -$ ]  
 $\frac{5}{6} - \frac{1}{2} =$

5. [Fraction  $\times, \div$ ]  
 $9 \div \frac{3}{5} =$

6. [Percentages]  
 200% of 45 =

7. [Decimals / Fractions / Percentages]  
 Write 50 out of 250 as a percentage.

8. [Integer  $+, -$ ]  
 $(-12) - (+17) + (-14) =$

9. [Integer  $\times, \div$ ]  
 $(-3) \times (-8) \div (-4) =$

10. [Rates / Ratios]  
 Find the missing term in the proportion:  
 $\frac{a}{30} = \frac{4}{8}$    $a =$

11. [Indices]  
 Simplify  $m^4 n^2 \times mn$

12. [Square Roots]  
 $\sqrt{\frac{1}{9}} \times \sqrt{\frac{1}{9}} =$

13. [Exploring Number]  
 $-8 - 3 \times (14 - 2) =$

14. [Financial Mathematics]  
 Sally has a taxable income of \$47 000. Her employer has withheld \$7622 in tax. How much tax refund will she receive at the end of the financial year, if there are no other deductions?

Taxable Income	Tax on this income*
0-\$18200	Nil
\$18201 - \$37000	19¢ for each \$1 over \$18200
\$37001 - \$90000	\$3572 plus 32.5¢ for each dollar over \$37000
\$90001 - \$180000	\$20797 plus 37¢ for each dollar over \$90000
\$180001 and over	\$54097 plus 45¢ for each dollar over \$180000

\*Resident tax rates 2019-2020 (Australia)

15. [Number Patterns]  
 Complete the pattern:  
 243, 81, 27, 9, 3, ,

16. [Expressions]  
 Simplify  $3b^2 + 7b - b^2 - 3b$

17. [Substitution]  
 If  $y = x(x - 10)$ , find  $y$  when  $x = 10$

18. [Expansion]  
 Expand and simplify  $g(5g - 1) + 4(5g - 2)$

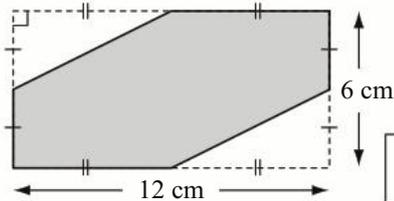
19. [Factorisation]  
 Factorise  $-6d^3 - 9de$

20. [Equations]  
 Solve for  $x$ :  $\frac{x}{2} = x - 4$

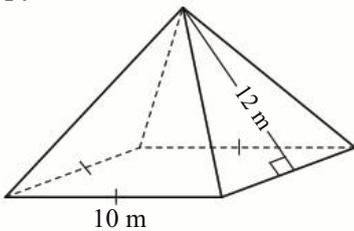
21. [Coordinate Geometry]  
 Write the equation  $4x + y = -1$  in the gradient-intercept form  $y = mx + c$ , where  $m$  represents the gradient and  $c$  the  $y$ -intercept.  
 $y =$

22. [Units of Measurement / Time]  
A typical person has 100 000 strands of hair on their head. If each strand measures 650 mm, how many kilometres of scalpal hair would the typical person have?

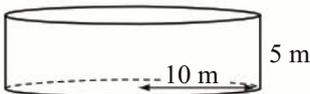
23. [Perimeter / Area]  
Find the area of the shaded shape.



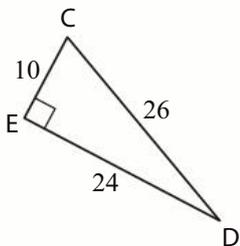

24. [Surface Area]  
Find the total surface area of the regular square pyramid.




25. [Volume]  
Find the volume of the cylinder using  $\pi \approx 3.14$



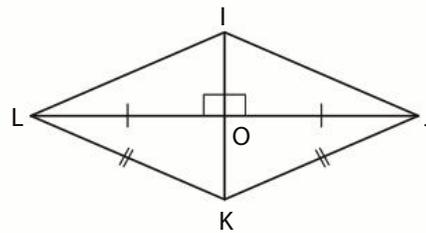

26. [Pythagoras / Trigonometry]  
Calculate the value of  $\cos C$  in this triangle.



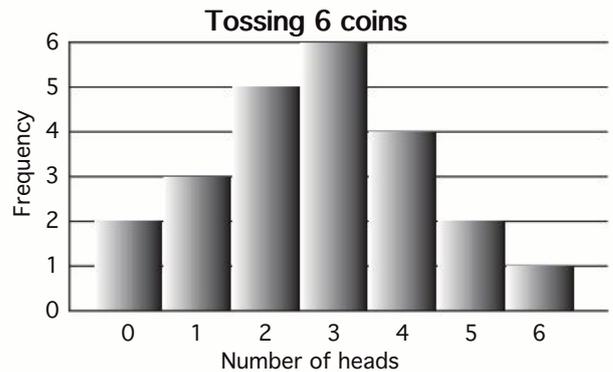

27. [Angles]  
Find the value of  $x^\circ$ .




28. [Geometric Reasoning]  
Which congruence test (SSS, SAS, AAS, RHS) can be applied to show that  $\Delta KOL$  is congruent to  $\Delta KOJ$ ?




29. [Statistics]  
Find the range and median of the distribution.



range =                      median =

30. [Probability]  
A pair of standard dice is rolled. Complete the table. Find the probability of the difference between the numbers rolled being a non-zero, even number. [Give the answer as a fraction in simplest form.]

Difference		Die 1					
		1	2	3	4	5	6
Die 2	1	0	1				
	2	1					
	3	2					
	4						
	5						
	6						

31. [Problem Solving 1]  
Sam counts the number of ads in each of the 4 breaks during a TV show. He notes that the median is 4, the mode is 3, and the mean is 4.5. How many ads are there in each break?

32. [Problem Solving 2]  
How many pairs of positive integers make this equation true?

$$2x + 3y = 41$$

[Hint: Positive integers are 1, 2, 3, 4, ...]



## Test 4

Covering worksheets 2.5 - 2.8

Name: .....

1. [Long  $\times, \div$ ]  
 $391 \div 17 =$

2. [Decimal  $+, -$ ]  
 $20 - 0.057 + 0.9 =$

3. [Decimal  $\times, \div$ ]  
 $3.28 \times 80 =$

4. [Fraction  $+, -$ ]  
 $\frac{5}{12} - \frac{1}{4} =$

5. [Fraction  $\times, \div$ ]  
 $6 \div \frac{3}{4} =$

6. [Percentages]  
 110% of 80 =

7. [Decimals / Fractions / Percentages]  
 What percentage is 25 out of 500?

8. [Integer  $+, -$ ]  
 $(-16) - (+13) + (-12) =$

9. [Integer  $\times, \div$ ]  
 $(-2) \times (-45) \div (-3) =$

10. [Rates / Ratios]  
 Find the missing term in the proportion:  
 $\frac{10}{z} = \frac{3}{15}$

11. [Indices]  
 Simplify  $j^2k^2 \times jk^2$

12. [Square Roots]  
 $\sqrt{\frac{1}{4}} \times \sqrt{\frac{1}{4}} =$

13. [Exploring Number]  
 $5 - (7 - 2) \times 8 =$

14. [Financial Mathematics]  
 Nate has a taxable income of \$100 000. His employer has withheld \$26 000 in tax. How much tax refund will he receive at the end of the financial year, if there are no other deductions?

Taxable Income	Tax on this income*
0-\$18 200	Nil
\$18 201 - \$37 000	19¢ for each \$1 over \$18 200
\$37 001 - \$90 000	\$3572 plus 32.5¢ for each dollar over \$37 000
\$90 001 - \$180 000	\$20 797 plus 37¢ for each dollar over \$90 000
\$180 001 and over	\$54 097 plus 45¢ for each dollar over \$180 000

\*Resident tax rates 2019-2020 (Australia)

15. [Number Patterns]  
 Complete the pattern:  
 625 , 125 , 25 , 5 ,

16. [Expressions]  
 Simplify  $y^2 - 2y + 2y^2 + 3y$

17. [Substitution]  
 If  $y = x(x + 6)$ , find  $y$  when  $x = 0$

18. [Expansion]  
 Expand and simplify  $i(4i - 5) + 3(i + 9)$

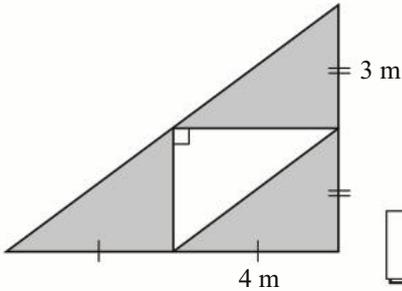
19. [Factorisation]  
 Factorise  $-4a^3 - 10ab$

20. [Equations]  
 Solve for  $x$ :  $\frac{x}{5} = 6 - x$

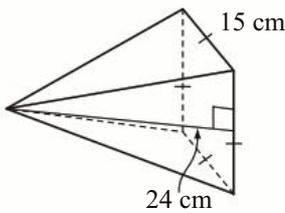
21. [Coordinate Geometry]  
 Write the equation  $-6x - y = 3$  in the gradient-intercept form  $y = mx + c$ , where  $m$  represents the gradient and  $c$  the  $y$ -intercept.

22. [Units of Measurement / Time]  
 If you place 45 of the world's largest flower, Titan Arum, end to end, they would reach the top of the London Eye. If each flower measures 300 cm, how tall is the London Eye in metres?

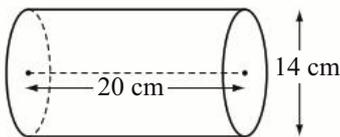
23. [Perimeter / Area]  
 Find the shaded area of the triangle.



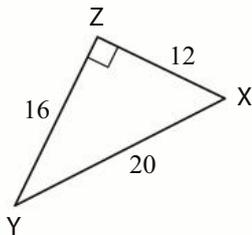

24. [Surface Area]  
 Find the total surface area of the regular square pyramid.




25. [Volume]  
 Find the volume of the cylinder using  $\pi \approx \frac{22}{7}$



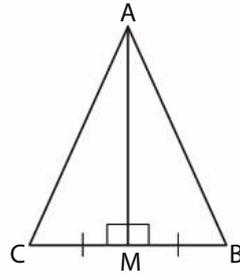

26. [Pythagoras / Trigonometry]  
 Calculate the value of  $\sin Y$  in this triangle.



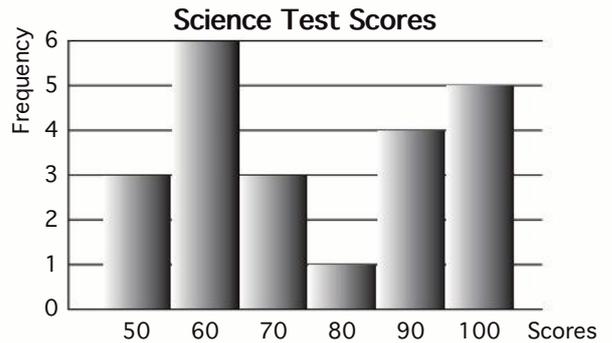

27. [Angles]  
 Find the value of  $x^\circ$ .




28. [Geometric Reasoning]  
 Which congruence test (SSS, SAS, AAS, RHS) can be applied to show that  $\triangle ACM$  is congruent to  $\triangle ABM$ ?




29. [Statistics]  
 Find the range and median of the distribution.



range =                      median =

30. [Probability]  
 A standard die is tossed and a spinner labelled 1, 2, 3 and 4 is spun. Complete the table. What is the probability of obtaining a total greater than 4 when the die is tossed and the spinner is spun once? [Give the answer as a fraction in simplest form.]

		Die					
		1	2	3	4	5	6
Spinner	1	2	3				
	2	3					
	3	4					
	4						

31. [Problem Solving 1]  
 Jay counts the number of ads in each of the 4 breaks during a TV show. He notes that the median is 6.5, the mode is 6, and the mean is 7.5. How many ads are there in each break?

32. [Problem Solving 2]  
 How many pairs of positive integers make this equation true?

$$3x + 5y = 76$$

[Hint: Positive integers are 1, 2, 3, 4, ...]



## Test 5

Covering worksheets 3.1 - 3.4

Name: .....

1. [Long  $\times, +$ ]  
 $325 \times 1500 =$

2. [Decimal  $+, -$ ]  
 $10 - 0.066 =$

3. [Decimal  $\times, +$ ]  
 $0.002 \div 0.01 =$

4. [Fraction  $+, -$ ]  
 $\frac{1}{6} + \frac{2}{9} =$

5. [Fraction  $\times, +$ ]  
 $\frac{1}{6} \times 2\frac{2}{5} =$

6. [Percentages]  
 Increase 60 by 75%.

7. [Decimals / Fractions / Percentages]  
 Complete the table:

Decimal	Fraction	Percentage
0.44		

8. [Integer  $+, -$ ]  
 $2 + (3 - 7) =$

9. [Integer  $\times, +$ ]  
 $(6 - 9) \times (9 + 6) =$

10. [Rates / Ratios]  
 The ratio of wins to losses for Fremantle in the 2018 home and away AFL season was 4 : 7. If Fremantle lost 14 games, how many did they win?

11. [Indices]  
 Simplify  $4(3x)^2$

12. [Square Roots]  
 $6\sqrt{9} - 5\sqrt{4} =$

13. [Exploring Number]  
 Write 0.000005 m, the diameter of a blood capillary vessel, in scientific notation.

14. [Financial Mathematics]  
 Carol invests \$3000 for 5 years at a simple interest rate of 15% per year. How much will Carol have after that time?  
 [Hint: Principal + interest.]

15. [Number Patterns]  
 Find the 20th term in the pattern:  
 $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \frac{1}{6}, \dots$

16. [Expressions]  
 Simplify  $-4xy \times 3y$

17. [Substitution]  
 If  $e = -1$  and  $f = 4$ , find the value of  $5e - 2f$

18. [Expansion]  
 Expand and simplify  $-5(v^2 - w) + 6v(v - 1)$

19. [Factorisation]  
 Factorise  $fg - 3f + 2g - 6$

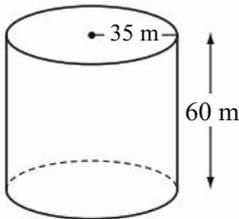
20. [Equations]  
 Solve the inequality:  
 $5x - \frac{x}{2} < 18$

21. [Coordinate Geometry]  
 Use  $y - y_1 = m(x - x_1)$  where  $m = \frac{y_2 - y_1}{x_2 - x_1}$  to write the equation of the line passing through the points (0, -2) and (3, 4).  
 $y =$

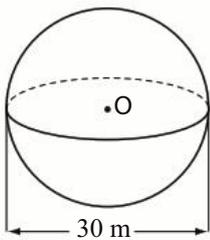
22. [Units of Measurement / Time]  
The heaviest land animal, an African elephant weighed 12 tonnes. If 15 such elephants equalled the mass of a blue whale, what would be the mass of that whale in kilograms?

23. [Perimeter / Area]  
Using  $C = 2\pi r$  where  $\pi \approx \frac{22}{7}$ , find how far a bicycle wheel with a diameter of 42 cm will travel after 1 full turn.

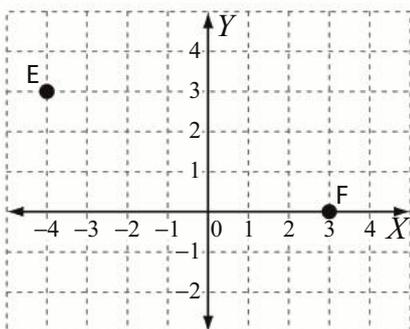
24. [Surface Area]  
Using  $LA = 2\pi rh$  and  $\pi \approx \frac{22}{7}$ , find the lateral area of the cylinder.



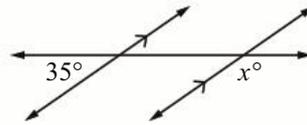

25. [Volume]  
Find the volume of the sphere using  $\pi \approx 3.14$



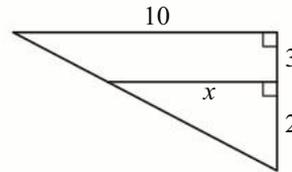

26. [Pythagoras / Trigonometry]  
Find the distance EF in this Cartesian plane.  
[Leave your answer in surd form.]




27. [Angles]  
Find the value of  $x^\circ$ .




28. [Geometric Reasoning]  
Find the value of  $x$ . [All measurements are in cm.]




29. [Statistics]  
Find the mean of the following distribution.

Score	0	1	2	3	4
Frequency	12	10	5	2	1

30. [Probability]  
A money bag has fifty 1-dollar coins, thirty 2-dollar coins and sixty 50-cent coins. Find the probability that the first coin, taken at random from the bag, will be a 1-dollar or 2-dollar coin. [Give the answer as a fraction in simplest form.]

31. [Problem Solving 1]  
Six consecutive numbers are listed. The sum of the smallest three numbers is 39. What is the sum of the largest three?

32. [Problem Solving 2]  
A group of 24 students decided to go on an expedition. They bought enough food to last for 20 days. If 16 more students join them, how many days will their food last?



## Test 5

Covering worksheets 3.1 - 3.4

Name: .....

1. [Long  $\times$ ,+]  $412 \times 1500 =$

2. [Decimal +,-]  $10 - 0.047 =$

3. [Decimal  $\times$ ,+]  $0.006 \div 0.01 =$

4. [Fraction +,-]  $\frac{1}{10} + \frac{2}{15} =$

5. [Fraction  $\times$ ,+]  $\frac{3}{5} \times 1\frac{1}{6} =$

6. [Percentages] Increase 60 by 25%.

7. [Decimals / Fractions / Percentages] Complete the table:

Decimal	Fraction	Percentage
0.85		

8. [Integer +,-]  $7 + (1 - 9) =$

9. [Integer  $\times$ ,+]  $(4 - 7) \times (7 + 4) =$

10. [Rates / Ratios] The ratio of wins to losses for Essendon in the 2018 home and away AFL season was 6 : 5. If Essendon won 12 games, how many did they lose?

11. [Indices] Simplify  $2(7x)^2$

12. [Square Roots]  $7\sqrt{16} - 3\sqrt{25} =$

13. [Exploring Number] Write 0.0000012 m, the size of a plant cell, in scientific notation.

14. [Financial Mathematics] What are the total repayments on a loan of \$2000 for 6 years at a 15% simple interest rate? [Hint: Principal + interest.]

15. [Number Patterns] Find the 20th term in the pattern: 10, 15, 20, 25, 30, .....

16. [Expressions] Simplify  $-5ef \times 2e$

17. [Substitution] If  $p = 0$  and  $q = -10$ , find the value of  $3p - 2q$

18. [Expansion] Expand and simplify  $-2(j^2 - k) + 3j(j - 1)$

19. [Factorisation] Factorise  $rs - 4r + 2s - 8$

20. [Equations] Solve the inequality:  $5x + \frac{x}{2} > 22$

21. [Coordinate Geometry] Use  $y - y_1 = m(x - x_1)$  where  $m = \frac{y_2 - y_1}{x_2 - x_1}$  to write the equation of the line passing through the points (5,0) and (-1,6).

$y =$

22. [Units of Measurement / Time]

Which mass is greater?

- A) 0.074 mg of arsenic found in a bag of rice  
 B) grain of sand weighing 0.01 g

23. [Perimeter / Area]

The diameter of a basketball hoop is 45 cm.

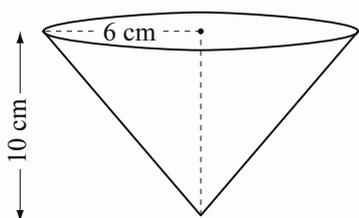
Using  $C = 2\pi r$  where  $\pi \approx 3.14$ , find its circumference.

24. [Surface Area]

Using  $LA = 2\pi rh$  and  $\pi \approx \frac{22}{7}$ , find the lateral area of a straw of diameter 7 mm and length 300 mm.

25. [Volume]

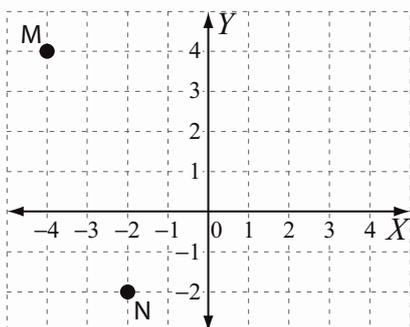
Find the volume of the cone using  $\pi \approx 3.14$




26. [Pythagoras / Trigonometry]

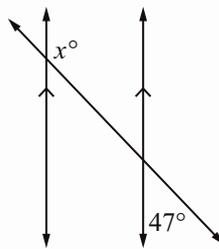
Find the distance MN in this Cartesian plane.

[Leave your answer in surd form.]



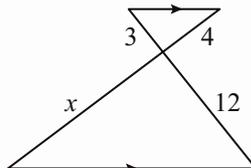

27. [Angles]

Find the value of  $x^\circ$ .




28. [Geometric Reasoning]

Find the value of  $x$ . [All measurements are in cm.]




29. [Statistics]

Find the mean of the following distribution.

Score	0	1	2	3	4
Frequency	6	7	2	3	2

30. [Probability]

Elly's drawer contains 8 white, 6 navy and 12 multicoloured socks. Find the probability that the first sock taken at random from the drawer will be white or multicoloured. [Give the answer as a fraction in simplest form.]

31. [Problem Solving 1]

Six consecutive numbers are listed. The sum of the largest three numbers is 72. What is the sum of the smallest three?

32. [Problem Solving 2]

Twelve people in a shoe company can pack a shipping container of shoes in 25 minutes. If eight more people join them, how long would it take to pack the container?



## Test 6

Covering worksheets 3.5 - 3.8

Name: .....

1. [Long  $\times, \div$ ]  
 $6096 \div 15 =$

2. [Decimal  $+, -$ ]  
 $13 - 0.408 =$

3. [Decimal  $\times, \div$ ]  
 $6.37 \div 0.7 =$

4. [Fraction  $+, -$ ]  
 $3\frac{1}{6} - 1\frac{5}{6} =$

5. [Fraction  $\times, \div$ ]  
 $\frac{3}{10} \div 6 =$

6. [Percentages]  
 Decrease 680 by 40%.

7. [Decimals / Fractions / Percentages]  
 Place in descending order:  
 $0.3, 33\%, \frac{1}{3}$

8. [Integer  $+, -$ ]  
 $(7 - 15) + (2 - 8) =$

9. [Integer  $\times, \div$ ]  
 $\frac{3 - 7}{6 - 4} =$

10. [Rates / Ratios]  
 The American antelope is the fastest mammal on land over long distances. It can run at 54 km/h. What is the speed in metres per second?

11. [Indices]  
 Simplify  $(d^2)^3$

12. [Square Roots]  
 $5\sqrt{4} \times \sqrt{4} =$

13. [Exploring Number]  
 Which is an irrational number?  
 A) 3.616161...    B)  $\sqrt{15}$   
 C)  $\sqrt{81}$         D)  $\frac{3}{14}$

14. [Financial Mathematics]  
 There is a 30% sale on items already reduced by 10%. Is the total saving  $>$ ,  $<$  or  $=$  a 40% discount on the original value?

15. [Number Patterns]  
 If the rule of a pattern is  $30 - n$  find the 50th term ( $n = 50$ ).

16. [Expressions]  
 Simplify  $-12vw \div 4v$

17. [Substitution]  
 If  $p = 5$  and  $q = -7$ , find the value of  $\frac{p}{2}(q - 3)$

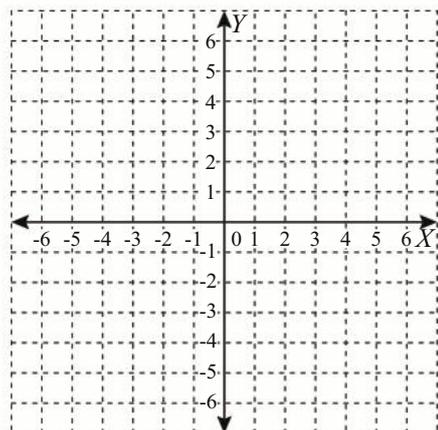
18. [Expansion]  
 Expand  $(5 + e)(2 - f)$

19. [Factorisation]  
 Factorise  $x^2 - 49y^2$

20. [Equations]  
 Solve for  $x$ :  
 $x(x + 7) = 0$

21. [Coordinate Geometry]  
 Sketch the non-linear rule  $y = x^2 - 2$  (parabola) by first completing this table of values.

$x$	-3	-2	-1	0	1	2	3
$y$	7						



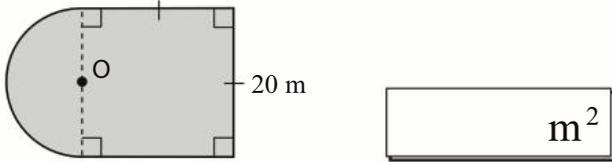
22. [Units of Measurement / Time]

Express in litres:

2 L and 50 000 mL =

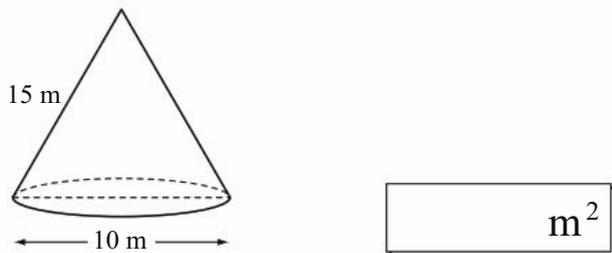
23. [Perimeter / Area]

Find the area of the shape. (Use  $\pi \approx 3.14$ )



24. [Surface Area]

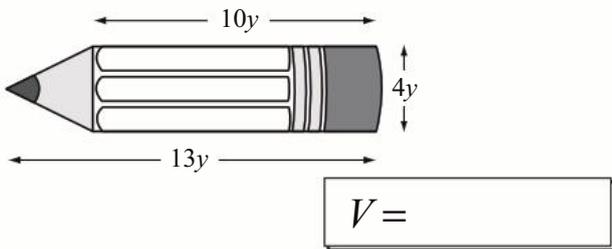
Use  $\pi \approx 3.14$  to find the total surface area of the cone. [Hint:  $TSA_{cone} = \pi r(r + s)$ ]



25. [Volume]

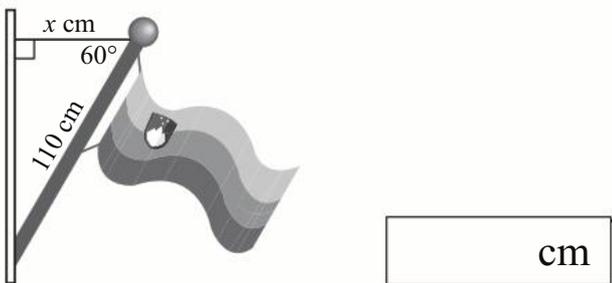
Write an algebraic expression in terms of  $y$  and  $\pi$  for the volume  $V$  of the pencil.

[Hint:  $V_{cone} = \frac{\pi r^2 h}{3}$ ,  $V_{cylinder} = \pi r^2 h$ ]



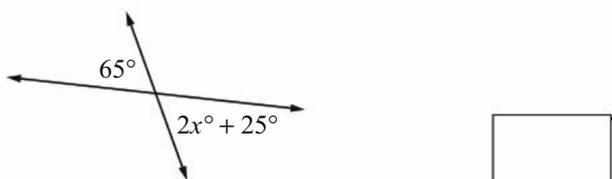
26. [Pythagoras / Trigonometry]

A flagpole extends from the wall of a building as shown. If the length of the flagpole is 110 cm and  $\cos 60^\circ = 0.5$ , find the distance from the end of the flagpole to the wall.



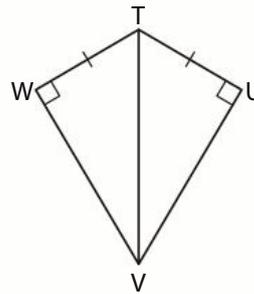
27. [Angles]

Find the value of  $x^\circ$ .



28. [Geometric Reasoning]

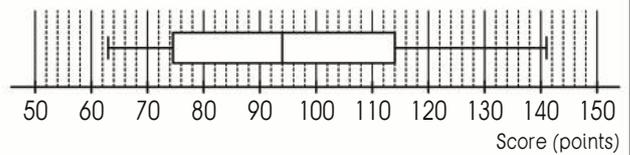
Write the pairs of equal sides and angles to prove that  $\triangle TVW$  and  $\triangle TVU$  are congruent. Which congruence test did you use?



$\begin{aligned} &= \\ &= \\ &= \\ \text{congruence test:} \end{aligned}$

29. [Statistics]

What is the median and upper quartile (UQ) of the scores?



median =  UQ =

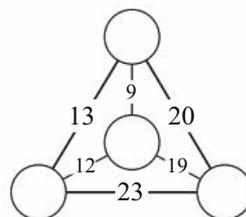
30. [Probability]

In a basketball game Kai's team put up 125 shots at goal and the probability of a certain result is shown. How many 3 pointers were scored by Kai's team?

Result	3 points	2 points	1 points	miss
Probability	0.2	0.4	0.1	0.3

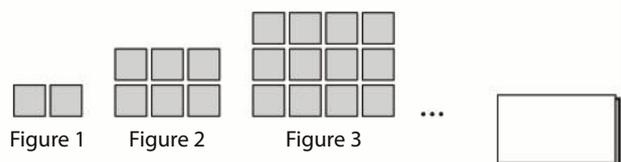
31. [Problem Solving 1]

Enter numbers in the circles so that the numbers on each line equal the sum of the numbers at each end.



32. [Problem Solving 2]

How many blocks are needed for the twenty-fifth figure, following the pattern?





## Test 6

Covering worksheets 3.5 - 3.8

Name: .....

1. [Long  $\times$ ,+]  $2088 \div 15 =$

2. [Decimal +,-]  $17 - 0.603 =$

3. [Decimal  $\times$ ,+]  $2.55 \div 0.5 =$

4. [Fraction +,-]  $4\frac{3}{10} - 2\frac{7}{10} =$

5. [Fraction  $\times$ ,+]  $\frac{3}{5} \div 9 =$

6. [Percentages] Decrease 560 by 30%.

7. [Decimals / Fractions / Percentages] Place in ascending order:  
 $0.7, 75\%, \frac{5}{7}$

8. [Integer +,-]  $(8 - 19) + (6 - 17) =$

9. [Integer  $\times$ ,+]  $\frac{-3 + 5}{3 - 5} =$

10. [Rates / Ratios] The fastest land bird is the ostrich, who can reach a speed of 20 m/s. What is the speed in kilometres per hour?

11. [Indices] Simplify  $(j^4)^3$

12. [Square Roots]  $10\sqrt{9} \times \sqrt{9} =$

13. [Exploring Number] Which is an irrational number?  
 A)  $\sqrt{10}$  B)  $-1.4142$   
 C)  $\frac{9}{25}$  D)  $\sqrt{64}$

14. [Financial Mathematics] There is a 25% sale on items already reduced by 10%. Is the total saving  $>$ ,  $<$  or  $=$  a 35% discount on the original value?

15. [Number Patterns] If the rule of a pattern is  $5(n - 2)$  find the 22nd term ( $n = 22$ ).

16. [Expressions] Simplify  $-15mn \div 5n$

17. [Substitution] If  $a = 3, b = -2$  and  $c = 1$ , find the value of  $\frac{4}{b}(ac - b)$

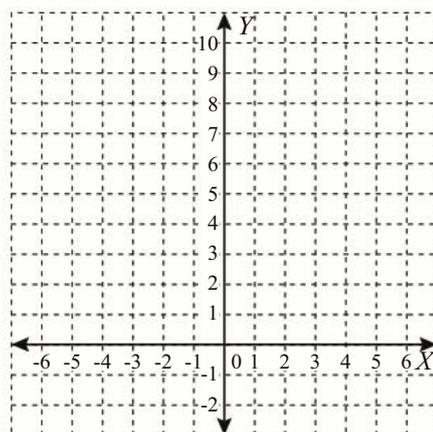
18. [Expansion] Expand  $(6 + g)(3 - h)$

19. [Factorisation] Factorise  $j^2 - 36k^2$

20. [Equations] Solve for  $x$ :  
 $x(x - 6) = 0$

21. [Coordinate Geometry] Sketch the non-linear rule  $y = x^2 + 1$  (parabola) by first completing this table of values.

$x$	-3	-2	-1	0	1	2	3
$y$	10						



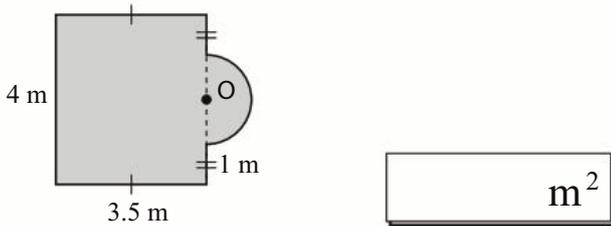
22. [Units of Measurement / Time]

Express in litres:

5 L and 40 000 mL =

23. [Perimeter / Area]

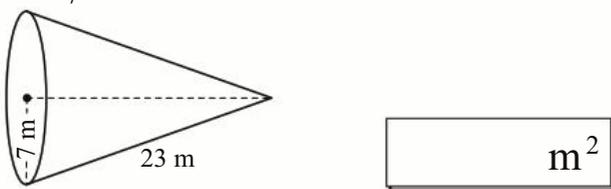
Find the area of the shape. (Use  $\pi \approx 3.14$ )



24. [Surface Area]

Find the total surface area of the cone using

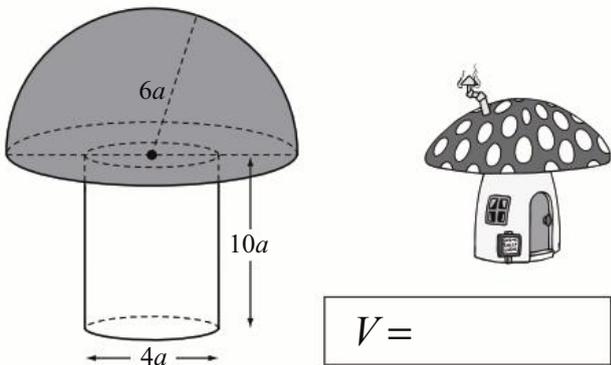
$\pi \approx \frac{22}{7}$ . [Hint:  $TSA_{\text{cone}} = \pi r(r + s)$ ]



25. [Volume]

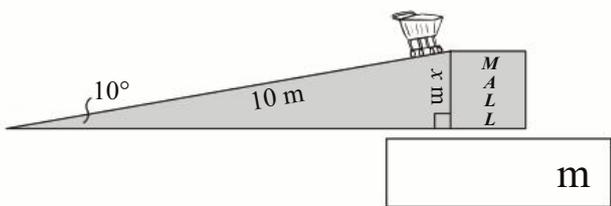
Write an algebraic expression in terms of  $a$  and  $\pi$  for the volume  $V$  of the garden gnome.

[Hint:  $V_{\text{sphere}} = \frac{4\pi r^3}{3}$ ,  $V_{\text{cylinder}} = \pi r^2 h$ ]



26. [Pythagoras / Trigonometry]

A 10 m long ramp leads out of the shopping mall and makes an angle of  $10^\circ$  with the ground. If  $\sin 10^\circ \approx 0.17$ , find the approximate height of the ramp.



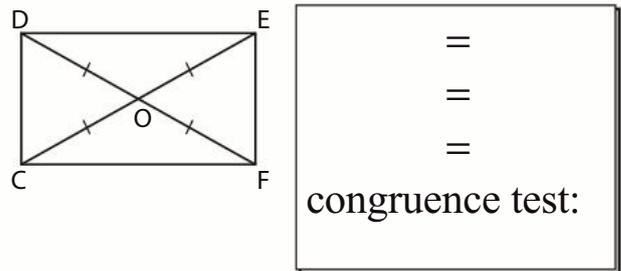
27. [Angles]

Find the value of  $x^\circ$ .



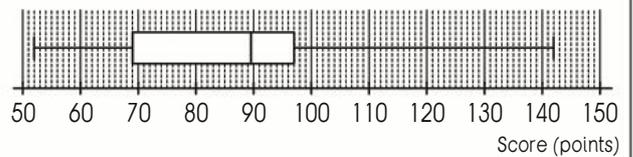
28. [Geometric Reasoning]

Write the pairs of equal sides and angles to prove that  $\triangle COD$  and  $\triangle EOF$  are congruent. Which congruence test did you use?



29. [Statistics]

What is the interquartile range (IQR) of the scores?



30. [Probability]

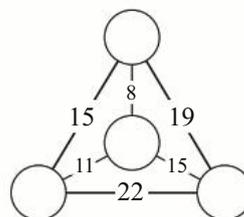
A tennis player has 60 service points in a match and the probability of a certain result is shown. How many serves were a double fault?

Result	Ace	In	Double fault	Let
Probability	0.15	0.6	0.2	0.05



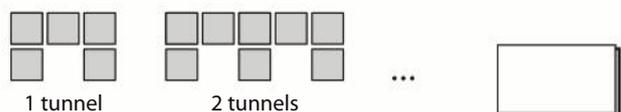
31. [Problem Solving 1]

Enter numbers in the circles so that the numbers on each line equal the sum of the numbers at each end.



32. [Problem Solving 2]

How many blocks are needed to build ten tunnels, following the pattern shown?





## Test 7

Covering worksheets 4.1 - 4.4

Name: .....

1. [Long  $\times$ ,+]  $4125 \times 63 =$

2. [Decimal +,-]  $16 - 0.094 + 0.08 =$

3. [Decimal  $\times$ ,+]  $20 \div 0.2 =$

4. [Fraction +,-]  $\frac{2}{3} - \frac{5}{12} + \frac{1}{4} =$

5. [Fraction  $\times$ ,+]  $\frac{6}{7} \times \frac{5}{6} \times \frac{14}{15} =$

6. [Percentages]  
Panda numbers in the wild increased from 1000 in 1974 to 1600 in 2004. What percentage increase is this?

7. [Decimals / Fractions / Percentages]  
Write  $\frac{2}{9}$  as a recurring decimal.

8. [Integer +,-]  $-6 + -3 - 1 =$

9. [Integer  $\times$ ,+]  $27 \div -3 \div 3 =$

10. [Rates / Ratios]  
432 Park Ave Condominiums (430 m) is the world's tallest residential building. A model is built using the scale 1 : 1000. How tall is the model?  cm

11. [Indices]  
Evaluate  $(-2)^5$

12. [Square Roots]  
 $\sqrt{25} + \sqrt{144} = \sqrt{169}$   
True or false?

13. [Exploring Number]  
Use true and false to complete this table:

	Integer	Rational	Irrational	Real
$\sqrt{9}$				

14. [Financial Mathematics]  
Klaus invests \$10 000 at a compound interest rate of 8% per year. How much does he get back after 2 years?  
[Hint: Principal + interest.]

15. [Number Patterns]  
Write an expression for the term in position  $n$  given the table of values for the sequence.

position	1	2	3	4	5	...	$n$
term	5	7	9	11	13	...	

16. [Expressions]  
Simplify  $-2p - p + 2p^2 - 3p^2$

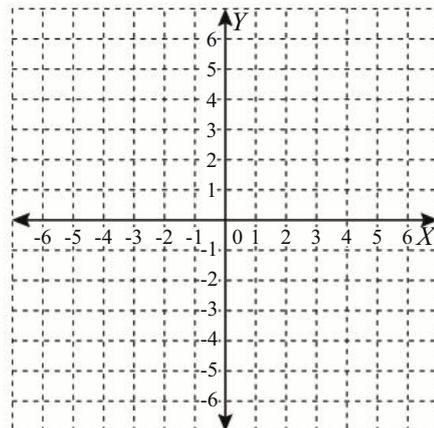
17. [Substitution]  
If  $y = 3x^2 - 5x + 2$ , find  $y$  when  $x = 1$

18. [Expansion]  
Expand and simplify  $(q + 4)(2q - 6)$

19. [Factorisation]  
Factorise  $e^2 + 7e + 2e + 14$

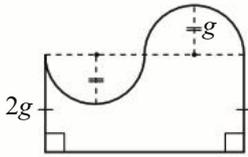
20. [Equations]  
Solve the simultaneous equations:  
 $x + y = 6$   
 $y = 2x$

21. [Coordinate Geometry]  
Solve the simultaneous equations  $y = 2x - 3$  and  $y = x - 1$  by graphing their lines on the Cartesian plane.



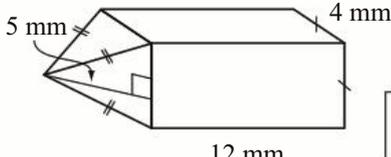
22. [Units of Measurement / Time]  
A 2019 New Zealand Sir Edmond Hillary commemorative stamp has an area of  $16.10 \text{ cm}^2$ . Express this area in square millimetres.

23. [Perimeter / Area]  
Write an algebraic expression for the perimeter  $P$  of the shape. [Express the answer in terms of  $g$  and  $\pi$ .]



$P =$

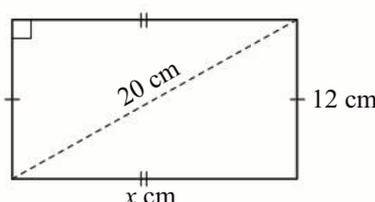
24. [Surface Area]  
Find the total surface area of the obelisk.



$\text{mm}^2$

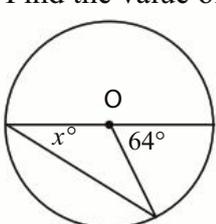
25. [Volume]  
A water trough in the shape of a rectangular prism has dimensions 300 cm by 60 cm by 50 cm. How many millilitres of water would you need to fill the trough? [Hint:  $1 \text{ mL} = 1 \text{ cm}^3$ ]

26. [Pythagoras / Trigonometry]  
Find the area of the rectangle by first calculating the missing side length.



$\text{cm}^2$

27. [Angles]  
Find the value of  $x^\circ$ .

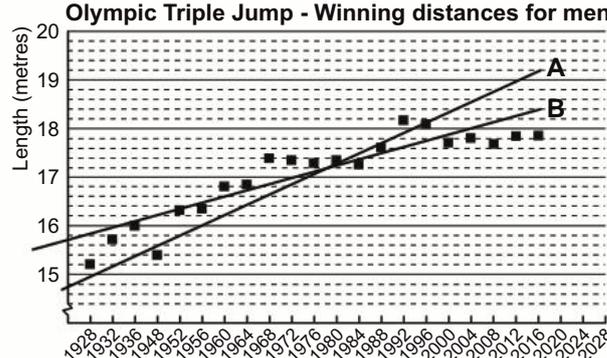


28. [Geometric Reasoning]  
Determine the scale factor used when the square represents the plan of a market of perimeter 800 m.

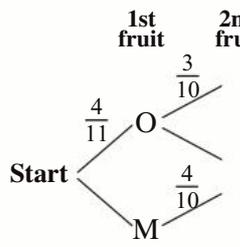


1 :

29. [Statistics]  
Select the most appropriate trend line for this scatter plot. [Hint: The sums of the distances from the points above and below the line, to the line, are approximately equal.]



30. [Probability]  
A bowl contains 4 oranges and 7 mandarines. Two pieces of fruit are picked randomly one after another. Complete the probability tree diagram. What is the probability of picking two mandarines? [Give the answer as a fraction in simplest form.]



31. [Problem Solving 1]  
If  $n$  is an odd number, which one or more of the following must be even?

A)  $2n + 2$       B)  $n - 2$   
C)  $n^2$             D)  $3n + 1$

32. [Problem Solving 2]  
In a small town there are six straight streets, none of which is parallel to the other. What is the maximum number of intersections there could be in this town?



Three streets,  
three intersections



## Test 7

Covering worksheets 4.1 - 4.4

Name: .....

1. [Long  $\times$ ,+]  $7802 \times 54 =$

2. [Decimal +,-]  $23 - 0.876 + 0.9 =$

3. [Decimal  $\times$ ,+]  $40 \div 0.2 =$

4. [Fraction +,-]  $\frac{1}{4} + \frac{2}{5} - \frac{11}{20} =$

5. [Fraction  $\times$ ,+]  $\frac{5}{18} \times \frac{9}{10} \times \frac{4}{5} =$

6. [Percentages]  
The population of Wodonga is predicted to increase from 36 000 in 2010 to 45 000 in 2020. What percentage growth is this?

7. [Decimals / Fractions / Percentages]  
Write  $\frac{1}{6}$  as a recurring decimal.

8. [Integer +,-]  $-7 + -8 - 2 =$

9. [Integer  $\times$ ,+]  $18 \div -6 \div 3 =$

10. [Rates / Ratios]  
Melbourne's Rialto Tower (250 m) is the tallest office sky scraper in the southern hemisphere. A model is built using the scale 1 : 1000. How tall is the model?  cm

11. [Indices]  
Evaluate  $(-3)^4$

12. [Square Roots]  
 $\sqrt{100} - \sqrt{64} = \sqrt{36}$   
True or false?

13. [Exploring Number]  
Use true and false to complete this table:

	Integer	Rational	Irrational	Real
-6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

14. [Financial Mathematics]  
Luke invests \$10 000 at a compound interest rate of 5% per year. How much does he get back after 2 years?  
[Hint: Principal + interest.]

15. [Number Patterns]  
Write an expression for the term in position  $n$  given the table of values for the sequence.

position	1	2	3	4	5	...	$n$
term	1	3	5	7	9	...	<input type="text"/>

16. [Expressions]  
Simplify  $-3k + k^2 - 4k^2 + k$

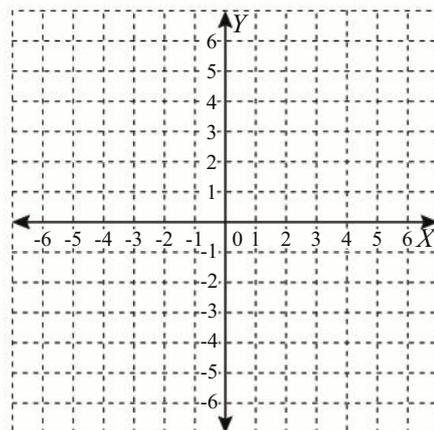
17. [Substitution]  
If  $y = 4x^2 - 6x + 2$ , find  $y$  when  $x = 1$

18. [Expansion]  
Expand and simplify  $(m + 3)(2m - 8)$

19. [Factorisation]  
Factorise  $p^2 + 2p + 4p + 8$

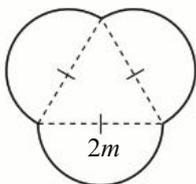
20. [Equations]  
Solve the simultaneous equations:  
 $y + 1 = x$   
 $x + y = 1$

21. [Coordinate Geometry]  
Solve the simultaneous equations  $y = 2x$  and  $y = 6x - 8$  by graphing their lines on the Cartesian plane.



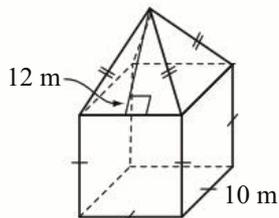
22. [Units of Measurement / Time]  
A 2018 Isle of Man stamp issued for the 125th Anniversary of the Manx Electric Railway has an area of  $11.76 \text{ cm}^2$ . Express this area in square millimetres.

23. [Perimeter / Area]  
Write an algebraic expression for the perimeter  $P$  of the shape. [Express the answer in terms of  $m$  and  $\pi$ .]



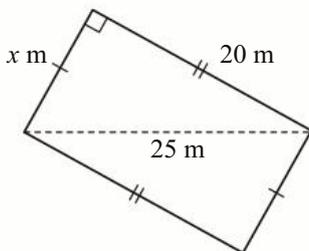
$P =$

24. [Surface Area]  
Find the total surface area of the obelisk.

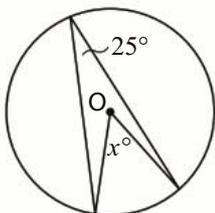

  $\text{m}^2$ 

25. [Volume]  
A rectangular fish tank with dimensions 40 cm by 30 cm by 25 cm is one third full of water. How many millilitres of water would you need to fill the fish tank? [Hint:  $1 \text{ mL} = 1 \text{ cm}^3$ ]

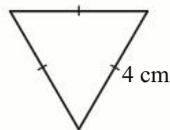
26. [Pythagoras / Trigonometry]  
Find the area of the rectangle by first calculating the missing side length.


  $\text{m}^2$ 

27. [Angles]  
Find the value of  $x^\circ$ .

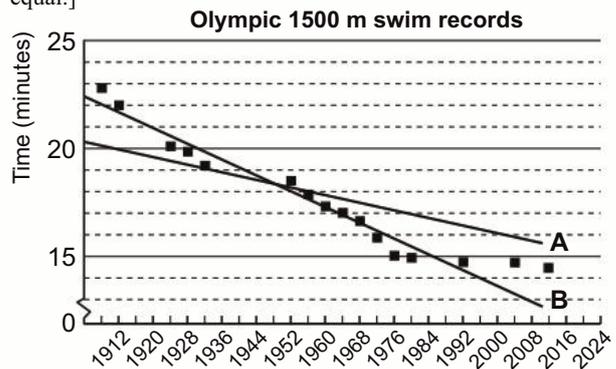



28. [Geometric Reasoning]  
Determine the scale factor used when the equilateral triangle represents the plan of a zoo enclosure of perimeter 120 m.

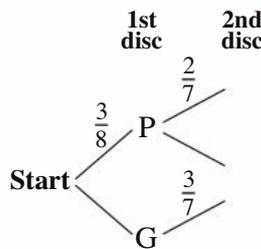


1 :

29. [Statistics]  
Select the most appropriate trend line for this scatter plot. [Hint: The sums of the distances from the points above and below the line, to the line, are approximately equal.]




30. [Probability]  
Two discs are taken out in succession, without replacing, from a barrel containing 3 purple and 5 green discs. Complete the probability tree diagram. What is the probability of choosing two green discs? [Give the answer as a fraction in simplest form.]




31. [Problem Solving 1]  
If  $n$  is a whole number, which one or more of the following must be even?

- A)  $2n + 1$       B)  $3n + 1$   
C)  $2n + 2$       D)  $2n$

32. [Problem Solving 2]  
In a small town there are seven straight streets, none of which is parallel to the other. What is the maximum number of intersections there could be in this town?



Three streets,  
three intersections



## Test 8

Covering worksheets 4.5 - 4.8

Name: .....

1. [Long  $\times, \div$ ]  
 $3358 \div 9 =$

2. [Decimal  $+, -$ ]  
 $10 - 3.8 - 2.49 =$

3. [Decimal  $\times, \div$ ]  
 $0.18 \div 0.4 =$

4. [Fraction  $+, -$ ]  
 $1\frac{1}{4} + 1\frac{1}{5} =$

5. [Fraction  $\times, \div$ ]  
 $2\frac{2}{3} \div 1\frac{7}{9} =$

6. [Percentages]  
 75% of  = 60

7. [Decimals / Fractions / Percentages]  
 Which fraction does 0.4 equal?  
 A)  $\frac{1}{4}$    B)  $\frac{4}{10}$    C)  $\frac{4}{9}$   

8. [Integer  $+, -$ ]  
 + (-5) = 5

9. [Integer  $\times, \div$ ]  
  $\div 5 = -9$

10. [Rates / Ratios]  
 Which telephone call rate is cheaper?  
 A) 20 cents/block of 30 seconds     
 B) 35 cents/minute

11. [Indices]  
 Evaluate  $7^{-2}$

12. [Square Roots]  
 Between which two consecutive whole numbers does  $\sqrt{30}$  lie?  and

13. [Exploring Number]  
 Which number is greater?  
 3 or  $\sqrt{10}$

14. [Financial Mathematics]  
 The population of a town compounded annually at a rate of 20% per year. The population was initially 1000. What was the population after 2 years?

15. [Number Patterns]  
 Complete the pattern:  
 $2\frac{2}{5}, 2\frac{4}{5}, 3\frac{1}{5}, 3\frac{3}{5},$  ,

16. [Expressions]  
 Simplify  $4yz \times -2z \times -y$

17. [Substitution]  
 Use  $V = \frac{\pi r^2 h}{3}$  to find the volume  $V$  of a cone when  $\pi \approx 3.14$ ,  $r = 5$  and  $h = 6$

18. [Expansion]  
 Expand and simplify   
 $(w + 4)^2$

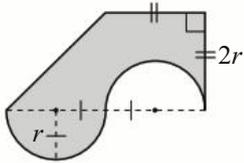
19. [Factorisation]  
 Factorise   
 $c^2 + 11c + 18$

20. [Equations]  
 Solve for  $x$ :   
 $x^2 - 4 = 0$

21. [Coordinate Geometry]  
 Use  $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$  to find the distance between the points (3,8) and (5,4).  
 [Leave the answer in surd form.]

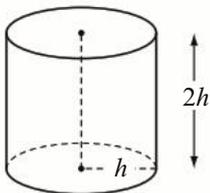
22. [Units of Measurement / Time]  
 If the volume of an archive box is  $18\,250\text{ cm}^3$ ,  
 what is its capacity in litres?

23. [Perimeter / Area]  
 Write an algebraic expression for the area  $A$   
 of the shaded shape. [Express the answer in terms  
 of  $r$ .]



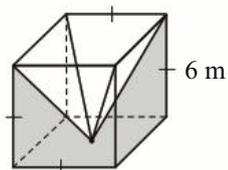
$A =$

24. [Surface Area]  
 Write an algebraic expression for the total  
 surface area  $TSA$  of the cylinder. [Express the  
 answer in terms of  $h$  and  $\pi$ .]



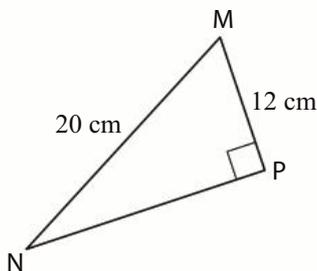
$TSA =$

25. [Volume]  
 A  $6\text{ m} \times 6\text{ m} \times 6\text{ m}$  pyramid is removed from a  
 $6\text{ m} \times 6\text{ m} \times 6\text{ m}$  cube. What is the volume of  
 the remaining shape?

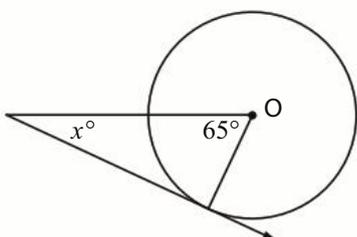


$\text{m}^3$

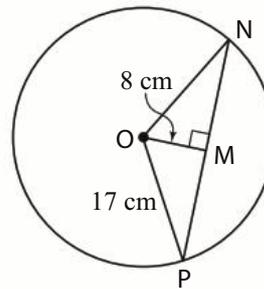
26. [Pythagoras / Trigonometry]  
 Calculate the value of  $\cos N$  in this triangle.  
 [Hint: Pythagoras' theorem will help.]



27. [Angles]  
 Find the value of  $x^\circ$ .



28. [Geometric Reasoning]  
 A chord NP is 8 cm from the centre of a circle  
 of radius 17 cm. Find the length of chord  
 NP. [Hint: Pythagoras' theorem will help.]



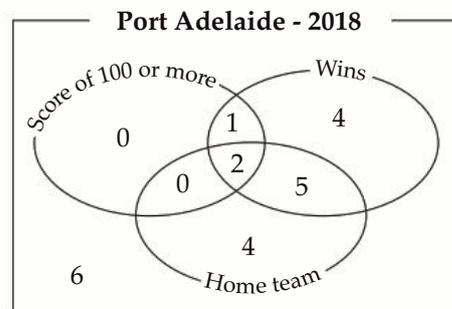
cm

29. [Statistics]  
 Find the interquartile range (IQR) for the set  
 of data shown in this stem-and-leaf plot.

STEM	LEAF
5	0 1 1 2 3
6	0 2
6	5 7 7 9
7	1 2 2 3
7	5 6 8 8 9
8	0 3 4 4
8	7 7 8 8 9 9

$IQR =$

30. [Probability]  
 If one 2018 Port Adelaide match is selected  
 at random, what is the probability that Port  
 Adelaide scored less than 100 points as an  
 away team and won? [Give the answer as a fraction  
 in simplest form.]



31. [Problem Solving 1]  
 Nicole has three children and one of them is a  
 teenager. When Nicole multiplies her  
 children's ages together the result is 770.  
 How old is the youngest child?

32. [Problem Solving 2]  
 A family of four, two adults and two children,  
 want to cross a river. They can row a boat  
 which holds one adult or two children.  
 If none of them can swim, what is the  
 minimum number of trips across the river, in  
 either direction, to get all the  
 family across?



## Test 8

Covering worksheets 4.5 - 4.8

Name: .....

1. [Long  $\times, \div$ ]  
 $788 \div 6 =$

2. [Decimal  $+, -$ ]  
 $20 - 0.057 - 0.9 =$

3. [Decimal  $\times, \div$ ]  
 $0.25 \div 0.2 =$

4. [Fraction  $+, -$ ]  
 $1\frac{1}{3} + 1\frac{1}{4} =$

5. [Fraction  $\times, \div$ ]  
 $2\frac{1}{5} \div 1\frac{1}{10} =$

6. [Percentages]  
 80% of  = 240

7. [Decimals / Fractions / Percentages]  
 Which fraction does  $0.\dot{5}$  equal?  
 A)  $\frac{1}{5}$     B)  $\frac{5}{9}$     C)  $\frac{5}{10}$    

8. [Integer  $+, -$ ]  
 + (-9) = 4

9. [Integer  $\times, \div$ ]  
  $\div 6 = -5$

10. [Rates / Ratios]  
 Which telephone call rate is cheaper?  
 A) \$6.00/block of 5 minutes      
 B) \$1.50/minute

11. [Indices]  
 Evaluate  $6^{-2}$    

12. [Square Roots]  
 Between which two consecutive whole numbers does  $\sqrt{20}$  lie?     and

13. [Exploring Number]  
 Which number is greater?  
 $\sqrt{35}$  or 6   

14. [Financial Mathematics]  
 The population of a town compounded annually at a rate of 30% per year. The population was initially 1000. What was the population after 2 years?   

15. [Number Patterns]  
 Complete the pattern:  
 $2\frac{2}{7}, 2\frac{5}{7}, 3\frac{1}{7}, 3\frac{4}{7},$  ,

16. [Expressions]  
 Simplify  $-ef \times -3e \times 3f$    

17. [Substitution]  
 Use  $V = \frac{l^2 h}{3}$  to find the volume  $V$  of a square pyramid when  $l = 4$  and  $h = 9$    

18. [Expansion]  
 Expand and simplify  $(t - 6)^2$    

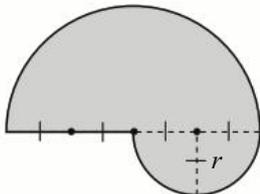
19. [Factorisation]  
 Factorise  $q^2 + 10q + 16$    

20. [Equations]  
 Solve for  $x$ :  
 $x^2 - 25 = 0$    

21. [Coordinate Geometry]  
 Use  $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$  to find the distance between the points (6,-1) and (-2,4).  
 [Leave the answer in surd form.]

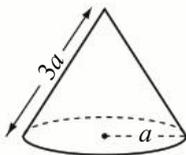
22. [Units of Measurement / Time]  
If the capacity of a '20 foot' shipping container is 29 500 L, what is its volume in cubic metres?

23. [Perimeter / Area]  
Write an algebraic expression for the area  $A$  of the shaded shape. [Express the answer in terms of  $r$  and  $\pi$ .]



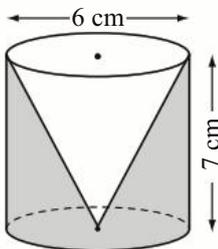
$A =$

24. [Surface Area]  
Write an algebraic expression for the total surface area  $TSA$  of the cone. [Express the answer in terms of  $a$  and  $\pi$ .]



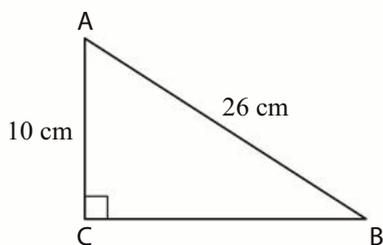
$TSA =$

25. [Volume]  
A cone of diameter of base 6 cm and height 7 cm is removed from this cylinder. Using  $\pi \approx \frac{22}{7}$  find the volume of the remaining shape.

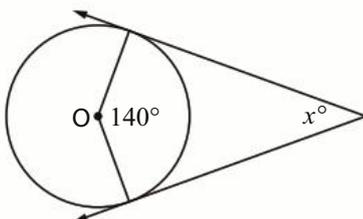


$\text{cm}^3$

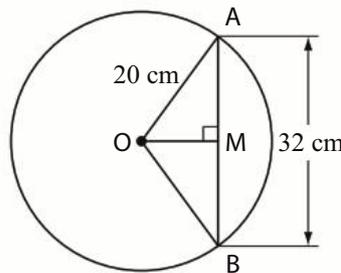
26. [Pythagoras / Trigonometry]  
Calculate the value of  $\sin A$  in this triangle. [Hint: Pythagoras' theorem will help.]




27. [Angles]  
Find the value of  $x^\circ$ .




28. [Geometric Reasoning]  
Find the length of the segment OM in this diagram. [Hint: Pythagoras' theorem will help.]



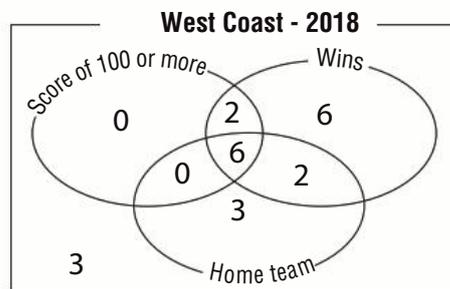
cm

29. [Statistics]  
Find the interquartile range (IQR) for the set of data shown in this stem-and-leaf plot.

STEM	LEAF
3	8 9
4	0 1 3 3 4 4
4	5 6 8 9
5	0 1 2 3
5	6 6 7 8 9
6	1 3 4 4
6	7 7

$IQR =$

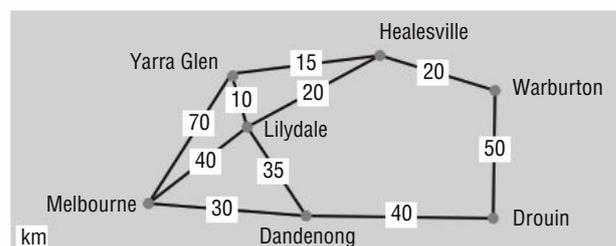
30. [Probability]  
If one 2018 West Coast Eagles match is selected at random, what is the probability that the Eagles scored less than 100 points as a home team and won? [Give the answer as a fraction in simplest form.]




31. [Problem Solving 1]  
Susan has 3 children. When Susan multiplies her children's ages together the result is 350. How old are the twins?

32. [Problem Solving 2]  
Starting from Melbourne, find the shortest distance you must travel to visit all other towns on the map.

km



# MATHS MATE



## Teacher Resource



### **Teacher's Guide to the Use of Maths Mate**

pages i - viii



### **Student Pad Answers**

pages 3 - 72



### **Student Pad Short Answers**

pages 1 - 8



### **Problem Solving Hints & Solutions**

pages 1 - 15



### **Test Masters**

pages 1 - 32



### **Test Answers**

pages 1 - 32



### **Record Keeping Sheets**

pages 1 - 10





## Test 1

Covering worksheets 1.1 - 1.4

Name: .....

1. [Long  $\times$ ,+]  
 $347 \times 300 =$

104 100

2. [Decimal +,-]  
 $0.547 + 11.06 =$

11.607

3. [Decimal  $\times$ ,+]  
 $0.37 \times 1000 =$

370

4. [Fraction +,-]  
 $\frac{7}{4} + \frac{9}{4} =$

4

5. [Fraction  $\times$ ,+]  
 $\frac{1}{5} \times \frac{5}{6} =$

$\frac{1}{6}$

6. [Percentages]  
12% of 80 =

9.6

7. [Decimals / Fractions / Percentages]  
 $\frac{2+10}{3+10} = \frac{2}{3}$  True or false?

false

8. [Integer +,-]  
 $(-16) + (+7) =$

-9

9. [Integer  $\times$ ,+]  
 $(-6) \times (+10) =$

-60

10. [Rates / Ratios]  
Of the 206 bones in the human body 14 are in the face. Find the ratio of bones in the face to the total number of bones.

7 : 103

11. [Indices]  
 $\left(\frac{4}{5}\right)^2 =$

$\frac{16}{25}$

12. [Square Roots]  
 $\sqrt{1\frac{9}{16}} =$

$1\frac{1}{4}$

13. [Exploring Number]  
 $36 - 2 \times (3 + 5) \div 4 + 6 =$

38

14. [Financial Mathematics]  
The printing costs \$1353 including GST. If the GST is 10%, how much is the cost excluding GST?

\$ 1230

15. [Number Patterns]  
Complete the pattern:  
28, 27, 25, 22, 18,  $\frac{13}{7}$

$\frac{13}{7}$

16. [Expressions]  
Write as an expression:  
5 more than the product of  $g$  and  $h$

or  $g \times h + 5$   $gh + 5$

17. [Substitution]  
If  $a = 1$  and  $b = 4$ ,  
find the value of  $6b - a$

23

18. [Expansion]  
Expand  $3(6a - 5)$

$18a - 15$

19. [Factorisation]  
Factorise  $3x - 15y + 9$

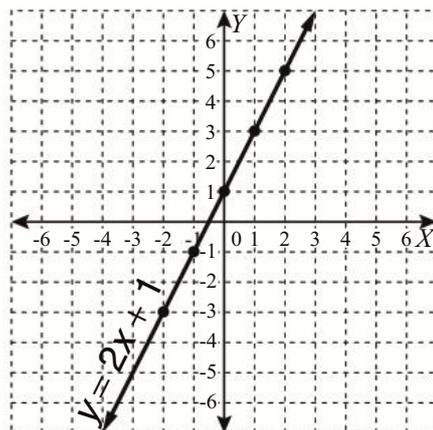
$3(x - 5y + 3)$

20. [Equations]  
Solve for  $x$ :  $\frac{5x}{2} - 1 = 1$

$\frac{4}{5}$

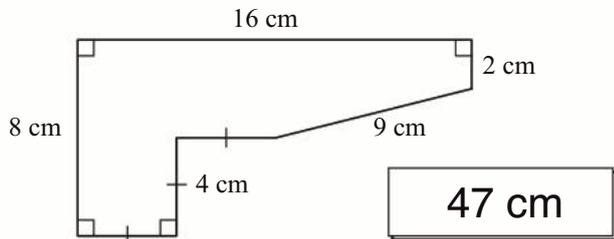
21. [Coordinate Geometry]  
Graph the line of equation  $y = 2x + 1$  by first completing this table of values.

$x$	-2	-1	0	1	2
$y$	-3	-1	1	3	5

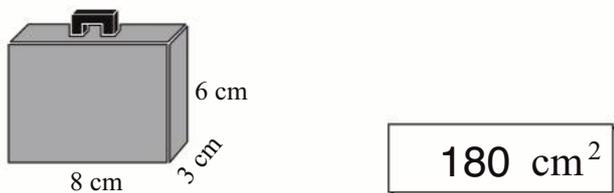


22. [Units of Measurement / Time]  
Which metric prefix is used to describe one hundredth of a standard unit?  
**centi**

23. [Perimeter / Area]  
Find the perimeter of the shape in centimetres.



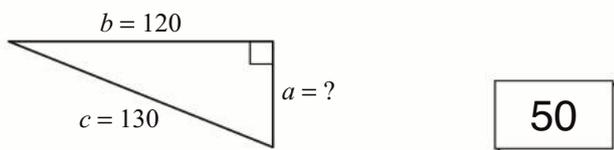
24. [Surface Area]  
Find the total surface area of the suitcase.



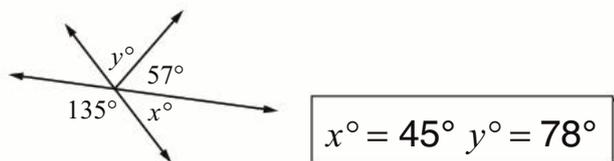
25. [Volume]  
Find the volume of the prism using  $V = Bh$ .



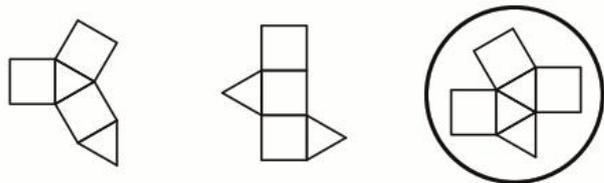
26. [Pythagoras / Trigonometry]  
For this triangle use Pythagoras' theorem  $a^2 + b^2 = c^2$ . Find the length of the hypotenuse.



27. [Angles]  
Find the values of  $x^\circ$  and  $y^\circ$ .



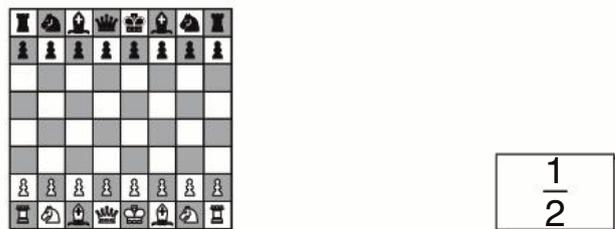
28. [Geometric Reasoning]  
Circle the net that **cannot** be folded to make a model of a triangular prism.



29. [Statistics]  
Which set of data has the same mean, median and mode?

- A) 5, 7, 8, 10, 10  
B) 1, 3, 3, 3, 5
- B**

30. [Probability]  
A fly lands on one square of the chess board. What is the probability that it lands on an empty square? [Give the answer as a fraction in simplest form.]



31. [Problem Solving 1]  
Nine matchsticks are used to represent a cube as shown. Show how you would move three matches to form 3 equilateral triangles.



32. [Problem Solving 2]  
Place all the digits 1 to 5 in each row and column, so that they are not repeated in any of the rows, columns, diagonals and shaded squares. The numbers outside the big square represent the sums of the four digits in each shaded square.

11					12
	3	2	4	1	5
	1	5	3	2	4
	2	4	1	5	3
	5	3	2	4	1
	4	1	5	3	2
13					10



## Test 1

Covering worksheets 1.1 - 1.4

Name: .....

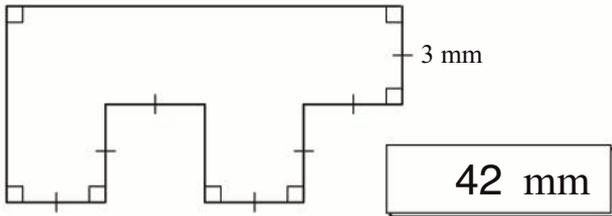
1. [Long  $\times$ ,+]  $459 \times 200 =$  91 800
2. [Decimal +,-]  $0.093 + 13.74 =$  13.833
3. [Decimal  $\times$ ,+]  $1000 \times 2.8 =$  2800
4. [Fraction +,-]  $\frac{5}{6} + \frac{7}{6} =$  2
5. [Fraction  $\times$ ,+]  $\frac{6}{7} \times \frac{5}{6} =$   $\frac{5}{7}$
6. [Percentages] 9% of 30 = 2.7
7. [Decimals / Fractions / Percentages]  $\frac{3 \times 6}{5 \times 6} = \frac{3}{5}$  True or false? true
8. [Integer +,-]  $(-14) + (+8) =$  -6
9. [Integer  $\times$ ,+]  $(-3) \times (+21) =$  -63
10. [Rates / Ratios] Of the 206 bones in the human body 106 are in the hands and feet. Find the ratio of bones in the hands and feet to the total number of bones. 53 : 103
11. [Indices]  $\left(\frac{3}{10}\right)^3 =$   $\frac{27}{1000}$
12. [Square Roots]  $\sqrt{3\frac{6}{25}} =$   $1\frac{4}{5}$
13. [Exploring Number]  $8 + 4 \times 6 - 2 \times (3 + 4) =$  18
14. [Financial Mathematics] The printing costs \$968 including GST. If the GST is 10%, how much is the cost excluding GST? \$ 880
15. [Number Patterns] Complete the pattern:  
 $50, 49, 46, 41, 34,$  25, 14
16. [Expressions] Write as an expression:  
8 more than seven lots of  $x$   
or  $7 \times x + 8$   $7x + 8$
17. [Substitution] If  $a = 7$  and  $b = 3$ , find the value of  $4b - 3a$  -9
18. [Expansion] Expand  $4(4z - 3)$   $16z - 12$
19. [Factorisation] Factorise  $4d - 12e + 4$   $4(d - 3e + 1)$
20. [Equations] Solve for  $x$ :  $\frac{3x}{2} + 6 = 7$   $\frac{2}{3}$
21. [Coordinate Geometry] Graph the line of equation  $y = 2x - 3$  by first completing this table of values.  
[Label the line with the rule.]  

$x$	-2	-1	0	1	2
$y$	-7	-5	-3	-1	1

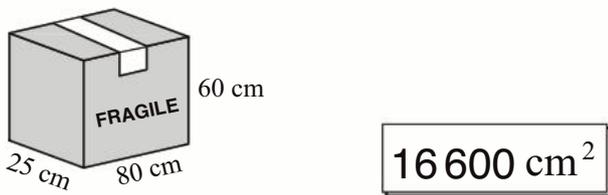
22. [Units of Measurement / Time]  
Which metric prefix is used to describe one thousandth of a standard unit?

milli

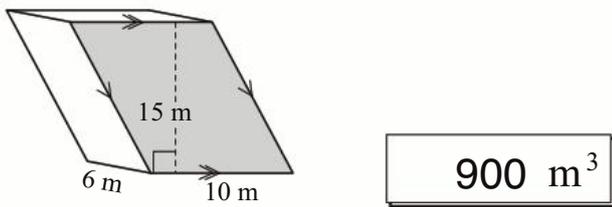
23. [Perimeter / Area]  
Find the perimeter of the polygon.



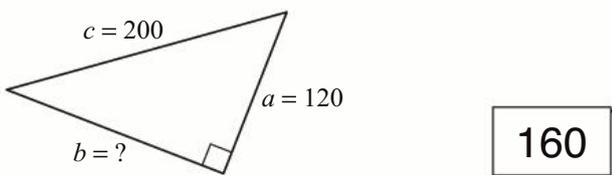
24. [Surface Area]  
What is the total surface area of the cardboard box?



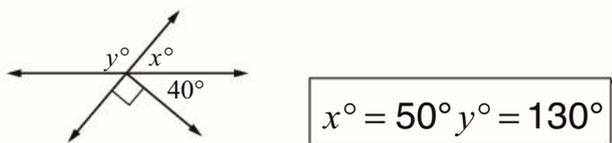
25. [Volume]  
Find the volume of the prism using  $V = Bh$ .



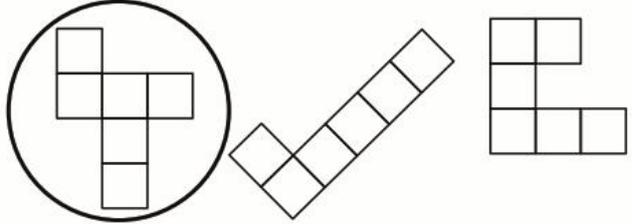
26. [Pythagoras / Trigonometry]  
For this triangle use Pythagoras' theorem  $a^2 + b^2 = c^2$ . Find the length of the side labelled  $b$ .



27. [Angles]  
Find the values of  $x^\circ$  and  $y^\circ$ .



28. [Geometric Reasoning]  
Circle the net that **can** be folded to make a model of a cube.



29. [Statistics]  
Which set of data has the same mean, median and mode?

- A) 6, 7, 8, 8, 11
- B) 5, 5, 8, 11, 11

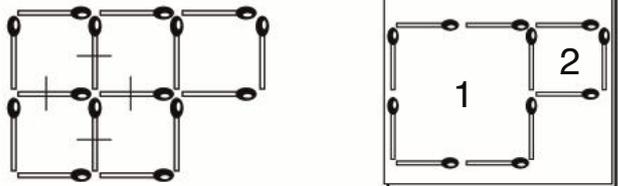
A

30. [Probability]  
A dart board has 20 numbered sections of identical size. A dart is thrown and hits the board. What is the probability that the dart lands inside a section with a number less than 12? [Give the answer as a fraction in simplest form.]



$\frac{11}{20}$

31. [Problem Solving 1]  
Which four matches should you remove to leave exactly two squares?



32. [Problem Solving 2]  
Place all the digits 1 to 5 in each row and column, so that they are not repeated in any of the rows, columns, diagonals and shaded squares. The numbers outside the big square represent the products of the four digits in each shaded square.

30					40
	1	5	3	2	4
	3	2	4	1	5
	4	1	5	3	2
	5	3	2	4	1
	2	4	1	5	3
120					60



## Test 2

Covering worksheets 1.5 - 1.8

Name: .....

1. [Long  $\times, \div$ ]  
 $14\,700 \div 60 =$

245

2. [Decimal  $+, -$ ]  
 $2.035 - 0.78 =$

1.255

3. [Decimal  $\times, \div$ ]  
 $0.001 \times 8.7 =$

0.0087

4. [Fraction  $+, -$ ]  
 $3\frac{7}{12} - 1\frac{3}{12} =$

$2\frac{1}{3}$

5. [Fraction  $\times, \div$ ]  
 $\frac{9}{10} \div \frac{3}{5} =$

$1\frac{1}{2}$

6. [Percentages]  
A 175 gram meat pie contains 24% carbohydrate. How many grams of carbohydrate does the pie contain?

42 g

7. [Decimals / Fractions / Percentages]  
Write 0.412 as a percentage.

41.2%

8. [Integer  $+, -$ ]  
 $(+9) - (-18) =$

27

9. [Integer  $\times, \div$ ]  
 $(-36) \div (+9) =$

-4

10. [Rates / Ratios]  
Australian Michael Milton is the world's fastest skier on one leg. He can ski 6.5 km in around 2 minutes. What is his average speed?

195 km/h

11. [Indices]  
Simplify  $x^3 \times x^7$

$x^{10}$

12. [Square Roots]  
 $\sqrt{0.16} =$

0.4

13. [Exploring Number]  
 $\sin 60^\circ \approx 0.86603$   
Write the rational approximation of  $\sin 60^\circ$  correct to two decimal places.

0.87

14. [Financial Mathematics]  
Roller blades are marked up 20%. If the sale price is \$120, what profit is made?

\$ 20

15. [Number Patterns]  
Complete the pattern:  
18, 13, 8, 3,

$-2, -7$

16. [Expressions]  
Simplify  $3 \times y \times y$

$3y^2$

17. [Substitution]  
If  $y = x^2 - 6$ , find  $y$  when  $x = 4$

10

18. [Expansion]  
Expand  $3f(4f - 8)$

$12f^2 - 24f$

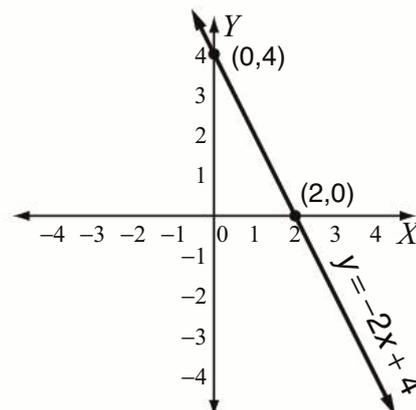
19. [Factorisation]  
Factorise and evaluate  
 $-8 \times 73 - 8 \times 27$

-800

20. [Equations]  
Solve the inequality:  
 $-4(2x + 3) > 12$

$x < -3$

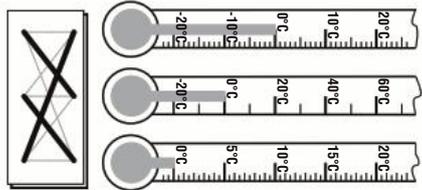
21. [Coordinate Geometry]  
Sketch the line of equation  $y = -2x + 4$  by marking the  $x$ -intercept and the  $y$ -intercept.  
[Label the graph with the rule.]



22. [Units of Measurement / Time]

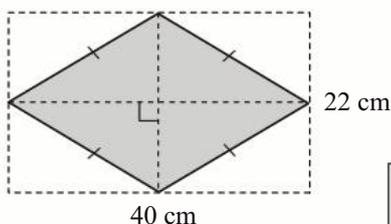
Match the temperature to the thermometer based on the precision of their scales.

- A)  $10^{\circ}\text{C}$
- B)  $0.5^{\circ}\text{C}$
- C)  $1^{\circ}\text{C}$



23. [Perimeter / Area]

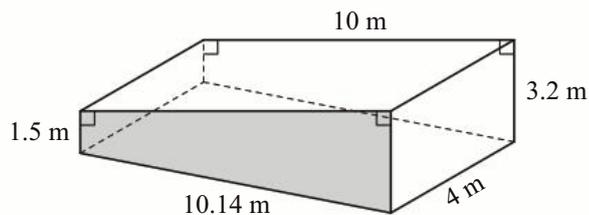
Find the area of the rhombus.



**440 cm<sup>2</sup>**

24. [Surface Area]

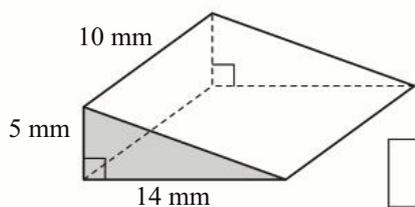
A swimming pool has the shape of a trapezoidal prism. What is the total surface area of the inside walls and floor of the pool?



**106.36 m<sup>2</sup>**

25. [Volume]

Find the volume of the triangular prism.

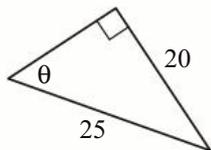


**350 mm<sup>3</sup>**

26. [Pythagoras / Trigonometry]

Which trigonometric ratio would be used to find angle  $\theta$ ?

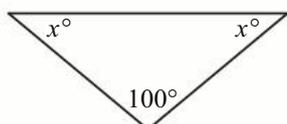
- A) sine
- B) cosine
- C) tangent



**A**

27. [Angles]

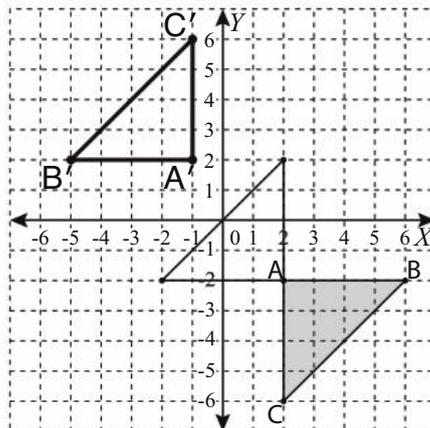
Find the value of  $x^{\circ}$ .



**40<sup>o</sup>**

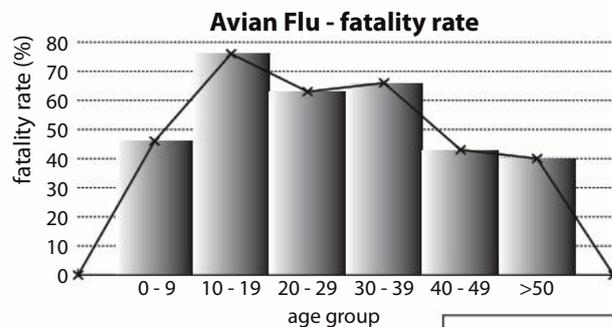
28. [Geometric Reasoning]

Redraw the triangle ABC after rotating it  $180^{\circ}$  about the point of coordinates  $(2, -2)$  and then translating it  $-3$  units horizontally and  $4$  units vertically.



29. [Statistics]

Which age group has the highest fatality rate from avian flu?



**10 - 19**

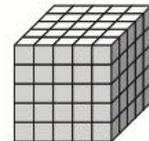
30. [Probability]

A money bag has forty 1-dollar coins, fifty 2-dollar coins and thirty 50-cent coins. Find the probability that the first coin taken at random from the bag will be a 50-cent coin. [Give your answer as a decimal.]

**0.25**

31. [Problem Solving 1]

How many of the smaller cubes have faces which touch the faces of exactly six other cubes?



**27**

32. [Problem Solving 2]

Paul and Anthony live 20 km from each other. They both start walking towards each other's house at the same time and meet after 2 hours. If Paul's speed is  $x$  km/h, which expression represents Anthony's speed?

- A)  $10 - 2x$
- B)  $10 - x$
- C)  $20 - 2x$
- D)  $20 - x$

**B**



## Test 2

Covering worksheets 1.5 - 1.8

Name: .....

1. [Long  $\times, \div$ ]  
 $29\,680 \div 40 =$

742

2. [Decimal  $+, -$ ]  
 $5.465 - 0.67 =$

4.795

3. [Decimal  $\times, \div$ ]  
 $6.3 \times 0.001 =$

0.0063

4. [Fraction  $+, -$ ]  
 $5\frac{7}{10} - 1\frac{1}{10} =$

$4\frac{3}{5}$

5. [Fraction  $\times, \div$ ]  
 $\frac{4}{7} \div \frac{2}{21} =$

6

6. [Percentages]  
 A 250 g chocolate bar is 52% sugar. How many grams of sugar are in the bar?

130 g

7. [Decimals / Fractions / Percentages]  
 Write 0.099 as a percentage.

9.9%

8. [Integer  $+, -$ ]  
 $(+8) - (-17) =$

25

9. [Integer  $\times, \div$ ]  
 $(-32) \div (+16) =$

-2

10. [Rates / Ratios]  
 The highest speed on a ski bob to date is approximately 200 km/h. It was achieved by R. Bonvin, in 2003. At this speed, how long would it take a ski bob to travel 50 km?

15 min

11. [Indices]  
 Simplify  $g^4 \times g^5$

$g^9$

12. [Square Roots]  
 $\sqrt{0.25} =$

0.5

13. [Exploring Number]  
 $\tan 30^\circ \approx 0.57735$   
 Write the rational approximation of  $\tan 30^\circ$  correct to two decimal places.

0.58

14. [Financial Mathematics]  
 A mobile phone is marked up 30%. If the sale price is \$130, what profit is made?

\$ 30

15. [Number Patterns]  
 Complete the pattern:

18, 14, 10, 6, 2, -2, -6

16. [Expressions]  
 Simplify  $5 \times b \times b$

$5b^2$

17. [Substitution]  
 If  $y = x^2 - 8$ , find  $y$  when  $x = 5$

17

18. [Expansion]  
 Expand  $4n(4n - 5)$

$16n^2 - 20n$

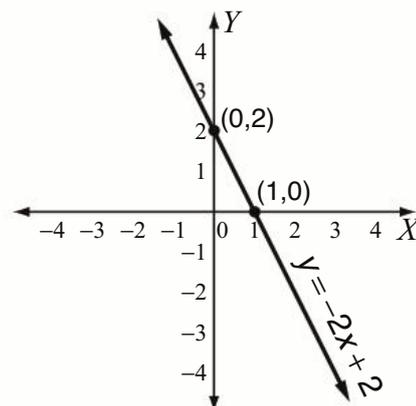
19. [Factorisation]  
 Factorise and evaluate  
 $-9 \times 42 - 9 \times 58$

-900

20. [Equations]  
 Solve the inequality:  
 $2(4x + 5) \leq -6$

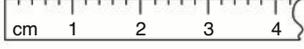
$x \leq -2$

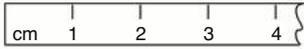
21. [Coordinate Geometry]  
 Sketch the line of equation  $y = -2x + 2$  by marking the  $x$ -intercept and the  $y$ -intercept.  
 [Label the graph with the rule.]



22. [Units of Measurement / Time]

Match the length to the ruler based on the precision of their scales.

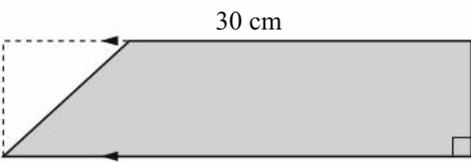
A) 1 cm 

B) 0.2 cm 

C) 0.1 cm 

23. [Perimeter / Area]

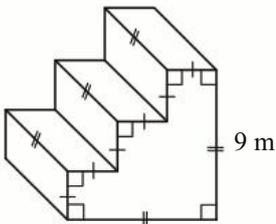
Find the area of the trapezium.



**355 cm<sup>2</sup>**

24. [Surface Area]

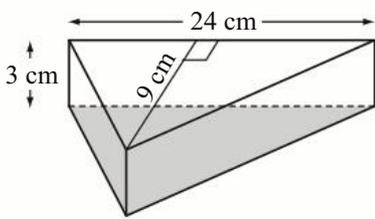
Find the total surface area of the prism.



**432 m<sup>2</sup>**

25. [Volume]

Find the volume of the triangular prism.

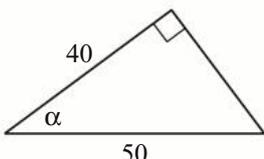


**324 cm<sup>3</sup>**

26. [Pythagoras / Trigonometry]

Which trigonometric ratio would be used to find angle  $\alpha$ ?

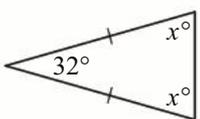
- A) sine
- B) cosine
- C) tangent



**B**

27. [Angles]

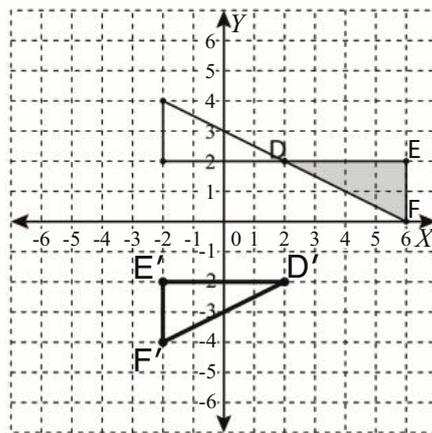
Find the value of  $x^\circ$ .



**74°**

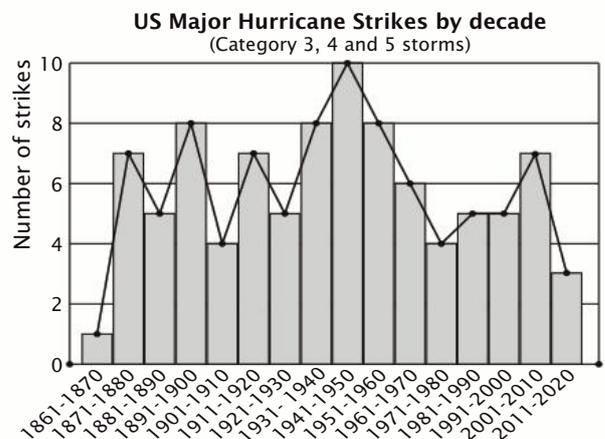
28. [Geometric Reasoning]

Redraw the triangle DEF after rotating it 180° about the point of coordinates (2,2) and then reflecting it in the x-axis.



29. [Statistics]

Which decade registered the most major hurricane strikes?



**1941 - 1950**

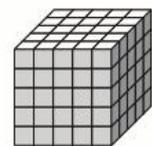
30. [Probability]

A bag contains 7 green, 15 red and 3 blue marbles. Find the probability that a marble drawn at random from the bag will be red. [Give your answer as a decimal.]

**0.6**

31. [Problem Solving 1]

How many of the smaller cubes have faces which touch the faces of exactly five other cubes?



**54**

32. [Problem Solving 2]

John ran  $x$  m on his first day of training for the marathon. On each following day, John ran 100 m more than he had run on the previous day. Which is an expression for the number of metres John ran on his 7<sup>th</sup> day of training?

- A)  $x + 700$
- B)  $7(x + 100)$
- C)  $x + 600$
- D)  $100x + 7$

**C**



## Test 3

Covering worksheets 2.1 - 2.4

Name: .....

1. [Long  $\times, +$ ]  
 $578 \times 13 =$  7514

2. [Decimal  $+, -$ ]  
 $12.5 - 0.69 =$  11.81

3. [Decimal  $\times, +$ ]  
 $1.8 \times 0.04 =$  0.072

4. [Fraction  $+, -$ ]  
 $6 - 3\frac{5}{7} =$   $2\frac{2}{7}$

5. [Fraction  $\times, +$ ]  
 $\frac{2}{7} \times \frac{7}{10} =$   $\frac{1}{5}$

6. [Percentages]  
 $33\frac{1}{3}\%$  of 24 = 8

7. [Decimals / Fractions / Percentages]  
 Write  $\frac{27}{50}$  as a decimal. 0.54

8. [Integer  $+, -$ ]  
 $(-13) - (+7) + (-18) =$  -38

9. [Integer  $\times, +$ ]  
 $(-5) \times (-4) \times (-7) =$  -140

10. [Rates / Ratios]  
 The USA has an area of nearly 10 million  $\text{km}^2$ , and reached a population of 330 million people in July 2019. What was the average population density of the USA at that time?  
33 people/ $\text{km}^2$

11. [Indices]  
 Evaluate  $\frac{7^9}{7^6}$  343

12. [Square Roots]  
 $6\sqrt{81} =$  54

13. [Exploring Number]  
 0.0000024 written in scientific notation is:  
 A)  $2.4 \times 10^5$  B)  $2.4 \times 10^{-6}$  C)  $2.04 \times 10^{-5}$   
B

14. [Financial Mathematics]  
 On a base income of \$50 000 how much superannuation will Ronan be paid when the guarantee reaches 10%?  
\$ 5000

15. [Number Patterns]  
 Complete the pattern:  
 $\frac{2}{25}, \frac{2}{5}, 2, 10, 50,$  250, 1250

16. [Expressions]  
 Choose the like terms:  
 $4a, a, -4a^2, 4b$  4a, a

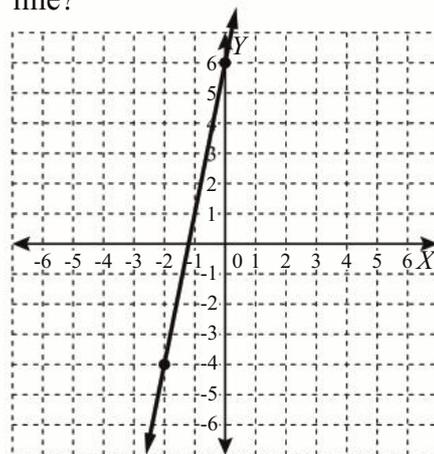
17. [Substitution]  
 Use  $C = \frac{5}{9}(F - 32)$  to find the temperature  $C$  in degrees Celsius when  $F = 113$   
45

18. [Expansion]  
 Expand  $-2y(4yz + 7)$   $-8y^2z - 14y$

19. [Factorisation]  
 Factorise  $m^3n^2 + m^2n + mn$   $mn(m^2n + m + 1)$

20. [Equations]  
 Solve for  $x$ :  $5(3x - 2) - 4x = 12$  2

21. [Coordinate Geometry]  
 Graph the line passing through the points  $(-2, -4)$  and  $(0, 6)$ . What is the gradient of the line?



5

22. [Units of Measurement / Time]

At what time would you take a tram from Lygon St to get to South Melbourne Beach for a swim at 6:00 am?

Monday to Friday		East Coburg to South Melbourne Beach								
Route 1		via Brunswick > Carlton > City > Sth Melbourne								
Stop		AM	AM	AM	AM	AM	AM	AM	AM	
135 East Coburg - Bell St								5:40	5:50	6:00
112 Elgin St & Lygon St		4:59	5:11	5:35	5:46	5:56	6:06	6:16	6:26	
1 Melbourne University		5:01	5:13	5:25	5:37	5:48	5:58	6:08	6:18	
13 Federation Square		5:12	5:24	5:36	5:48	5:59	6:09	6:16	6:29	
14 Arts Centre		5:14	5:26	5:38	5:50	6:01	6:11	6:21	6:31	
16 Southbank Blvd & St Kilda Rd		5:15	5:27	5:39	5:51	6:02	6:12	6:22	6:32	
32 South Melbourne Beach		5:27	5:39	5:51	6:03	6:14	6:24	6:34	6:54	

5:35 am

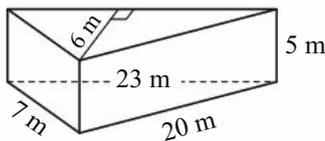
23. [Perimeter / Area]

What is the perimeter of a rectangle with an area of  $28 \text{ cm}^2$  if its length is  $7 \text{ cm}$ ?

22 cm

24. [Surface Area]

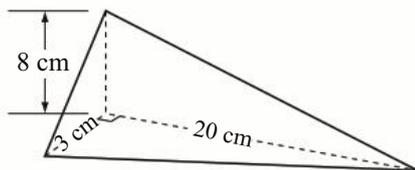
Find the total surface area of the triangular prism.



388 m<sup>2</sup>

25. [Volume]

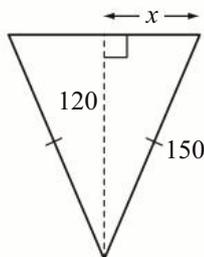
Calculate the volume of the triangular pyramid of height 8 cm.



80 cm<sup>3</sup>

26. [Pythagoras / Trigonometry]

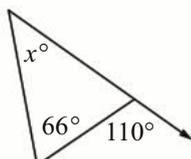
Find the missing length in this triangle.



90

27. [Angles]

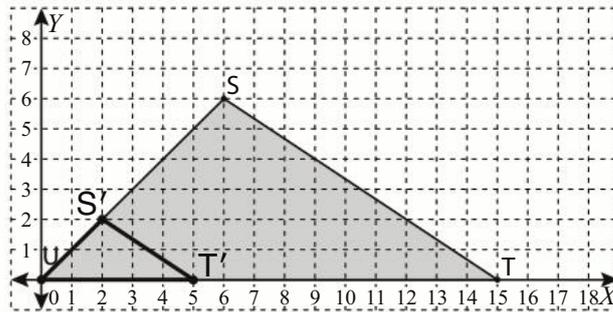
Find the value of  $x^\circ$ .



44°

28. [Geometric Reasoning]

Redraw the triangle STU reduced by a scale factor of  $\frac{1}{3}$  about the origin of the axes. Label the reduction S'T'U. Are triangles STU and S'T'U congruent or similar?



similar

29. [Statistics]

The back-to-back stem plot shows the number of medals won by the United Kingdom and Australia at each of the Olympics between 1912 and 2016. Find the difference between the medians of the two sets of data.

United Kingdom		Australia	
		0	1 3 4 5 5 6 6 9
9 8 8 6 5 4 3 3 1		1	1 3 4 7 7 8
	8 4 4 3 1 0 0	2	2 4 7 9
		3	5 4
	7 4 0	4	1 6 9
Key	7 5 2 2	5	8
1   4 = 14		6	
		7	6

5

30. [Probability]

All 18 employees walk part of the way to work. Four of these employees also catch a tram, another two ride the train and another three cycle part way. What is the probability that an employee chosen at random does not catch a tram? [Give the answer as a fraction in simplest form.]

$\frac{7}{9}$

31. [Problem Solving 1]

A 64-page magazine is made up of 16 sheets which have been folded over and stapled down the middle. Pages 1, 2, 63, 64 are on the same sheet. Pages 31, 32, 33, 34 are on the same sheet. What numbers are on the same sheet with 22?

21, 43, 44

32. [Problem Solving 2]

Sam and Kevin are bricklayers. Sam lays 100 bricks in 40 minutes and Kevin lays 30 bricks in 10 minutes. If they work together, how many minutes will it take them to lay 220 bricks?

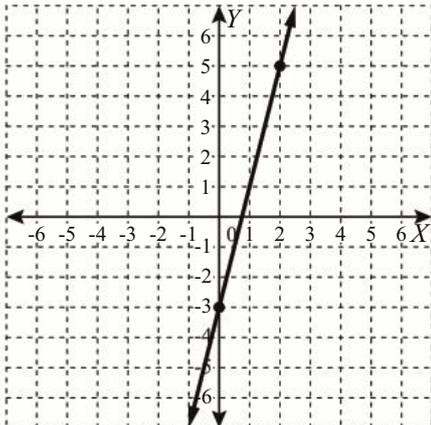
40 min



## Test 3

Covering worksheets 2.1 - 2.4

Name: .....

1. [Long  $\times$ ,+]  $196 \times 26 =$  5096
2. [Decimal +,-]  $14.4 - 0.58 =$  13.82
3. [Decimal  $\times$ ,+]  $1.7 \times 0.03 =$  0.051
4. [Fraction +,-]  $4 - 2\frac{3}{8} =$   $1\frac{5}{8}$
5. [Fraction  $\times$ ,+]  $\frac{3}{4} \times \frac{4}{9} =$   $\frac{1}{3}$
6. [Percentages] 0.5% of 100 = 0.5
7. [Decimals / Fractions / Percentages] Write  $\frac{9}{20}$  as a decimal. 0.45
8. [Integer +,-]  $(-15) - (+11) + (-13) =$  -39
9. [Integer  $\times$ ,+]  $(-4) \times (-5) \times (-6) =$  -120
10. [Rates / Ratios] The average web surfer types around 450 words in 15 minutes. What is this rate in words per minute? 30 words/min
11. [Indices] Evaluate  $\frac{6^8}{6^5} =$  216
12. [Square Roots]  $9\sqrt{49} =$  63
13. [Exploring Number] 89 000 000 000 written in scientific notation is:  
A)  $8.9 \times 10^8$  B)  $8.9 \times 10^9$  C)  $8.9 \times 10^{10}$  C
14. [Financial Mathematics] On a base income of \$20 000 how much superannuation will Jennifer be paid when the guarantee reaches 10%? \$ 2000
15. [Number Patterns] Complete the pattern:  
 $\frac{5}{36}, \frac{5}{6}, 5, 30, 180,$  1080, 6480
16. [Expressions] Choose the like terms:  
 $6c, 6d, -d^2, -2d$   $6d, -2d$
17. [Substitution] Use  $S = (n - 2) \times 180^\circ$  to find the sum of all interior angles when  $n = 8$  (octagon) 1080°
18. [Expansion] Expand  $-4j(3jk + 6)$   $-12j^2k - 24j$
19. [Factorisation] Factorise  $t^3u^2 - tu + tu^2$   $tu(t^2u - 1 + u)$
20. [Equations] Solve for  $x$ :  $6(2x - 2) - 3x = 15$  3
21. [Coordinate Geometry] Graph the line passing through the points (2,5) and (0,-3). What is the gradient of the line?  
 4

22. [Units of Measurement / Time]

At what time would you take a tram from NewQuay Docklands to be at the Epworth Hospital by 3:30 pm?

Saturday NewQuay Docklands to North Balwyn								
Route 48 via City > Richmond > Hawthorn > Kew								
Stop	PM							
D11 NewQuay Docklands	2:05	2:17	2:29	2:41	2:53	3:05	3:17	3:29
D2 Central Pier	2:09	2:21	2:33	2:45	2:57	3:09	3:21	3:33
4 Elizabeth St & Flinders St	2:20	2:32	2:44	2:56	3:08	3:20	3:32	3:44
15 Epworth Hospital	2:32	2:44	2:56	3:08	3:20	3:32	3:44	3:56
23 Hawthorn Bridge	2:41	2:53	3:05	3:17	3:29	3:41	3:53	4:05
32 Kew Junction	2:46	2:58	3:10	3:22	3:34	3:46	3:58	4:10
51 North Balwyn - Balwyn Rd	3:01	3:13	3:25	3:37	3:49	4:01	4:13	4:25

2:53 pm

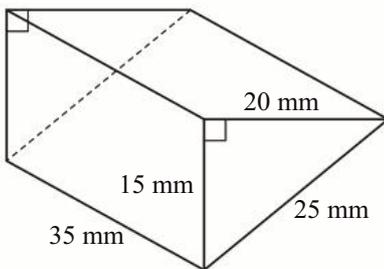
23. [Perimeter / Area]

What is the perimeter of a rectangle with an area of  $90 \text{ mm}^2$  if its length is  $10 \text{ mm}$ ?

38 mm

24. [Surface Area]

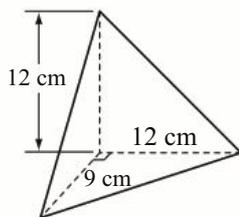
Find the total surface area of the triangular prism.



$2400 \text{ mm}^2$

25. [Volume]

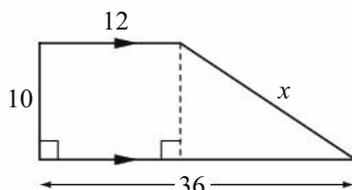
Calculate the volume of the triangular pyramid of height  $12 \text{ cm}$ .



$216 \text{ cm}^3$

26. [Pythagoras / Trigonometry]

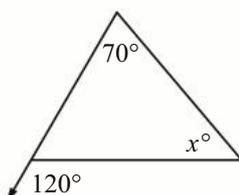
Find the missing length in this trapezium.



26

27. [Angles]

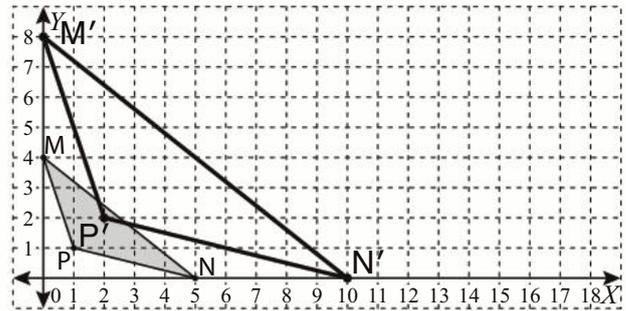
Find the value of  $x^\circ$ .



$50^\circ$

28. [Geometric Reasoning]

Redraw the triangle MNP enlarged by a scale factor of 2 about the origin of the axes. Label the enlargement  $M'N'P'$ . Are triangles MNP and  $M'N'P'$  congruent or similar?



similar

29. [Statistics]

The back-to-back stem plot shows the number of medals won by the United Kingdom and Romania at each of the Olympics between 1952 and 2016. Find the difference between the medians of the two sets of data.

United Kingdom		Romania
	0	4 5 8 9
9 8 8 5 3 3 1	1	0 2 3 5 6 8 8 9
8 4 4 1 0	2	4 4 6 7
7 0 3	3	
7 5 4	4	
	5	3
	6	

Key  
1 | 4 = 14

5

30. [Probability]

All thirty students in Maria's class speak English. Six of these students speak Chinese, another two Japanese and another four Russian. What is the probability that a student selected at random does not speak Russian? [Give the answer as a fraction in simplest form.]

$\frac{13}{15}$

31. [Problem Solving 1]

A 64-page magazine is made up of 16 sheets which have been folded over and stapled down the middle. Pages 1, 2, 63, 64 are on the same sheet. Pages 31, 32, 33, 34 are on the same sheet. What numbers are on the same sheet with 18?

17, 47, 48

32. [Problem Solving 2]

Rufus and Wade are bricklayers. Rufus lays 75 bricks in 45 minutes and Wade lays 20 bricks in 15 minutes. If they work together, how many minutes will it take them to lay 150 bricks?

50 min



## Test 4

Covering worksheets 2.5 - 2.8

Name: .....

1. [Long  $\times, \div$ ]  
 $288 \div 16 =$

18

2. [Decimal  $+, -$ ]  
 $10 - 3.8 + 2.49 =$

8.69

3. [Decimal  $\times, \div$ ]  
 $60 \times 2.45 =$

147

4. [Fraction  $+, -$ ]  
 $\frac{5}{6} - \frac{1}{2} =$

$\frac{1}{3}$

5. [Fraction  $\times, \div$ ]  
 $9 \div \frac{3}{5} =$

15

6. [Percentages]  
200% of 45 =

90

7. [Decimals / Fractions / Percentages]  
Write 50 out of 250 as a percentage.

20%

8. [Integer  $+, -$ ]  
 $(-12) - (+17) + (-14) =$

-43

9. [Integer  $\times, \div$ ]  
 $(-3) \times (-8) \div (-4) =$

-6

10. [Rates / Ratios]  
Find the missing term in the proportion:

$$\frac{a}{30} = \frac{4}{8}$$

$a = 15$

11. [Indices]  
Simplify  $m^4 n^2 \times mn$

$m^5 n^3$

12. [Square Roots]  
 $\sqrt{\frac{1}{9}} \times \sqrt{\frac{1}{9}} =$

$\frac{1}{9}$

13. [Exploring Number]  
 $-8 - 3 \times (14 - 2) =$

-44

14. [Financial Mathematics]  
Sally has a taxable income of \$47 000. Her employer has withheld \$7622 in tax. How much tax refund will she receive at the end of the financial year, if there are no other deductions?

Taxable Income	Tax on this income*
0-\$18200	Nil
\$18201 - \$37000	19¢ for each \$1 over \$18200
\$37001 - \$90000	\$3572 plus 32.5¢ for each dollar over \$37000
\$90001 - \$180000	\$20797 plus 37¢ for each dollar over \$90000
\$180001 and over	\$54097 plus 45¢ for each dollar over \$180000

\*Resident tax rates 2019-2020 (Australia)

\$800

15. [Number Patterns]  
Complete the pattern:  
243, 81, 27, 9, 3,  $\frac{1}{3}$

$\frac{1}{3}$

16. [Expressions]  
Simplify  $3b^2 + 7b - b^2 - 3b$

$2b^2 + 4b$

17. [Substitution]  
If  $y = x(x - 10)$ , find  $y$  when  $x = 10$

0

18. [Expansion]  
Expand and simplify  
 $g(5g - 1) + 4(5g - 2)$

$5g^2 + 19g - 8$

19. [Factorisation]  
Factorise  
 $-6d^3 - 9de$

$-3d(2d^2 + 3e)$

20. [Equations]  
Solve for  $x$ :  $\frac{x}{2} = x - 4$

8

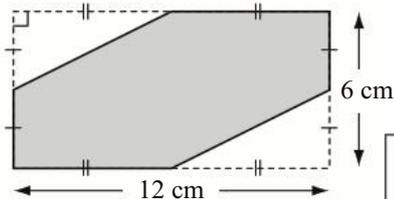
21. [Coordinate Geometry]  
Write the equation  $4x + y = -1$  in the gradient-intercept form  $y = mx + c$ , where  $m$  represents the gradient and  $c$  the  $y$ -intercept.

$y = -4x - 1$

22. [Units of Measurement / Time]  
A typical person has 100 000 strands of hair on their head. If each strand measures 650 mm, how many kilometres of scalpal hair would the typical person have?

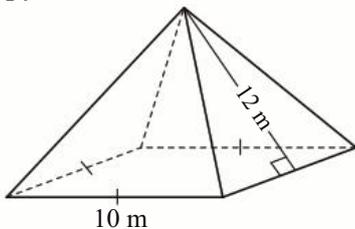
65 km

23. [Perimeter / Area]  
Find the area of the shaded shape.



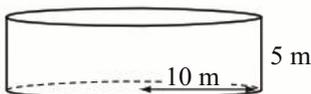
54 cm<sup>2</sup>

24. [Surface Area]  
Find the total surface area of the regular square pyramid.



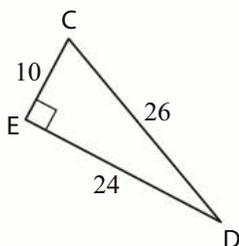
340 m<sup>2</sup>

25. [Volume]  
Find the volume of the cylinder using  $\pi \approx 3.14$



1570 m<sup>3</sup>

26. [Pythagoras / Trigonometry]  
Calculate the value of  $\cos C$  in this triangle.



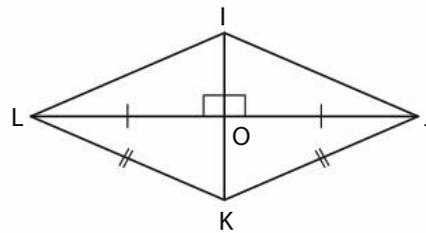
$\frac{5}{13}$

27. [Angles]  
Find the value of  $x^\circ$ .



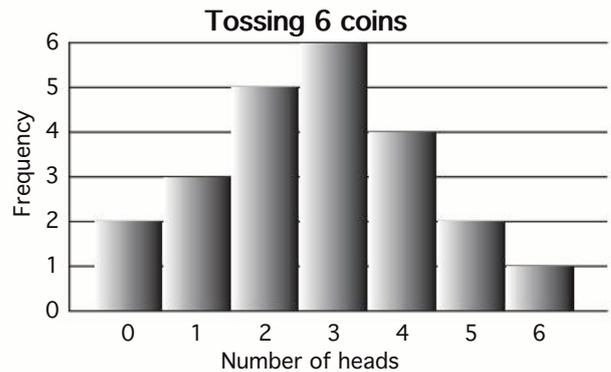
38°

28. [Geometric Reasoning]  
Which congruence test (SSS, SAS, AAS, RHS) can be applied to show that  $\Delta KOL$  is congruent to  $\Delta KOJ$ ?



RHS

29. [Statistics]  
Find the range and median of the distribution.



range = 6      median = 3

30. [Probability]  
A pair of standard dice is rolled. Complete the table. Find the probability of the difference between the numbers rolled being a non-zero, even number. [Give the answer as a fraction in simplest form.]

$\frac{1}{3}$

Difference		Die 1					
		1	2	3	4	5	6
Die 2	1	0	1	2	3	4	5
	2	1	0	1	2	3	4
	3	2	1	0	1	2	3
	4	3	2	1	0	1	2
	5	4	3	2	1	0	1
	6	5	4	3	2	1	0

31. [Problem Solving 1]  
Sam counts the number of ads in each of the 4 breaks during a TV show. He notes that the median is 4, the mode is 3, and the mean is 4.5. How many ads are there in each break?

3, 3, 5, 7

32. [Problem Solving 2]  
How many pairs of positive integers make this equation true?

$$2x + 3y = 41$$

[Hint: Positive integers are 1, 2, 3, 4, ...]

(19,1) (16,3) (13,5)  
(10,7) (7,9) (4,11) (1,13)

7



## Test 4

Covering worksheets 2.5 - 2.8

Name: .....

1. [Long  $\times, \div$ ]  
 $391 \div 17 =$

23

2. [Decimal  $+, -$ ]  
 $20 - 0.057 + 0.9 =$

20.843

3. [Decimal  $\times, \div$ ]  
 $3.28 \times 80 =$

262.4

4. [Fraction  $+, -$ ]  
 $\frac{5}{12} - \frac{1}{4} =$

$\frac{1}{6}$

5. [Fraction  $\times, \div$ ]  
 $6 \div \frac{3}{4} =$

8

6. [Percentages]  
110% of 80 =

88

7. [Decimals / Fractions / Percentages]  
What percentage is 25 out of 500?

5%

8. [Integer  $+, -$ ]  
 $(-16) - (+13) + (-12) =$

-41

9. [Integer  $\times, \div$ ]  
 $(-2) \times (-45) \div (-3) =$

-30

10. [Rates / Ratios]  
Find the missing term in the proportion:

$$\frac{10}{z} = \frac{3}{15}$$

$z = 50$

11. [Indices]  
Simplify  $j^2k^2 \times jk^2$

$j^3k^4$

12. [Square Roots]  
 $\sqrt{\frac{1}{4}} \times \sqrt{\frac{1}{4}} =$

$\frac{1}{4}$

13. [Exploring Number]  
 $5 - (7 - 2) \times 8 =$

-35

14. [Financial Mathematics]  
Nate has a taxable income of \$100 000. His employer has withheld \$26 000 in tax. How much tax refund will he receive at the end of the financial year, if there are no other deductions?

Taxable Income	Tax on this income*
0-\$18 200	Nil
\$18 201 - \$37 000	19¢ for each \$1 over \$18 200
\$37 001 - \$90 000	\$3572 plus 32.5¢ for each dollar over \$37 000
\$90 001 - \$180 000	\$20 797 plus 37¢ for each dollar over \$90 000
\$180 001 and over	\$54 097 plus 45¢ for each dollar over \$180 000

\*Resident tax rates 2019-2020 (Australia)

\$1503

15. [Number Patterns]  
Complete the pattern:  
625, 125, 25, 5,  $\frac{1}{5}$

$\frac{1}{5}$

16. [Expressions]  
Simplify  $y^2 - 2y + 2y^2 + 3y$

$3y^2 + y$

17. [Substitution]  
If  $y = x(x + 6)$ , find  $y$  when  $x = 0$

0

18. [Expansion]  
Expand and simplify  
 $i(4i - 5) + 3(i + 9)$

$4i^2 - 2i + 27$

19. [Factorisation]  
Factorise  
 $-4a^3 - 10ab$

$-2a(2a^2 + 5b)$

20. [Equations]  
Solve for  $x$ :  $\frac{x}{5} = 6 - x$

5

21. [Coordinate Geometry]  
Write the equation  $-6x - y = 3$  in the gradient-intercept form  $y = mx + c$ , where  $m$  represents the gradient and  $c$  the  $y$ -intercept.

$y = -6x - 3$

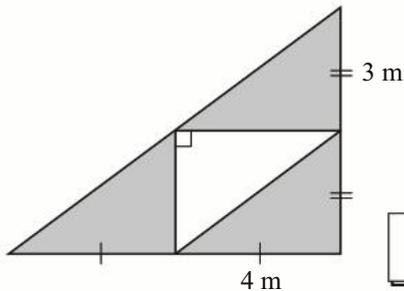
22. [Units of Measurement / Time]

If you place 45 of the world's largest flower, Titan Arum, end to end, they would reach the top of the London Eye. If each flower measures 300 cm, how tall is the London Eye in metres?

135 m

23. [Perimeter / Area]

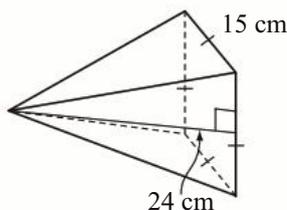
Find the shaded area of the triangle.



18 m<sup>2</sup>

24. [Surface Area]

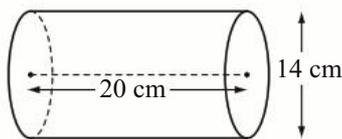
Find the total surface area of the regular square pyramid.



945 cm<sup>2</sup>

25. [Volume]

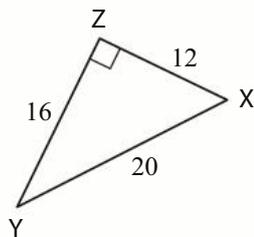
Find the volume of the cylinder using  $\pi \approx \frac{22}{7}$



3080 cm<sup>3</sup>

26. [Pythagoras / Trigonometry]

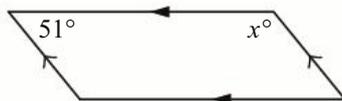
Calculate the value of  $\sin Y$  in this triangle.



or 0.6  
 $\frac{3}{5}$

27. [Angles]

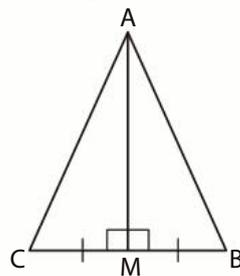
Find the value of  $x^\circ$ .



129°

28. [Geometric Reasoning]

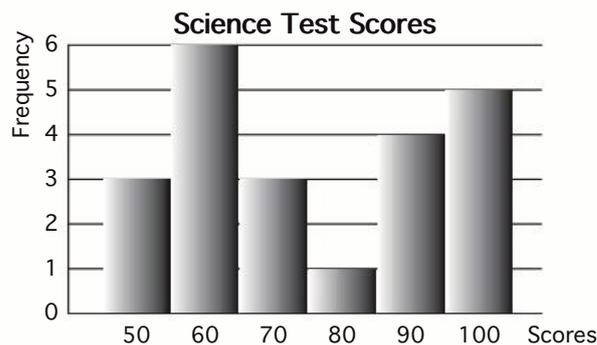
Which congruence test (SSS, SAS, AAS, RHS) can be applied to show that  $\triangle ACM$  is congruent to  $\triangle ABM$ ?



SAS

29. [Statistics]

Find the range and median of the distribution.



range = 50      median = 70

30. [Probability]

A standard die is tossed and a spinner labelled 1, 2, 3 and 4 is spun. Complete the table. What is the probability of obtaining a total greater than 4 when the die is tossed and the spinner is spun once? [Give the answer as a fraction in simplest form.]

$\frac{3}{4}$

Total value		Die					
		1	2	3	4	5	6
Spinner	1	2	3	4	5	6	7
	2	3	4	5	6	7	8
	3	4	5	6	7	8	9
	4	5	6	7	8	9	10

31. [Problem Solving 1]

Jay counts the number of ads in each of the 4 breaks during a TV show. He notes that the median is 6.5, the mode is 6, and the mean is 7.5. How many ads are there in each break?

6 , 6 , 7 , 11

32. [Problem Solving 2]

How many pairs of positive integers make this equation true?

$$3x + 5y = 76$$

[Hint: Positive integers are 1, 2, 3, 4, ...]      (2,14) (7,11) (12,8) (17,5) (22,2)

5



## Test 5

Covering worksheets 3.1 - 3.4

Name: .....

1. [Long  $\times$ ,+]  
 $325 \times 1500 =$

487 500

2. [Decimal +,-]  
 $10 - 0.066 =$

9.934

3. [Decimal  $\times$ ,+]  
 $0.002 \div 0.01 =$

0.2

4. [Fraction +,-]  
 $\frac{1}{6} + \frac{2}{9} =$

$\frac{7}{18}$

5. [Fraction  $\times$ ,+]  
 $\frac{1}{6} \times 2\frac{2}{5} =$

$\frac{2}{5}$

6. [Percentages]  
Increase 60 by 75%.

105

7. [Decimals / Fractions / Percentages]  
Complete the table:

Decimal	Fraction	Percentage
0.44	$\frac{44}{100} = \frac{11}{25}$	44%

8. [Integer +,-]  
 $2 + (3 - 7) =$

-2

9. [Integer  $\times$ ,+]  
 $(6 - 9) \times (9 + 6) =$

-45

10. [Rates / Ratios]  
The ratio of wins to losses for Fremantle in the 2018 home and away AFL season was 4 : 7. If Fremantle lost 14 games, how many did they win?

8

11. [Indices]  
Simplify  $4(3x)^2$

$36x^2$

12. [Square Roots]  
 $6\sqrt{9} - 5\sqrt{4} =$

8

13. [Exploring Number]  
Write 0.000005 m, the diameter of a blood capillary vessel, in scientific notation.

$5 \times 10^{-6}$

14. [Financial Mathematics]  
Carol invests \$3000 for 5 years at a simple interest rate of 15% per year. How much will Carol have after that time?  
[Hint: Principal + interest.]

\$5250

15. [Number Patterns]  
Find the 20th term in the pattern:

$\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \frac{1}{6}, \dots$

$\frac{1}{21}$

16. [Expressions]  
Simplify  $-4xy \times 3y$

$-12xy^2$

17. [Substitution]  
If  $e = -1$  and  $f = 4$ ,  
find the value of  $5e - 2f$

-13

18. [Expansion]  
Expand and simplify  
 $-5(v^2 - w) + 6v(v - 1)$

$v^2 - 6v + 5w$

19. [Factorisation]  
Factorise  
 $fg - 3f + 2g - 6$

$(f + 2)(g - 3)$

20. [Equations]  
Solve the inequality:

$5x - \frac{x}{2} < 18$

$x < 4$

21. [Coordinate Geometry]  
Use  $y - y_1 = m(x - x_1)$  where  $m = \frac{y_2 - y_1}{x_2 - x_1}$  to write the equation of the line passing through the points (0,-2) and (3,4).

$y = 2x - 2$

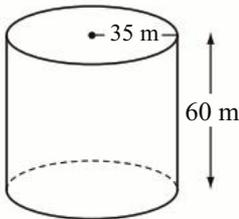
22. [Units of Measurement / Time]  
The heaviest land animal, an African elephant weighed 12 tonnes. If 15 such elephants equalled the mass of a blue whale, what would be the mass of that whale in kilograms?

180 000 kg

23. [Perimeter / Area]  
Using  $C = 2\pi r$  where  $\pi \approx \frac{22}{7}$ , find how far a bicycle wheel with a diameter of 42 cm will travel after 1 full turn.

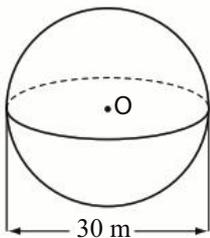
132 cm

24. [Surface Area]  
Using  $LA = 2\pi rh$  and  $\pi \approx \frac{22}{7}$ , find the lateral area of the cylinder.



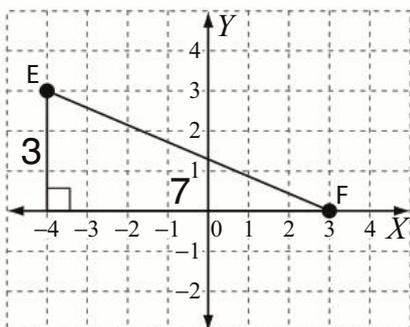
13 200 m<sup>2</sup>

25. [Volume]  
Find the volume of the sphere using  $\pi \approx 3.14$



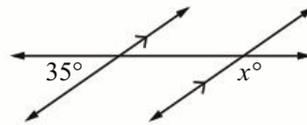
14 130 m<sup>3</sup>

26. [Pythagoras / Trigonometry]  
Find the distance EF in this Cartesian plane.  
[Leave your answer in surd form.]



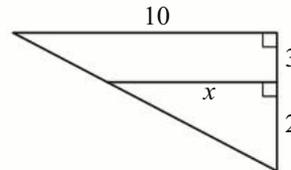
$\sqrt{58}$

27. [Angles]  
Find the value of  $x^\circ$ .



145°

28. [Geometric Reasoning]  
Find the value of  $x$ . [All measurements are in cm.]



4

29. [Statistics]  
Find the mean of the following distribution.

Score	0	1	2	3	4
Frequency	12	10	5	2	1

1

30. [Probability]  
A money bag has fifty 1-dollar coins, thirty 2-dollar coins and sixty 50-cent coins. Find the probability that the first coin, taken at random from the bag, will be a 1-dollar or 2-dollar coin. [Give the answer as a fraction in simplest form.]

$\frac{4}{7}$

31. [Problem Solving 1]  
Six consecutive numbers are listed. The sum of the smallest three numbers is 39. What is the sum of the largest three?

48

32. [Problem Solving 2]  
A group of 24 students decided to go on an expedition. They bought enough food to last for 20 days. If 16 more students join them, how many days will their food last?

12



## Test 5

Covering worksheets 3.1 - 3.4

Name: .....

1. [Long  $\times$ ,+]  
 $412 \times 1500 =$

618 000

2. [Decimal +,-]  
 $10 - 0.047 =$

9.953

3. [Decimal  $\times$ ,+]  
 $0.006 \div 0.01 =$

0.6

4. [Fraction +,-]  
 $\frac{1}{10} + \frac{2}{15} =$

$\frac{7}{30}$

5. [Fraction  $\times$ ,+]  
 $\frac{3}{5} \times 1\frac{1}{6} =$

$\frac{7}{10}$

6. [Percentages]  
Increase 60 by 25%.

75

7. [Decimals / Fractions / Percentages]  
Complete the table:

Decimal	Fraction	Percentage
0.85	$\frac{85}{100} = \frac{17}{20}$	85%

8. [Integer +,-]  
 $7 + (1 - 9) =$

-1

9. [Integer  $\times$ ,+]  
 $(4 - 7) \times (7 + 4) =$

-33

10. [Rates / Ratios]  
The ratio of wins to losses for Essendon in the 2018 home and away AFL season was 6 : 5. If Essendon won 12 games, how many did they lose?

10

11. [Indices]  
Simplify  $2(7x)^2$

$98x^2$

12. [Square Roots]  
 $7\sqrt{16} - 3\sqrt{25} =$

13

13. [Exploring Number]  
Write 0.0000012 m, the size of a plant cell, in scientific notation.

$1.2 \times 10^{-6}$

14. [Financial Mathematics]  
What are the total repayments on a loan of \$2000 for 6 years at a 15% simple interest rate? [Hint: Principal + interest.]

\$3800

15. [Number Patterns]  
Find the 20th term in the pattern:  
10, 15, 20, 25, 30, .....

105

16. [Expressions]  
Simplify  $-5ef \times 2e$

$-10e^2f$

17. [Substitution]  
If  $p = 0$  and  $q = -10$ ,  
find the value of  $3p - 2q$

20

18. [Expansion]  
Expand and simplify  
 $-2(j^2 - k) + 3j(j - 1)$

$j^2 + 2k - 3j$

19. [Factorisation]  
Factorise  
 $rs - 4r + 2s - 8$

$(s - 4)(r + 2)$

20. [Equations]  
Solve the inequality:  
 $5x + \frac{x}{2} > 22$

$x > 4$

21. [Coordinate Geometry]  
Use  $y - y_1 = m(x - x_1)$  where  $m = \frac{y_2 - y_1}{x_2 - x_1}$  to write the equation of the line passing through the points (5,0) and (-1,6).

$y = -x + 5$

22. [Units of Measurement / Time]

Which mass is greater?

- A) 0.074 mg of arsenic found in a bag of rice  
 B) grain of sand weighing 0.01 g

**B**

23. [Perimeter / Area]

The diameter of a basketball hoop is 45 cm.  
 Using  $C = 2\pi r$  where  $\pi \approx 3.14$ , find its circumference.

**141.3 cm**

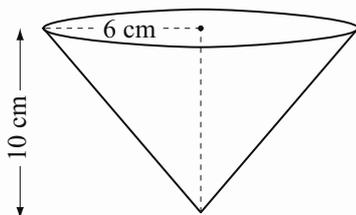
24. [Surface Area]

Using  $LA = 2\pi rh$  and  $\pi \approx \frac{22}{7}$ , find the lateral area of a straw of diameter 7 mm and length 300 mm.

**6600 mm<sup>2</sup>**

25. [Volume]

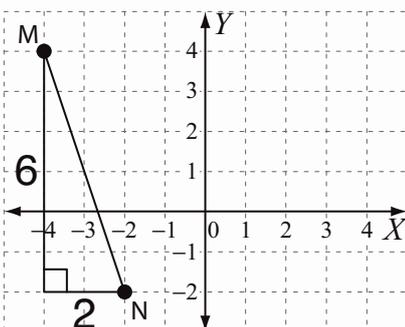
Find the volume of the cone using  $\pi \approx 3.14$



**376.8 cm<sup>3</sup>**

26. [Pythagoras / Trigonometry]

Find the distance MN in this Cartesian plane.  
 [Leave your answer in surd form.]

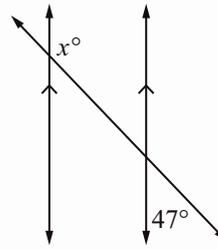


or  $2\sqrt{10}$

**$\sqrt{40}$**

27. [Angles]

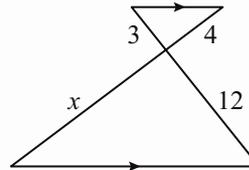
Find the value of  $x^\circ$ .



**133°**

28. [Geometric Reasoning]

Find the value of  $x$ . [All measurements are in cm.]



**16**

29. [Statistics]

Find the mean of the following distribution.

Score	0	1	2	3	4
Frequency	6	7	2	3	2

**1.4**

30. [Probability]

Elly's drawer contains 8 white, 6 navy and 12 multicoloured socks. Find the probability that the first sock taken at random from the drawer will be white or multicoloured. [Give the answer as a fraction in simplest form.]

**$\frac{10}{13}$**

31. [Problem Solving 1]

Six consecutive numbers are listed. The sum of the largest three numbers is 72. What is the sum of the smallest three?

**63**

32. [Problem Solving 2]

Twelve people in a shoe company can pack a shipping container of shoes in 25 minutes. If eight more people join them, how long would it take to pack the container?

**15 min**



## Test 6

Covering worksheets 3.5 - 3.8

Name: .....

1. [Long  $\times, \div$ ]  
 $6096 \div 15 =$

406.4

2. [Decimal  $+, -$ ]  
 $13 - 0.408 =$

12.592

3. [Decimal  $\times, \div$ ]  
 $6.37 \div 0.7 =$

9.1

4. [Fraction  $+, -$ ]  
 $3\frac{1}{6} - 1\frac{5}{6} =$

$1\frac{1}{3}$

5. [Fraction  $\times, \div$ ]  
 $\frac{3}{10} \div 6 =$

$\frac{1}{20}$

6. [Percentages]  
Decrease 680 by 40%.

408

7. [Decimals / Fractions / Percentages]  
Place in descending order:

0.3, 33%,  $\frac{1}{3}$

$\frac{1}{3}$ , 33%, 0.3

8. [Integer  $+, -$ ]  
 $(7 - 15) + (2 - 8) =$

-14

9. [Integer  $\times, \div$ ]  
 $\frac{3 - 7}{6 - 4} =$

-2

10. [Rates / Ratios]  
The American antelope is the fastest mammal on land over long distances. It can run at 54 km/h. What is the speed in metres per second?

15 m/s

11. [Indices]  
Simplify  $(d^2)^3$

$d^6$

12. [Square Roots]  
 $5\sqrt{4} \times \sqrt{4} =$

20

13. [Exploring Number]  
Which is an irrational number?

- A) 3.616161...    B)  $\sqrt{15}$   
C)  $\sqrt{81}$         D)  $\frac{3}{14}$

B

14. [Financial Mathematics]  
There is a 30% sale on items already reduced by 10%. Is the total saving  $>$ ,  $<$  or  $=$  a 40% discount on the original value?

$<$

15. [Number Patterns]  
If the rule of a pattern is  $30 - n$  find the 50th term ( $n = 50$ ).

-20

16. [Expressions]  
Simplify  $-12vw \div 4v$

$-3w$

17. [Substitution]  
If  $p = 5$  and  $q = -7$ , find the value of  $\frac{p}{2}(q - 3)$

-25

18. [Expansion]  
Expand  $(5 + e)(2 - f)$

$10 - 5f + 2e - ef$

19. [Factorisation]  
Factorise  $x^2 - 49y^2$

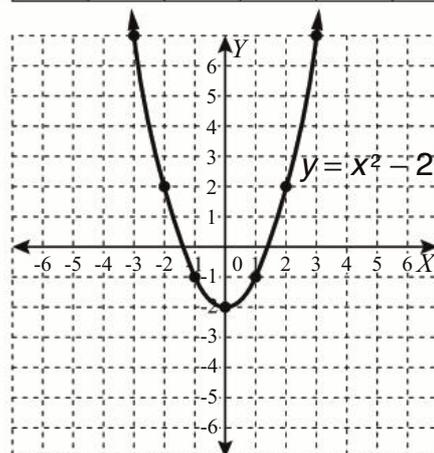
$(x + 7y)(x - 7y)$

20. [Equations]  
Solve for  $x$ :  
 $x(x + 7) = 0$

-7, 0

21. [Coordinate Geometry]  
Sketch the non-linear rule  $y = x^2 - 2$  (parabola) by first completing this table of values.

$x$	-3	-2	-1	0	1	2	3
$y$	7	2	-1	-2	-1	2	7



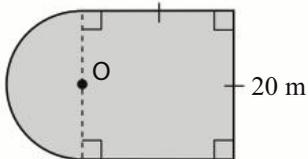
22. [Units of Measurement / Time]

Express in litres:

2 L and 50 000 mL = 52 L

23. [Perimeter / Area]

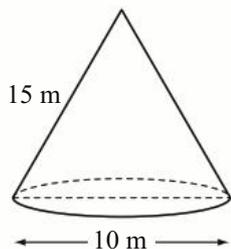
Find the area of the shape. (Use  $\pi \approx 3.14$ )



557 m<sup>2</sup>

24. [Surface Area]

Use  $\pi \approx 3.14$  to find the total surface area of the cone. [Hint:  $TSA_{cone} = \pi r(r + s)$ ]

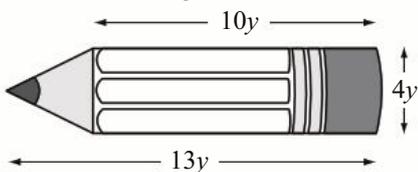


314 m<sup>2</sup>

25. [Volume]

Write an algebraic expression in terms of  $y$  and  $\pi$  for the volume  $V$  of the pencil.

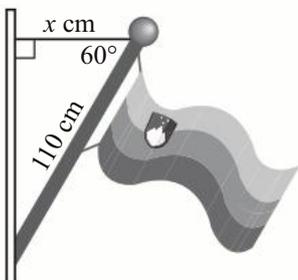
[Hint:  $V_{cone} = \frac{\pi r^2 h}{3}$ ,  $V_{cylinder} = \pi r^2 h$ ]



$V = 44\pi y^3$

26. [Pythagoras / Trigonometry]

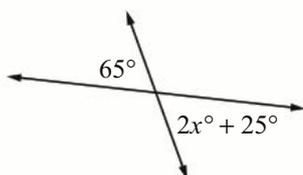
A flagpole extends from the wall of a building as shown. If the length of the flagpole is 110 cm and  $\cos 60^\circ = 0.5$ , find the distance from the end of the flagpole to the wall.



55 cm

27. [Angles]

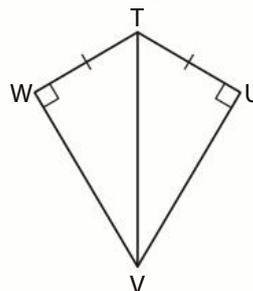
Find the value of  $x^\circ$ .



20°

28. [Geometric Reasoning]

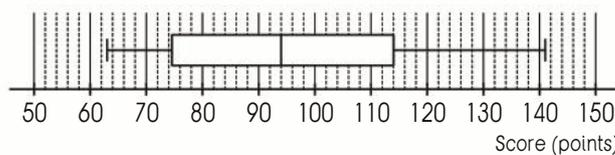
Write the pairs of equal sides and angles to prove that  $\triangle TVW$  and  $\triangle TVU$  are congruent. Which congruence test did you use?



$WT = TU$   
 $TV = TV$   
 $\angle TWV = \angle TUV$   
 congruence test:  
**RHS**

29. [Statistics]

What is the median and upper quartile (UQ) of the scores?



median = 94                  UQ = 114

30. [Probability]

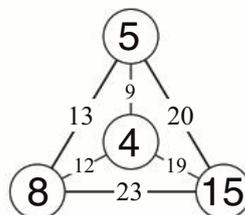
In a basketball game Kai's team put up 125 shots at goal and the probability of a certain result is shown. How many 3 pointers were scored by Kai's team?

<b>Result</b>	3 points	2 points	1 points	miss
<b>Probability</b>	0.2	0.4	0.1	0.3

25

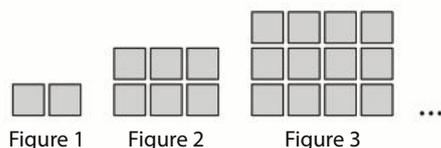
31. [Problem Solving 1]

Enter numbers in the circles so that the numbers on each line equal the sum of the numbers at each end.



32. [Problem Solving 2]

How many blocks are needed for the twenty-fifth figure, following the pattern?



650



## Test 6

Covering worksheets 3.5 - 3.8

Name: .....

1. [Long  $\times, \div$ ]  
 $2088 \div 15 =$  139.2

2. [Decimal  $+, -$ ]  
 $17 - 0.603 =$  16.397

3. [Decimal  $\times, \div$ ]  
 $2.55 \div 0.5 =$  5.1

4. [Fraction  $+, -$ ]  
 $4\frac{3}{10} - 2\frac{7}{10} =$   $1\frac{3}{5}$

5. [Fraction  $\times, \div$ ]  
 $\frac{3}{5} \div 9 =$   $\frac{1}{15}$

6. [Percentages]  
 Decrease 560 by 30%. 392

7. [Decimals / Fractions / Percentages]  
 Place in ascending order:  
 $0.7, 75\%, \frac{5}{7}$   $0.7, \frac{5}{7}, 75\%$

8. [Integer  $+, -$ ]  
 $(8 - 19) + (6 - 17) =$  -22

9. [Integer  $\times, \div$ ]  
 $\frac{-3 + 5}{3 - 5} =$  -1

10. [Rates / Ratios]  
 The fastest land bird is the ostrich, who can reach a speed of 20 m/s. What is the speed in kilometres per hour?  
72 km/h

11. [Indices]  
 Simplify  $(j^4)^3$   $j^{12}$

12. [Square Roots]  
 $10\sqrt{9} \times \sqrt{9} =$  90

13. [Exploring Number]  
 Which is an irrational number?  
 A)  $\sqrt{10}$       B)  $-1.4142$   
 C)  $\frac{9}{25}$       D)  $\sqrt{64}$  A

14. [Financial Mathematics]  
 There is a 25% sale on items already reduced by 10%. Is the total saving  $>$ ,  $<$  or  $=$  a 35% discount on the original value?  
 $<$

15. [Number Patterns]  
 If the rule of a pattern is  $5(n - 2)$  find the 22nd term ( $n = 22$ ).  
100

16. [Expressions]  
 Simplify  $-15mn \div 5n$  -3m

17. [Substitution]  
 If  $a = 3, b = -2$  and  $c = 1$ , find the value of  $\frac{4}{b}(ac - b)$  -10

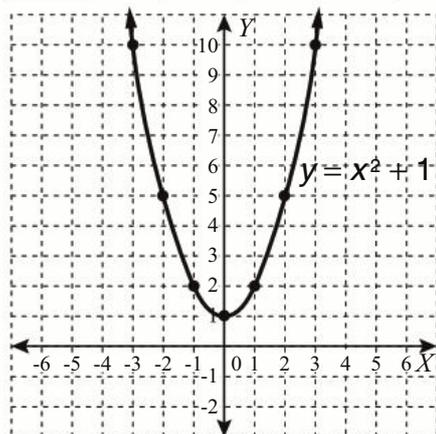
18. [Expansion]  
 Expand  $(6 + g)(3 - h)$   $18 - 6h + 3g - gh$

19. [Factorisation]  
 Factorise  $j^2 - 36k^2$   $(j + 6k)(j - 6k)$

20. [Equations]  
 Solve for  $x$ :  
 $x(x - 6) = 0$  0, 6

21. [Coordinate Geometry]  
 Sketch the non-linear rule  $y = x^2 + 1$  (parabola) by first completing this table of values.

$x$	-3	-2	-1	0	1	2	3
$y$	10	5	2	1	2	5	10



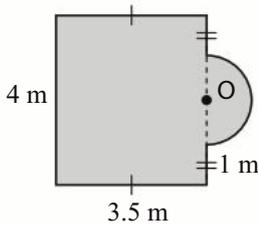
22. [Units of Measurement / Time]

Express in litres:

5 L and 40 000 mL = 45 L

23. [Perimeter / Area]

Find the area of the shape. (Use  $\pi \approx 3.14$ )

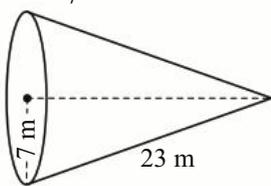


15.57 m<sup>2</sup>

24. [Surface Area]

Find the total surface area of the cone using

$\pi \approx \frac{22}{7}$ . [Hint:  $TSA_{cone} = \pi r(r + s)$ ]

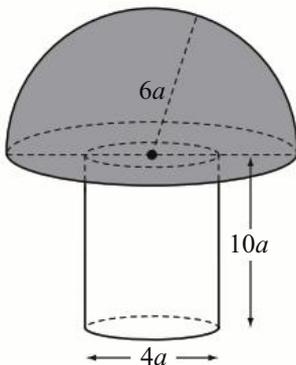


660 m<sup>2</sup>

25. [Volume]

Write an algebraic expression in terms of  $a$  and  $\pi$  for the volume  $V$  of the garden gnome.

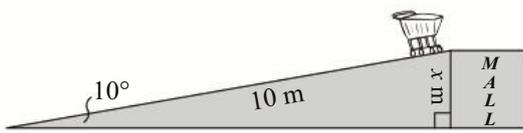
[Hint:  $V_{sphere} = \frac{4\pi r^3}{3}$ ,  $V_{cylinder} = \pi r^2 h$ ]



$V = 184\pi a^3$

26. [Pythagoras / Trigonometry]

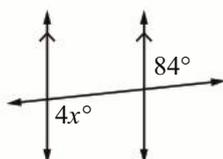
A 10 m long ramp leads out of the shopping mall and makes an angle of  $10^\circ$  with the ground. If  $\sin 10^\circ \approx 0.17$ , find the approximate height of the ramp.



1.7 m

27. [Angles]

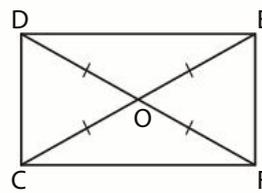
Find the value of  $x^\circ$ .



24°

28. [Geometric Reasoning]

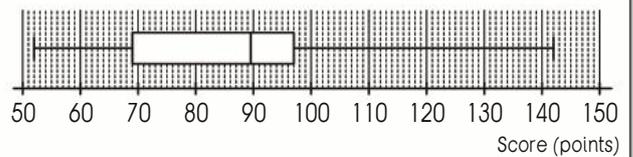
Write the pairs of equal sides and angles to prove that  $\triangle COD$  and  $\triangle EOF$  are congruent. Which congruence test did you use?



$CO = OE$   
 $DO = OF$   
 $\angle COD = \angle EOF$   
 congruence test:  
**SAS**

29. [Statistics]

What is the interquartile range (IQR) of the scores?



IQR = 28

30. [Probability]

A tennis player has 60 service points in a match and the probability of a certain result is shown. How many serves were a double fault?

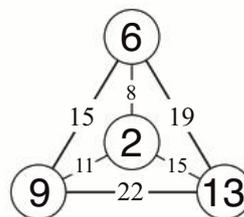
Result	Ace	In	Double fault	Let
Probability	0.15	0.6	0.2	0.05



12

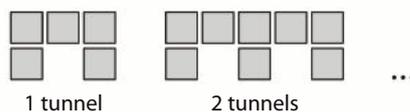
31. [Problem Solving 1]

Enter numbers in the circles so that the numbers on each line equal the sum of the numbers at each end.



32. [Problem Solving 2]

How many blocks are needed to build ten tunnels, following the pattern shown?



32



## Test 7

Covering worksheets 4.1 - 4.4

Name: .....

1. [Long  $\times, +$ ]  
 $4125 \times 63 =$  259 875

2. [Decimal  $+, -$ ]  
 $16 - 0.094 + 0.08 =$  15.986

3. [Decimal  $\times, +$ ]  
 $20 \div 0.2 =$  100

4. [Fraction  $+, -$ ]  
 $\frac{2}{3} - \frac{5}{12} + \frac{1}{4} =$   $\frac{1}{2}$

5. [Fraction  $\times, +$ ]  
 $\frac{6}{7} \times \frac{5}{6} \times \frac{14}{15} =$   $\frac{2}{3}$

6. [Percentages]  
 Panda numbers in the wild increased from 1000 in 1974 to 1600 in 2004. What percentage increase is this? 60%

7. [Decimals / Fractions / Percentages]  
 Write  $\frac{2}{9}$  as a recurring decimal.  $0.\dot{2}$

8. [Integer  $+, -$ ]  
 $-6 + -3 - 1 =$  -10

9. [Integer  $\times, +$ ]  
 $27 \div -3 \div 3 =$  -3

10. [Rates / Ratios]  
 432 Park Ave Condominiums (430 m) is the world's tallest residential building. A model is built using the scale 1 : 1000. How tall is the model? 43 cm

11. [Indices]  
 Evaluate  $(-2)^5$  -32

12. [Square Roots]  
 $\sqrt{25} + \sqrt{144} = \sqrt{169}$   
 True or false? false

13. [Exploring Number]  
 Use true and false to complete this table:

	Integer	Rational	Irrational	Real
$\sqrt{9}$	true	true	false	true

14. [Financial Mathematics]  
 Klaus invests \$10 000 at a compound interest rate of 8% per year. How much does he get back after 2 years?  
 [Hint: Principal + interest.] \$11 664

15. [Number Patterns]  
 Write an expression for the term in position  $n$  given the table of values for the sequence.

position	1	2	3	4	5	...	$n$
term	5	7	9	11	13	...	$2n + 3$

$2n + 3$

16. [Expressions]  
 Simplify  $-2p - p + 2p^2 - 3p^2$   $-3p - p^2$

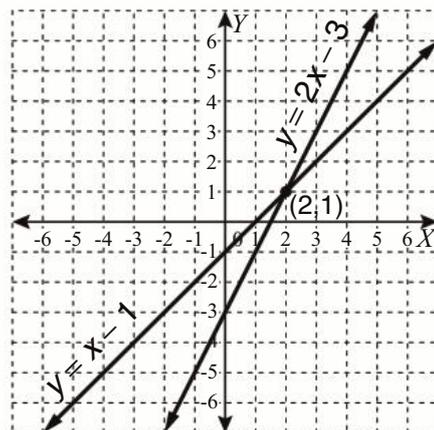
17. [Substitution]  
 If  $y = 3x^2 - 5x + 2$ , find  $y$  when  $x = 1$  0

18. [Expansion]  
 Expand and simplify  $(q + 4)(2q - 6)$   $2q^2 + 2q - 24$

19. [Factorisation]  
 Factorise  $e^2 + 7e + 2e + 14$   $(e + 2)(e + 7)$

20. [Equations]  
 Solve the simultaneous equations:  
 $x + y = 6$   
 $y = 2x$  (2, 4)

21. [Coordinate Geometry]  
 Solve the simultaneous equations  $y = 2x - 3$  and  $y = x - 1$  by graphing their lines on the Cartesian plane.



(2, 1)

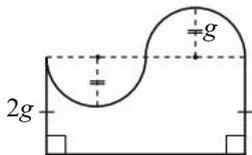
22. [Units of Measurement / Time]

A 2019 New Zealand Sir Edmond Hillary commemorative stamp has an area of  $16.10 \text{ cm}^2$ . Express this area in square millimetres.

$1610 \text{ mm}^2$

23. [Perimeter / Area]

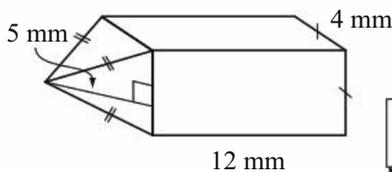
Write an algebraic expression for the perimeter  $P$  of the shape. [Express the answer in terms of  $g$  and  $\pi$ .]



or  $2g(4 + \pi)$   
 $P = 8g + 2\pi g$

24. [Surface Area]

Find the total surface area of the obelisk.



$248 \text{ mm}^2$

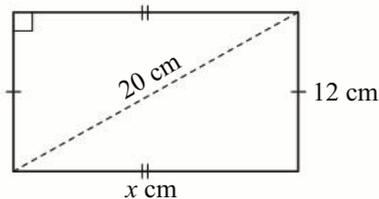
25. [Volume]

A water trough in the shape of a rectangular prism has dimensions 300 cm by 60 cm by 50 cm. How many millilitres of water would you need to fill the trough? [Hint:  $1 \text{ mL} = 1 \text{ cm}^3$ ]

$900\,000 \text{ mL}$

26. [Pythagoras / Trigonometry]

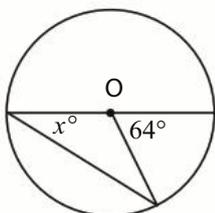
Find the area of the rectangle by first calculating the missing side length.



$192 \text{ cm}^2$

27. [Angles]

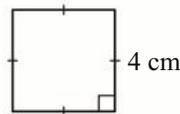
Find the value of  $x^\circ$ .



$32^\circ$

28. [Geometric Reasoning]

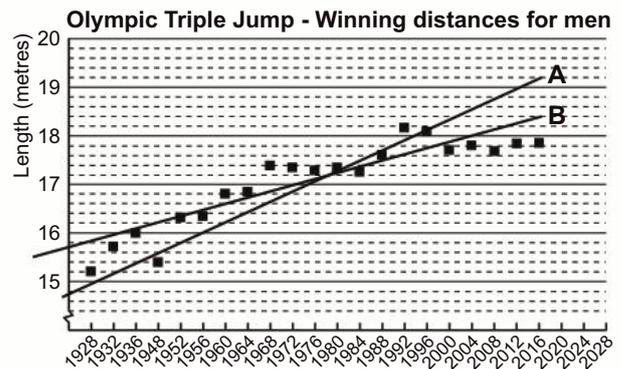
Determine the scale factor used when the square represents the plan of a market of perimeter 800 m.



$1 : 5000$

29. [Statistics]

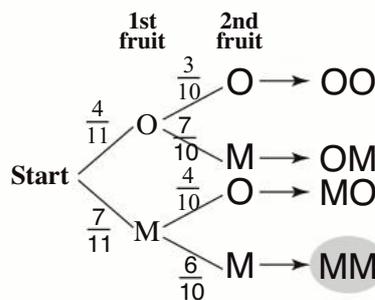
Select the most appropriate trend line for this scatter plot. [Hint: The sums of the distances from the points above and below the line, to the line, are approximately equal.]



**B**

30. [Probability]

A bowl contains 4 oranges and 7 mandarines. Two pieces of fruit are picked randomly one after another. Complete the probability tree diagram. What is the probability of picking two mandarines? [Give the answer as a fraction in simplest form.]



$\frac{21}{55}$

31. [Problem Solving 1]

If  $n$  is an odd number, which one or more of the following must be even?

- A)  $2n + 2$       B)  $n - 2$   
 C)  $n^2$             D)  $3n + 1$

**A and D**

32. [Problem Solving 2]

In a small town there are six straight streets, none of which is parallel to the other. What is the maximum number of intersections there could be in this town?



Three streets,  
three intersections

$15$



## Test 7

Covering worksheets 4.1 - 4.4

Name: .....

1. [Long  $\times$ ,+]  $7802 \times 54 =$  421 308

2. [Decimal +,-]  $23 - 0.876 + 0.9 =$  23.024

3. [Decimal  $\times$ ,+]  $40 \div 0.2 =$  200

4. [Fraction +,-]  $\frac{1}{4} + \frac{2}{5} - \frac{11}{20} =$   $\frac{1}{10}$

5. [Fraction  $\times$ ,+]  $\frac{5}{18} \times \frac{9}{10} \times \frac{4}{5} =$   $\frac{1}{5}$

6. [Percentages] The population of Wodonga is predicted to increase from 36 000 in 2010 to 45 000 in 2020. What percentage growth is this? 25%

7. [Decimals / Fractions / Percentages] Write  $\frac{1}{6}$  as a recurring decimal. 0.1 $\dot{6}$

8. [Integer +,-]  $-7 + -8 - 2 =$  -17

9. [Integer  $\times$ ,+]  $18 \div -6 \div 3 =$  -1

10. [Rates / Ratios] Melbourne's Rialto Tower (250 m) is the tallest office sky scraper in the southern hemisphere. A model is built using the scale 1 : 1000. How tall is the model? 25 cm

11. [Indices] Evaluate  $(-3)^4$  81

12. [Square Roots]  $\sqrt{100} - \sqrt{64} = \sqrt{36}$   
True or false? false

13. [Exploring Number] Use true and false to complete this table:

	Integer	Rational	Irrational	Real
-6	true	true	false	true

14. [Financial Mathematics] Luke invests \$10 000 at a compound interest rate of 5% per year. How much does he get back after 2 years? [Hint: Principal + interest.] \$11 025

15. [Number Patterns] Write an expression for the term in position  $n$  given the table of values for the sequence.

position	1	2	3	4	5	...	$n$
term	1	3	5	7	9	...	$2n - 1$

$2n - 1$

16. [Expressions] Simplify  $-3k + k^2 - 4k^2 + k$   $-2k - 3k^2$

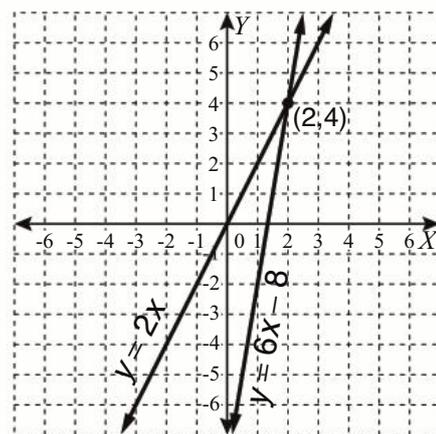
17. [Substitution] If  $y = 4x^2 - 6x + 2$ , find  $y$  when  $x = 1$  0

18. [Expansion] Expand and simplify  $(m + 3)(2m - 8)$   $2m^2 - 2m - 24$

19. [Factorisation] Factorise  $p^2 + 2p + 4p + 8$   $(p + 4)(p + 2)$

20. [Equations] Solve the simultaneous equations:  
 $y + 1 = x$   
 $x + y = 1$  (1,0)

21. [Coordinate Geometry] Solve the simultaneous equations  $y = 2x$  and  $y = 6x - 8$  by graphing their lines on the Cartesian plane.



(2,4)

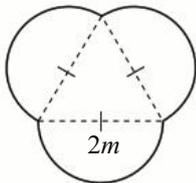
22. [Units of Measurement / Time]

A 2018 Isle of Man stamp issued for the 125th Anniversary of the Manx Electric Railway has an area of  $11.76 \text{ cm}^2$ . Express this area in square millimetres.

**1176 mm<sup>2</sup>**

23. [Perimeter / Area]

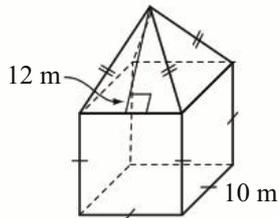
Write an algebraic expression for the perimeter  $P$  of the shape. [Express the answer in terms of  $m$  and  $\pi$ .]



**$P = 3\pi m$**

24. [Surface Area]

Find the total surface area of the obelisk.



**740 m<sup>2</sup>**

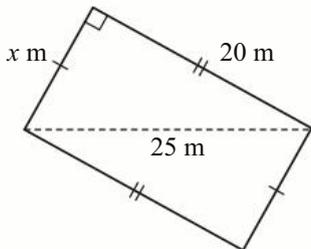
25. [Volume]

A rectangular fish tank with dimensions 40 cm by 30 cm by 25 cm is one third full of water. How many millilitres of water would you need to fill the fish tank? [Hint:  $1 \text{ mL} = 1 \text{ cm}^3$ ]

**20 000 mL**

26. [Pythagoras / Trigonometry]

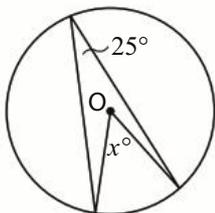
Find the area of the rectangle by first calculating the missing side length.



**300 m<sup>2</sup>**

27. [Angles]

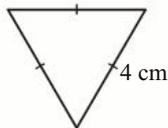
Find the value of  $x^\circ$ .



**50°**

28. [Geometric Reasoning]

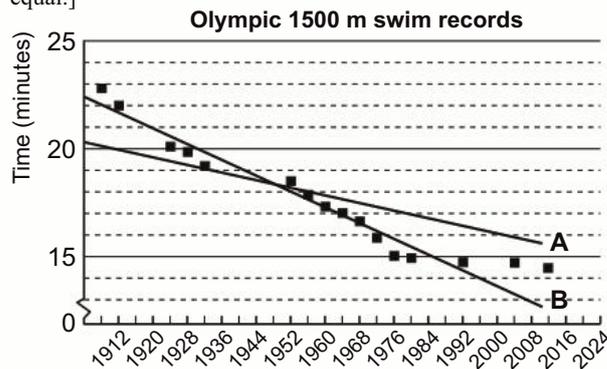
Determine the scale factor used when the equilateral triangle represents the plan of a zoo enclosure of perimeter 120 m.



**1 : 1000**

29. [Statistics]

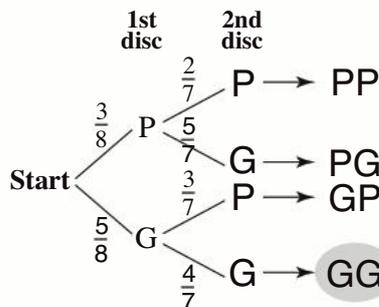
Select the most appropriate trend line for this scatter plot. [Hint: The sums of the distances from the points above and below the line, to the line, are approximately equal.]



**B**

30. [Probability]

Two discs are taken out in succession, without replacing, from a barrel containing 3 purple and 5 green discs. Complete the probability tree diagram. What is the probability of choosing two green discs? [Give the answer as a fraction in simplest form.]



**$\frac{5}{14}$**

31. [Problem Solving 1]

If  $n$  is a whole number, which one or more of the following must be even?

- A)  $2n + 1$       B)  $3n + 1$   
C)  $2n + 2$       D)  $2n$

**C and D**

32. [Problem Solving 2]

In a small town there are seven straight streets, none of which is parallel to the other. What is the maximum number of intersections there could be in this town?



Three streets,  
three intersections

**21**



## Test 8

Covering worksheets 4.5 - 4.8

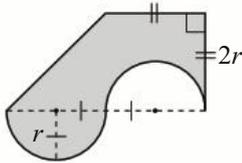
Name: .....

1. [Long  $\times, \div$ ]  
 $3358 \div 9 =$  **373.1**
2. [Decimal  $+, -$ ]  
 $10 - 3.8 - 2.49 =$  **3.71**
3. [Decimal  $\times, \div$ ]  
 $0.18 \div 0.4 =$  **0.45**
4. [Fraction  $+, -$ ]  
 $1\frac{1}{4} + 1\frac{1}{5} =$   **$2\frac{9}{20}$**
5. [Fraction  $\times, \div$ ]  
 $2\frac{2}{3} \div 1\frac{7}{9} =$   **$1\frac{1}{2}$**
6. [Percentages]  
75% of **80** = 60
7. [Decimals / Fractions / Percentages]  
Which fraction does 0.4 equal?  
A)  $\frac{1}{4}$    B)  $\frac{4}{10}$    C)  $\frac{4}{9}$    **C**
8. [Integer  $+, -$ ]  
**10** + (-5) = 5
9. [Integer  $\times, \div$ ]  
**-45**  $\div 5 = -9$
10. [Rates / Ratios]  
Which telephone call rate is cheaper?  
A) 20 cents/block of 30 seconds   **B**  
B) 35 cents/minute
11. [Indices]  
Evaluate  $7^{-2}$     **$\frac{1}{49}$**
12. [Square Roots]  
Between which two consecutive whole numbers does  $\sqrt{30}$  lie?   **5 and 6**
13. [Exploring Number]  
Which number is greater?  
3 or  $\sqrt{10}$     **$\sqrt{10}$**
14. [Financial Mathematics]  
The population of a town compounded annually at a rate of 20% per year. The population was initially 1000. What was the population after 2 years?   **1440**
15. [Number Patterns]  
Complete the pattern:  
 $2\frac{2}{5}, 2\frac{4}{5}, 3\frac{1}{5}, 3\frac{3}{5},$   **$4, 4\frac{2}{5}$**
16. [Expressions]  
Simplify  $4yz \times -2z \times -y$     **$8y^2z^2$**
17. [Substitution]  
Use  $V = \frac{\pi r^2 h}{3}$  to find the volume  $V$  of a cone when  $\pi \approx 3.14, r = 5$  and  $h = 6$    **157**
18. [Expansion]  
Expand and simplify  $(w + 4)^2$     **$w^2 + 8w + 16$**
19. [Factorisation]  
Factorise  $c^2 + 11c + 18$     **$(c + 9)(c + 2)$**
20. [Equations]  
Solve for  $x$ :  
 $x^2 - 4 = 0$    **-2, 2**
21. [Coordinate Geometry]  
Use  $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$  to find the distance between the points (3,8) and (5,4).  
[Leave the answer in surd form.]    **$\sqrt{20}$**

22. [Units of Measurement / Time]  
 If the volume of an archive box is  $18\,250\text{ cm}^3$ ,  
 what is its capacity in litres?

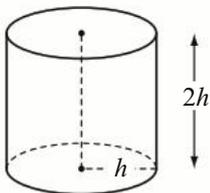
**18.25 L**

23. [Perimeter / Area]  
 Write an algebraic expression for the area  $A$   
 of the shaded shape. [Express the answer in terms  
 of  $r$ .]



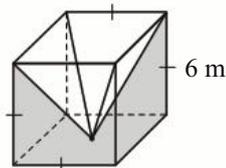
**$A = 6r^2$**

24. [Surface Area]  
 Write an algebraic expression for the total  
 surface area  $TSA$  of the cylinder. [Express the  
 answer in terms of  $h$  and  $\pi$ .]



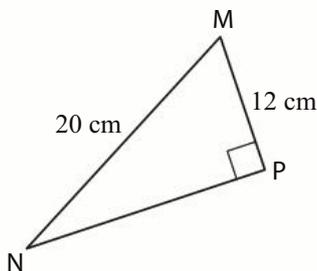
**$TSA = 6\pi h^2$**

25. [Volume]  
 A  $6\text{ m} \times 6\text{ m} \times 6\text{ m}$  pyramid is removed from a  
 $6\text{ m} \times 6\text{ m} \times 6\text{ m}$  cube. What is the volume of  
 the remaining shape?



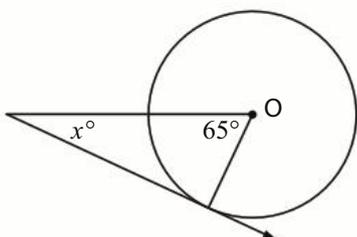
**$144\text{ m}^3$**

26. [Pythagoras / Trigonometry]  
 Calculate the value of  $\cos N$  in this triangle.  
 [Hint: Pythagoras' theorem will help.]



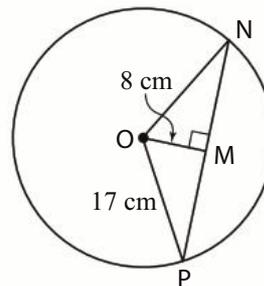
**$\frac{4}{5}$**

27. [Angles]  
 Find the value of  $x^\circ$ .



**$25^\circ$**

28. [Geometric Reasoning]  
 A chord NP is 8 cm from the centre of a circle  
 of radius 17 cm. Find the length of chord  
 NP. [Hint: Pythagoras' theorem will help.]



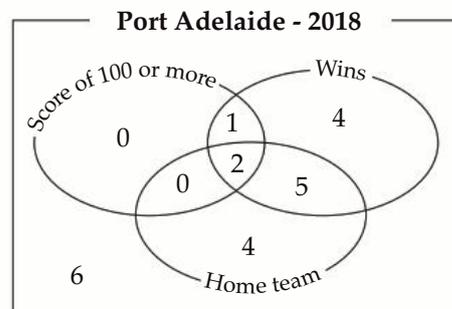
**30 cm**

29. [Statistics]  
 Find the interquartile range (IQR) for the set  
 of data shown in this stem-and-leaf plot.

STEM	LEAF
5	0 1 1 2 3
6	0 2
6	5 7 7 9
7	1 2 2 3
7	5 6 8 8 9
8	0 3 4 4
8	7 7 8 8 9 9

**IQR = 19**

30. [Probability]  
 If one 2018 Port Adelaide match is selected  
 at random, what is the probability that Port  
 Adelaide scored less than 100 points as an  
 away team and won? [Give the answer as a fraction  
 in simplest form.]



**$\frac{2}{11}$**

31. [Problem Solving 1]  
 Nicole has three children and one of them is a  
 teenager. When Nicole multiplies her  
 children's ages together the result is 770.  
 How old is the youngest child?

**5**

32. [Problem Solving 2]  
 A family of four, two adults and two children,  
 want to cross a river. They can row a boat  
 which holds one adult or two children.  
 If none of them can swim, what is the  
 minimum number of trips across the river, in  
 either direction, to get all the  
 family across?

**9**



## Test 8

Covering worksheets 4.5 - 4.8

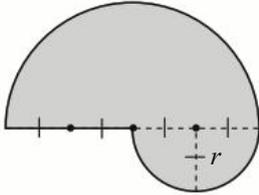
Name: .....

1. [Long  $\times, \div$ ]  
 $788 \div 6 =$  131. $\dot{3}$
2. [Decimal  $+, -$ ]  
 $20 - 0.057 - 0.9 =$  19.043
3. [Decimal  $\times, \div$ ]  
 $0.25 \div 0.2 =$  1.25
4. [Fraction  $+, -$ ]  
 $1\frac{1}{3} + 1\frac{1}{4} =$   $2\frac{7}{12}$
5. [Fraction  $\times, \div$ ]  
 $2\frac{1}{5} \div 1\frac{1}{10} =$  2
6. [Percentages]  
80% of 300 = 240
7. [Decimals / Fractions / Percentages]  
Which fraction does  $0.\dot{5}$  equal?  
A)  $\frac{1}{5}$    B)  $\frac{5}{9}$    C)  $\frac{5}{10}$  B
8. [Integer  $+, -$ ]  
13 + (-9) = 4
9. [Integer  $\times, \div$ ]  
-30  $\div 6 = -5$
10. [Rates / Ratios]  
Which telephone call rate is cheaper?  
A) \$6.00/block of 5 minutes A  
B) \$1.50/minute
11. [Indices]  
Evaluate  $6^{-2}$   $\frac{1}{36}$
12. [Square Roots]  
Between which two consecutive whole numbers does  $\sqrt{20}$  lie? 4 and 5
13. [Exploring Number]  
Which number is greater?  
 $\sqrt{35}$  or 6 6
14. [Financial Mathematics]  
The population of a town compounded annually at a rate of 30% per year. The population was initially 1000. What was the population after 2 years? 1690
15. [Number Patterns]  
Complete the pattern:  
 $2\frac{2}{7}, 2\frac{5}{7}, 3\frac{1}{7}, 3\frac{4}{7},$  4,  $4\frac{3}{7}$
16. [Expressions]  
Simplify  $-ef \times -3e \times 3f$   $9e^2f^2$
17. [Substitution]  
Use  $V = \frac{l^2h}{3}$  to find the volume  $V$  of a square pyramid when  $l = 4$  and  $h = 9$  48
18. [Expansion]  
Expand and simplify  $(t - 6)^2$   $t^2 - 12t + 36$
19. [Factorisation]  
Factorise  $q^2 + 10q + 16$   $(q + 8)(q + 2)$
20. [Equations]  
Solve for  $x$ :  
 $x^2 - 25 = 0$  -5, 5
21. [Coordinate Geometry]  
Use  $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$  to find the distance between the points (6,-1) and (-2,4).  
[Leave the answer in surd form.]  $\sqrt{89}$

22. [Units of Measurement / Time]  
If the capacity of a '20 foot' shipping container is 29 500 L, what is its volume in cubic metres?

$$29.5 \text{ m}^3$$

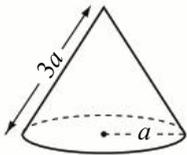
23. [Perimeter / Area]  
Write an algebraic expression for the area  $A$  of the shaded shape. [Express the answer in terms of  $r$  and  $\pi$ .]



$$\text{or } \frac{\pi 4r^2}{2} + \frac{\pi r^2}{2}$$

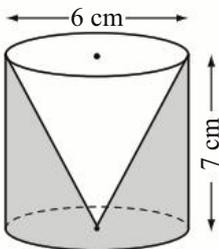
$$A = \frac{5\pi r^2}{2}$$

24. [Surface Area]  
Write an algebraic expression for the total surface area  $TSA$  of the cone. [Express the answer in terms of  $a$  and  $\pi$ .]



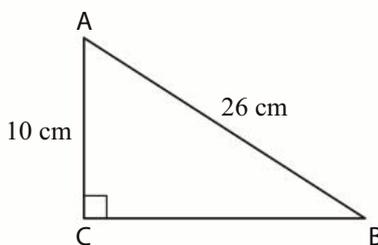
$$TSA = 4\pi a^2$$

25. [Volume]  
A cone of diameter of base 6 cm and height 7 cm is removed from this cylinder. Using  $\pi \approx \frac{22}{7}$  find the volume of the remaining shape.



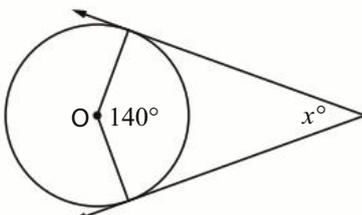
$$132 \text{ cm}^3$$

26. [Pythagoras / Trigonometry]  
Calculate the value of  $\sin A$  in this triangle. [Hint: Pythagoras' theorem will help.]



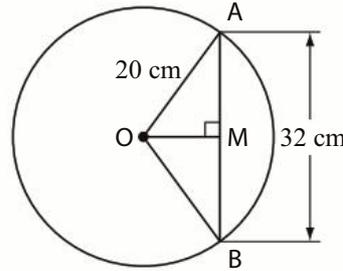
$$\frac{12}{13}$$

27. [Angles]  
Find the value of  $x^\circ$ .



$$40^\circ$$

28. [Geometric Reasoning]  
Find the length of the segment OM in this diagram. [Hint: Pythagoras' theorem will help.]



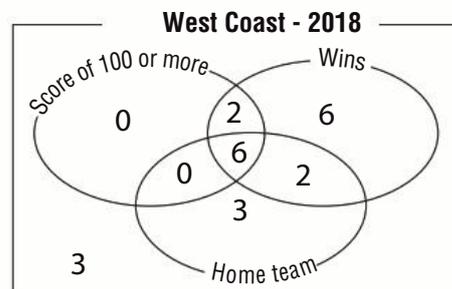
$$12 \text{ cm}$$

29. [Statistics]  
Find the interquartile range (IQR) for the set of data shown in this stem-and-leaf plot.

STEM	LEAF
3	8 9
4	0 1 3 3 4 4
4	5 6 8 9
5	0 1 2 3
5	6 6 7 8 9
6	1 3 4 4
6	7 7

$$IQR = 15$$

30. [Probability]  
If one 2018 West Coast Eagles match is selected at random, what is the probability that the Eagles scored less than 100 points as a home team and won? [Give the answer as a fraction in simplest form.]



$$\frac{1}{11}$$

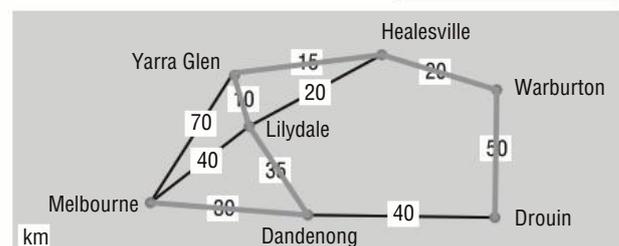
31. [Problem Solving 1]  
Susan has 3 children. When Susan multiplies her children's ages together the result is 350. How old are the twins?

$$5$$

32. [Problem Solving 2]  
Starting from Melbourne, find the shortest distance you must travel to visit all other towns on the map.

[Note: You don't have to return to Melbourne.]

$$160 \text{ km}$$



# MATHS MATE



## Teacher Resource



### **Teacher's Guide to the Use of Maths Mate**

pages i - viii



### **Student Pad Answers**

pages 3 - 72



### **Student Pad Short Answers**

pages 1 - 8



### **Problem Solving Hints & Solutions**

pages 1 - 15



### **Test Masters**

pages 1 - 32



### **Test Answers**

pages 1 - 32



### **Record Keeping Sheets**

pages 1 - 10



# MATHS MATE



Name: .....

Class: .....

Teacher: .....

## Worksheet Results

**Term 1**

		Sheet 1	Sheet 2	Sheet 3	Sheet 4	Skill Builder links	Sheet 5	Sheet 6	Sheet 7	Sheet 8	Skill Builder links
NUMBER	1. [Long $\times, \div$ ]	(1)	(1)	(1)	(1)	1.1	(1)	(1)	(1)	(1)	1.4,6
	2. [Decimal $+, -$ ]	(2)	(2)	(2)	(2)	2.1	(2)	(2)	(2)	(2)	2.2
	3. [Decimal $\times, \div$ ]	(3)	(3)	(3)	(3)	3.2	(3)	(3)	(3)	(3)	3.3
	4. [Fraction $+, -$ ]	(4)	(4)	(4)	(4)	4.1,2	(4)	(4)	(4)	(4)	4.3,4
	5. [Fraction $\times, \div$ ]	(5)	(5)	(5)	(5)	5.2	(5)	(5)	(5)	(5)	5.5
	6. [Percentages]	(6)	(6)	(6)	(6)	6.3,4	(6)	(6)	(6)	(6)	6.5,9
	7. [Decimals / Fractions / Percentages]	(7)	(7)	(7)	(7)	7.3	(7)	(7)	(7)	(7)	7.4,5
	8. [Integer $+, -$ ]	(8)	(8)	(8)	(8)	8.1	(8)	(8)	(8)	(8)	8.2
	9. [Integer $\times, \div$ ]	(9)	(9)	(9)	(9)	9.1	(9)	(9)	(9)	(9)	9.2
	10. [Rates / Ratios]	(10)	(10)	(10)	(10)	10.2,3,4	(10)	(10)	(10)	(10)	10.5,6,7
	11. [Indices]	(11)	(11)	(11)	(11)	11.1,2	(11)	(11)	(11)	(11)	11.3
	12. [Square Roots]	(12)	(12)	(12)	(12)	12.2	(12)	(12)	(12)	(12)	12.3
	13. [Exploring Number]	(13)	(13)	(13)	(13)	13.1,2	(13)	(13)	(13)	(13)	13.3,4
	14. [Financial Mathematics]	(14)	(14)	(14)	(14)	14.1,3	(14)	(14)	(14)	(14)	14.4
	15. [Number Patterns]	(15)	(15)	(15)	(15)	15.2	(15)	(15)	(15)	(15)	15.3
ALGEBRA	16. [Expressions]	(16)	(16)	(16)	(16)	16.1	(16)	(16)	(16)	(16)	16.2
	17. [Substitution]	(17)	(17)	(17)	(17)	17.2,3	(17)	(17)	(17)	(17)	17.4
	18. [Expansion]	(18)	(18)	(18)	(18)	18.1	(18)	(18)	(18)	(18)	18.2,3
	19. [Factorisation]	(19)	(19)	(19)	(19)	19.1	(19)	(19)	(19)	(19)	19.3
	20. [Equations]	(20)	(20)	(20)	(20)	20.3	(20)	(20)	(20)	(20)	20.7
	21. [Coordinate Geometry]	(21)	(21)	(21)	(21)	21.3,5	(21)	(21)	(21)	(21)	21.6,7
MEASUREMENT	22. [Units of Measurement / Time]	(22)	(22)	(22)	(22)	22.3	(22)	(22)	(22)	(22)	22.4
	23. [Perimeter / Area]	(23)	(23)	(23)	(23)	23.1,2	(23)	(23)	(23)	(23)	23.6,8,9
	24. [Surface Area]	(24)	(24)	(24)	(24)	24.2	(24)	(24)	(24)	(24)	24.3
	25. [Volume]	(25)	(25)	(25)	(25)	25.1,2	(25)	(25)	(25)	(25)	25.2
	26. [Pythagoras / Trigonometry]	(26)	(26)	(26)	(26)	26.3	(26)	(26)	(26)	(26)	26.4,5
SPACE	27. [Angles]	(27)	(27)	(27)	(27)	27.2,3	(27)	(27)	(27)	(27)	27.4
	28. [Geometric Reasoning]	(28)	(28)	(28)	(28)	28.5,6,7	(28)	(28)	(28)	(28)	28.8
STAT.	29. [Statistics]	(29)	(29)	(29)	(29)	29.5,6,7,8	(29)	(29)	(29)	(29)	29.3,4,9
PROB.	30. [Probability]	(30)	(30)	(30)	(30)	30.2	(30)	(30)	(30)	(30)	30.2
PROBLEM SOLVING	31. [Problem Solving 1]	(31)	(31)	(31)	(31)	Hints & Solutions	(31)	(31)	(31)	(31)	Hints & Solutions
	32. [Problem Solving 2]	(32)	(32)	(32)	(32)	Hints & Solutions	(32)	(32)	(32)	(32)	Hints & Solutions
<b>Total Correct</b>		( )	( )	( )	( )		( )	( )	( )	( )	

# MATHS MATE



Name: .....

Class: .....

Teacher: .....

## Worksheet Results

**Term 2**

	Sheet 1	Sheet 2	Sheet 3	Sheet 4	Skill Builder links	Sheet 5	Sheet 6	Sheet 7	Sheet 8	Skill Builder links
NUMBER	1	1	1	1	1.2	1	1	1	1	1.4,7
	2	2	2	2	2.2	2	2	2	2	2.4
	3	3	3	3	3.4	3	3	3	3	3.2
	4	4	4	4	4.5	4	4	4	4	4.6,9
	5	5	5	5	5.2	5	5	5	5	5.6
	6	6	6	6	6.4	6	6	6	6	6.6
	7	7	7	7	7.6,7	7	7	7	7	7.8,9
	8	8	8	8	8.3	8	8	8	8	8.3
	9	9	9	9	9.1	9	9	9	9	9.4
	10	10	10	10	10.12	10	10	10	10	10.8,9
	11	11	11	11	11.4	11	11	11	11	11.3,4,5,6
	12	12	12	12	12.4	12	12	12	12	12.5
	13	13	13	13	13.5,6	13	13	13	13	13.7
	14	14	14	14	14.5	14	14	14	14	14.6
	15	15	15	15	15.4	15	15	15	15	15.5
ALGEBRA	16	16	16	16	16.3	16	16	16	16	16.4
	17	17	17	17	17.5,6	17	17	17	17	17.6
	18	18	18	18	18.4	18	18	18	18	18.5
	19	19	19	19	19.2,4	19	19	19	19	19.5
	20	20	20	20	20.5	20	20	20	20	20.6
	21	21	21	21	21.8,9	21	21	21	21	21.10,11
MEASUREMENT	22	22	22	22	22.5	22	22	22	22	22.6
	23	23	23	23	23.1,5	23	23	23	23	23.10
	24	24	24	24	24.4	24	24	24	24	24.5
	25	25	25	25	25.3	25	25	25	25	25.4
	26	26	26	26	26.6	26	26	26	26	26.7
SPACE	27	27	27	27	27.5	27	27	27	27	27.6
	28	28	28	28	28.9	28	28	28	28	28.10
STAT.	29	29	29	29	29.10	29	29	29	29	29.11,15
PROB.	30	30	30	30	30.3	30	30	30	30	30.5
PROBLEM SOLVING	31	31	31	31	Hints & Solutions	31	31	31	31	Hints & Solutions
	32	32	32	32	Hints & Solutions	32	32	32	32	Hints & Solutions
<b>Total Correct</b>										

# MATHS MATE



Name: .....

Class: .....

Teacher: .....

## Worksheet Results

**Term 3**

		Sheet 1	Sheet 2	Sheet 3	Sheet 4	Skill Builder links	Sheet 5	Sheet 6	Sheet 7	Sheet 8	Skill Builder links
NUMBER	1. [Long $\times, \div$ ]	(1)	(1)	(1)	(1)	1.3	(1)	(1)	(1)	(1)	1.4,8
	2. [Decimal $+, -$ ]	(2)	(2)	(2)	(2)	2.3	(2)	(2)	(2)	(2)	2.3
	3. [Decimal $\times, \div$ ]	(3)	(3)	(3)	(3)	3.6,7	(3)	(3)	(3)	(3)	3.8
	4. [Fraction $+, -$ ]	(4)	(4)	(4)	(4)	4.7,8,10,11	(4)	(4)	(4)	(4)	4.3,4
	5. [Fraction $\times, \div$ ]	(5)	(5)	(5)	(5)	5.3	(5)	(5)	(5)	(5)	5.7
	6. [Percentages]	(6)	(6)	(6)	(6)	6.7	(6)	(6)	(6)	(6)	6.8
	7. [Decimals / Fractions / Percentages]	(7)	(7)	(7)	(7)	7.10,11	(7)	(7)	(7)	(7)	7.12
	8. [Integer $+, -$ ]	(8)	(8)	(8)	(8)	8.4	(8)	(8)	(8)	(8)	8.4
	9. [Integer $\times, \div$ ]	(9)	(9)	(9)	(9)	9.5	(9)	(9)	(9)	(9)	9.5
	10. [Rates / Ratios]	(10)	(10)	(10)	(10)	10.10,11	(10)	(10)	(10)	(10)	10.13,15
	11. [Indices]	(11)	(11)	(11)	(11)	11.7	(11)	(11)	(11)	(11)	11.8
	12. [Square Roots]	(12)	(12)	(12)	(12)	12.7	(12)	(12)	(12)	(12)	12.5,6,7
	13. [Exploring Number]	(13)	(13)	(13)	(13)	13.5,6	(13)	(13)	(13)	(13)	13.9
	14. [Financial Mathematics]	(14)	(14)	(14)	(14)	14.7	(14)	(14)	(14)	(14)	14.8
	15. [Number Patterns]	(15)	(15)	(15)	(15)	15.6	(15)	(15)	(15)	(15)	15.7
ALGEBRA	16. [Expressions]	(16)	(16)	(16)	(16)	16.5	(16)	(16)	(16)	(16)	16.6
	17. [Substitution]	(17)	(17)	(17)	(17)	17.7	(17)	(17)	(17)	(17)	17.8
	18. [Expansion]	(18)	(18)	(18)	(18)	18.6	(18)	(18)	(18)	(18)	18.7
	19. [Factorisation]	(19)	(19)	(19)	(19)	19.6,7	(19)	(19)	(19)	(19)	19.8
	20. [Equations]	(20)	(20)	(20)	(20)	20.7	(20)	(20)	(20)	(20)	20.8
	21. [Coordinate Geometry]	(21)	(21)	(21)	(21)	21.12,13	(21)	(21)	(21)	(21)	21.14,15
MEASUREMENT	22. [Units of Measurement / Time]	(22)	(22)	(22)	(22)	22.7	(22)	(22)	(22)	(22)	22.8
	23. [Perimeter / Area]	(23)	(23)	(23)	(23)	23.3,4	(23)	(23)	(23)	(23)	23.12
	24. [Surface Area]	(24)	(24)	(24)	(24)	24.7	(24)	(24)	(24)	(24)	24.7,8
	25. [Volume]	(25)	(25)	(25)	(25)	25.4	(25)	(25)	(25)	(25)	25.5
	26. [Pythagoras / Trigonometry]	(26)	(26)	(26)	(26)	26.8	(26)	(26)	(26)	(26)	26.9
SPACE	27. [Angles]	(27)	(27)	(27)	(27)	27.7	(27)	(27)	(27)	(27)	27.8
	28. [Geometric Reasoning]	(28)	(28)	(28)	(28)	28.11	(28)	(28)	(28)	(28)	28.12,13
STAT.	29. [Statistics]	(29)	(29)	(29)	(29)	29.12	(29)	(29)	(29)	(29)	29.13,16
PROB.	30. [Probability]	(30)	(30)	(30)	(30)	30.6,7	(30)	(30)	(30)	(30)	30.8
PROBLEM SOLVING	31. [Problem Solving 1]	(31)	(31)	(31)	(31)	Hints & Solutions	(31)	(31)	(31)	(31)	Hints & Solutions
	32. [Problem Solving 2]	(32)	(32)	(32)	(32)	Hints & Solutions	(32)	(32)	(32)	(32)	Hints & Solutions
<b>Total Correct</b>		( )	( )	( )	( )		( )	( )	( )	( )	

# MATHS MATE



Name: .....

Class: .....

Teacher: .....

## Worksheet Results

**Term 4**

	Sheet 1	Sheet 2	Sheet 3	Sheet 4	Skill Builder links	Sheet 5	Sheet 6	Sheet 7	Sheet 8	Skill Builder links										
<b>NUMBER</b>	1. [Long $\times, \div$ ]	①	①	①	①	1.2	①	①	①	①	1.4,9									
	2. [Decimal $+, -$ ]	②	②	②	②	2.4	②	②	②	②	2.4									
	3. [Decimal $\times, \div$ ]	③	③	③	③	3.9	③	③	③	③	3.8									
	4. [Fraction $+, -$ ]	④	④	④	④	4.12	④	④	④	④	4.13									
	5. [Fraction $\times, \div$ ]	⑤	⑤	⑤	⑤	5.4	⑤	⑤	⑤	⑤	5.8									
	6. [Percentages]	⑥	⑥	⑥	⑥	6.10	⑥	⑥	⑥	⑥	6.11									
	7. [Decimals / Fractions / Percentages]	⑦	⑦	⑦	⑦	7.13,14	⑦	⑦	⑦	⑦	7.15									
	8. [Integer $+, -$ ]	⑧	⑧	⑧	⑧	8.1,2,3	⑧	⑧	⑧	⑧	8.5									
	9. [Integer $\times, \div$ ]	⑨	⑨	⑨	⑨	9.1,2,4	⑨	⑨	⑨	⑨	9.6									
	10. [Rates / Ratios]	⑩	⑩	⑩	⑩	10.16	⑩	⑩	⑩	⑩	10.17									
	11. [Indices]	⑪	⑪	⑪	⑪	11.9	⑪	⑪	⑪	⑪	11.10									
	12. [Square Roots]	⑫	⑫	⑫	⑫	12.7	⑫	⑫	⑫	⑫	12.8									
	13. [Exploring Number]	⑬	⑬	⑬	⑬	13.10	⑬	⑬	⑬	⑬	13.11									
	14. [Financial Mathematics]	⑭	⑭	⑭	⑭	14.9	⑭	⑭	⑭	⑭	14.10									
	15. [Number Patterns]	⑮	⑮	⑮	⑮	15.8	⑮	⑮	⑮	⑮	15.9									
<b>ALGEBRA</b>	16. [Expressions]	⑯	⑯	⑯	⑯	16.4	⑯	⑯	⑯	⑯	16.5,6									
	17. [Substitution]	⑰	⑰	⑰	⑰	17.9	⑰	⑰	⑰	⑰	17.5,6									
	18. [Expansion]	⑱	⑱	⑱	⑱	18.7	⑱	⑱	⑱	⑱	18.8,9									
	19. [Factorisation]	⑲	⑲	⑲	⑲	19.7	⑲	⑲	⑲	⑲	19.9									
	20. [Equations]	⑳	⑳	⑳	⑳	20.9	⑳	⑳	⑳	⑳	20.10									
	21. [Coordinate Geometry]	㉑	㉑	㉑	㉑	21.16	㉑	㉑	㉑	㉑	21.17									
<b>MEASUREMENT</b>	22. [Units of Measurement / Time]	㉒	㉒	㉒	㉒	22.9	㉒	㉒	㉒	㉒	22.10									
	23. [Perimeter / Area]	㉓	㉓	㉓	㉓	23.4	㉓	㉓	㉓	㉓	23.10,12									
	24. [Surface Area]	㉔	㉔	㉔	㉔	24.6,8	㉔	㉔	㉔	㉔	24.9									
	25. [Volume]	㉕	㉕	㉕	㉕	25.6,7	㉕	㉕	㉕	㉕	25.8									
	26. [Pythagoras / Trigonometry]	㉖	㉖	㉖	㉖	26.10	㉖	㉖	㉖	㉖	26.11									
<b>SPACE</b>	27. [Angles]	㉗	㉗	㉗	㉗	27.9	㉗	㉗	㉗	㉗	27.9									
	28. [Geometric Reasoning]	㉘	㉘	㉘	㉘	28.14	㉘	㉘	㉘	㉘	28.15									
<b>STAT.</b>	29. [Statistics]	㉙	㉙	㉙	㉙	29.14	㉙	㉙	㉙	㉙	29.17									
<b>PROB.</b>	30. [Probability]	㉚	㉚	㉚	㉚	30.9,10	㉚	㉚	㉚	㉚	30.11,12									
<b>PROBLEM SOLVING</b>	31. [Problem Solving 1]	㉛	㉛	㉛	㉛	Hints & Solutions	㉛	㉛	㉛	㉛	Hints & Solutions									
	32. [Problem Solving 2]	㉜	㉜	㉜	㉜	Hints & Solutions	㉜	㉜	㉜	㉜	Hints & Solutions									
<b>Total Correct</b>											○	○	○	○	○	○	○	○	○	○

# MATHS MATE



Name: .....

Class: .....

Teacher: .....

## Test Results

		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7	Test 8
NUMBER	1. [Long $\times, \div$ ]	①	①	①	①	①	①	①	①
	2. [Decimal $+, -$ ]	②	②	②	②	②	②	②	②
	3. [Decimal $\times, \div$ ]	③	③	③	③	③	③	③	③
	4. [Fraction $+, -$ ]	④	④	④	④	④	④	④	④
	5. [Fraction $\times, \div$ ]	⑤	⑤	⑤	⑤	⑤	⑤	⑤	⑤
	6. [Percentages]	⑥	⑥	⑥	⑥	⑥	⑥	⑥	⑥
	7. [Decimals / Fractions / Percentages]	⑦	⑦	⑦	⑦	⑦	⑦	⑦	⑦
	8. [Integer $+, -$ ]	⑧	⑧	⑧	⑧	⑧	⑧	⑧	⑧
	9. [Integer $\times, \div$ ]	⑨	⑨	⑨	⑨	⑨	⑨	⑨	⑨
	10. [Rates / Ratios]	⑩	⑩	⑩	⑩	⑩	⑩	⑩	⑩
	11. [Indices]	⑪	⑪	⑪	⑪	⑪	⑪	⑪	⑪
	12. [Square Roots]	⑫	⑫	⑫	⑫	⑫	⑫	⑫	⑫
	13. [Exploring Number]	⑬	⑬	⑬	⑬	⑬	⑬	⑬	⑬
	14. [Financial Mathematics]	⑭	⑭	⑭	⑭	⑭	⑭	⑭	⑭
	15. [Number Patterns]	⑮	⑮	⑮	⑮	⑮	⑮	⑮	⑮
ALGEBRA	16. [Expressions]	⑯	⑯	⑯	⑯	⑯	⑯	⑯	⑯
	17. [Substitution]	⑰	⑰	⑰	⑰	⑰	⑰	⑰	⑰
	18. [Expansion]	⑱	⑱	⑱	⑱	⑱	⑱	⑱	⑱
	19. [Factorisation]	⑲	⑲	⑲	⑲	⑲	⑲	⑲	⑲
	20. [Equations]	⑳	⑳	⑳	⑳	⑳	⑳	⑳	⑳
	21. [Coordinate Geometry]	㉑	㉑	㉑	㉑	㉑	㉑	㉑	㉑
MEASUREMENT	22. [Units of Measurement / Time]	㉒	㉒	㉒	㉒	㉒	㉒	㉒	㉒
	23. [Perimeter / Area]	㉓	㉓	㉓	㉓	㉓	㉓	㉓	㉓
	24. [Surface Area]	㉔	㉔	㉔	㉔	㉔	㉔	㉔	㉔
	25. [Volume]	㉕	㉕	㉕	㉕	㉕	㉕	㉕	㉕
	26. [Pythagoras / Trigonometry]	㉖	㉖	㉖	㉖	㉖	㉖	㉖	㉖
SPACE	27. [Angles]	㉗	㉗	㉗	㉗	㉗	㉗	㉗	㉗
	28. [Geometric Reasoning]	㉘	㉘	㉘	㉘	㉘	㉘	㉘	㉘
STAT.	29. [Statistics]	㉙	㉙	㉙	㉙	㉙	㉙	㉙	㉙
PROB.	30. [Probability]	㉚	㉚	㉚	㉚	㉚	㉚	㉚	㉚
PROBLEM SOLVING	31. [Problem Solving 1]	㉛	㉛	㉛	㉛	㉛	㉛	㉛	㉛
	32. [Problem Solving 2]	㉜	㉜	㉜	㉜	㉜	㉜	㉜	㉜
<b>Total Correct</b>		○	○	○	○	○	○	○	○





**Class:** .....

**Teacher:** .....

Worksheet Number	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
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✓ - Signed by parent      L - Work handed in late      x - Not signed by parent



**Class:** .....

**Teacher:** .....

	Worksheet Number	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8
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✓ - Signed by parent

L - Work handed in late

✗ - Not signed by parent



Class: .....

Teacher: .....

Worksheet Number	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8
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✓ - Signed by parent      L - Work handed in late      x - Not signed by parent



**Class:** .....

**Teacher:** .....

	Worksheet Number	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8
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✓ - Signed by parent

L - Work handed in late

✗ - Not signed by parent