second edition

MATHS MATE

trial pack

Includes:

How to use Maths Mate

Record keeping sheet: Term 1

Worksheet masters: Term 1, Sheets 1 to 4

Test masters: 1A & 1B

Worksheet answers: Term 1, Sheets 1 to 4

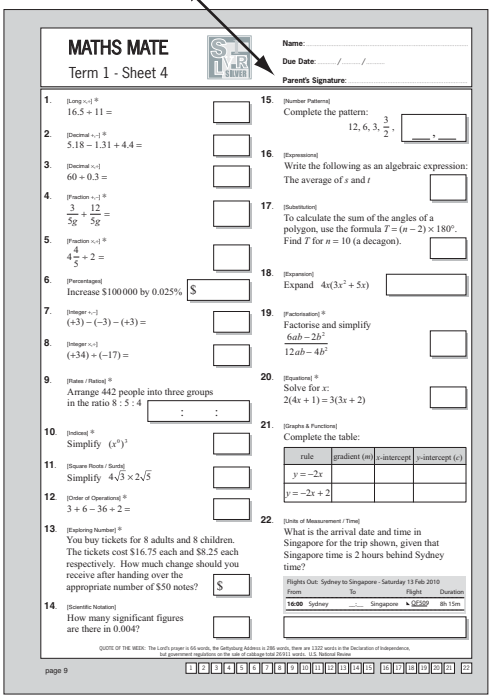
Test answers: 1A & 1B

Problem Solving Hints & Solutions

J. B. Wright & I. Tutos

HOW TO USE MATHS MATE

1. Students complete the **Maths Mate sheet.** Parents sign the work.



MATHS MATE

Term 1 - Sheet 4

Name: .....

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

Parent's Signature: .....

1. [Long ×,÷] * 16.5 + 11 =
2. [Decimal +,−] * 5.18 − 1.31 + 4.4 =
3. [Decimal ×,÷] 60 ÷ 0.3 =
4. [Fraction +,−] * $\frac{3}{5g} + \frac{12}{5g} =$
5. [Fraction ×,÷] * $4\frac{4}{5} \div 2 =$
6. [Percentages] Increase $100 000 by 0.025% $
7. [Integer +,−] (+3) − (−3) − (+3) =
8. [Integer ×,÷] (+34) ÷ (−17) =
9. [Rates / Ratios] * Arrange 442 people into three groups in the ratio 8 : 5 : 4 : :
10. [Indices] * Simplify $(x^a)^3$
11. [Square Roots / Surds] Simplify $4\sqrt{3} \times 2\sqrt{5}$
12. [Order of Operations] * $3 + 6 - 36 \div 2 =$
13. [Exploring Number] * You buy tickets for 8 adults and 8 children. The tickets cost $16.75 each and $8.25 each respectively. How much change should you receive after handing over the appropriate number of $50 notes? $
14. [Scientific Notation] How many significant figures are there in 0.004?
15. [Number Patterns] Complete the pattern: 12, 6, 3, $\frac{3}{2}$, ___, ___
16. [Expressions] Write the following as an algebraic expression: The average of s and t
17. [Substitution] To calculate the sum of the angles of a polygon, use the formula $T = (n-2) \times 180°$. Find T for $n = 10$ (a decagon).
18. [Expansion] Expand $4x(3x^2 + 5x)$
19. [Factorisation] * Factorise and simplify $\frac{6ab - 2b^2}{12ab - 4b^2}$
20. [Equations] * Solve for x: $2(4x + 1) = 3(3x + 2)$
21. [Graphs & Functions] Complete the table:

rule	gradient (m)	x-intercept	y-intercept (c)
$y = -2x$			
$y = -2x + 2$			

22. [Units of Measurement / Time] What is the arrival date and time in Singapore for the trip shown, given that Singapore time is 2 hours behind Sydney time?

Flights Out: Sydney to Singapore - Saturday 13 Feb 2010

From	To	Flight	Duration
16:00 Sydney	Singapore	QF329	8h 15m

QUOTE OF THE WEEK: The Lord's prayer is 66 words, the Gettysburg Address is 286 words, there are 1322 words in the Declaration of Independence, but government regulations on the sale of cabbage total 26'911 words. U.S. National Review

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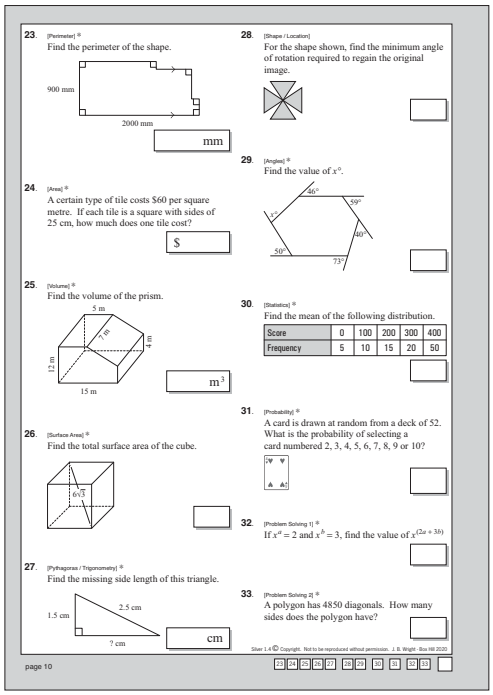

23. [Perimeter] * Find the perimeter of the shape.

900 mm, 2000 mm

mm

24. [Area] * A certain type of tile costs $60 per square metre. If each tile is a square with sides of 25 cm, how much does one tile cost?

$

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

5 m, 12 m, 15 m, $x°$

m^3

26. [Surface Area] * Find the total surface area of the cube.

$6\sqrt{3}$

27. [Pythagoras / Trigonometry] * Find the missing side length of this triangle.

1.5 cm, 2.5 cm, ? cm

cm

28. [Shape / Location] For the shape shown, find the minimum angle of rotation required to regain the original image.

29. [Angles] * Find the value of $x°$.

46°, 59°, $x°$, 40°, 50°, 73°

30. [Statistics] * Find the mean of the following distribution.

Score	0	100	200	300	400
Frequency	5	10	15	20	50

31. [Probability] * A card is drawn at random from a deck of 52. What is the probability of selecting a card numbered 2, 3, 4, 5, 6, 7, 8, 9 or 10?

32. [Problem Solving 1] * If $x^a = 2$ and $x^b = 3$, find the value of $x^{(2a+3b)}$

33. [Problem Solving 2] * A polygon has 4850 diagonals. How many sides does the polygon have?

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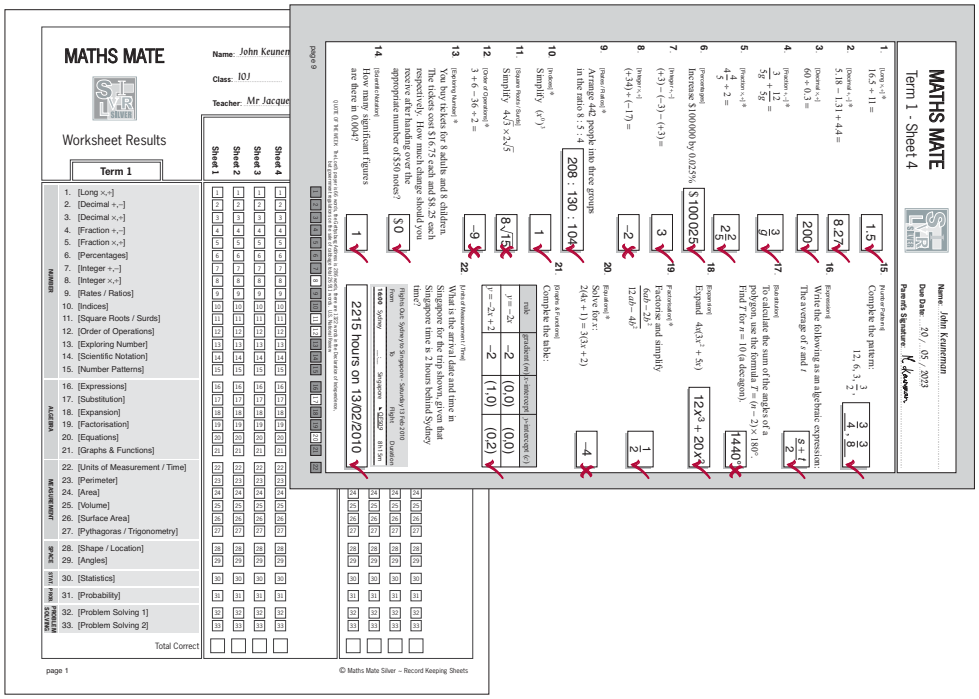
2. Students correct their work in class. Students colour the boxes at the bottom of the worksheets to record their correct answers.

3. The student **record keeping sheets** are completed. Students can transfer their results directly from the worksheet to the results sheet.



MATHS MATE

Worksheet Results

Name: John Keunen

Class: 10J

Teacher: Mr Jacque

Term 1

		Sheet 1	Sheet 2	Sheet 3	Sheet 4
NUMBER	1. [Long ×,÷]	1	1	1	1
	2. [Decimal +,−]	2	2	2	2
	3. [Decimal ×,÷]	3	3	3	3
	4. [Fraction +,−]	4	4	4	4
	5. [Fraction ×,÷]	5	5	5	5
	6. [Percentages]	6	6	6	6
	7. [Integer +,−]	7	7	7	7
	8. [Integer ×,÷]	8	8	8	8
	9. [Rates / Ratios]	9	9	9	9
	10. [Indices]	10	10	10	10
	11. [Square Roots / Surds]	11	11	11	11
	12. [Order of Operations]	12	12	12	12
	13. [Exploring Number]	13	13	13	13
	14. [Scientific Notation]	14	14	14	14
	15. [Number Patterns]	15	15	15	15
ALGEBRA	16. [Expressions]	16	16	16	16
	17. [Substitution]	17	17	17	17
	18. [Expansion]	18	18	18	18
	19. [Factorisation]	19	19	19	19
	20. [Equations]	20	20	20	20
	21. [Graphs & Functions]	21	21	21	21
MEASUREMENT	22. [Units of Measurement / Time]	22	22	22	22
	23. [Perimeter]	23	23	23	23
	24. [Area]	24	24	24	24
	25. [Volume]	25	25	25	25
	26. [Surface Area]	26	26	26	26
	27. [Pythagoras / Trigonometry]	27	27	27	27
SPACE	28. [Shape / Location]	28	28	28	28
	29. [Angles]	29	29	29	29
STAT	30. [Statistics]	30	30	30	30
PROB	31. [Probability]	31	31	31	31
PROBLEM SOLVING	32. [Problem Solving 1]	32	32	32	32
	33. [Problem Solving 2]	33	33	33	33
	Total Correct				

page 1

© Maths Mate Silver – Record Keeping Sheets

MATHS MATE

Term 1 - Sheet 4

Name: John Keunen

Due Date: 20 / 05 / 2023

Parent's Signature: M. Keunen

1. [Long ×,÷] * 16.5 + 11 = 1.5
2. [Decimal +,−] * 5.18 − 1.31 + 4.4 = 8.27
3. [Decimal ×,÷] 60 ÷ 0.3 = 200
4. [Fraction +,−] * $\frac{3}{5g} + \frac{12}{5g} =$ $\frac{3}{g}$
5. [Fraction ×,÷] * $4\frac{4}{5} \div 2 =$ $2\frac{2}{5}$
6. [Percentages] Increase $100 000 by 0.025% $100 025
7. [Integer +,−] (+3) − (−3) − (+3) = 3
8. [Integer ×,÷] (+34) ÷ (−17) = −2
9. [Rates / Ratios] * Arrange 442 people into three groups in the ratio 8 : 5 : 4 : 208 : 130 : 104
10. [Indices] * Simplify $(x^a)^3$ x^{3a}
11. [Square Roots / Surds] Simplify $4\sqrt{3} \times 2\sqrt{5}$ $8\sqrt{15}$
12. [Order of Operations] * $3 + 6 - 36 \div 2 =$ −9
13. [Exploring Number] * You buy tickets for 8 adults and 8 children. The tickets cost $16.75 each and $8.25 each respectively. How much change should you receive after handing over the appropriate number of $50 notes? $0
14. [Scientific Notation] How many significant figures are there in 0.004? 1
15. [Number Patterns] Complete the pattern: 12, 6, 3, $\frac{3}{2}$, ___, ___ $\frac{3}{4}, \frac{3}{8}$
16. [Expressions] Write the following as an algebraic expression: The average of s and t $\frac{s+t}{2}$
17. [Substitution] To calculate the sum of the angles of a polygon, use the formula $T = (n-2) \times 180°$. Find T for $n = 10$ (a decagon). 1440°
18. [Expansion] Expand $4x(3x^2 + 5x)$ $12x^3 + 20x^2$
19. [Factorisation] * Factorise and simplify $\frac{6ab - 2b^2}{12ab - 4b^2}$ $\frac{1}{2}$
20. [Equations] * Solve for x: $2(4x + 1) = 3(3x + 2)$ −4
21. [Graphs & Functions] Complete the table:

rule	gradient (m)	x-intercept	y-intercept (c)
$y = -2x$	−2	(0,0)	(0,0)
$y = -2x + 2$	−2	(1,0)	(0,2)

22. [Units of Measurement / Time] What is the arrival date and time in Singapore for the trip shown, given that Singapore time is 2 hours behind Sydney time? 2215 hours on 13/02/2010

Flights Out: Sydney to Singapore - Saturday 13 Feb 2010

From	To	Flight	Duration
1600 Sydney	Singapore	QF329	8h 15m

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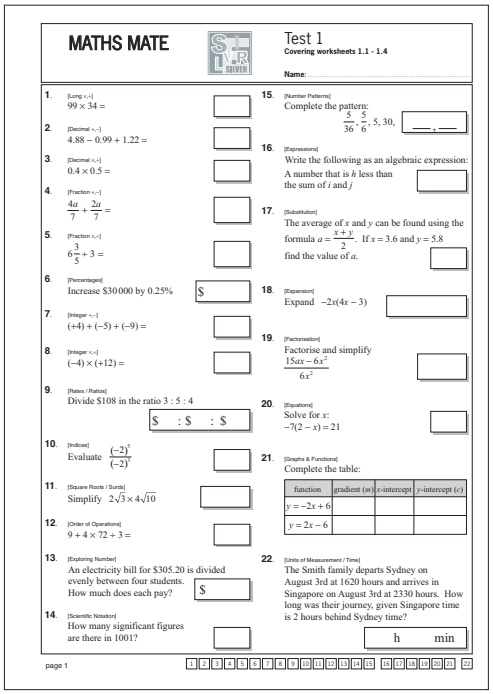
4. **Testing** is available after every 4 Maths Mate sheets.



MATHS MATE

Test 1

Covering worksheets 1.1 - 1.4

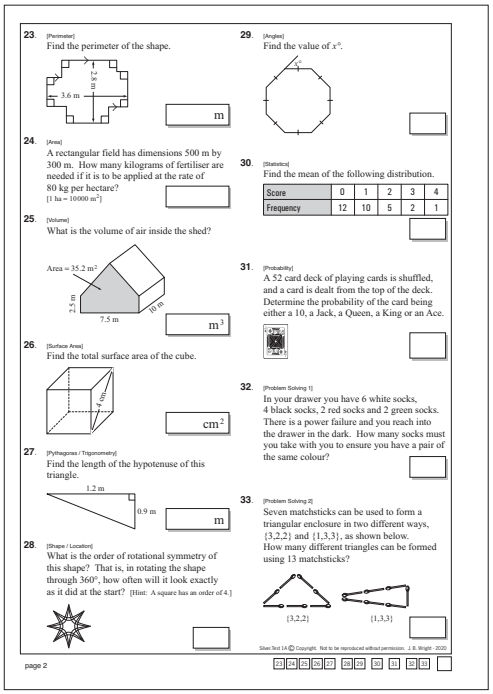
Name:

1. [Long ×,÷] $99 \times 34 =$
2. [Decimal +,−] $4.88 - 0.99 + 1.22 =$
3. [Decimal ×,÷] $0.4 \times 0.5 =$
4. [Fraction ×,÷] $\frac{4x}{7} + \frac{2x}{7} =$
5. [Fraction ×,÷] $6\frac{3}{5} + 3 =$
6. [Percentages] Increase \$30 000 by 0.25%
7. [Integer +,−] $(+4) + (-5) + (-9) =$
8. [Integer ×,÷] $(-4) \times (+12) =$
9. [Rates / Ratios] Divide \$108 in the ratio 3 : 5 : 4
10. [Indices] Evaluate $\frac{(-2)^5}{(-2)^3}$
11. [Square Roots / Surds] Simplify $2\sqrt{3} \times 4\sqrt{10}$
12. [Order of Operations] $9 + 4 \times 72 + 3 =$
13. [Exploring Number] An electricity bill for \$305.20 is divided evenly between four students. How much does each pay?
14. [Scientific Notation] How many significant figures are there in 1001?
15. [Number Patterns] Complete the pattern: $\frac{5}{36}, \frac{5}{6}, 5, 30, ___, ___$
16. [Expressions] Write the following as an algebraic expression: A number that is h less than the sum of t and j
17. [Substitution] The average of x and y can be found using the formula $a = \frac{x+y}{2}$. If $x = 3.6$ and $y = 5.8$ find the value of a.
18. [Expansion] Expand $-2x(4x - 3)$
19. [Factorisation] Factorise and simplify $\frac{15ax - 6x^2}{6x^2}$
20. [Equations] Solve for x: $-7(2 - x) = 21$
21. [Graphs & Functions] Complete the table:

function	gradient (m)	x-intercept	y-intercept (c)
$y = -2x + 6$			
$y = 2x - 6$			

22. [Units of Measurement / Time] The Smith family departs Sydney on August 3rd at 1620 hours and arrives in Singapore on August 3rd at 2330 hours. How long was their journey, given Singapore time is 2 hours behind Sydney time?

page 1



23. [Perimeter] Find the perimeter of the shape.
24. [Area] A rectangular field has dimensions 500 m by 300 m. How many kilograms of fertiliser are needed if it is to be applied at the rate of 80 kg per hectare? [1 ha = 10000 m²]
25. [Volume] What is the volume of air inside the shed?
26. [Surface Area] Find the total surface area of the cube.
27. [Pythagoras / Trigonometry] Find the length of the hypotenuse of this triangle.
28. [Shape / Location] What is the order of rotational symmetry of this shape? That is, in rotating the shape through 360°, how often will it look exactly as it did at the start? [Hint: A square has an order of 4.]
29. [Angles] Find the value of $x°$.
30. [Statistics] Find the mean of the following distribution.

Score	0	1	2	3	4
Frequency	12	10	5	2	1

31. [Probability] A 52 card deck of playing cards is shuffled, and a card is dealt from the top of the deck. Determine the probability of the card being either a 10, a Jack, a Queen, a King or an Ace.
32. [Problem Solving 1] In your drawer you have 6 white socks, 4 black socks, 2 red socks and 2 green socks. There is a power failure and you reach into the drawer in the dark. How many socks must you take with you to ensure you have a pair of the same colour?
33. [Problem Solving 2] 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 13 matchsticks?

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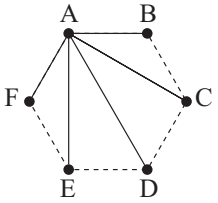
5. If a student is having difficulty with their problem solving strategies, then the **Problem Solving Hints & Solutions** can be used by teachers to develop students' problem solving skills.

1.4 **33**. **Hint:** ***Diagonals of a hexagon (n = 6):***

In a hexagon we can draw 5 lines from A to each of B, C, D, E and F. Two of these lines (AB and AF) are sides of the hexagon, so diagonals from A = 5 − 2 = 3. In total we have 6 × 3 = 18 diagonals. But lines from A to C and C to A are the same so we have exactly half of 18 different diagonals, which is 9.

Use this to find the general formula for the number of diagonals of a polygon with n sides.



Solution:

For any polygon with n sides (vertices) we can draw $n - 1$ lines from each corner (vertex) to the others. Two of these lines are sides of the polygon. So we are left with $(n - 1) - 2 = n - 3$ diagonals from each vertex.

That leads to a total of $n(n - 3)$ diagonals. As with the hint, lines double up so we have exactly half of $n(n - 3)$ different diagonals.

Therefore the formula for the number of diagonals of a polygon with n sides is $\frac{n(n-3)}{2}$

Using algebra, write the quadratic equation:

$$\frac{n(n-3)}{2} = 4850$$ expand to rearrange the equation to polynomial form

$$n^2 - 3n - 9700 = 0$$ factorise

$$(n - 100)(n + 97) = 0$$ use the null factor law

The only positive solution is $n = 100$.

There are **100** sides in the polygon with 4850 diagonals.

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MATHS MATE

Worksheet Results

Term 1

Name: .....

Class: .....

Teacher: .....

		Sheet 1	Sheet 2	Sheet 3	Sheet 4	Sheet 5	Sheet 6	Sheet 7	Sheet 8
NUMBER	1. [Long ×,÷]	1	1	1	1	1	1	1	1
	2. [Decimal +,–]	2	2	2	2	2	2	2	2
	3. [Decimal ×,÷]	3	3	3	3	3	3	3	3
	4. [Fraction +,–]	4	4	4	4	4	4	4	4
	5. [Fraction ×,÷]	5	5	5	5	5	5	5	5
	6. [Percentages]	6	6	6	6	6	6	6	6
	7. [Integer +,–]	7	7	7	7	7	7	7	7
	8. [Integer ×,÷]	8	8	8	8	8	8	8	8
	9. [Rates / Ratios]	9	9	9	9	9	9	9	9
	10. [Indices]	10	10	10	10	10	10	10	10
	11. [Square Roots / Surds]	11	11	11	11	11	11	11	11
	12. [Order of Operations]	12	12	12	12	12	12	12	12
	13. [Exploring Number]	13	13	13	13	13	13	13	13
	14. [Scientific Notation]	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. [Graphs & Functions]	21	21	21	21	21	21	21	21
MEASUREMENT	22. [Units of Measurement / Time]	22	22	22	22	22	22	22	22
	23. [Perimeter]	23	23	23	23	23	23	23	23
	24. [Area]	24	24	24	24	24	24	24	24
	25. [Volume]	25	25	25	25	25	25	25	25
	26. [Surface Area]	26	26	26	26	26	26	26	26
	27. [Pythagoras / Trigonometry]	27	27	27	27	27	27	27	27
SPACE	28. [Shape / Location]	28	28	28	28	28	28	28	28
	29. [Angles]	29	29	29	29	29	29	29	29
STAT.	30. [Statistics]	30	30	30	30	30	30	30	30
PROB.	31. [Probability]	31	31	31	31	31	31	31	31
PROBLEM SOLVING	32. [Problem Solving 1]	32	32	32	32	32	32	32	32
	33. [Problem Solving 2]	33	33	33	33	33	33	33	33
	Total Correct								

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MATHS MATE

Term 1 - Sheet 1

SILVER

Name: .....

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

Parent's Signature: .....

1. [Long ×,÷] *

$304 \times 14 =$

2. [Decimal +,–] *

$4.8 - 0.95 + 0.18 =$

3. [Decimal ×,÷]

$0.2 \times 0.3 =$

4. [Fraction +,–]

$\frac{x}{5} + \frac{2x}{5} =$

5. [Fraction ×,÷] *

$2 \times 3\frac{1}{3} =$

6. [Percentages] *

Increase \$6 by 2.5%

\$

7. [Integer +,–]

$(+6) - (+8) + (-2) =$

8. [Integer ×,÷]

$(-5) \times (+12) =$

9. [Rates / Ratios] *

Share 475 pens in the ratio 10 : 7 : 8

: :

10. [Indices] *

Evaluate $\left(\frac{2}{3}\right)^{-2}$

11. [Square Roots / Surds]

Simplify $4\sqrt{7} \times 3\sqrt{2}$

12. [Order of Operations] *

$13 - 5 \times 3 =$

13. [Exploring Number] *

You buy 5 CDs at \$28.90 each and pay using the appropriate number of \$20 notes. How much change should you receive?

\$

14. [Scientific Notation]

How many significant figures are there in 205?

15. [Number Patterns]

Complete the pattern:

$\frac{10}{9}, \frac{10}{3}, 10, 30,$ ____ , ____

16. [Expressions]

Write the following as an algebraic expression:

The sum of p, q and w

17. [Substitution] *

The formula of the area of a triangle is $A = \frac{bh}{2}$. Find A when $b = 15$ and $h = 3$

18. [Expansion]

Expand $2xy(2x - y)$

19. [Factorisation] *

Factorise and simplify

$\frac{3xy - 6y}{3xy}$

20. [Equations] *

Solve for x:

$-3(4 - x) = 6$

21. [Graphs & Functions]

Complete the table:

rule	gradient (m)	x-intercept	y-intercept (c)
$y = 3x$			
$y = 3x - 6$			

22. [Units of Measurement / Time]

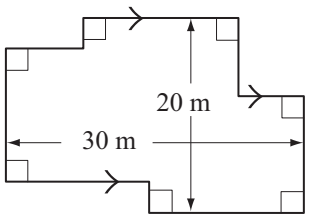
The Wills family departs Melbourne on March 27th at 1300 hours and arrives in London on March 28th at 0555 hours. How long was their journey, given London time is 10 hours behind Melbourne time?

h min

QUOTE OF THE WEEK: I went into McDonalds yesterday and said, "I'd like some fries." The girl at the counter said, "Would you like some fries with that?"

23. [Perimeter] *

Find the perimeter of the shape.



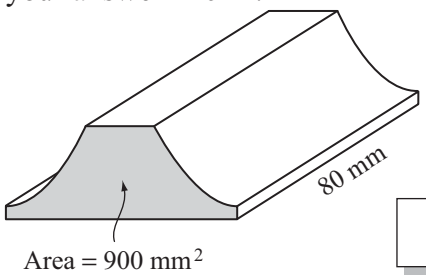
m

24. [Area] *

A rectangular field has dimensions 500 metres by 300 metres. How many kilograms of fertiliser are needed for this field if it is to be applied at the rate of 60 kilograms per hectare? [1 ha = 10 000 m^2]

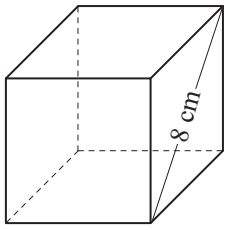
25. [Volume] *

Find the volume of the solid and express your answer in cm^3.



26. [Surface Area] *

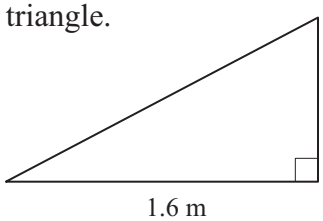
Find the total surface area of the cube.



cm^2

27. [Pythagoras / Trigonometry] *

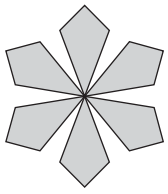
Find the length of the hypotenuse of this triangle.



m

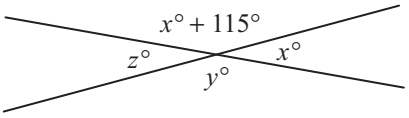
28. [Shape / Location]

What is the order of rotational symmetry of this shape? That is, in rotating the shape through 360°, how often will it look exactly as it did at the start? [Hint: A square has an order of 4.]



29. [Angles] *

Find the values of $x°$, $y°$ and $z°$.



$x° =$ $y° =$ $z° =$

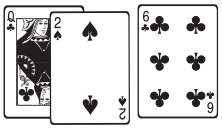
30. [Statistics] *

Find the mean of the following distribution.

Score	70	71	72	73	74
Frequency	1	4	10	4	1

31. [Probability] *

A 52 card deck of playing cards is shuffled, and three cards are dealt from the top of the deck. The first two cards are both black. Determine the probability of the third card also being black.



32. [Problem Solving 1] *

In your drawer you have 6 white socks, 4 black socks, 8 red socks, 4 yellow socks and 2 green socks. There is a power failure and you reach into the drawer in the dark. How many socks must you take with you to ensure you have a pair of the same colour?

33. [Problem Solving 2] *

Solve for x:

$(x+1)+(x+2)+(x+3)+...+(x+100)=15\,050$

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MATHS MATE

Term 1 - Sheet 2

SILVER

Name: .....

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

Parent's Signature: .....

1. [Long ×,÷] *

$134 \times 34 =$

2. [Decimal +,–] *

$3.11 - 0.33 + 0.77 =$

3. [Decimal ×,÷]

$9 \div 0.03 =$

4. [Fraction +,–]

$\frac{4y}{7} - \frac{y}{7} =$

5. [Fraction ×,÷] *

$2\frac{6}{7} \div 2 =$

6. [Percentages] *

Reduce \$400 by 0.75%

\$

7. [Integer +,–]

$(-1) - (+7) + (-8) =$

8. [Integer ×,÷]

$(+2) \times (-25) =$

9. [Rates / Ratios] *

Arrange 756 people into three groups in the ratio 8 : 6 : 7

: :

10. [Indices] *

Evaluate $\left(\frac{1}{4}\right)^{-3}$

11. [Square Roots / Surds]

Simplify $\frac{6\sqrt{6}}{2\sqrt{3}}$

12. [Order of Operations] *

$(2 - 8) \times 8 - 19 =$

13. [Exploring Number]

A phone bill of \$241.50 is divided equally between three students. How much does each student pay?

\$

14. [Scientific Notation]

How many significant figures are there in 0.0120?

15. [Number Patterns]

Complete the pattern:

$9, 3, 1, \frac{1}{3}$, ____ , ____

16. [Expressions]

Write the following as an algebraic expression:

A number that is k less than the sum of m and n

17. [Substitution] *

Interest is calculated using the formula $I = \frac{PRT}{100}$. Find I when $P = 3000$, $R = 6.5$ and $T = 2$

18. [Expansion]

Expand $5x(2xy - 3y)$

19. [Factorisation] *

Factorise and simplify

$\frac{8x^2 - 6x}{12x - 9}$

20. [Equations] *

Solve for x:

$3(x - 1) = 2(x + 4)$

21. [Graphs & Functions]

Complete the table:

rule	gradient (m)	x-intercept	y-intercept (c)
$y = -5x$			
$y = 5x$			

22. [Units of Measurement / Time]

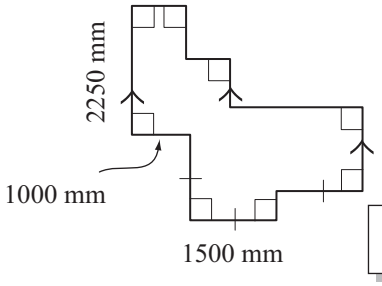
The Ming family departs London on April 19th at 2200 hours and arrives in Singapore on April 20th at 1715 hours. How long was their journey, given London time is 8 hours behind Singapore time?

h min

QUOTE OF THE WEEK: Everyone is kneaded out of the same bread but not baked in the same oven. Yiddish proverb

23. [Perimeter] *

Find the perimeter of the shape.



mm

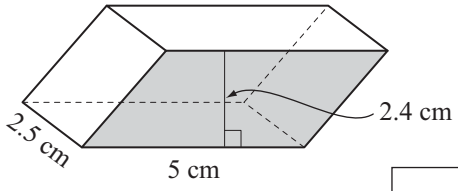
24. [Area] *

A rectangular swimming pool 15 m by 8 m has a 1 m wide concrete path around it. What is the area of the path?

m^2

25. [Volume] *

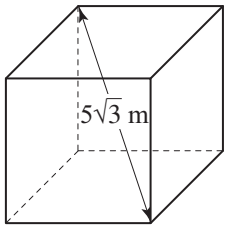
Find the volume of the prism.



cm^3

26. [Surface Area] *

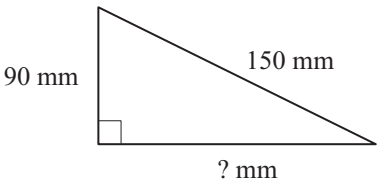
Find the total surface area of the cube.



m^2

27. [Pythagoras / Trigonometry] *

Find the missing side length of this triangle.



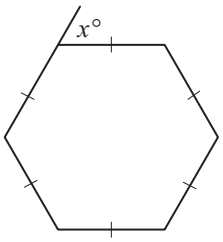
mm

28. [Shape / Location]

For the shape shown, find the minimum angle of rotation required to regain the original image.

29. [Angles] *

Find the value of $x°$.



30. [Statistics] *

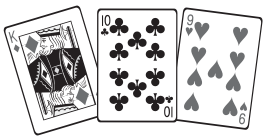
Find the mean of the following distribution.

Score	0	1	2	3	4
Frequency	10	8	6	4	2

31. [Probability] *

Three cards are drawn at random from a deck of 52. The probability of them all being red is: $\frac{26}{52}\times\frac{25}{51}\times\frac{24}{50}=\frac{2}{17}$

What is the probability that at least one card is black?



32. [Problem Solving 1] *

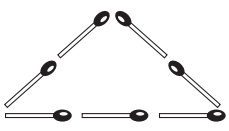
To the nearest whole second, what is one millionth of a year?

s

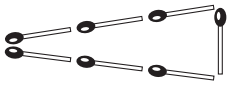
33. [Problem Solving 2] *

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 11 matchsticks?



{3,2,2}



{1,3,3}

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MATHS MATE

Term 1 - Sheet 3

SILVER

Name: .....

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

Parent's Signature: .....

1. [Long ×,÷] *

$62 \times 26 =$

2. [Decimal +,–] *

$2.41 - 0.72 + 1.43 =$

3. [Decimal ×,÷]

$0.04 \times 0.7 =$

4. [Fraction +,–] *

$\frac{5}{2f} + \frac{1}{2f} =$

5. [Fraction ×,÷] *

$9\frac{3}{5} \div 3 =$

6. [Percentages] *

Reduce \$1000 by 0.15%

\$

7. [Integer +,–]

$(+9) + (-1) + (-2) =$

8. [Integer ×,÷]

$(-16) \div (-2) =$

9. [Rates / Ratios] *

Divide \$216 in the ratio 3 : 4 : 5

\$: \$: \$

10. [Indices] *

Evaluate $\frac{(-2)^8}{(-2)^6}$

11. [Square Roots / Surds]

Simplify $\frac{8\sqrt{12}}{6\sqrt{4}}$

12. [Order of Operations] *

$12 + 10 - 8 \times 4 =$

13. [Exploring Number]

Six kitchen chairs cost \$592.50. What is the cost per chair?

\$

14. [Scientific Notation]

How many significant figures are there in 63 000?

15. [Number Patterns]

Complete the pattern:

$\frac{3}{16}, \frac{3}{4}, 3, 12,$ ___ , ___

16. [Expressions]

Write the following as an algebraic expression:

Fifteen lots of g

17. [Substitution] *

The volume of a cube is found by using the formula $V = l^3$. Find V when $l = 0.4$ m.

m^3

18. [Expansion]

Expand

$5x(x^2 - 3x + 2)$

19. [Factorisation] *

Factorise and simplify

$\frac{6x^2 + 15x}{6x^2}$

20. [Equations] *

Solve for x:

$5(x + 1) = -20$

21. [Graphs & Functions]

Complete the table:

rule	gradient (m)	x-intercept	y-intercept (c)
$y = \frac{1}{2}x + 2$			
$y = \frac{1}{2}x + 3$			

22. [Units of Measurement / Time]

What is the arrival date and time in New York for the trip shown, given that New York time is 15 hours behind Melbourne time?

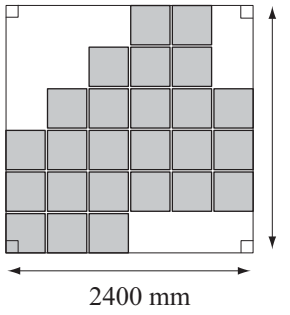
Flights Out: Melbourne to New York - Saturday 06 Feb 2010

From		To		Flight	Duration
15:30	Melbourne	__:__	New York	QF508	21h 40m

QUOTE OF THE WEEK: It is better in prayer to have a heart without words than words without a heart. Mahatma Gandhi

23. [Perimeter] *

Find the perimeter of the shaded paved area.



mm

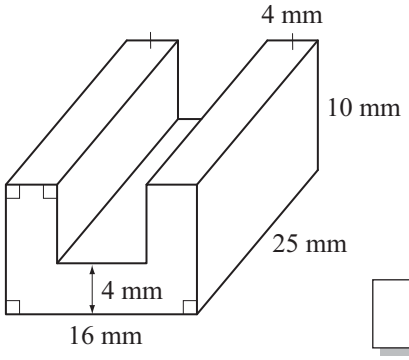
24. [Area] *

A rare type of coloured glass costs $600 per square metre. How much would a rectangular piece 20 cm by 25 cm cost?

$

25. [Volume] *

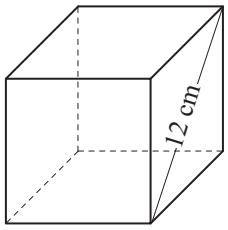
Find the volume of the solid.



mm^3

26. [Surface Area] *

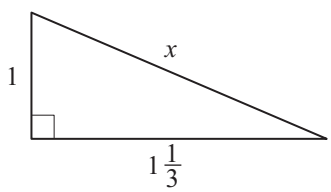
Find the total surface area of the cube.



cm^2

27. [Pythagoras / Trigonometry] *

Find the value of x.

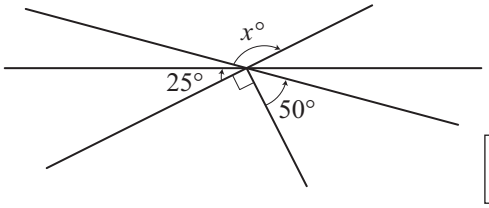


28. [Shape / Location]

What is the order of rotational symmetry of this shape? That is, in rotating the shape through 360°, how often will it look exactly as it did at the start? [Hint: A square has an order of 4.]

29. [Angles] *

Find the value of $x°$.



30. [Statistics] *

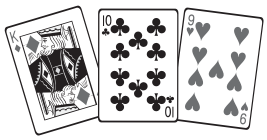
Find the mean of the following distribution.

Score	5	10	15	20	25	30
Frequency	7	5	4	2	1	1

31. [Probability] *

Two cards are drawn at random from a deck of 52. The probability that neither card is a heart is: $\frac{39}{52} \times \frac{38}{51} = \frac{19}{34}$

What is the probability that at least one card is a heart?



32. [Problem Solving 1] *

What two-digit whole number is twice the product of its digits?

33. [Problem Solving 2] *

If a and b are positive integers and $a + b + a \times b = 39$, what are the three possible values of $a + b$?

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MATHS MATE

Term 1 - Sheet 4

SILVER

Name: .....

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

Parent's Signature: .....

1. [Long ×,÷] *

$16.5 \div 11 =$

2. [Decimal +,–] *

$5.18 - 1.31 + 4.4 =$

3. [Decimal ×,÷]

$60 \div 0.3 =$

4. [Fraction +,–] *

$\frac{3}{5g} + \frac{12}{5g} =$

5. [Fraction ×,÷] *

$4\frac{4}{5} \div 2 =$

6. [Percentages]

Increase \$100 000 by 0.025% \$

7. [Integer +,–]

$(+3) - (-3) - (+3) =$

8. [Integer ×,÷]

$(+34) \div (-17) =$

9. [Rates / Ratios] *

Arrange 442 people into three groups in the ratio 8 : 5 : 4 : :

10. [Indices] *

Simplify $(x^0)^3$

11. [Square Roots / Surds]

Simplify $4\sqrt{3} \times 2\sqrt{5}$

12. [Order of Operations] *

$3 + 6 - 36 \div 2 =$

13. [Exploring Number] *

You buy tickets for 8 adults and 8 children. The tickets cost \$16.75 each and \$8.25 each respectively. How much change should you receive after handing over the appropriate number of \$50 notes? \$

14. [Scientific Notation]

How many significant figures are there in 0.004?

15. [Number Patterns]

Complete the pattern:

$12, 6, 3, \frac{3}{2}$, ____ , ____

16. [Expressions]

Write the following as an algebraic expression:

The average of s and t

17. [Substitution]

To calculate the sum of the angles of a polygon, use the formula $T = (n - 2) \times 180°$.

Find T for $n = 10$ (a decagon).

18. [Expansion]

Expand $4x(3x^2 + 5x)$

19. [Factorisation] *

Factorise and simplify

$$\frac{6ab - 2b^2}{12ab - 4b^2}$$

20. [Equations] *

Solve for x:

$2(4x + 1) = 3(3x + 2)$

21. [Graphs & Functions]

Complete the table:

rule	gradient (m)	x-intercept	y-intercept (c)
$y = -2x$			
$y = -2x + 2$			

22. [Units of Measurement / Time]

What is the arrival date and time in Singapore for the trip shown, given that Singapore time is 2 hours behind Sydney time?

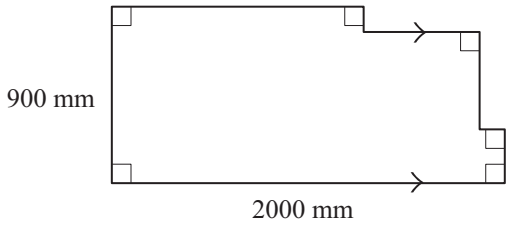
Flights Out: Sydney to Singapore - Saturday 13 Feb 2010

From		To		Flight	Duration
16:00	Sydney	__:__	Singapore	QF509	8h 15m

QUOTE OF THE WEEK: The Lord's prayer is 66 words, the Gettysburg Address is 286 words, there are 1322 words in the Declaration of Independence, but government regulations on the sale of cabbage total 26 911 words. U.S. National Review

23. [Perimeter] *

Find the perimeter of the shape.



mm

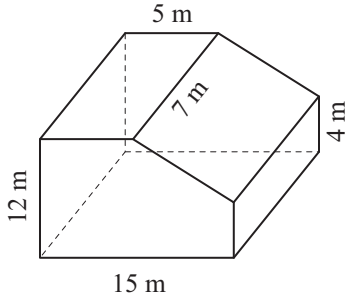
24. [Area] *

A certain type of tile costs $60 per square metre. If each tile is a square with sides of 25 cm, how much does one tile cost?

$

25. [Volume] *

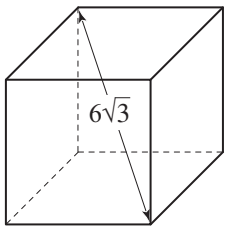
Find the volume of the prism.



m^3

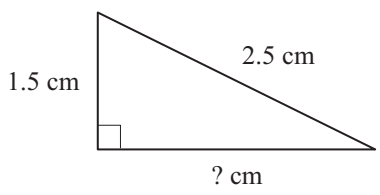
26. [Surface Area] *

Find the total surface area of the cube.



27. [Pythagoras / Trigonometry] *

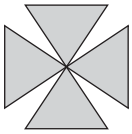
Find the missing side length of this triangle.



cm

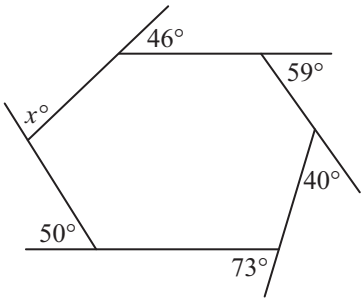
28. [Shape / Location]

For the shape shown, find the minimum angle of rotation required to regain the original image.



29. [Angles] *

Find the value of $x°$.



30. [Statistics] *

Find the mean of the following distribution.

Score	0	100	200	300	400
Frequency	5	10	15	20	50

31. [Probability] *

A card is drawn at random from a deck of 52. What is the probability of selecting a card numbered 2, 3, 4, 5, 6, 7, 8, 9 or 10?

32. [Problem Solving 1] *

If $x^a = 2$ and $x^b = 3$, find the value of $x^{(2a+3b)}$

33. [Problem Solving 2] *

A polygon has 4850 diagonals. How many sides does the polygon have?

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MATHS MATE

SILVER

Test 1

Covering worksheets 1.1 - 1.4

Name: .....

1. [Long ×,÷]

$99 \times 34 =$

2. [Decimal +,–]

$4.88 - 0.99 + 1.22 =$

3. [Decimal ×,÷]

$0.4 \times 0.5 =$

4. [Fraction +,–]

$\frac{4a}{7} + \frac{2a}{7} =$

5. [Fraction ×,÷]

$6\frac{3}{5} \div 3 =$

6. [Percentages]

Increase \$30 000 by 0.25%

\$

7. [Integer +,–]

$(+4) + (-5) + (-9) =$

8. [Integer ×,÷]

$(-4) \times (+12) =$

9. [Rates / Ratios]

Divide \$108 in the ratio 3 : 5 : 4

\$: \$: \$

10. [Indices]

Evaluate $\frac{(-2)^5}{(-2)^3}$

11. [Square Roots / Surds]

Simplify $2\sqrt{3} \times 4\sqrt{10}$

12. [Order of Operations]

$9 + 4 \times 72 \div 3 =$

13. [Exploring Number]

An electricity bill for \$305.20 is divided evenly between four students. How much does each pay?

\$

14. [Scientific Notation]

How many significant figures are there in 1001?

15. [Number Patterns]

Complete the pattern:

$\frac{5}{36}, \frac{5}{6}, 5, 30,$ ___ , ___

16. [Expressions]

Write the following as an algebraic expression:

A number that is h less than the sum of i and j

17. [Substitution]

The average of x and y can be found using the formula $a = \frac{x+y}{2}$. If $x = 3.6$ and $y = 5.8$ find the value of a.

18. [Expansion]

Expand $-2x(4x - 3)$

19. [Factorisation]

Factorise and simplify $\frac{15ax - 6x^2}{6x^2}$

20. [Equations]

Solve for x:

$-7(2 - x) = 21$

21. [Graphs & Functions]

Complete the table:

function	gradient (m)	x-intercept	y-intercept (c)
$y = -2x + 6$			
$y = 2x - 6$			

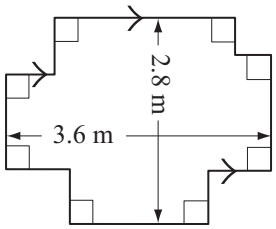
22. [Units of Measurement / Time]

The Smith family departs Sydney on August 3rd at 1620 hours and arrives in Singapore on August 3rd at 2330 hours. How long was their journey, given Singapore time is 2 hours behind Sydney time?

h min

23. [Perimeter]

Find the perimeter of the shape.



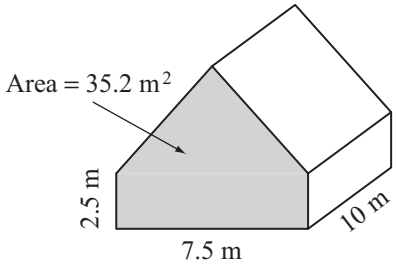
m

24. [Area]

A rectangular field has dimensions 500 m by 300 m. How many kilograms of fertiliser are needed if it is to be applied at the rate of 80 kg per hectare?
[1 ha = 10000 m^2]

25. [Volume]

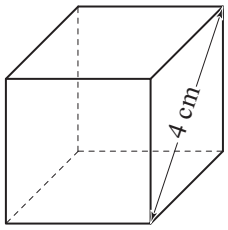
What is the volume of air inside the shed?



m^3

26. [Surface Area]

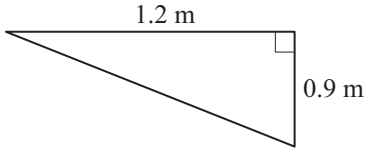
Find the total surface area of the cube.



cm^2

27. [Pythagoras / Trigonometry]

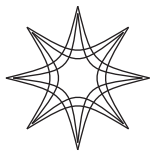
Find the length of the hypotenuse of this triangle.



m

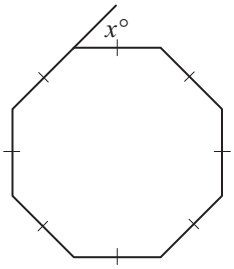
28. [Shape / Location]

What is the order of rotational symmetry of this shape? That is, in rotating the shape through 360°, how often will it look exactly as it did at the start? [Hint: A square has an order of 4.]



29. [Angles]

Find the value of $x°$.



30. [Statistics]

Find the mean of the following distribution.

Score	0	1	2	3	4
Frequency	12	10	5	2	1

31. [Probability]

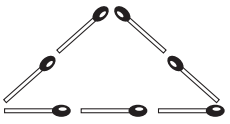
A 52 card deck of playing cards is shuffled, and a card is dealt from the top of the deck. Determine the probability of the card being either a 10, a Jack, a Queen, a King or an Ace.

32. [Problem Solving 1]

In your drawer you have 6 white socks, 4 black socks, 2 red socks and 2 green socks. There is a power failure and you reach into the drawer in the dark. How many socks must you take with you to ensure you have a pair of the same colour?

33. [Problem Solving 2]

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 13 matchsticks?



{3,2,2}

{1,3,3}

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MATHS MATE

SILVER

Test 1

Covering worksheets 1.1 - 1.4

Name: .....

1. [Long ×,÷]

$164 \times 25 =$

2. [Decimal +,–]

$2.82 - 2.87 + 1.05 =$

3. [Decimal ×,÷]

$0.06 \times 0.9 =$

4. [Fraction +,–]

$\frac{6y}{11} - \frac{3y}{11} =$

5. [Fraction ×,÷]

$4\frac{6}{7} \div 2 =$

6. [Percentages]

Increase \$30 000 by 0.75%

\$

7. [Integer +,–]

$(-1) - (-6) + (+5) =$

8. [Integer ×,÷]

$(-45) \div (-9) =$

9. [Rates / Ratios]

Divide \$480 in the ratio 9 : 4 : 7

\$: \$: \$

10. [Indices]

Evaluate $\left(\frac{1}{5}\right)^{-2}$

11. [Square Roots / Surds]

Simplify $8\sqrt{7} \times 2\sqrt{5}$

12. [Order of Operations]

$8 + 6 - 32 \div 4 =$

13. [Exploring Number]

A Lotto prize of \$663 250 is shared by four people. How much does each receive?

\$

14. [Scientific Notation]

How many significant figures are there in 0.0502?

15. [Number Patterns]

Complete the pattern:

$50, 10, 2, \frac{2}{5},$ ___ , ___

16. [Expressions]

Write the following as an algebraic expression:

The average of m and n

17. [Substitution]

Given that the formula for the area of a kite is $A = \frac{ab}{2}$, find A when $a = 8.5$ and $b = 4$.

18. [Expansion]

Expand $5x(x^2 - 3)$

19. [Factorisation]

Factorise and simplify

$$\frac{-5x - 10}{2x + 4}$$

20. [Equations]

Solve for x:

$-2(x - 6) = 18$

21. [Graphs & Functions]

Complete the table:

function	gradient (m)	x-intercept	y-intercept (c)
$y = 4x$			
$y = 4x + 2$			

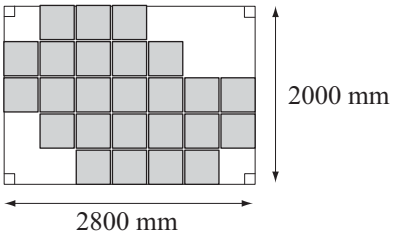
22. [Units of Measurement / Time]

The Barnes family departs London on June 19th at 2300 hours and arrives in Melbourne on June 21st at 0455 hours. How long was their journey, given London time is 10 hours behind Melbourne time?

h min

23. [Perimeter]

Find, in metres, the perimeter of the paved area.



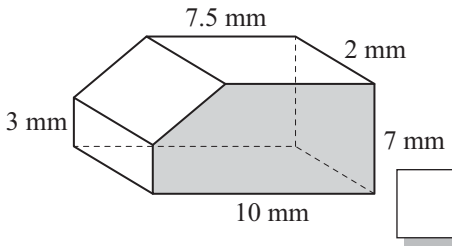
24. [Area]

Find the area of paving needed to construct a 1.5 metre wide path around a rectangular pool with dimensions 5 m by 4 m.

m^2

25. [Volume]

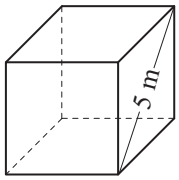
Find the volume of the prism.



mm^3

26. [Surface Area]

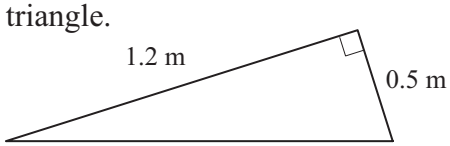
Find the total surface area of the cube.



m^2

27. [Pythagoras / Trigonometry]

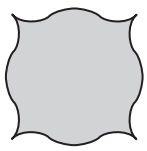
Find the length of the hypotenuse of this triangle.



m

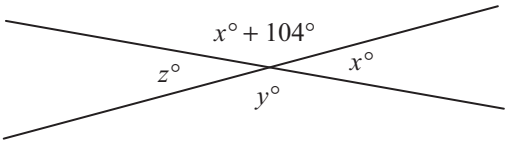
28. [Shape / Location]

For the shape shown, find the minimum angle of rotation required to regain the original image.



29. [Angles]

Find the values of $x°$, $y°$ and $z°$.



$x° =$ $y° =$ $z° =$

30. [Statistics]

Find the mean of the following distribution.

Score	6	7	8	9	10	11	12
Frequency	5	10	20	30	20	10	5

31. [Probability]

Three cards are drawn at random from a deck of 52. The probability of choosing three of a kind (3 Aces, 3 Kings, 3 Queens ... or 3 Twos) is: $\frac{52}{52} \times \frac{3}{51} \times \frac{2}{50} = \frac{1}{425}$

What is the probability of not choosing three of a kind?

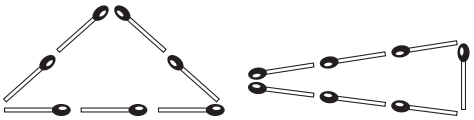
32. [Problem Solving 1]

In your drawer you have 4 white socks, 2 black socks, 2 red socks, 6 brown socks and 4 green socks. There is a power failure and you reach into the drawer in the dark. How many socks must you take with you to ensure you have a pair of the same colour?

33. [Problem Solving 2]

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 9 matchsticks?



{3,2,2} {1,3,3}

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MATHS MATE

Term 1 - Sheet 1

Name: .....

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

Parent's Signature: .....

1. [Long ×,÷] *

$304 \times 14 =$

4256

2. [Decimal +,–] *

$4.8 - 0.95 + 0.18 =$

4.03

3. [Decimal ×,÷]

$0.2 \times 0.3 =$

0.06

4. [Fraction +,–]

$\frac{x}{5} + \frac{2x}{5} =$

$\frac{3x}{5}$

5. [Fraction ×,÷] *

$2 \times 3\frac{1}{3} =$

$6\frac{2}{3}$

6. [Percentages] *

Increase \$6 by 2.5%

\$ 6.15

7. [Integer +,–]

$(+6) - (+8) + (-2) =$

–4

8. [Integer ×,÷]

$(-5) \times (+12) =$

–60

9. [Rates / Ratios] *

Share 475 pens in the ratio 10 : 7 : 8

190 : 133 : 152

10. [Indices] *

Evaluate $\left(\frac{2}{3}\right)^{-2}$

$2\frac{1}{4}$

11. [Square Roots / Surds]

Simplify $4\sqrt{7} \times 3\sqrt{2}$

$12\sqrt{14}$

12. [Order of Operations] *

$13 - 5 \times 3 =$

–2

13. [Exploring Number] *

You buy 5 CDs at \$28.90 each and pay using the appropriate number of \$20 notes. How much change should you receive?

\$ 15.50

14. [Scientific Notation]

How many significant figures are there in 205?

3

15. [Number Patterns]

Complete the pattern:

$\frac{10}{9}, \frac{10}{3}, 10, 30,$ 90 , 270

16. [Expressions]

Write the following as an algebraic expression:

The sum of p, q and w

$p + q + w$

17. [Substitution] *

The formula of the area of a triangle is $A = \frac{bh}{2}$. Find A when $b = 15$ and $h = 3$

22.5

18. [Expansion]

Expand $2xy(2x - y)$

$4x^2y - 2xy^2$

19. [Factorisation] *

Factorise and simplify

$\frac{3xy - 6y}{3xy}$

$\frac{x-2}{x}$

20. [Equations] *

Solve for x:

$-3(4 - x) = 6$

6

21. [Graphs & Functions]

Complete the table:

rule	gradient (m)	x-intercept	y-intercept (c)
$y = 3x$	3	(0,0)	(0,0)
$y = 3x - 6$	3	(2,0)	(0,–6)

22. [Units of Measurement / Time]

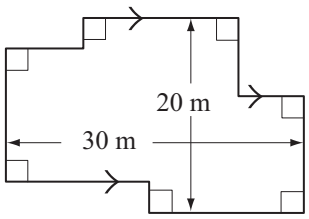
The Wills family departs Melbourne on March 27th at 1300 hours and arrives in London on March 28th at 0555 hours. How long was their journey, given London time is 10 hours behind Melbourne time?

26 h 55 min

QUOTE OF THE WEEK: I went into McDonalds yesterday and said, "I'd like some fries." The girl at the counter said, "Would you like some fries with that?"

23. [Perimeter] *

Find the perimeter of the shape.



100 m

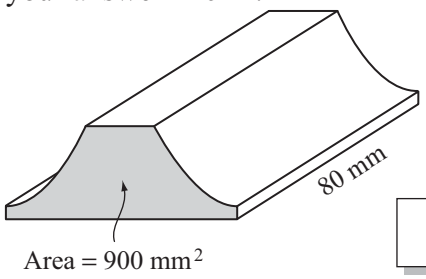
24. [Area] *

A rectangular field has dimensions 500 metres by 300 metres. How many kilograms of fertiliser are needed for this field if it is to be applied at the rate of 60 kilograms per hectare? [1 ha = 10 000 m^2]

900 kg

25. [Volume] *

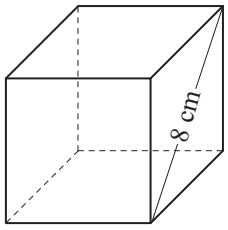
Find the volume of the solid and express your answer in cm^3.



72 cm^3

26. [Surface Area] *

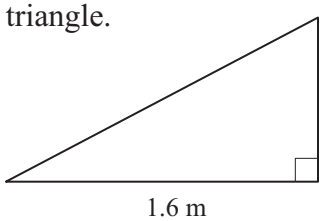
Find the total surface area of the cube.



192 cm^2

27. [Pythagoras / Trigonometry] *

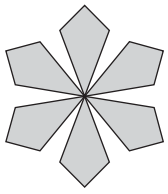
Find the length of the hypotenuse of this triangle.



2 m

28. [Shape / Location]

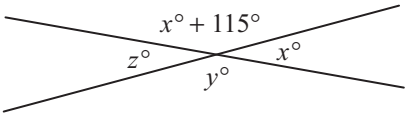
What is the order of rotational symmetry of this shape? That is, in rotating the shape through 360°, how often will it look exactly as it did at the start? [Hint: A square has an order of 4.]



6

29. [Angles] *

Find the values of $x°$, $y°$ and $z°$.



$x° = 32.5°$ $y° = 147.5°$ $z° = 32.5°$

30. [Statistics] *

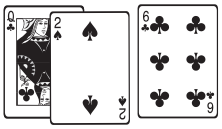
Find the mean of the following distribution.

Score	70	71	72	73	74
Frequency	1	4	10	4	1

72

31. [Probability] *

A 52 card deck of playing cards is shuffled, and three cards are dealt from the top of the deck. The first two cards are both black. Determine the probability of the third card also being black.



$\frac{12}{25}$

32. [Problem Solving 1] *

In your drawer you have 6 white socks, 4 black socks, 8 red socks, 4 yellow socks and 2 green socks. There is a power failure and you reach into the drawer in the dark. How many socks must you take with you to ensure you have a pair of the same colour?

6

33. [Problem Solving 2] *

Solve for x:

$(x+1)+(x+2)+(x+3)+...+(x+100)=15\,050$

100

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MATHS MATE

Term 1 - Sheet 2

Name: .....

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

Parent's Signature: .....

1. [Long ×,÷] *

$134 \times 34 =$

4556

2. [Decimal +,–] *

$3.11 - 0.33 + 0.77 =$

3.55

3. [Decimal ×,÷]

$9 \div 0.03 =$

300

4. [Fraction +,–]

$\frac{4y}{7} - \frac{y}{7} =$

$\frac{3y}{7}$

5. [Fraction ×,÷] *

$2\frac{6}{7} \div 2 =$

$1\frac{3}{7}$

6. [Percentages] *

Reduce \$400 by 0.75%

\$ 397

7. [Integer +,–]

$(-1) - (+7) + (-8) =$

–16

8. [Integer ×,÷]

$(+2) \times (-25) =$

–50

9. [Rates / Ratios] *

Arrange 756 people into three groups in the ratio 8 : 6 : 7

288 : 216 : 252

10. [Indices] *

Evaluate $\left(\frac{1}{4}\right)^{-3}$

64

11. [Square Roots / Surds]

Simplify $\frac{6\sqrt{6}}{2\sqrt{3}}$

$3\sqrt{2}$

12. [Order of Operations] *

$(2 - 8) \times 8 - 19 =$

–67

13. [Exploring Number]

A phone bill of \$241.50 is divided equally between three students. How much does each student pay?

\$ 80.50

14. [Scientific Notation]

How many significant figures are there in 0.0120?

3

15. [Number Patterns]

Complete the pattern:

$9, 3, 1, \frac{1}{3}, ___, ___$

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

16. [Expressions]

Write the following as an algebraic expression:

A number that is k less than the sum of m and n

$m + n - k$

17. [Substitution] *

Interest is calculated using the formula $I = \frac{PRT}{100}$. Find I when $P = 3000$, $R = 6.5$ and $T = 2$

390

18. [Expansion]

Expand $5x(2xy - 3y)$

$10x^2y - 15xy$

19. [Factorisation] *

Factorise and simplify

$\frac{8x^2 - 6x}{12x - 9}$

$\frac{2x}{3}$

20. [Equations] *

Solve for x:

$3(x - 1) = 2(x + 4)$

11

21. [Graphs & Functions]

Complete the table:

rule	gradient (m)	x-intercept	y-intercept (c)
$y = -5x$	–5	(0,0)	(0,0)
$y = 5x$	5	(0,0)	(0,0)

22. [Units of Measurement / Time]

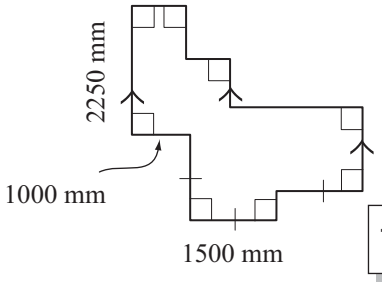
The Ming family departs London on April 19th at 2200 hours and arrives in Singapore on April 20th at 1715 hours. How long was their journey, given London time is 8 hours behind Singapore time?

11 h 15 min

QUOTE OF THE WEEK: Everyone is kneaded out of the same bread but not baked in the same oven. Yiddish proverb

23. [Perimeter] *

Find the perimeter of the shape.



15 500 mm

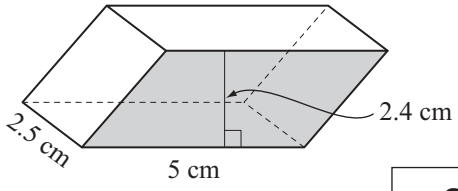
24. [Area] *

A rectangular swimming pool 15 m by 8 m has a 1 m wide concrete path around it. What is the area of the path?

50 m^2

25. [Volume] *

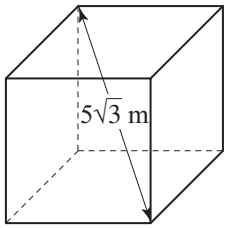
Find the volume of the prism.



30 cm^3

26. [Surface Area] *

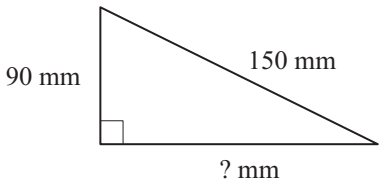
Find the total surface area of the cube.



150 m^2

27. [Pythagoras / Trigonometry] *

Find the missing side length of this triangle.



120 mm

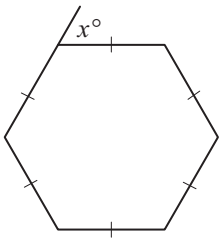
28. [Shape / Location]

For the shape shown, find the minimum angle of rotation required to regain the original image.

120°

29. [Angles] *

Find the value of $x°$.



60°

30. [Statistics] *

Find the mean of the following distribution.

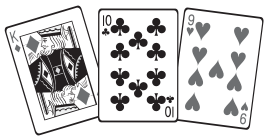
Score	0	1	2	3	4
Frequency	10	8	6	4	2

$\frac{4}{3}$

31. [Probability] *

Three cards are drawn at random from a deck of 52. The probability of them all being red is: $\frac{26}{52}\times\frac{25}{51}\times\frac{24}{50}=\frac{2}{17}$

What is the probability that at least one card is black?



$\frac{15}{17}$

32. [Problem Solving 1] *

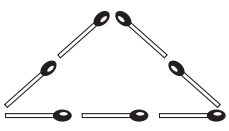
To the nearest whole second, what is one millionth of a year?

32 s

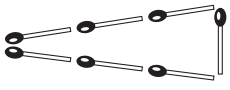
33. [Problem Solving 2] *

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 11 matchsticks?



{3,2,2}



{1,3,3}

4

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MATHS MATE

Term 1 - Sheet 3

Name: .....

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

Parent's Signature: .....

1. [Long ×,÷] *

$62 \times 26 =$

1612

2. [Decimal +,–] *

$2.41 - 0.72 + 1.43 =$

3.12

3. [Decimal ×,÷]

$0.04 \times 0.7 =$

0.028

4. [Fraction +,–] *

$\frac{5}{2f} + \frac{1}{2f} =$

$\frac{3}{f}$

5. [Fraction ×,÷] *

$9\frac{3}{5} \div 3 =$

$3\frac{1}{5}$

6. [Percentages] *

Reduce \$1000 by 0.15%

\$ 998.50

7. [Integer +,–]

$(+9) + (-1) + (-2) =$

6

8. [Integer ×,÷]

$(-16) \div (-2) =$

8

9. [Rates / Ratios] *

Divide \$216 in the ratio 3 : 4 : 5

\$ 54 : \$ 72 : \$ 90

10. [Indices] *

Evaluate $\frac{(-2)^8}{(-2)^6}$

4

11. [Square Roots / Surds]

Simplify $\frac{8\sqrt{12}}{6\sqrt{4}}$

$\frac{4\sqrt{3}}{3}$

12. [Order of Operations] *

$12 + 10 - 8 \times 4 =$

–10

13. [Exploring Number]

Six kitchen chairs cost \$592.50. What is the cost per chair?

\$ 98.75

14. [Scientific Notation]

How many significant figures are there in 63 000?

2

15. [Number Patterns]

Complete the pattern:

$\frac{3}{16}, \frac{3}{4}, 3, 12,$ 48 ,192

16. [Expressions]

Write the following as an algebraic expression:

Fifteen lots of g

$15g$

17. [Substitution] *

The volume of a cube is found by using the formula $V = l^3$. Find V when $l = 0.4$ m.

0.064 m^3

18. [Expansion]

Expand $5x(x^2 - 3x + 2)$

$5x^3 - 15x^2 + 10x$

19. [Factorisation] *

Factorise and simplify $\frac{6x^2 + 15x}{6x^2}$

$\frac{2x+5}{2x}$

20. [Equations] *

Solve for x:

$5(x + 1) = -20$

–5

21. [Graphs & Functions]

Complete the table:

rule	gradient (m)	x-intercept	y-intercept (c)
$y = \frac{1}{2}x + 2$	$\frac{1}{2}$	(–4,0)	(0,2)
$y = \frac{1}{2}x + 3$	$\frac{1}{2}$	(–6,0)	(0,3)

22. [Units of Measurement / Time]

What is the arrival date and time in New York for the trip shown, given that New York time is 15 hours behind Melbourne time?

Flights Out: Melbourne to New York - Saturday 06 Feb 2010

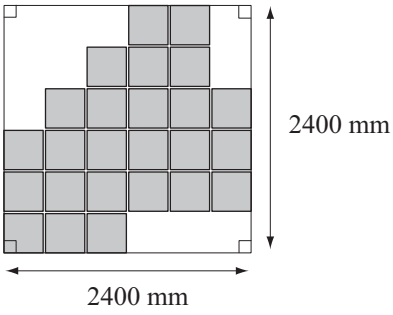
From		To		Flight	Duration
15:30	Melbourne	__:__	New York	QF508	21h 40m

2210 hours on 06/02/2010

QUOTE OF THE WEEK: It is better in prayer to have a heart without words than words without a heart. Mahatma Gandhi

23. [Perimeter] *

Find the perimeter of the shaded paved area.



9600 mm

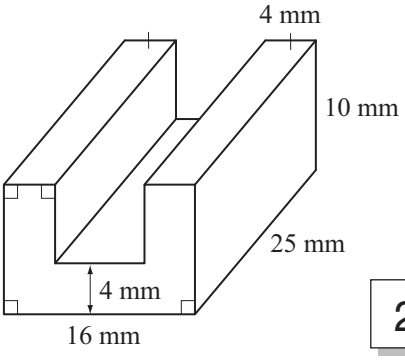
24. [Area] *

A rare type of coloured glass costs $600 per square metre. How much would a rectangular piece 20 cm by 25 cm cost?

$ 30

25. [Volume] *

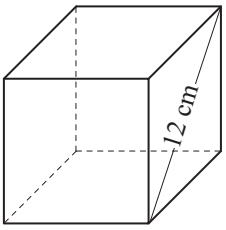
Find the volume of the solid.



2800 mm^3

26. [Surface Area] *

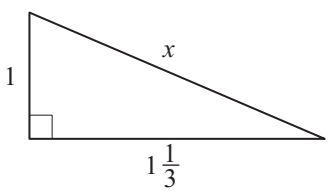
Find the total surface area of the cube.



432 cm^2

27. [Pythagoras / Trigonometry] *

Find the value of x.



$1\frac{2}{3}$

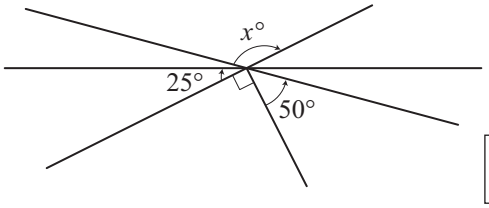
28. [Shape / Location]

What is the order of rotational symmetry of this shape? That is, in rotating the shape through 360°, how often will it look exactly as it did at the start? [Hint: A square has an order of 4.]

2

29. [Angles] *

Find the value of $x°$.



140°

30. [Statistics] *

Find the mean of the following distribution.

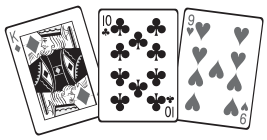
Score	5	10	15	20	25	30
Frequency	7	5	4	2	1	1

12

31. [Probability] *

Two cards are drawn at random from a deck of 52. The probability that neither card is a heart is: $\frac{39}{52} \times \frac{38}{51} = \frac{19}{34}$

What is the probability that at least one card is a heart?



$\frac{15}{34}$

32. [Problem Solving 1] *

What two-digit whole number is twice the product of its digits?

36

33. [Problem Solving 2] *

If a and b are positive integers and $a + b + a \times b = 39$, what are the three possible values of $a + b$?

11, 12, 20

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MATHS MATE

Term 1 - Sheet 4

Name: .....

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

Parent's Signature: .....

1. [Long ×,÷] *

$16.5 \div 11 =$

1.5

2. [Decimal +,–] *

$5.18 - 1.31 + 4.4 =$

8.27

3. [Decimal ×,÷]

$60 \div 0.3 =$

200

4. [Fraction +,–] *

$\frac{3}{5g} + \frac{12}{5g} =$

$\frac{3}{g}$

5. [Fraction ×,÷] *

$4\frac{4}{5} \div 2 =$

$2\frac{2}{5}$

6. [Percentages]

Increase \$100 000 by 0.025%

\$100 025

7. [Integer +,–]

$(+3) - (-3) - (+3) =$

3

8. [Integer ×,÷]

$(+34) \div (-17) =$

–2

9. [Rates / Ratios] *

Arrange 442 people into three groups in the ratio 8 : 5 : 4

208 : 130 : 104

10. [Indices] *

Simplify $(x^0)^3$

1

11. [Square Roots / Surds]

Simplify $4\sqrt{3} \times 2\sqrt{5}$

$8\sqrt{15}$

12. [Order of Operations] *

$3 + 6 - 36 \div 2 =$

–9

13. [Exploring Number] *

You buy tickets for 8 adults and 8 children. The tickets cost \$16.75 each and \$8.25 each respectively. How much change should you receive after handing over the appropriate number of \$50 notes?

\$0

14. [Scientific Notation]

How many significant figures are there in 0.004?

1

15. [Number Patterns]

Complete the pattern:

$12, 6, 3, \frac{3}{2}, ___, ___$

$\frac{3}{4}, \frac{3}{8}$

16. [Expressions]

Write the following as an algebraic expression:

The average of s and t

$\frac{s+t}{2}$

17. [Substitution]

To calculate the sum of the angles of a polygon, use the formula $T = (n-2) \times 180°$.

Find T for $n = 10$ (a decagon).

1440°

18. [Expansion]

Expand $4x(3x^2 + 5x)$

$12x^3 + 20x^2$

19. [Factorisation] *

Factorise and simplify

$\frac{6ab - 2b^2}{12ab - 4b^2}$

$\frac{1}{2}$

20. [Equations] *

Solve for x:

$2(4x + 1) = 3(3x + 2)$

–4

21. [Graphs & Functions]

Complete the table:

rule	gradient (m)	x-intercept	y-intercept (c)
$y = -2x$	–2	(0,0)	(0,0)
$y = -2x + 2$	–2	(1,0)	(0,2)

22. [Units of Measurement / Time]

What is the arrival date and time in Singapore for the trip shown, given that Singapore time is 2 hours behind Sydney time?

Flights Out: Sydney to Singapore - Saturday 13 Feb 2010

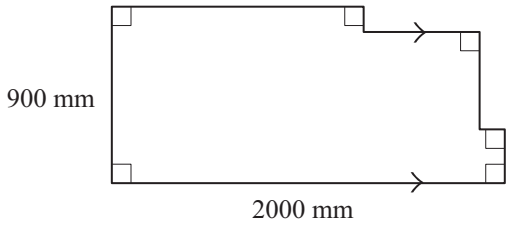
From		To		Flight	Duration
16:00	Sydney	__:__	Singapore	QF509	8h 15m

2215 hours on 13/02/2010

QUOTE OF THE WEEK: The Lord's prayer is 66 words, the Gettysburg Address is 286 words, there are 1322 words in the Declaration of Independence, but government regulations on the sale of cabbage total 26 911 words. U.S. National Review

23. [Perimeter] *

Find the perimeter of the shape.



5800 mm

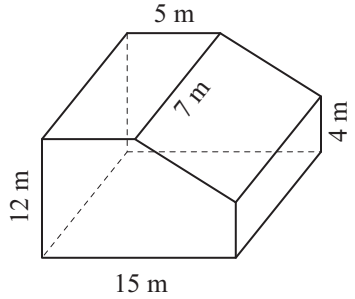
24. [Area] *

A certain type of tile costs $60 per square metre. If each tile is a square with sides of 25 cm, how much does one tile cost?

$ 3.75

25. [Volume] *

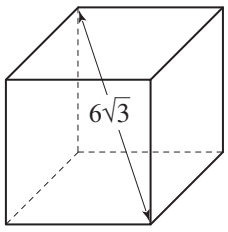
Find the volume of the prism.



980 m^3

26. [Surface Area] *

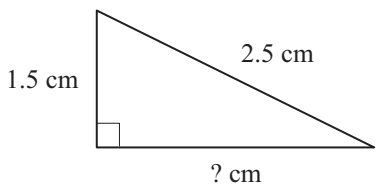
Find the total surface area of the cube.



216

27. [Pythagoras / Trigonometry] *

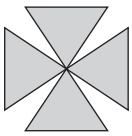
Find the missing side length of this triangle.



2 cm

28. [Shape / Location]

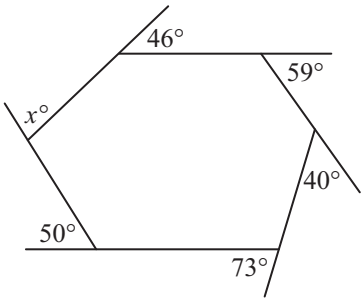
For the shape shown, find the minimum angle of rotation required to regain the original image.



90°

29. [Angles] *

Find the value of $x°$.



92°

30. [Statistics] *

Find the mean of the following distribution.

Score	0	100	200	300	400
Frequency	5	10	15	20	50

300

31. [Probability] *

A card is drawn at random from a deck of 52. What is the probability of selecting a card numbered 2, 3, 4, 5, 6, 7, 8, 9 or 10?

$\frac{9}{13}$

32. [Problem Solving 1] *

If $x^a = 2$ and $x^b = 3$, find the value of $x^{(2a+3b)}$

108

33. [Problem Solving 2] *

A polygon has 4850 diagonals. How many sides does the polygon have?

100

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MATHS MATE

SILVER

Test 1

Covering worksheets 1.1 - 1.4

Name: .....

1. [Long ×,÷]

$99 \times 34 =$

3366

2. [Decimal +,–]

$4.88 - 0.99 + 1.22 =$

5.11

3. [Decimal ×,÷]

$0.4 \times 0.5 =$

0.2

4. [Fraction +,–]

$\frac{4a}{7} + \frac{2a}{7} =$

$\frac{6a}{7}$

5. [Fraction ×,÷]

$6\frac{3}{5} \div 3 =$

$2\frac{1}{5}$

6. [Percentages]

Increase \$30 000 by 0.25%

\$ 30 075

7. [Integer +,–]

$(+4) + (-5) + (-9) =$

–10

8. [Integer ×,÷]

$(-4) \times (+12) =$

–48

9. [Rates / Ratios]

Divide \$108 in the ratio 3 : 5 : 4

\$ 27 : \$ 45 : \$ 36

10. [Indices]

Evaluate $\frac{(-2)^5}{(-2)^3}$

4

11. [Square Roots / Surds]

Simplify $2\sqrt{3} \times 4\sqrt{10}$

$8\sqrt{30}$

12. [Order of Operations]

$9 + 4 \times 72 \div 3 =$

105

13. [Exploring Number]

An electricity bill for \$305.20 is divided evenly between four students. How much does each pay?

\$ 76.30

14. [Scientific Notation]

How many significant figures are there in 1001?

4

15. [Number Patterns]

Complete the pattern:

$\frac{5}{36}, \frac{5}{6}, 5, 30,$ 180, 1080

16. [Expressions]

Write the following as an algebraic expression:

A number that is h less than the sum of i and j

$i + j - h$

17. [Substitution]

The average of x and y can be found using the formula $a = \frac{x+y}{2}$. If $x = 3.6$ and $y = 5.8$ find the value of a.

4.7

18. [Expansion]

Expand $-2x(4x - 3)$

$-8x^2 + 6x$

19. [Factorisation]

Factorise and simplify $\frac{15ax - 6x^2}{6x^2}$

$\frac{5a - 2x}{2x}$

20. [Equations]

Solve for x:

$-7(2 - x) = 21$

5

21. [Graphs & Functions]

Complete the table:

function	gradient (m)	x-intercept	y-intercept (c)
$y = -2x + 6$	–2	(3,0)	(0,6)
$y = 2x - 6$	2	(3,0)	(0,–6)

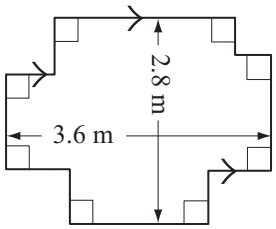
22. [Units of Measurement / Time]

The Smith family departs Sydney on August 3rd at 1620 hours and arrives in Singapore on August 3rd at 2330 hours. How long was their journey, given Singapore time is 2 hours behind Sydney time?

9 h 10 min

23. [Perimeter]

Find the perimeter of the shape.



12.8 m

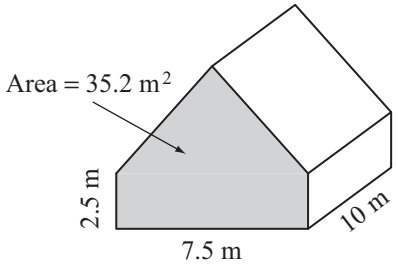
24. [Area]

A rectangular field has dimensions 500 m by 300 m. How many kilograms of fertiliser are needed if it is to be applied at the rate of 80 kg per hectare?
[1 ha = 10000 m^2]

1200 kg

25. [Volume]

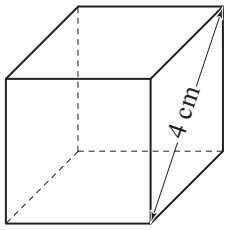
What is the volume of air inside the shed?



352 m^3

26. [Surface Area]

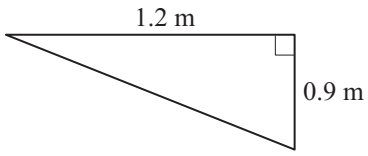
Find the total surface area of the cube.



48 cm^2

27. [Pythagoras / Trigonometry]

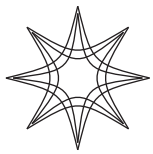
Find the length of the hypotenuse of this triangle.



1.5 m

28. [Shape / Location]

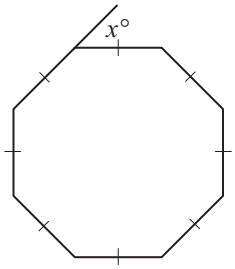
What is the order of rotational symmetry of this shape? That is, in rotating the shape through 360°, how often will it look exactly as it did at the start? [Hint: A square has an order of 4.]



8

29. [Angles]

Find the value of $x°$.



45°

30. [Statistics]

Find the mean of the following distribution.

Score	0	1	2	3	4
Frequency	12	10	5	2	1

1

31. [Probability]

A 52 card deck of playing cards is shuffled, and a card is dealt from the top of the deck. Determine the probability of the card being either a 10, a Jack, a Queen, a King or an Ace.

$\frac{5}{13}$

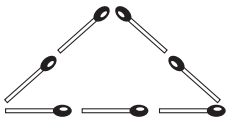
32. [Problem Solving 1]

In your drawer you have 6 white socks, 4 black socks, 2 red socks and 2 green socks. There is a power failure and you reach into the drawer in the dark. How many socks must you take with you to ensure you have a pair of the same colour?

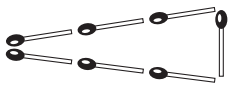
5

33. [Problem Solving 2]

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 13 matchsticks?



{3,2,2}



{1,3,3}

5

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MATHS MATE

SILVER

Test 1

Covering worksheets 1.1 - 1.4

Name: .....

1. [Long ×,÷]

$164 \times 25 =$

4100

2. [Decimal +,–]

$2.82 - 2.87 + 1.05 =$

1

3. [Decimal ×,÷]

$0.06 \times 0.9 =$

0.054

4. [Fraction +,–]

$\frac{6y}{11} - \frac{3y}{11} =$

$\frac{3y}{11}$

5. [Fraction ×,÷]

$4\frac{6}{7} \div 2 =$

$2\frac{3}{7}$

6. [Percentages]

Increase \$30 000 by 0.75%

\$ 30 225

7. [Integer +,–]

$(-1) - (-6) + (+5) =$

10

8. [Integer ×,÷]

$(-45) \div (-9) =$

5

9. [Rates / Ratios]

Divide \$480 in the ratio 9 : 4 : 7

\$ 216 : \$ 96 : \$ 168

10. [Indices]

Evaluate $\left(\frac{1}{5}\right)^{-2}$

25

11. [Square Roots / Surds]

Simplify $8\sqrt{7} \times 2\sqrt{5}$

$16\sqrt{35}$

12. [Order of Operations]

$8 + 6 - 32 \div 4 =$

6

13. [Exploring Number]

A Lotto prize of \$663 250 is shared by four people. How much does each receive?

\$165 812.50

14. [Scientific Notation]

How many significant figures are there in 0.0502?

3

15. [Number Patterns]

Complete the pattern:

50, 10, 2, $\frac{2}{5}$, $\frac{2}{25}$, $\frac{2}{125}$

16. [Expressions]

Write the following as an algebraic expression:

The average of m and n

$\frac{m+n}{2}$

17. [Substitution]

Given that the formula for the area of a kite is $A = \frac{ab}{2}$, find A when $a = 8.5$ and $b = 4$.

17

18. [Expansion]

Expand $5x(x^2 - 3)$

$5x^3 - 15x$

19. [Factorisation]

Factorise and simplify $\frac{-5x - 10}{2x + 4}$

or –2.5

$-\frac{5}{2}$

20. [Equations]

Solve for x:

$-2(x - 6) = 18$

–3

21. [Graphs & Functions]

Complete the table:

function	gradient (m)	x-intercept	y-intercept (c)
$y = 4x$	4	(0,0)	(0,0)
$y = 4x + 2$	4	$(-\frac{1}{2}, 0)$	(0,2)

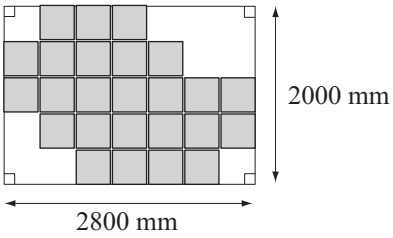
22. [Units of Measurement / Time]

The Barnes family departs London on June 19th at 2300 hours and arrives in Melbourne on June 21st at 0455 hours. How long was their journey, given London time is 10 hours behind Melbourne time?

19 h 55 min

23. [Perimeter]

Find, in metres, the perimeter of the paved area.



9.6 m

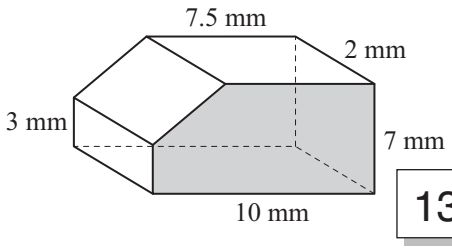
24. [Area]

Find the area of paving needed to construct a 1.5 metre wide path around a rectangular pool with dimensions 5 m by 4 m.

36 m^2

25. [Volume]

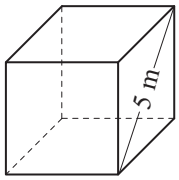
Find the volume of the prism.



130 mm^3

26. [Surface Area]

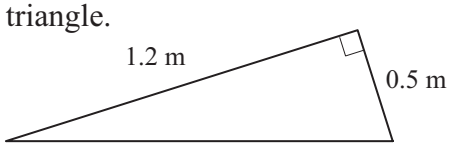
Find the total surface area of the cube.



75 m^2

27. [Pythagoras / Trigonometry]

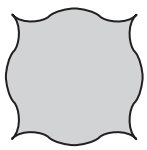
Find the length of the hypotenuse of this triangle.



1.3 m

28. [Shape / Location]

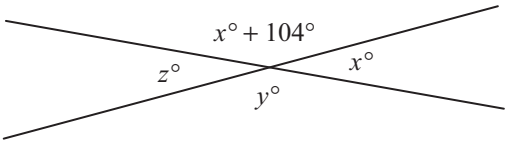
For the shape shown, find the minimum angle of rotation required to regain the original image.



90°

29. [Angles]

Find the values of $x°$, $y°$ and $z°$.



$x° = 38°$ $y° = 142°$ $z° = 38°$

30. [Statistics]

Find the mean of the following distribution.

Score	6	7	8	9	10	11	12
Frequency	5	10	20	30	20	10	5

9

31. [Probability]

Three cards are drawn at random from a deck of 52. The probability of choosing three of a kind (3 Aces, 3 Kings, 3 Queens ... or 3 Twos) is: $\frac{52}{52} \times \frac{3}{51} \times \frac{2}{50} = \frac{1}{425}$

What is the probability of not choosing three of a kind?

$\frac{424}{425}$

32. [Problem Solving 1]

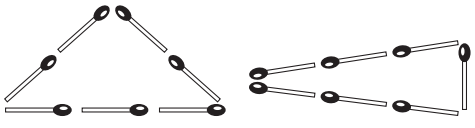
In your drawer you have 4 white socks, 2 black socks, 2 red socks, 6 brown socks and 4 green socks. There is a power failure and you reach into the drawer in the dark. How many socks must you take with you to ensure you have a pair of the same colour?

6

33. [Problem Solving 2]

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 9 matchsticks?



{3,2,2} {1,3,3}

3

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1.1

32. **Hint:** *No clues allowed!*
Solution: There are 5 different colours. All you have to do is take 6 socks from the drawer. Because you don't have 6 different colours, you will end up with having at least one pair of socks of the same colour.
The answer is **6** socks.

33. **Hint:** *You could start adding the numbers 1 to 100. OR Use a trick instead!*
Solution: There are 100 brackets on the left hand side, so the equation becomes:
$100x + (1 + 2 + 3 + \ldots\ldots + 100) = 15\,050$

The sum of the numbers 1 to 100 (S) can be written in two different ways:

$S = 1 + 2 + 3 + 4 + \ldots\ldots\ldots\ldots + 98 + 99 + 100$
or
$S = 100 + 99 + 98 + 97 + \ldots\ldots\ldots\ldots + 3 + 2 + 1$
Add both sums as shown in the diagram above:

$$\begin{aligned} 2S &= 101 + 101 + 101 + 101 + \ldots\ldots\ldots\ldots + 101 + 101 + 101 \\ &= 100 \times 101 \\ &= 10\,100 \end{aligned}$$

$$S = \frac{10\,100}{2} = \mathbf{5050}$$

The equation becomes:
$100x + 5050 = 15\,050$ subtract 5050 from both sides
$100x = 10\,000$ divide both sides by 100
$x = \mathbf{100}$

1.2

32. **Hint:** *Find the number of seconds in a year, considering both a year with 365 days and a leap year with 366 days.*
Solution:

1 year $= 365$ days
$= 365 \times 24$ hours
$= 365 \times 24 \times 3600$ seconds
$= 31\,536\,000$ seconds

A millionth of 1 year $= 31\,536\,000 \div 1\,000\,000$
$= 31.536$ round to the nearest whole number
$\approx \mathbf{32}$ seconds

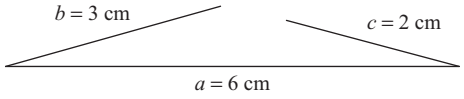
1 leap year $= 366$ days
$= 366 \times 24$ hours
$= 366 \times 24 \times 3600$ seconds
$= 31\,622\,400$ seconds

A millionth of 1 year $= 31\,622\,400 \div 1\,000\,000$
$= 31.6224$ round to the nearest whole number
$\approx \mathbf{32}$ seconds

To the nearest whole second, one millionth of a year equals **32** seconds.

33. **Hint:** *List all the different triplets of whole numbers {a,b,c} that add to 11. 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 6, 3, 2 results in $a < b + c$ being false, so it is an impossible triangle.*



Solution: The different triplets of whole numbers that add to 11 are:

~~{1,1,9}~~	~~{2,2,7}~~	{3,3,5}
~~{1,2,8}~~	~~{2,3,6}~~	{3,4,4}
~~{1,3,7}~~	{2,4,5}	
~~{1,4,6}~~		
{1,5,5}		

Using the rule above, impossible triangles have been eliminated. The only possible triangles are {1,5,5}, {2,4,5}, {3,3,5} and {3,4,4}.
Using 11 matchsticks, **4** different triangles can be formed.

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1.3

32. **Hint:** *Any two digit number AB can be represented in base 10 as: $AB = 10 \times A + B$. Use expanded notation for a 2-digit number and algebra.*
e.g. $58 = 5 \times 10 + 8$
Solution: Let *AB* represent the two digit number that is twice the product of its digits.
Write the equation:

$10 \times A + B = 2 \times A \times B$ — solve for B

$B(2A - 1) = 10A$

$B = \dfrac{10A}{2A - 1}$ — write as a sum of two fractions with denominator $2A - 1$, so one fraction can be reduced to a whole number.

$B = \dfrac{10A - 5 + 5}{2A - 1}$ — factorise

$B = \dfrac{5(2A - 1) + 5}{2A - 1}$ — write as a sum of two fractions

$B = \dfrac{5(2A - 1)}{2A - 1} + \dfrac{5}{2A - 1}$ — reduce the first fraction

$B = 5 + \dfrac{5}{2A - 1}$

So $2A - 1$ must be a positive or negative factor of 5.
Therefore $2A - 1$ must equal ± 1 or ± 5.

$2A - 1 = -1$ $A = 0$ and $B = 0$ (false)
$2A - 1 = 1$ $A = 1$ and $B = 10$ (false)
$2A - 1 = -5$ $A = -2$ and $B = 4$ (false)
$2A - 1 = 5$ $A = 3$ and $B = 6$ (true)

Check against the initial statement: $36 = 2 \times 3 \times 6$
The two digit whole number that is twice the product of its digits is **36**.

33. **Hint:** *Solve the equation for a and find restrictions for b.*
Solution:

$a + b + ab = 39$ — solve for a

$a(b + 1) = 39 - b$

$a = \dfrac{39 - b}{b + 1}$ — write as a sum of two fractions with denominator $b + 1$, so one fraction can be reduced to a whole number.

$a = \dfrac{39 - b + 1 - 1}{b + 1}$ — factorise

$a = \dfrac{-(b + 1) + 40}{b + 1}$ — write as a sum of two fractions

$a = \dfrac{-(b + 1)}{b + 1} + \dfrac{40}{b + 1}$ — reduce the first fraction

$a = -1 + \dfrac{40}{b + 1}$

a and b must be positive integers, so $b + 1$ must be a positive factor of 40.
Therefore $b + 1$ must equal 1, 2, 4, 5, 8, 10, 20 or 40.

$b + 1 = 1 \rightarrow b = 0$ and $a = 39$ (false, b must be positive)
$b + 1 = 2 \rightarrow b = 1$ and $a = 19 \rightarrow a + b = 20$
$b + 1 = 4 \rightarrow b = 3$ and $a = 9 \rightarrow a + b = 12$
$b + 1 = 5 \rightarrow b = 4$ and $a = 7 \rightarrow a + b = 11$
$b + 1 = 8 \rightarrow b = 7$ and $a = 4 \rightarrow a + b = 11$
$b + 1 = 10 \rightarrow b = 9$ and $a = 3 \rightarrow a + b = 12$
$b + 1 = 20 \rightarrow b = 19$ and $a = 1 \rightarrow a + b = 20$
$b + 1 = 40 \rightarrow b = 39$ and $a = 0$ (false, a must be positive)

The three possible values for $a + b$ are **11**, **12** and **20**.

1.4

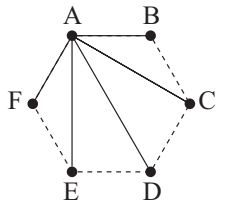
32. **Hint:** *Use the index laws:*

> *(1)* $a^{m+n} = a^m \times a^n$
> *(2)* $a^{mn} = (a^m)^n$

Solution:

$x^{(2a+3b)} \overset{(1)}{=} x^{2a} \times x^{3b}$
$\overset{(2)}{=} (x^a)^2 \times (x^b)^3$
Substitute $x^a = 2$ and $x^b = 3$ $\rightarrow$ $= 2^2 \times 3^3$
Order of operations $\rightarrow$ $= 4 \times 27$
$= \mathbf{108}$

33. **Hint:** ***Diagonals of a hexagon (n = 6):***
In a hexagon we can draw 5 lines from A to each of B, C, D, E and F. Two of these lines (AB and AF) are sides of the hexagon, so diagonals from A = 5 – 2 = 3. In total we have 6 × 3 = 18 diagonals. But lines from A to C and C to A are the same so we have exactly half of 18 different diagonals, which is 9.
Use this to find the general formula for the number of diagonals of a polygon with n sides.



Solution:
For any polygon with n sides (vertices) we can draw $n - 1$ lines from each corner (vertex) to the others.
Two of these lines are sides of the polygon. So we are left with $(n - 1) - 2 = n - 3$ diagonals from each vertex.

That leads to a total of $n(n - 3)$ diagonals. As with the hint, lines double up so we have exactly half of $n(n - 3)$ different diagonals.
Therefore the formula for the number of diagonals of a polygon with n sides is $\dfrac{n(n - 3)}{2}$

Using algebra, write the quadratic equation:

$\dfrac{n(n - 3)}{2} = 4850$ — expand to rearrange the equation to polynomial form

$n^2 - 3n - 9700 = 0$ — factorise

$(n - 100)(n + 97) = 0$ — use the null factor law

The only positive solution is $n = 100$.
There are **100** sides in the polygon with 4850 diagonals.

OR Use the quadratic formula:
For the equation $ax^2 + bx + c = 0$, $\boxed{x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}}$

$n^2 - 3n - 9700 = 0$
$a = 1, b = -3, c = -9700$

$n = \dfrac{3 \pm \sqrt{9 + 38\,800}}{2} = \dfrac{3 \pm 197}{2} = 100$ or -97

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