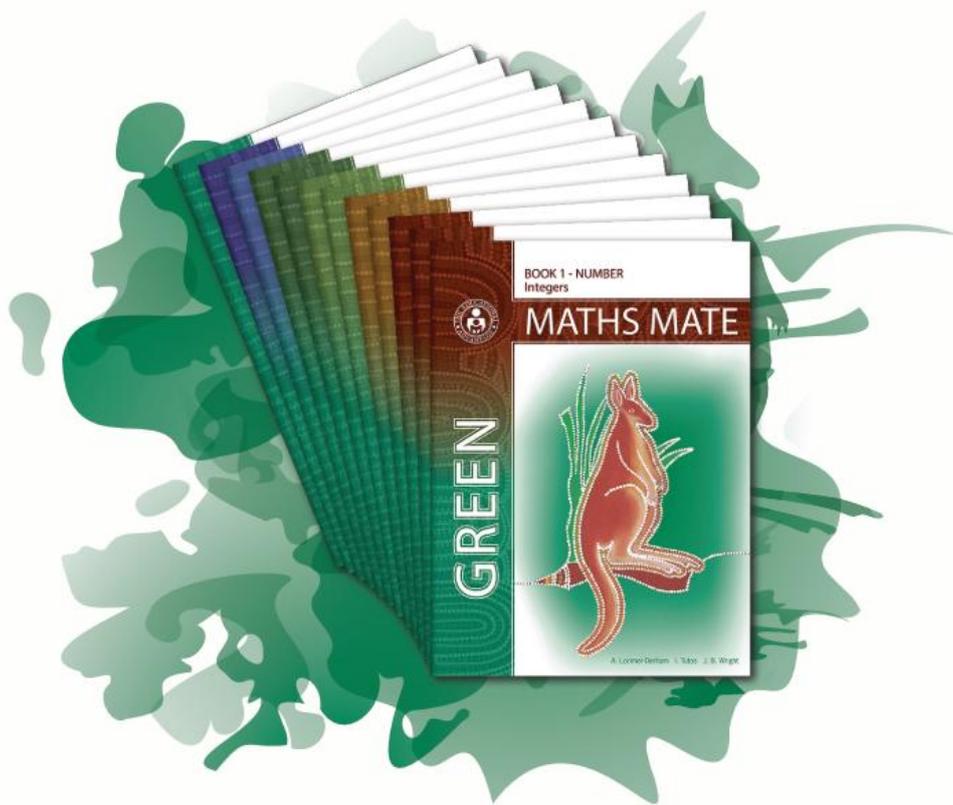


# GREEN TEXTBOOK



# Sample Pages

# BOOK 1 - NUMBER

## Integers

### **Sample pages include:**

Table of Contents .....	p1
Opening Puzzle - Fried Circuits .....	p2
Sample Lesson, with opener and Sudo-clue puzzle .....	p4
Activity - Nearest the Pin .....	p6
Book 1 Review .....	p8
Game - Magic (Zero) Square .....	p10

# MATHS MATE GREEN - BOOK 1

## Number - Integers

	<b>Drop the Koala's Integer Quest</b> .....	<b>1</b>
	<b>Space Pirates</b> .....	<b>2</b>
<b>1.1</b>	<b>Whole Numbers</b>	
1.1.1	Rounding Whole Numbers to a Given Place .....	5
	<b>Gold Diggers</b> .....	6
1.1.2	Comparing and Ordering Whole Numbers .....	7
1.1.3	Adding Whole Numbers .....	8
1.1.4	Subtracting Whole Numbers .....	10
1.1.5	Multiplying Whole Numbers .....	12
1.1.6	Dividing Whole Numbers .....	15
1.1.7	Using Order of Operations Rules .....	17
1.1.8	Properties of Operations .....	19
<b>1.2</b>	<b>Multiples, Factors and Primes</b>	
1.2.1	Finding Multiples and the Lowest Common Multiple .....	21
	<b>Number Path Factors and Multiples</b> .....	22
1.2.2	Understanding Factors, the HCF and Divisibility Tests .....	23
1.2.3	Recognising Prime and Composite Numbers .....	25
	<b>Humans vs Aliens</b> .....	25
	<b>Prime Merchandise</b> .....	26
1.2.4	Writing a Product of Prime Factors in Exponential Notation .....	28
	<b>Sudo-clue: Welcome</b> .....	29
<b>1.3</b>	<b>Integers</b>	
1.3.1	Comparing and Ordering Integers .....	30
1.3.2	Modelling Addition and Subtraction of Integers on a Number Line ...	31
	<b>Nearest the Pin</b> .....	32
1.3.3	Adding and Subtracting Integers Using a Number Line .....	33
1.3.4	Adding and Subtracting Integers by Simplifying the Signs .....	35
1.3.5	Multiplying Integers .....	37
1.3.6	Dividing Integers .....	38
1.3.7	Using Order of Operations Rules with Integers .....	39
<b>1.4</b>	<b>Exponents and Square Roots</b>	
1.4.1	Squaring Positive and Negative Integers .....	40
	<b>Tag</b> .....	40
1.4.2	Calculating Powers of Positive and Negative Integers .....	42
	<b>Power Mini Golf</b> .....	43
1.4.3	Using Exponent Laws .....	44
1.4.4	Calculating and Estimating Square Roots .....	46
1.4.5	Calculating Cubes and Cubic Roots of Integers .....	47
	<b>Space Pirates</b> .....	48
<b>1.5</b>	<b>Book 1 Review</b>	
	BOOK 1 - Integers REVIEW .....	50
	BOOK 1 - ANSWERS .....	51

# Fried Circuits

A massive bolt of lightning has caused a power outage at the MCG. Your job is to rewire the fried circuits and restore power to the light towers, one tower at a time. Take too long and the footy game will not go ahead. See how many of the towers you can save without exceeding ten minutes per circuit.

To rewire a circuit:

- All numbers must be included as part of a wire.
- The numbers included as part of each wire must add to 10.
- No wires may cross or share a space with another wire.
- Wires may only run horizontally or vertically.

**EXAMPLE #01**

	①		⑤		⑦
	①				
		⑧	③		③
			④		⑤
	⑥	②		④	
			⑨	②	

**SOLUTION #01**

	①		⑤		⑦
	①				
		⑧	③		③
			④		⑤
	⑥	②		④	
			⑨	②	

**BEGINNER #01**

⑧	⑥			
			③	
		④		
	②	⑦		

**BEGINNER #02**

	⑧			③
		⑤		⑤
	⑦			
			②	

**BEGINNER #03**

⑦	②			
			④	
	⑧			
			⑥	③

**BEGINNER #04**

	⑥		⑤	
	⑤		④	
	⑨			
			①	

**EASY #01**

⑤		⑦			
				⑧	
	①	⑤		④	
	②				
	⑥				
		⑨		③	

**EASY #02**

⑤	③	④	②		⑤
				①	
	⑥	⑦	⑨	⑧	

**EASY #03**

⑨			⑤		
			⑧		
⑦				②	⑤
	⑥				
	③			④	①

**EASY #04**

	⑧		⑤	②	
⑤				⑨	
⑦	⑥		③		
				①	④

**MODERATE #01**

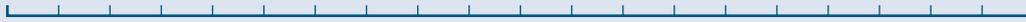
	⑤				②	
		④		③		
⑥				⑧		
⑨			③			
					②	⑦
				①		

**HARD #01**

							①
	③				④		
					⑦		
	①		⑧				
					①		
			①			⑥	⑧
	⑥				③		
⑨			②				

### 1.3.3 Adding and Subtracting Integers Using a Number Line

Demonstrate two different ways to model  $3 - 5$  on the number line.

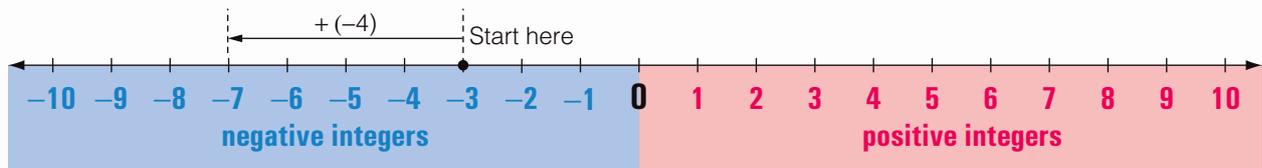


#### To add integers using a number line:

- Visualise or mark the starting number on a number line.
- If the number to add is positive, move that many units to the right.
- If the number to add is negative, move that many units to the left.

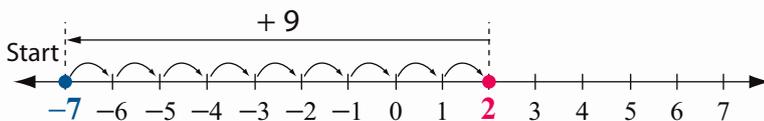
**Example:**  $-3 + (-4) = -7$

Start at  $-3$ . To add  $-4$  (negative 4), move 4 units left. You stop at  $-7$ .



#### 1. Add the integers.

**a)**  $-7 + 9$       Start at  $-7$  on the number line.  
 = 2              To add 9, move 9 units to the right.  
                     You stop at 2.



**b)**  $5 + (-7)$

**c)**  $-5 + (-3)$

**d)**  $2 + (-8)$

**e)**  $-6 + 4$

**f)**  $-7 + 11$

**g)**  $-5 + (-6)$

**h)**  $9 + (-4)$

**2.** A sample of oxygen has a temperature of  $-200^{\circ}\text{C}$ . The temperature is increased by  $17^{\circ}\text{C}$  and it starts to boil.

**a)** Write an operation to find the temperature at which the oxygen sample starts to boil.

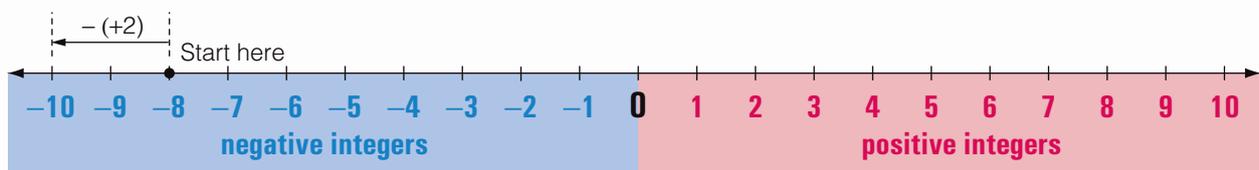
**b)** Find this temperature.

#### To subtract integers using a number line:

- Visualise or mark the starting number on a number line.
- If the number to subtract is positive, move that many units to the left.
- If the number to subtract is negative, move that many units to the right.

**Example:**  $-8 - (+2) = -10$

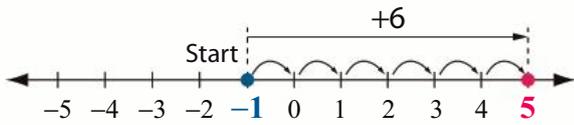
Start at  $-8$ . To subtract  $+2$  (positive 2), move 2 units left. You stop at  $-10$ .



**3. Subtract the integers.**

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

*Start at -1.  
 Move 6 units to the right to subtract a negative integer.  
 You stop at +5.*



**b)**  $3 - (-5)$

**c)**  $-3 - (-2)$

**d)**  $-4 - (+8)$

**e)**  $-0 - (+6)$

**f)**  $4 - (+7)$

**g)**  $3 - (-4)$

**h)**  $-5 - (-3)$

**4.** In New York the highest recorded temperature is  $42.2^{\circ}\text{C}$  and the lowest is  $-46.7^{\circ}\text{C}$ .

**a)** Write an operation to find the difference between the highest and the lowest recorded temperatures.

**b)** Find this temperature difference.

**5.** A nurse enters the elevator at the 5th floor of a hospital and travels down 9 floors.

**a)** Write an operation to find the level where she arrives.

**b)** Express this level as an integer.

**6.** You owe \$300 to your older brother. You pay him back \$240.

**a)** Write an operation to find the amount you still owe.

**b)** Calculate the amount you still owe.

**Sudo-clue: #02**

Place the numbers 1 to 9 on the grid using these clues:

If you made the five odd digits negative, the nine numbers would be  $-1, +2, -3, +4, -5, +6, -7, +8,$  and  $-9$  and:

1. The eight perimeter numbers would add to zero.
2. The numbers in Row A would add to zero.
3. The numbers in Column 1 would add to zero.
4. In Column 3 the first two numbers add to give the third.
5. The first number in the top row has no positive neighbours.

	1	2	3
A			
B			
C			

## Nearest the Pin

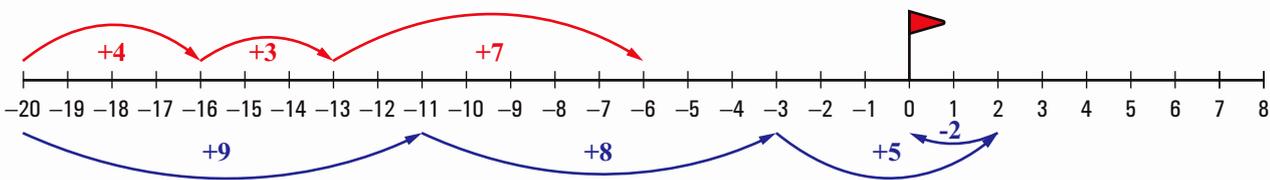
The aim is to be the first player to hit their ball in the hole or be the closest to the hole after 5 shots. *Nearest the Pin* is a two player *matchplay* game. Players take turns to choose from the numbers 1-10. The number chosen represents the distance the ball is hit. One player can draw their shots below the number line, and the other can draw their shots above the number line, or simply use different coloured pencils.

### Rules:

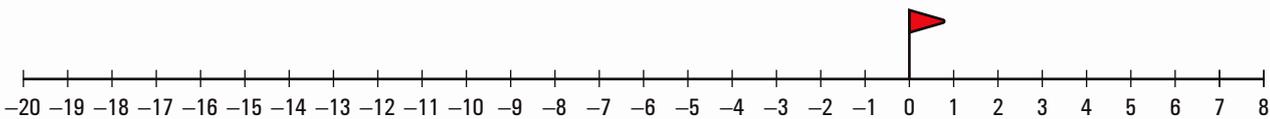
- Each player starts at  $-20$ .
- Players can hit the ball either forwards or backwards on the number line to try to get in the hole at 0.
- The hole is won immediately if someone reaches 0. Otherwise, the hole is won by the player closest to 0 after the tenth shot has been played.
- If players are an equal distance from the hole, the player who used the 10 loses the hole.
- The first player to win 3 holes, wins the match.

Player 1	+9		+8		+5		-2
Player 2		+4		+3		+7	

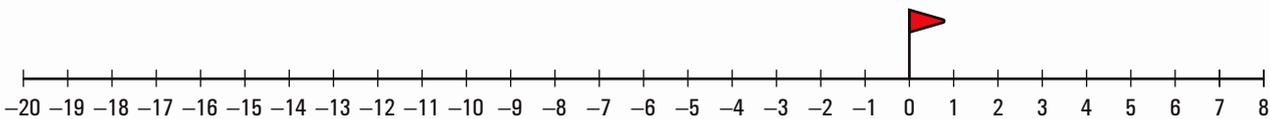
Player 1 wins. (In matchplay golf, all that matters is who wins the hole. There is no bonus for winning in 3 shots instead of 5.)



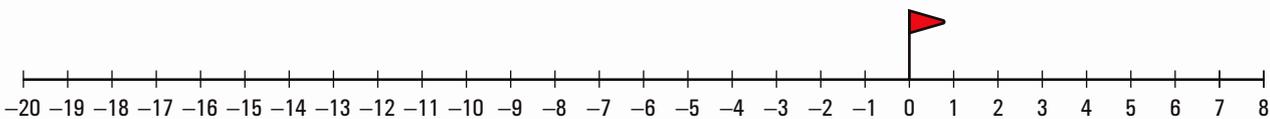
1	6
<del>2</del>	<del>7</del>
<del>3</del>	<del>8</del>
<del>4</del>	<del>9</del>
<del>5</del>	<del>10</del>



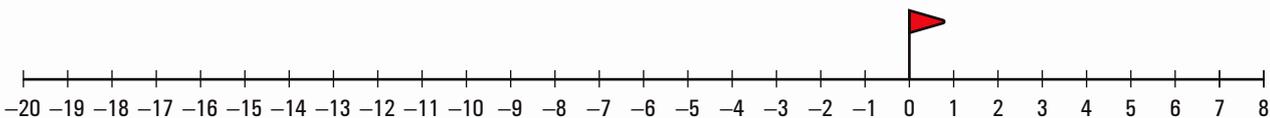
1	6
2	7
3	8
4	9
5	10



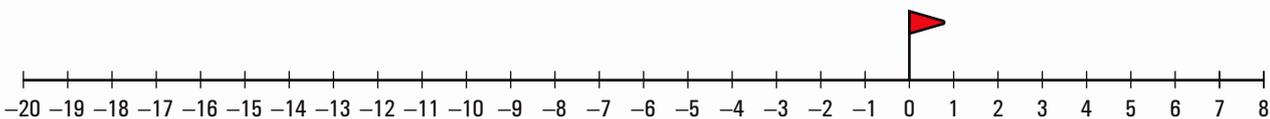
1	6
2	7
3	8
4	9
5	10



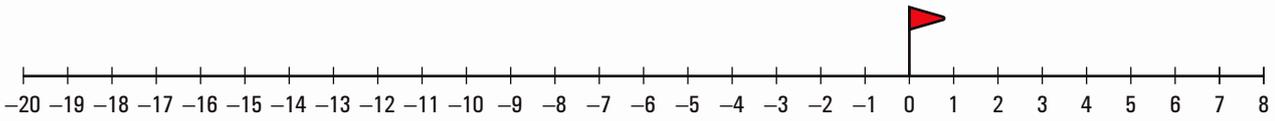
1	6
2	7
3	8
4	9
5	10



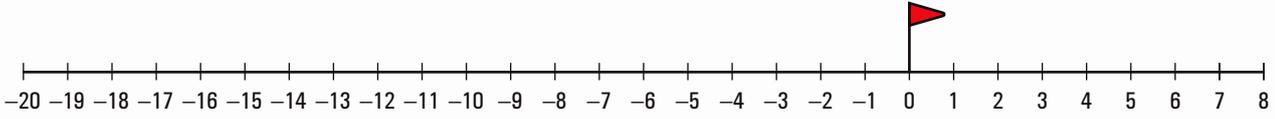
1	6
2	7
3	8
4	9
5	10



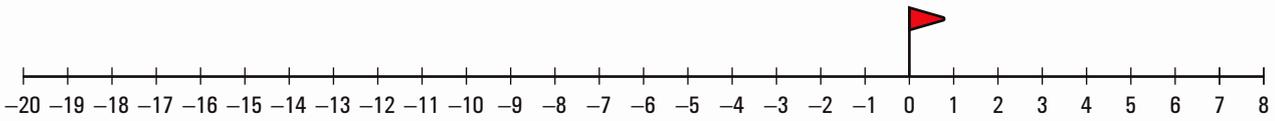
1	6
2	7
3	8
4	9
5	10



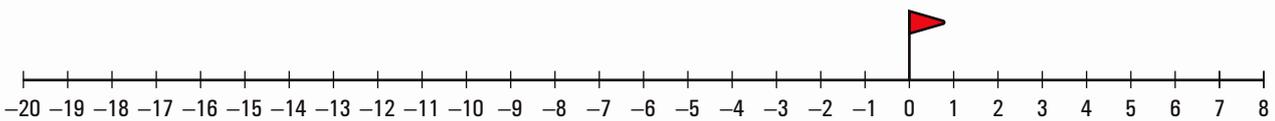
- 1 6
- 2 7
- 3 8
- 4 9
- 5 10



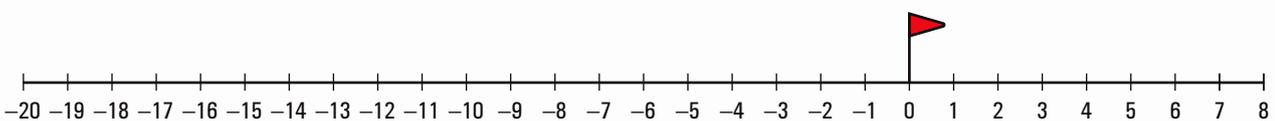
- 1 6
- 2 7
- 3 8
- 4 9
- 5 10



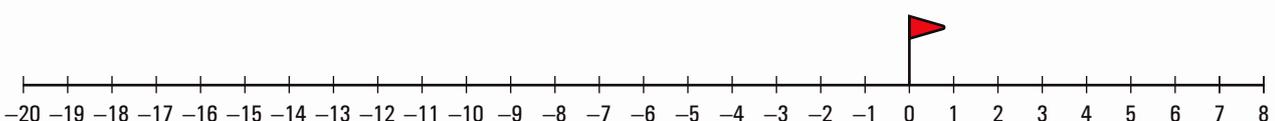
- 1 6
- 2 7
- 3 8
- 4 9
- 5 10



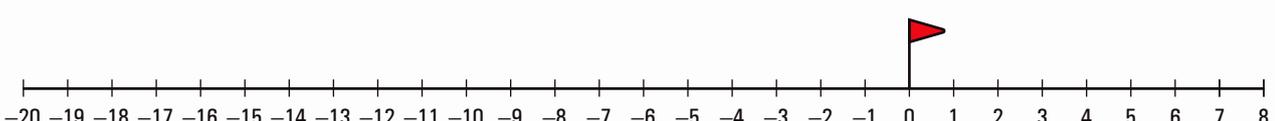
- 1 6
- 2 7
- 3 8
- 4 9
- 5 10



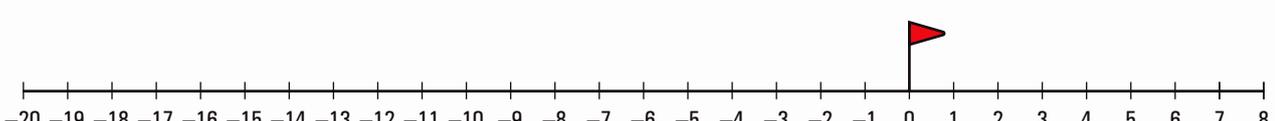
- 1 6
- 2 7
- 3 8
- 4 9
- 5 10



- 1 6
- 2 7
- 3 8
- 4 9
- 5 10



- 1 6
- 2 7
- 3 8
- 4 9
- 5 10



- 1 6
- 2 7
- 3 8
- 4 9
- 5 10

## 1.5 BOOK 1 - Integers REVIEW

### Multiple Choice

1. 36 550 rounded to the nearest thousand is:

- A** 36 500                      **B** 37 000  
**C** 36 000                      **D** 36 600

2. The sum of  $16 + 89 + 104$  is:

- A** 199    **B** 209    **C** 105    **D** 193

3. How many digits are in the result of  $500 \times 1300$ ?

- A** 4        **B** 5        **C** 6        **D** 7

4. The lowest common multiple of 12 and 18 is:

- A** 36    **B** 24    **C** 48    **D** 54

5. The highest common factor of 30 and 60 is:

- A** 6        **B** 10        **C** 15        **D** 30

6. Which is not a composite number?

- A** 21    **B** 25    **C** 27    **D** 29

7. The prime factorisation for 72 is:

- A**  $8 \times 9$   
**B**  $2^4 \times 3^3$   
**C**  $2^3 \times 3^2$

8. Which temperature is the highest?

- A**  $-62^\circ\text{C}$  (Alaska)  
**B**  $-34.3^\circ\text{C}$  (Finland)  
**C**  $-89.6^\circ\text{C}$  (Antartica)  
**D**  $-58^\circ\text{C}$  (China)

9. Machu Picchu (Peru) is at 2430 m above sea level. Qattara Depression (Egypt) is located at 133 m below sea level. What is the altitude difference between the two locations?

- A** 2297 m                      **B** 2430 m  
**C** 2563 m                      **D** 133 m

10. Which number is not a square number?

- A** 36    **B** 49    **C** 64    **D**  $-81$

11.  $5^5 \times 5^4 \times 5$  in simplest form is:

- A**  $5^{10}$     **B**  $5^9$     **C**  $5^3$     **D**  $5^6$

12. The value of  $(-5)^3$  is:

- A**  $-25$     **B**  $-125$     **C** 125    **D** 25

### Short Answer

1. Re-order from largest to smallest.

8055, 5805, 8550, 5085, 5508

2. Round the numbers to the nearest hundred.

- a)** 6080                      **b)** 1450

3. Calculate:

- a)**  $40153 + 9960$                       **b)**  $7004 - 2809$

- c)**  $142 \times 500$                       **d)**  $725 \times 8$

- e)**  $6300 \div 300$                       **f)**  $4128 \div 12$

- g)**  $20^2$                       **h)**  $3^5$

- i)**  $\sqrt{81}$                       **j)**  $\sqrt[3]{1000}$

4. Use BOMDAS and calculate:

- a)**  $18 - 3 \times 2$                       **b)**  $7 \times (10 - 5 \times 1)$

- c)**  $10 + 12 \div 2 \times 3$                       **d)**  $(11 - 27 \div 9)^2$

## 1.5 BOOK 1 - Integers REVIEW

5. What is the lowest common multiple of 4, 9 and 12?

.....

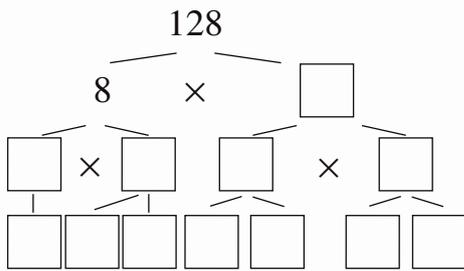
6. What is the highest common factor of 8, 16 and 40?

.....

7. True or false?

- a) 51 is a prime number. ....
- b) 310 is a composite number. ....
- c) 4 is a factor of 2025. ....
- d) 3750 is divisible by 6. ....

8. Express 128 as a product of prime factors in exponential notation, by first completing the factor tree.



128 = .....

9. Calculate:

- a)  $-6 + (-3)$  .....  
 b)  $-8 - (-2)$  .....
- c)  $(-3) \times (-5)$  .....  
 d)  $20 \div (-2)$  .....
- e)  $(-2) \times (-1 + 6)$  .....  
 f)  $(3 - 5) \times (5 - 3)$  .....

10. Calculate:

- a)  $(-10)^2$  .....  
 b)  $(-4)^3$  .....
- c)  $2^6 \div 2^4$  .....  
 d)  $(3^5)^0$  .....
- e)  $\sqrt[3]{-27}$  .....  
 f)  $\sqrt[3]{216}$  .....

11. What is the lowest common multiple of 15, 30 and 45?

.....

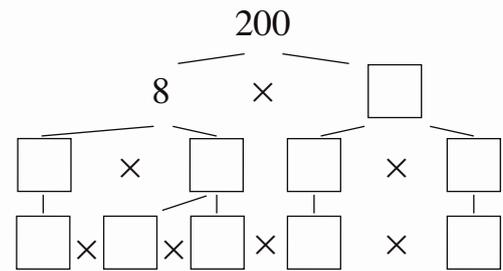
12. What is the highest common factor of 12, 24 and 30?

.....

13. True or false?

- a) 71 is not a prime number. ....
- b) 111 is a composite number. ....
- c) 100 is a factor of 1200. ....
- d) 2022 is divisible by 4. ....

14. Express 200 as a product of prime factors in exponential notation, by first completing the factor tree.



200 = .....

15. Calculate:

- a)  $-8 + 5$  .....  
 b)  $12 - (+20)$  .....
- c)  $6 \times (-9)$  .....  
 d)  $24 \div (-4)$  .....
- e)  $5 \times (8 - 11)$  .....  
 f)  $(7 - 3) \times (3 - 7)$  .....

16. Calculate:

- a)  $(-2)^3$  .....  
 b)  $(-5)^2$  .....
- c)  $3^4 \div 3^3$  .....  
 d)  $(2^2)^2$  .....
- e)  $\sqrt[3]{-8}$  .....  
 f)  $\sqrt[3]{27}$  .....

## Magic (Zero) Square

The aim is to be the first team/individual to place 16 numbers in a  $4 \times 4$  square, where **all** the rows, columns and diagonals add to 0.

You may choose from 1 - 10 in both Red and Blue. Use red cards (1 - 10) to represent negative integers and blue cards (1 - 10) to represent positive integers. You may only use each number once.

The mathematical playing cards can be sourced from Andrew Lorimer's website at <https://thinksquare.com.au/mathematical-playing-cards/lightning-multiplication-cards/>

Alternatively, students can write the integers in the  $4 \times 4$  squares below.

1	6	2	9	↖ 0
6	5	5	9	→ 0
7	4	7	4	→ 0
8	3	8	3	→ 0
	↓ 0		↘ 0	

For example, in this grid, 6 of 10 parts are completed:

**Top row:**  $-1 + -6 + -2 + 9 = 0$

**Third row:**  $7 + 4 + -7 + -4 = 0$

**Fourth row:**  $-8 + -3 + 8 + 3 = 0$

**Second column:**  $-6 + 5 + 4 + -3 = 0$

**Main diagonal:**  $-1 + 5 + -7 + 3 = 0$

**Second diagonal:**  $9 + -5 + 4 + -8 = 0$

Your goal is to get all ten.

1
2
10
10





