

Mathletics

The New Zealand Curriculum

Year 8



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Chapter 1 Computation with integers

Computation with integers

Positive and negative numbers are used every day – when you:

- measure temperatures
- read bank account statements
- estimate costs to stay within budget

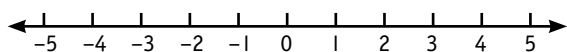
Understanding that the number system extends below zero, and knowing the rules and properties for calculating integers, ensures your mathematical working is accurate.



Key ideas

✓ Integers on the number line

Positive and negative numbers sit either side of zero. Example: $-5 < 0 < 5$

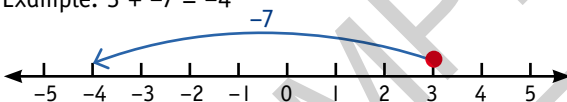


✓ Additive inverse

A number and its opposite always add up to zero. Example: $-5 + 5 = 0$

✓ Adding and subtracting integers

Move up or down the number line to find the total. Example: $3 + -7 = -4$



✓ Exponents (Indices)

Tell you how many times to multiply a number by itself.

Example: $5^3 = 5 \times 5 \times 5 = 125$

✓ Order of operations

Brackets $\rightarrow$ Exponents $\rightarrow \times \div \rightarrow + -$

Example: $6^2 - (9 + 12 \div 4) = 24$

By the end of this chapter, you will be able to:

- locate, compare, and order integers
- apply the additive inverse
- calculate using the four operations with integers
- evaluate basic exponents
- apply the order of operations
- solve real-world word problems

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Knowledge	Practices
Number	Number Structures and Operations
The number system extends infinitely, including into negative numbers, and can be represented with a number line.	Using exponents for cube numbers up to at least 125
Integers are all the whole numbers, including positive whole numbers, negative whole numbers, and zero.	Locating negative and positive numbers on a number line
Every number has an additive inverse, and their sum is zero (e.g. -5 and 5 are additive inverses; $-5 + 5 = 0$ and $5 + -5 = 0$).	Comparing and ordering negative and positive numbers using a number line
Division can result in a remainder expressed as a whole number, fraction, or decimal.	Evaluating expressions involving negative numbers, addition and subtraction
In expressions that have more than one operation, the order of operations is important; operations are done as follows: 1. operations grouped inside brackets 2. exponents such as squaring and cubing 3. multiplication and division, from left to right 4. addition and subtraction, from left to right. A mnemonic, such as GEMA: grouped, exponents, multiplicative ($\times$ and $\div$), and additive ($+$ and $-$) can be used to remember the order of operations.	Multiplying and dividing whole numbers
	Evaluating expressions with integers, using the order of operations

1 Draw these symbols on the number line at their integer position.

a  5

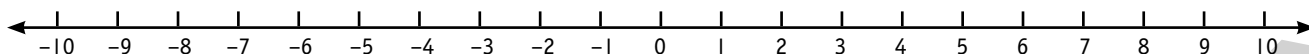
b  -2

c  3

d  0

e  -4

f  -9



2 Use the symbols above as starting positions for the directions below. What integer do they end on?

a  2 spaces left followed by 5 spaces right _____

b  3 spaces up followed by 7 spaces down _____

c  5 spaces right followed by 4 spaces right _____

d  6 spaces down followed by 1 space up _____

e  4 spaces left followed by 4 spaces right _____

f  9 spaces down followed by 5 spaces up _____

3 Add the greater than (>) or less than (<) symbol to make these statements true.

a 2 _____ 8 b 7 _____ -3 c -5 _____ -1 d 6 _____ 12

e -4 _____ -7 f -9 _____ 4 g -2 _____ -6 h 7 _____ -2

i 9 _____ -16 j -23 _____ -3 k -19 _____ -22 l 13 _____ -17

m -64 _____ -102 n 37 _____ -44 o -56 _____ 38 p -84 _____ -92

4 Place these integers in ascending order.

a -3, 9, 4, -1, -8, 2 _____
b -5, -19, -12, -8 _____

c 1, -2, 3, -4, 5 _____
d 49, 16, -53, -28, 0 _____

e -7, -8, 13, -2, -11 _____
f 12, -18, 24, -31, -2, -19 _____

5 Place these integers in descending order.

a 2, -1, 7, -5, 3 _____
b -12, -6, 4, -13, -1 _____

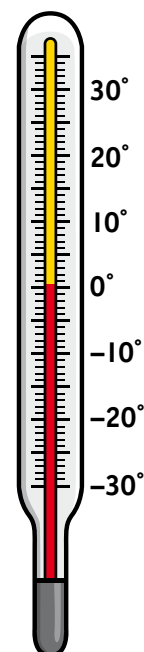
c -21, -14, 7, -15, -8 _____
d 13, -6, -1, 0, -15 _____

e -87, -32, -6, -24, -60 _____
f 37, -45, 92, -101, -235 _____

6 Write the temperatures onto the thermometer.

a 5° b -15° c -22°

d 17° e -2° f 11°





Adding positive and negative integers

$$+ + = +$$

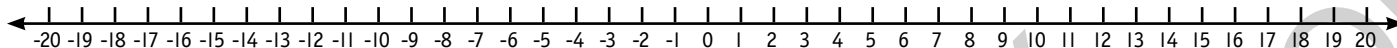
$$+ - = -$$

$$2 + 3 = 5$$

$$2 + -3 = 2 - 3 = -1$$

$$-2 + 3 = 1$$

$$-2 + -3 = -2 - 3 = -5$$



1 Find the sum of the following. Use the number line if necessary.

a $8 + 3 =$ _____

b $7 + -2 =$ _____

c $6 + 5 =$ _____

d $12 + -12 =$ _____

e $5 + 8 =$ _____

f $3 + -4 =$ _____

g $12 + 2 =$ _____

h $10 + -2 =$ _____

i $12 + 14 =$ _____

2 Find each sum.

a $7 + 6 =$ _____

b $9 + -5 =$ _____

c $23 + 8 =$ _____

d $7 + -7 =$ _____

e $3 + 21 =$ _____

f $15 + -2 =$ _____

g $3 + 9 =$ _____

h $5 + -7 =$ _____

i $52 + 2 =$ _____

3 Add the following.

a $2 + 3 =$ _____

b $8 + -5 =$ _____

c $13 + 6 =$ _____

d $-2 + 2 =$ _____

e $9 + 21 =$ _____

f $7 + -5 =$ _____

g $9 + 18 =$ _____

h $2 + -4 =$ _____

i $-9 + 18 =$ _____

4 Find the answers to these additions.

a $10 + 14 =$ _____

b $-3 + -2 =$ _____

c $-7 + 22 =$ _____

d $-9 + 9 =$ _____

e $-6 + 42 =$ _____

f $-9 + -5 =$ _____

g $4 + 8 =$ _____

h $-8 + -3 =$ _____

i $-6 + 14 =$ _____

5 Find the values of the following.

a $-3 + 6 + 8 =$ _____

b $12 + -4 =$ _____

c $-16 + 31 =$ _____

d $-15 + 15 =$ _____

e $-8 + 16 =$ _____

f $-7 + -6 =$ _____

g $-11 + 9 + 2 =$ _____

h $-10 + -5 + -2 =$ _____

i $-12 + 15 =$ _____

6 Find the missing number.

a $12 + \underline{\hspace{2cm}} = 21$

b $\underline{\hspace{2cm}} + -3 = 12$

c $-8 + 14 = \underline{\hspace{2cm}}$

d $6 + \underline{\hspace{2cm}} = -9$

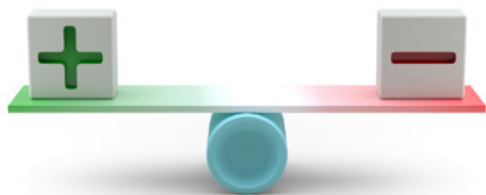
e $-6 + 10 = \underline{\hspace{2cm}}$

f $8 + \underline{\hspace{2cm}} = -7$

g $15 + \underline{\hspace{2cm}} = 29$

h $(-8) + -4 = \underline{\hspace{2cm}}$

i $11 + -11 = \underline{\hspace{2cm}}$



Subtracting positive and negative integers

$$- + = -$$

$$3 - 4 = -1$$

$$-3 - 2 = -5$$

$$- - = +$$

$$3 - -2 = 3 + 2 = 5$$

$$-3 - -2 = -3 + 2 = -1$$

1 Find the answers for the following questions.

a $6 - 2 =$ _____

b $8 - -3 =$ _____

c $9 - 6 =$ _____

d $9 - -1 =$ _____

e $17 - 17 =$ _____

f $18 - -10 =$ _____

g $8 - 15 =$ _____

h $16 - -6 =$ _____

i $25 - 8 =$ _____

2 Find each difference.

a $-17 - 4 =$ _____

b $-8 - -2 =$ _____

c $-10 - 3 =$ _____

d $-15 - -15 =$ _____

e $-6 - 4 =$ _____

f $-9 - -3 =$ _____

g $-10 - 7 =$ _____

h $-12 - -8 =$ _____

i $-7 - 21 =$ _____

3 Find the answers for the following subtractions.

a $-4 - 13 =$ _____

b $5 - 7 =$ _____

c $-5 - 12 =$ _____

d $-6 - -2 =$ _____

e $-7 - 16 =$ _____

f $-8 - -3 =$ _____

g $-8 - 24 =$ _____

h $-6 - -6 =$ _____

i $-10 - 15 =$ _____

4 Find the values of the following.

a $-8 - 18 =$ _____

b $-18 - -4 =$ _____

c $56 - 13 =$ _____

d $-17 - -9 =$ _____

e $-23 - -23 =$ _____

f $-15 - -12 =$ _____

g $-7 - 17 =$ _____

h $-16 - -6 =$ _____

i $-19 - 21 =$ _____

5 Simplify the following.

a $8 - 12 =$ _____

b $-5 - 2 =$ _____

c $-5 - 7 =$ _____

d $8 - -6 =$ _____

e $-5 - -5 =$ _____

f $-5 - -3 =$ _____

g $-9 - 9 =$ _____

h $-7 - 10 =$ _____

i $6 - 15 =$ _____

6 Manu is going hiking. He parks at 200 m above sea level. Write the equation and the new elevation for each day.

a On Monday, he hikes up 250 m. _____

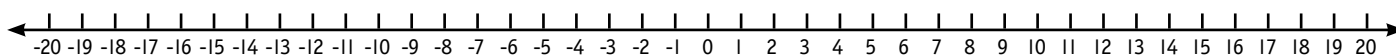
b On Tuesday, he slides down 500 m! _____

c On Wednesday, he climbs a cliff for 300 m. _____

d On Thursday, he abseils down 425 m. _____

e On Friday, he hikes back up to his car. _____





- 1
- a** $8 + -5 =$ _____ **b** $12 - 15 =$ _____ **c** $7 - -4 =$ _____
- d** $9 + -10 =$ _____ **e** $14 - -2 =$ _____ **f** $6 + -6 =$ _____
- g** $20 - 25 =$ _____ **h** $3 - -8 =$ _____ **i** $11 + -4 =$ _____

2 Find the answers to the following.

- a** $-6 + 4 =$ _____ **b** $-9 - 2 =$ _____ **c** $-5 - -7 =$ _____
- d** $-12 + 10 =$ _____ **e** $-8 - -8 =$ _____ **f** $-3 + -4 =$ _____
- g** $-15 + 20 =$ _____ **h** $-7 - -3 =$ _____ **i** $-10 - 5 =$ _____

3 Simplify the following.

- a** $7 + -3 =$ _____ **b** $-5 - -9 =$ _____ **c** $12 + -15 =$ _____
- d** $-8 + -4 =$ _____ **e** $6 - -11 =$ _____ **f** $-2 - -2 =$ _____
- g** $14 + -6 =$ _____ **h** $-10 - -5 =$ _____ **i** $9 - -9 =$ _____

4 Simplify the following.

- a** $-14 + 8 =$ _____ **b** $13 - 18 =$ _____ **c** $-7 - -12 =$ _____
- d** $5 + -16 =$ _____ **e** $-22 + 11 =$ _____ **f** $-9 - 9 =$ _____
- g** $17 - -4 =$ _____ **h** $-6 + -8 =$ _____ **i** $0 - -15 =$ _____

5 Complete the addition and subtraction tables.

a

-	4	-2	7	-5
3				
-8				
-1				

b

+	5	-3	8	-10
-2				
7				
-6				

c

-	9	-12	-7	3
8				
-2				
-11				

d

+	7	-13	4	-16
-5				
9				
8				

When an expression only contains **addition** and **subtraction**,
apply the order of operation by working from left to right.

Example: $-4 + 7 - 5$

Step 1: $-4 + 7 = 3$

Step 2: $3 - 5 = -2$

1 Work out the following 3-term expressions.

a $12 + 4 - 9 =$ _____

b $-8 + 10 - 5 =$ _____

c $15 - 20 + 3 =$ _____

d $-7 - 4 + 12 =$ _____

e $6 - 14 - 2 =$ _____

f $-9 + 9 - 4 =$ _____

g $18 - 10 + -3 =$ _____

h $-5 - -5 + 2 =$ _____

i $11 + -4 - 8 =$ _____

2 Evaluate these 4-term expressions. Remember to work left to right.

a $5 + 2 - 8 + 4 =$ _____

b $-3 + 7 - 2 + 1 =$ _____

c $10 - 15 + 4 - 2 =$ _____

d $-6 - 2 + 10 - 5 =$ _____

e $8 + -3 - 4 + 2 =$ _____

f $-12 + 5 - -3 + 1 =$ _____

g $4 - 9 + 6 - 3 =$ _____

h $-1 + 8 - 10 + 4 =$ _____

i $7 - -2 + -5 - 6 =$ _____

3 Simplify the following.

a $-2 + 6 - 8 + 3 =$ _____

b $14 - 20 + 5 - 2 =$ _____

c $-8 - -4 + 7 - 6 =$ _____

d $9 + -12 - 3 + 8 =$ _____

e $-5 + 15 - 20 + 2 =$ _____

f $3 - 10 + -4 - -5 =$ _____

g $-11 + 6 - 2 + 9 =$ _____

h $17 - 8 + -5 - 4 =$ _____

i $-4 - 6 + 12 - 3 =$ _____

4 Find the missing number to make the equation true.

a $5 + 3 - \underline{\hspace{1cm}} = 2$

b $-4 + \underline{\hspace{1cm}} - 1 = 3$

c $10 - 12 + \underline{\hspace{1cm}} = 0$

d $\underline{\hspace{1cm}} - 5 + 2 = -7$

e $-8 + 8 - \underline{\hspace{1cm}} = 4$

f $6 - \underline{\hspace{1cm}} + 3 = -1$

g $-2 - -4 + \underline{\hspace{1cm}} = 5$

h $\underline{\hspace{1cm}} + 7 - 10 = -5$

i $9 - 14 + \underline{\hspace{1cm}} = -2$

j $12 - 15 + \underline{\hspace{1cm}} = 4$

k $\underline{\hspace{1cm}} - 9 + 3 = -5$

l $\underline{\hspace{1cm}} + 2 - 15 = 8$

5 The weather at Aoraki / Mount Cook changes frequently. At dawn, the temperature is -5°C .
Write the equation and the new temperature for each time of day.

a By midday, the temperature goes up by 12°C . _____

b In the afternoon, the temperature drops by 9°C . _____

c Overnight, it drops another 4°C . _____

6 Insert the correct operation sign (+ or -) in the empty boxes to make the statements true.

a $15 \underline{\hspace{0.5cm}} 8 \underline{\hspace{0.5cm}} 4 = 11$

b $5 \underline{\hspace{0.5cm}} 12 \underline{\hspace{0.5cm}} 8 = 9$

c $12 \underline{\hspace{0.5cm}} 19 \underline{\hspace{0.5cm}} 7 = 0$

d $-3 \underline{\hspace{0.5cm}} 8 \underline{\hspace{0.5cm}} 5 = 10$

e $20 \underline{\hspace{0.5cm}} 14 \underline{\hspace{0.5cm}} 9 = -3$

f $-7 \underline{\hspace{0.5cm}} 15 \underline{\hspace{0.5cm}} 12 = -4$

Every integer has an opposite, known as its additive inverse.
When you add a number and its additive inverse together,
they cancel each other out, and the sum is always zero.

Example: $5 + -5 = 0$ and $-12 + 12 = 0$

- 1 Write the additive inverse for each of the following numbers.

a $6 =$ _____

b $-9 =$ _____

c $15 =$ _____

d $-3 =$ _____

e $22 =$ _____

f $-14 =$ _____

g $-8 =$ _____

h $11 =$ _____

i $-100 =$ _____

- 2 Fill in the missing number to make the equation true.

a $7 +$ _____ $= 0$

b _____ $+ 12 = 0$

c $-8 +$ _____ $= 0$

d _____ $+ -4 = 0$

e $25 +$ _____ $= 0$

f $-18 +$ _____ $= 0$

g _____ $+ 30 = 0$

h $-50 +$ _____ $= 0$

i $99 +$ _____ $= 0$

- 5 Use the additive inverse to easily solve these expressions.

a $4 + 7 + -4 =$ _____

b $-9 + 15 + 9 =$ _____

c $12 + -5 + -12 =$ _____

d $-8 + -3 + 8 =$ _____

e $20 + 6 + -20 =$ _____

f $-11 + 14 + 11 =$ _____

g $5 + -10 + -5 =$ _____

h $-2 + 18 + 2 =$ _____

i $13 + 7 + -13 =$ _____

j $17 + -8 + 8 =$ _____

- 4 A drone is hovering at an altitude of 15 metres.

Write the equation and its new altitude for each change.

a It flies up 8 metres. _____

b It flies down 8 metres. _____

c Explain how this represents the additive inverse. _____

- 5 Maia is tracking her bank account. Her starting balance is \$40.

Write the equation and her new balance for each change.

a She gets paid \$15 for walking her neighbour's dog. _____

b She buys lunch at the bakery for \$15. _____

c Explain how this represents the additive inverse. _____

base exponent
↓ ↙
 $3^4 = 81$
 $= 3 \times 3 \times 3 \times 3$
1 2 3 4

1 Evaluate the following exponents.

a $4^2 =$ _____ b $2^3 =$ _____
c $6^2 =$ _____ d $3^3 =$ _____
e $9^2 =$ _____ f $5^3 =$ _____
g $7^2 =$ _____ h $1^3 =$ _____

i $10^2 =$ _____

2 Add and subtract expressions with exponents.

a $3^2 - 15 =$ _____ b $4^2 + (-6) =$ _____ c $2^3 - 12 =$ _____
d $5^2 + (-30) =$ _____ e $7^2 - 50 =$ _____ f $3^3 + (-20) =$ _____
g $8^2 - 70 =$ _____ h $1^3 + (-5) =$ _____ i $10^2 - 120 =$ _____

3 Multiply and divide expressions with exponents.

a $2^2 \times 5 =$ _____ b $3^2 \times 3 =$ _____ c $4^2 \times 2 =$ _____
d $5^2 \times 4 =$ _____ e $2^3 \times 10 =$ _____ f $6^2 \div 4 =$ _____
g $10^2 \div 5 =$ _____ h $4^3 \div 8 =$ _____ i $3^3 \div 9 =$ _____

4 Simplify multi-step expressions.

a $3^2 \times 2 - 20 =$ _____ b $5^2 - 4 \times 8 =$ _____
c $2^3 \times 3 - 30 =$ _____ d $4^2 \div 2 - 15 =$ _____
e $10^2 - 3 \times 40 =$ _____ f $3^3 \div 3 - 12 =$ _____
g $6^2 - 5 \times 8 =$ _____ h $2^2 \times 6 - 30 =$ _____
i $5^3 \div 5 - 35 =$ _____ j $10^3 - 5 \times 20 =$ _____

5 Write out the full equation and find the answer.

a $2^2 \times 2^3 =$ _____
b $2^5 =$ _____
c $5^4 \times 5^5 =$ _____
d $5^9 =$ _____
e $10^3 \times 10^3 =$ _____
f $10^6 =$ _____

g Explain the rule for multiplying exponents with the same base.

1 Evaluate these expressions.

- a $6 \times 3 - 25 =$ _____ b $24 \div 4 - 11 =$ _____
c $-12 + 5 \times 2 =$ _____ d $7 \times 4 - 40 =$ _____
e $36 \div 6 - 15 =$ _____ f $-5 + 18 \div 3 =$ _____
g $9 \times 3 - 30 =$ _____ h $45 \div 5 - 14 =$ _____

Grouping () []

Exponents a^x

Multiply and divide $\times \div$

Add and subtract $+$ $-$

2 Evaluate these expressions.

- a $2^3 \times 3 - 35 =$ _____ b $5^2 \div 5 - 12 =$ _____ c $-15 + 3^2 \times 2 =$ _____
d $4^2 \times 2 - 40 =$ _____ e $6^2 \div 9 - 10 =$ _____ f $-8 + 2^3 \times 4 =$ _____
g $3^3 \div 3 - 15 =$ _____ h $10^2 \div 4 - 30 =$ _____ i $-50 + 4^2 \times 3 =$ _____

3 Evaluate.

- a $(25 - 5) \div 4 - 12 =$ _____ b $(3 + 5) \times 3 - 30 =$ _____
c $-18 + (14 - 4) \div 2 =$ _____ d $(40 - 4) \div 6 - 15 =$ _____
e $(2 + 4) \times 5 - 42 =$ _____ f $-30 + (16 + 4) \div 5 =$ _____
g $(50 - 2) \div 8 - 11 =$ _____ h $(1 + 6) \times 4 - 35 =$ _____
i $-8 + (30 - 10) \div 4 =$ _____ j $(12 - 2) \times 5 - 60 =$ _____

4 Insert grouping symbols to make these statements correct.

- a $6 + 4 \times 5 = 50$ b $12 \times 5 - 2 = 36$ c $12 - 4 \times 2 - 30 = -14$
d $20 - 2 \times 8 - 5 = 14$ e $15 - 3 \times 6 + 2 = -9$ f $40 \div 8 - 3 = 8$
g $24 \div 6 - 2 - 10 = -4$ h $3 \times 2^3 - 2 = 18$ i $4 - 16 \div 4 - 2 = -4$

5 Complete the operational chain table.

Input (x)	Step 1: Evaluate x^2	Step 2: Multiply by 3	Step 3: Subtract 40
1			
2			
3			
4			
5			
Input (y)	Step 1: Evaluate y^3	Step 2: Multiply by 2	Step 3: Subtract 100
0			
1			
2			
3			
4			

Problem solving with integers

Chapter 1 Computations with integers

- 1 The temperature was -3° . It rose 7° in an hour. What was the temperature at the end of the hour?
- 2 Adelaide is 35° south of the equator and Tokyo is 35° north of the equator. How many degrees are between Adelaide and Tokyo?
- 3 A drone flies up 25 metres, then flies down 35 metres. What is its final position relative to its starting point?
- 4 Charlie owes \$3,250 on his credit card.
- a He pays \$1,500 off the bill. How much does Charlie now owe?
- b Then Charlie buys a laptop for \$795. How much does Charlie owe now?
- 5 A spider is climbing a wall. It climbs up 5 cm, falls back 3 cm, climbs up another 4 cm, falls back 6 cm and climbs up another 5 cm. How far up the wall is the spider from its starting point?
- 6 The temperature fell 5 degrees during the day and another 8 degrees during the night. What was the total change in temperature?
- 7 Daisy travelled 8 km east and then 5 km west. Where did Daisy end up relative to her starting point?
- 8 What negative number is both greater than -6 and divisible by 4?
- 9 A submarine is at a depth of -40 metres. It descends another 30 metres. What is its new depth?
- 10 What is the combined effect of a profit of \$17,000 followed by a loss of \$20,000?
- 11 Find the two numbers that have a difference of 8 and a sum of -2 .
- 12 Jake had \$864 in the bank. He put another \$56 in the bank and then withdrew \$345. How much money does Jake now have in the bank?
- 13 An elevator starts on floor 10. It travels down 14 floors. Which floor is it on now?

Computations with integers

- Instructions**
- This part consists of 12 multiple-choice questions.
 - Fill in only ONE CIRCLE for each question.
 - Each question is worth 1 mark.
 - Calculators are NOT allowed.

Time allowed: 15 minutes

Total marks: 12

				Marks		
1	$3 - -5$ equals:	(A) 2	(B) -2	(C) 8	(D) -8	☐
2	$-4 + -7$ equals:	(A) 3	(B) -3	(C) 11	(D) -11	☐
3	Which of the following expressions is equal to -5 ?	(A) $-2 - 3$	(B) $-8 + 2$	(C) $1 - 4$	(D) $-10 - 5$	☐
4	What is the sum of 4 and -5 ?	(A) 1	(B) -1	(C) 9	(D) -9	☐
5	$-6 + 8 - 5$ equals:	(A) 7	(B) -7	(C) 3	(D) -3	☐
6	$-4 - (-3) + (-5)$ equals:	(A) -6	(B) 6	(C) -12	(D) 12	☐
7	$12 + (-5) - (-2)$ equals:	(A) 5	(B) 9	(C) 15	(D) 19	☐
8	What is the additive inverse of -7 ?	(A) 0	(B) 7	(C) -7	(D) 1	☐
9	2^3 equals:	(A) 6	(B) 8	(C) 16	(D) 9	☐
10	$-3 - 4 - 5$ equals:	(A) -12	(B) -2	(C) 2	(D) 12	☐
11	Which statement is true?	(A) $-8 > -5$	(B) $-3 < -7$	(C) $-6 > -9$	(D) $0 < -2$	☐
12	Evaluate: $15 - (6 + -2)$:	(A) 11	(B) 13	(C) 7	(D) 17	☐

Total marks achieved for PART A

12

Computations with integers

- Instructions**
- This part consists of 15 questions.
 - Each question is worth 1 mark.
 - Answer each question in the space provided.
 - For any working use the question column. Calculators are NOT allowed.

Time allowed: 20 minutes

Total marks: 15

Questions	Answers	Marks
1 $-6 - 5 =$		☐
2 $9 - (-4) =$		☐
3 $-7 + (-11) =$		☐
4 $-8 + 15 - 3 =$		☐
5 $-12 - (-5) =$		☐
6 $7 + (-3) - 8 =$		☐
7 $-10 + (-4) + 6 =$		☐
8 Evaluate $5^3 =$		☐
9 $20 - 25 - (-2) =$		☐
10 $-15 - (-15) =$		☐
11 $-9 + 14 + (-5) =$		☐
12 $3 + (-7) - (-4) =$		☐
13 Fill in the blank to make the statement true: $-5 + \underline{\hspace{2cm}} = 2$		☐
14 Fill in the blank to make the statement true: $4 - \underline{\hspace{2cm}} = -2$		☐
15 At 6 am the temperature was -3°C . By 9 am it had risen 15°C . What was the temperature at 9 am? $\underline{\hspace{2cm}}$		☐

Total marks achieved for PART B

15

Chapter 2 Fractions and decimals

Fractions and decimals

Fractions and decimals are used every day – when you:

- scale up a recipe to make more food
- measure out precise amounts of substances
- calculate pace and time for sport events

Understanding how to calculate with parts of a whole allows you to scale things up or down and make precise measurements in the real world.



Key ideas

✓ Equivalent fractions

Multiply or divide the numerator and denominator by the same non-zero number.

Example: $\frac{4}{8} = \frac{4 \div 4}{8 \div 4} = \frac{1}{2}$

✓ Converting formats

Divide numerator and denominator by HCF to find the simplest form.

Example: $\frac{4}{8}$ in simplest form is $\frac{1}{2}$

✓ Fraction formats

Convert improper fractions and mixed numbers.

Example: $\frac{5}{4} = 1\frac{1}{4}$

✓ Fraction of a whole

Multiply a whole number by a fraction.

Example: $\frac{2}{3}$ of 15 = 10

✓ Multiplying fractions

Multiply the top numbers and multiply the bottom numbers.

Example: $\frac{1}{2} \times \frac{3}{4} = \frac{3}{8}$

✓ Whole from a fraction

Find the whole amount from a fraction.

Example: If $\frac{1}{4}$ of a total is 5, the whole is 20.

✓ Powers of 10

Digits shift left or right across place value columns as values increase or decrease by powers of 10.

Example: $4.545 \times 100 = 454.5$

✓ Multiplying decimals

Calculate with base-10 parts of a whole.

Example: $1.75 \times 12 = 21$

By the end of this chapter, you will be able to:

- simplify and compare fractions
- convert fraction formats
- multiply with fractions
- multiply a fraction by another fraction
- find a whole amount from a fraction
- calculate with powers of 10
- multiply positive decimals
- solve real-world word problems using both fractions and decimals

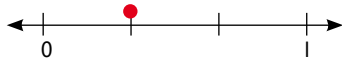
The New Zealand Curriculum Mathematics and Statistics 2025

Knowledge	Practices
Number	Number Structures and Operations
	Rounding decimals to the nearest whole number, tenth, hundredth, or thousandth
	Identifying, reading, writing, and representing fractions and decimals
	Comparing, ordering, and converting between fractions and decimals
The product of two fractions can be found by multiplying the numerators and multiplying the denominators.	Multiplying whole numbers by fractions, including by improper fractions, by mixed numbers, and by first converting to an improper fraction
	Multiplying fractions and representing the answer in its simplest form
	Multiplying and dividing numbers by powers of 10
	Multiplying positive decimals
	Finding a fraction of a whole number, including when the result is a mixed number or improper fraction
	Finding a whole amount when given a fraction, including when the whole set is a mixed number or improper fraction

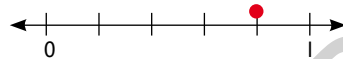
1 Write whether each fraction is proper, improper or a mixed number.

- | | | | |
|------------------------|------------------------|-------------------------|-------------------------|
| a $2\frac{1}{3}$ _____ | b $\frac{5}{6}$ _____ | c $\frac{41}{35}$ _____ | d $\frac{2}{9}$ _____ |
| e $5\frac{3}{4}$ _____ | f $1\frac{1}{2}$ _____ | g $5\frac{1}{4}$ _____ | h $9\frac{2}{3}$ _____ |
| i $\frac{17}{6}$ _____ | j $\frac{1}{12}$ _____ | k $\frac{41}{5}$ _____ | l $\frac{11}{13}$ _____ |
| m $\frac{2}{5}$ _____ | n $\frac{8}{9}$ _____ | o $6\frac{3}{4}$ _____ | p $\frac{18}{4}$ _____ |

2 What proper fraction do the following points on the number line represent?



a $\frac{\boxed{}}{\boxed{}}$

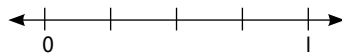


b $\frac{\boxed{}}{\boxed{}}$



c $\frac{\boxed{}}{\boxed{}}$

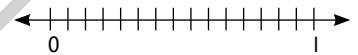
3 Display these fractions on a number line.



a $\frac{1}{4}$

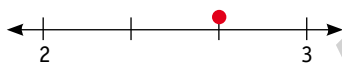


b $\frac{3}{3}$



c $\frac{8}{15}$

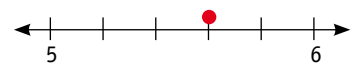
4 Write the mixed number and equivalent improper fraction for the dots plotted on these number lines:



a $\boxed{}\frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}}$



b $\boxed{}\frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}}$



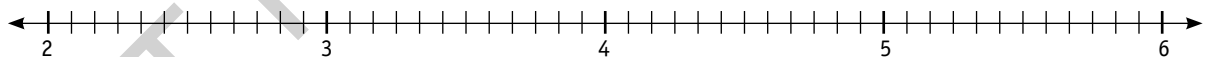
c $\boxed{}\frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}}$

5 Write these improper fractions as mixed numbers and plot on them on the number line.

a $\frac{27}{10} = \boxed{}\frac{\boxed{}}{\boxed{}}$

b $\frac{11}{2} = \boxed{}\frac{\boxed{}}{\boxed{}}$

c $\frac{22}{5} = \boxed{}\frac{\boxed{}}{\boxed{}}$



6 Write the mixed number as an improper fraction.

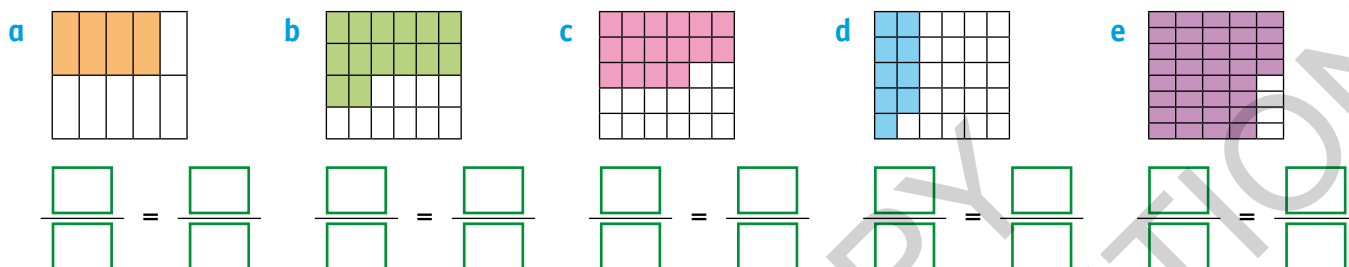
- | | | | |
|---|--|--|---|
| a $1\frac{2}{5} = \frac{}{}$ | b $3\frac{5}{8} = \frac{}{}$ | c $7\frac{8}{9} = \frac{}{}$ | d $2\frac{5}{6} = \frac{}{}$ |
| e $10\frac{1}{2} = \frac{}{}$ | f $21\frac{2}{3} = \frac{}{}$ | g $5\frac{3}{4} = \frac{}{}$ | h $8\frac{1}{5} = \frac{}{}$ |
| i $30\frac{2}{3} = \frac{}{}$ | j $10\frac{3}{11} = \frac{}{}$ | k $7\frac{1}{7} = \frac{}{}$ | l $1\frac{9}{10} = \frac{}{}$ |

7 Write each improper fraction as a mixed number.

- | | | | |
|---|--|--|--|
| a $\frac{10}{7} = \frac{}{}$ | b $\frac{5}{2} = \frac{}{}$ | c $\frac{7}{3} = \frac{}{}$ | d $\frac{9}{4} = \frac{}{}$ |
| e $\frac{20}{13} = \frac{}{}$ | f $\frac{35}{2} = \frac{}{}$ | g $\frac{84}{9} = \frac{}{}$ | h $\frac{36}{7} = \frac{}{}$ |
| i $\frac{41}{8} = \frac{}{}$ | j $\frac{49}{5} = \frac{}{}$ | k $\frac{63}{8} = \frac{}{}$ | l $\frac{52}{7} = \frac{}{}$ |

Simplest form: Divide the **numerator** and **denominator** by their highest common factor (**HCF**).
In simplest form, a fraction's numerator and denominator only have 1 as a common factor.

1 Write the fraction for the shaded part of the diagram, then write it in simplest form.

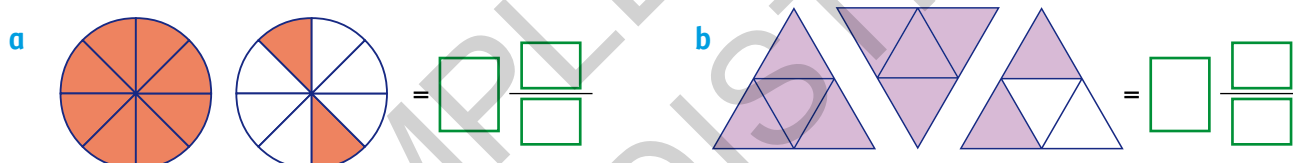


2 Write these fractions in the simplest form.

a $\frac{3}{6}$ _____ b $\frac{2}{8}$ _____ c $\frac{9}{12}$ _____ d $\frac{12}{20}$ _____

e $\frac{6}{10}$ _____ f $\frac{68}{100}$ _____ g $\frac{10}{25}$ _____ h $\frac{4}{6}$ _____

3 Write these mixed numbers in simplest form.



4 Write in simplest form, leaving the answer as a mixed number.

a $2\frac{6}{8} = \frac{\boxed{}}{\boxed{}}$ b $5\frac{8}{16} = \frac{\boxed{}}{\boxed{}}$ c $9\frac{3}{6} = \frac{\boxed{}}{\boxed{}}$ d $4\frac{5}{30} = \frac{\boxed{}}{\boxed{}}$

e $3\frac{4}{16} = \frac{\boxed{}}{\boxed{}}$ f $7\frac{10}{20} = \frac{\boxed{}}{\boxed{}}$ g $5\frac{8}{12} = \frac{\boxed{}}{\boxed{}}$ h $8\frac{3}{12} = \frac{\boxed{}}{\boxed{}}$

5 Simplify these proper fractions by writing them as mixed numbers.

a $\frac{12}{5}$ _____ b $\frac{14}{3}$ _____ c $\frac{23}{2}$ _____ d $\frac{13}{4}$ _____

e $\frac{15}{9}$ _____ f $\frac{21}{14}$ _____ g $\frac{18}{16}$ _____ h $\frac{24}{18}$ _____

6 Express each quantity as a simplified fraction.

a A test mark of 75 out of 100. $\frac{\boxed{}}{100} = \frac{\boxed{}}{\boxed{}}$

b A test mark of 30 out of 50. $\frac{\boxed{}}{50} = \frac{\boxed{}}{\boxed{}}$

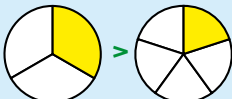
c 50 cents out of a \$1. $\frac{\boxed{}}{100} = \frac{\boxed{}}{\boxed{}}$

d 40 cents out of \$2 $\frac{\boxed{}}{200} = \frac{\boxed{}}{\boxed{}}$

e 45 mins out of 1 hour $\frac{\boxed{}}{60} = \frac{\boxed{}}{\boxed{}}$

f 4 mm of 3 cm $\frac{\boxed{}}{30} = \frac{\boxed{}}{\boxed{}}$

For unit fractions, a larger denominator results in a smaller value.

Example: $\frac{1}{3} > \frac{1}{5}$ 

Find a common denominator to compare different fractions.

Example: $\frac{3}{4} = \frac{6}{8}$ so, $\frac{3}{4} > \frac{5}{8}$ 

1 Write these unit fractions in order from smallest to largest: $\frac{1}{5}$ $\frac{1}{2}$ $\frac{1}{8}$ $\frac{1}{3}$ $\frac{1}{10}$ $\frac{1}{4}$ $\frac{1}{6}$

2 Convert to the same denominator to compare. Which is larger?

a $\frac{1}{2}$ or $\frac{3}{4}$?

$\frac{\boxed{}}{\boxed{}}$ or $\frac{3}{4}$

Answer: $\frac{\boxed{}}{\boxed{}}$

b $\frac{2}{5}$ or $\frac{3}{10}$?

$\frac{\boxed{}}{\boxed{}}$ or $\frac{3}{10}$

Answer: $\frac{\boxed{}}{\boxed{}}$

c $\frac{2}{3}$ or $\frac{5}{6}$?

$\frac{\boxed{}}{\boxed{}}$ or $\frac{\boxed{}}{\boxed{}}$

Answer: $\frac{\boxed{}}{\boxed{}}$

d $\frac{3}{4}$ or $\frac{5}{8}$?

$\frac{\boxed{}}{\boxed{}}$ or $\frac{\boxed{}}{\boxed{}}$

Answer: $\frac{\boxed{}}{\boxed{}}$

e $\frac{8}{10}$ or $\frac{17}{20}$?

Answer: _____

f $\frac{7}{16}$ or $\frac{3}{10}$?

Answer: _____

g $\frac{3}{4}$ or $\frac{8}{12}$?

Answer: _____

h $\frac{12}{15}$ or $\frac{3}{5}$?

Answer: _____

3 Compare these fractions using $<$, $>$ or $=$.

a $\frac{2}{3}$ _____ $\frac{2}{4}$

b $\frac{3}{5}$ _____ $\frac{3}{2}$

c $\frac{4}{6}$ _____ $\frac{4}{3}$

d $\frac{5}{5}$ _____ $\frac{5}{10}$

e $\frac{3}{4}$ _____ $\frac{5}{8}$

f $\frac{1}{3}$ _____ $\frac{3}{6}$

g $\frac{2}{5}$ _____ $\frac{3}{10}$

h $\frac{4}{6}$ _____ $\frac{8}{12}$

i $\frac{4}{15}$ _____ $\frac{6}{30}$

j $\frac{1}{12}$ _____ $\frac{2}{24}$

k $\frac{5}{20}$ _____ $\frac{20}{100}$

l $\frac{7}{25}$ _____ $\frac{19}{100}$

4 Add or subtract and simplify:

a $\frac{7}{18} + \frac{2}{18} =$ _____

b $\frac{10}{27} + \frac{8}{27} =$ _____

c $\frac{18}{40} - \frac{2}{40} =$ _____

d $\frac{45}{56} - \frac{5}{56} =$ _____

e $\frac{11}{35} + \frac{4}{7} =$ _____

f $\frac{3}{40} + \frac{2}{8} =$ _____

g $\frac{4}{7} - \frac{14}{35} =$ _____

h $\frac{2}{5} - \frac{12}{24} =$ _____

5 Evaluate the following, leaving your answer as a mixed numeral:

a $3\frac{3}{5} - \frac{4}{5} =$ _____

b $2\frac{1}{4} - \frac{2}{4} =$ _____

c $2\frac{4}{5} + \frac{4}{5} =$ _____

d $2\frac{5}{6} + \frac{2}{6} =$ _____

e $1\frac{3}{4} - \frac{7}{8} =$ _____

f $1\frac{2}{5} - \frac{7}{10} =$ _____

g $3\frac{1}{3} - \frac{4}{6} =$ _____

h $2\frac{3}{8} - \frac{3}{4} =$ _____

To find a fraction of a whole number, multiply the fraction by the number:

Multiply **numerator** by **number**, then **divide by denominator**.

$$\frac{2}{3} \times 9 = \frac{2 \times 9}{3} = (2 \times 9) \div 3 = 6$$

1 Evaluate the following, leaving your answer as a mixed numeral?

a $6 \times \frac{2}{5}$

= _____

= _____

b $7 \times \frac{2}{5}$

= _____

= _____

c $8 \times \frac{2}{7}$

= _____

= _____

d $9 \times \frac{2}{7}$

= _____

= _____

2 Simplify the following.

a $\frac{5}{8} \times 8 =$ _____

b $\frac{3}{4} \times 4 =$ _____

c $\frac{5}{6} \times 6 =$ _____

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

e $\frac{12}{13} \times 13 =$ _____

f $\frac{5}{7} \times 7 =$ _____

g $\frac{7}{10} \times 10 =$ _____

h $\frac{3}{4} \times 24 =$ _____

i $\frac{8}{9} \times 63 =$ _____

j $\frac{12}{20} \times 40 =$ _____

k $\frac{6}{15} \times 90 =$ _____

l $\frac{24}{36} \times 12 =$ _____

3 Work out the answers to the following.

a $\frac{1}{3}$ of \$27 = _____

b $\frac{3}{4}$ of \$400 = _____

c $\frac{1}{5}$ of 10 hours = _____

d $\frac{2}{3}$ of 1 hour = _____

e $\frac{3}{5}$ of 1 tonne = _____

f $\frac{3}{5}$ of 200 grams = _____

g $\frac{7}{10}$ of 2 hours = _____

h $\frac{2}{5}$ of 1 year = _____

i $\frac{2}{5}$ of 1 metre = _____

j $\frac{3}{5}$ of \$75 = _____

k $\frac{3}{8}$ of \$64 = _____

l $\frac{1}{5}$ of 1 kg = _____

4 Find the following.

a $\frac{1}{2}$ of 62 = _____

b $\frac{1}{5}$ of 120 = _____

c $\frac{4}{5}$ of \$175 = _____

d $\frac{19}{100}$ of 700 = _____

e $\frac{5}{12}$ of 120 = _____

f $\frac{1}{16}$ of 480 = _____

g $\frac{5}{16}$ of 80 = _____

h $\frac{1}{8}$ of 1 day = _____

i $\frac{1}{4}$ of 60 mins = _____

5 Work out the following.

a $\frac{3}{4}$ of \$88 = _____

b $\frac{3}{5}$ of 240 = _____

c $\frac{2}{7}$ of 770 = _____

d $\frac{2}{5}$ of 55 = _____

e $\frac{3}{5}$ of 600 = _____

f $\frac{1}{3}$ of 270 = _____

g $\frac{7}{100}$ of 1 century = _____

h $\frac{1}{4}$ of 52 weeks = _____

i $\frac{2}{5}$ of 2 km = _____

6 Hank bought $\frac{2}{7}$ of the 28 towels that were on sale in a shop.

How many towels were not bought by Hank? _____

1 Simplify the following.

a $\frac{3}{2} \times 6 =$ _____

b $\frac{5}{3} \times 9 =$ _____

c $\frac{7}{4} \times 12 =$ _____

d $\frac{9}{5} \times 10 =$ _____

e $\frac{11}{6} \times 18 =$ _____

f $\frac{8}{3} \times 15 =$ _____

g $\frac{5}{2} \times 14 =$ _____

h $\frac{7}{5} \times 20 =$ _____

i $\frac{13}{8} \times 16 =$ _____

j $\frac{10}{7} \times 21 =$ _____

k $\frac{17}{10} \times 30 =$ _____

l $\frac{7}{6} \times 24 =$ _____

2 Multiply by changing the mixed number to an improper fraction first.

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

b $4 \times 2\frac{1}{4} = 4 \times$ _____ $=$ _____

c $2 \times 3\frac{2}{5} = 2 \times$ _____ $=$ _____

d $5 \times 1\frac{2}{3} = 5 \times$ _____ $=$ _____

e $6 \times 1\frac{5}{6} = 6 \times$ _____ $=$ _____

f $3 \times 2\frac{3}{8} = 3 \times$ _____ $=$ _____

3 Simplify the following.

a $4 \times 1\frac{3}{4} =$ _____

b $6 \times 2\frac{1}{3} =$ _____

c $3 \times 4\frac{2}{3} =$ _____

d $12 \times 1\frac{1}{4} =$ _____

e $5 \times 2\frac{2}{5} =$ _____

f $10 \times 1\frac{1}{2} =$ _____

g $12 \times 1\frac{5}{6} =$ _____

h $9 \times 2\frac{2}{3} =$ _____

i $16 \times 1\frac{3}{8} =$ _____

j $14 \times 1\frac{1}{7} =$ _____

k $10 \times 3\frac{3}{5} =$ _____

l $8 \times 2\frac{5}{8} =$ _____

4 Simplify the following. Write answers as mixed numerals.

a $2 \times 1\frac{4}{5} =$ _____

b $5 \times 2\frac{1}{2} =$ _____

c $3 \times 3\frac{3}{4} =$ _____

d $4 \times 2\frac{2}{3} =$ _____

e $7 \times 1\frac{1}{4} =$ _____

f $6 \times 3\frac{1}{5} =$ _____

g $8 \times 1\frac{3}{7} =$ _____

h $9 \times 2\frac{1}{2} =$ _____

i $5 \times 4\frac{2}{3} =$ _____

j $3 \times 5\frac{1}{8} =$ _____

k $7 \times 2\frac{3}{5} =$ _____

l $11 \times 1\frac{1}{6} =$ _____

5 A company is designing a heavy-duty wooden cargo crate. The dimensions of the crate are:

• Length: $2\frac{1}{2}$ metre

• Width: $1\frac{1}{5}$ metres

• Height: $3\frac{3}{4}$ metres

a Find the area for the base of the crate. _____

b Find the total volume of the crate. _____

c The cargo crate needs to be packed entirely with smaller, identical square boxes. Each small box has a volume of $\frac{3}{8} \text{ m}^3$. How many small boxes will fit inside the large cargo crate.

To find the whole amount: **Divide** the number by the numerator, then **multiply** by the denominator.

$$\frac{2}{3} \text{ is } 6 = (6 \div 2) \times 3 = 9$$

1 Simplify the following.

a If 8 is $\frac{1}{2}$ of an amount, what is the whole? _____

b If 7 is $\frac{1}{3}$ of an amount, what is the whole? _____

c $\frac{1}{4}$ of an amount is 5. What is the whole? _____

d $\frac{1}{5}$ of an amount is 10. What is the whole? _____

e $\frac{1}{8}$ is 3. The whole is: _____

f $\frac{1}{10}$ is 12. The whole is: _____

g $\frac{1}{6}$ is 5. The whole is: _____

2 Simplify the following.

a $\frac{2}{3}$ is 12. The whole is: _____

b $\frac{4}{5}$ is 16. The whole is: _____

c $\frac{3}{8}$ is 9. The whole is: _____

d $\frac{5}{6}$ is 25. The whole is: _____

e $\frac{7}{10}$ is 14. The whole is: _____

f $\frac{3}{7}$ is 21. The whole is: _____

g $\frac{3}{4}$ is 12. The whole is: _____

h $\frac{4}{9}$ is 20. The whole is: _____

3 Simplify the following.

a $\frac{3}{2}$ is 15. One whole is: _____

b $\frac{4}{3}$ is 20. One whole is: _____

c $\frac{5}{4}$ is 25. One whole is: _____

d $\frac{8}{6}$ is 24. One whole is: _____

e $\frac{11}{10}$ is 44. One whole is: _____

f $\frac{9}{7}$ is 35. One whole is: _____

g $\frac{8}{5}$ is 48. One whole is: _____

h $\frac{12}{9}$ is 72. One whole is: _____

4 Convert the mixed number to an improper fraction, then calculate.

a $1\frac{1}{2}$ is 12. _____ is 12. One whole is: _____

b $1\frac{1}{3}$ is 16. _____ is 16. One whole is: _____

c $2\frac{1}{4}$ is 18. _____ is 18. One whole is: _____

d $2\frac{3}{5}$ is 26. _____ is 26. One whole is: _____

e $1\frac{5}{10}$ is 30. One whole is: _____

f $2\frac{6}{7}$ is 100. One whole is: _____

g $3\frac{3}{6}$ is 63. One whole is: _____

5 Calculate the following using improper fractions. Give the answer as a mixed number.

a If 9 is $\frac{2}{5}$, what is the whole? $9 \div 2 = \frac{9}{2} \times 5 = \frac{45}{2} =$ _____

b If $\frac{3}{4}$ is 11, what is the whole? $\frac{11}{3} \times 4 = \frac{44}{3} =$ _____

c If $\frac{3}{7}$ is 4, what is the whole? _____

d If $\frac{35}{8}$ is 6, what is the whole? _____

e If $\frac{3}{10}$ is 13, what is the whole? _____

f If 7 is $\frac{2}{9}$, what is the whole? _____

- 1 **a** How long is $\frac{5}{6}$ of 2 hours? _____ **b** How far is $\frac{1}{5}$ of 3 kilometres? _____
- 2 In an orchestra of 60 musicians, $\frac{1}{5}$ were in the brass section.
How many brass players were there? _____
- 3 Krista and her teammates each receive $\frac{1}{5}$ of \$900 prize after winning a competition.
How much does Krista receive? _____
- 4 In a classroom, $\frac{3}{5}$ of the students are boys.
If there are 40 students, how many girls are there? _____
- 5 On a bookshelf, $\frac{4}{7}$ of the books are fiction.
If there are 21 books, how many books are non-fiction? _____
- 6 In a bag of marbles, $\frac{3}{9}$ are green, $\frac{2}{9}$ are yellow and the rest are blue.
a If there are 45 marbles, how many marbles are blue? _____
b How many green marbles are there? _____
- 7 **a** Peter has 15 pens and gives $\frac{3}{5}$ to his sister. How many pens does he have left?

b Kaia's shop sold $\frac{5}{12}$ of their 72 cakes today. How many cakes are left?

- 8 Pana has 135 fancy spoons. She is splitting the collection equally between her 15 grandchildren.
Two of the children are planning to give their shares to their sister. How many spoons will she have?

- 9 As the lead engineer for a Mars rover, use the given data to calculate the true totals for the mission.
a The rover has travelled 24 km across the Martian surface. Mission Control reports that this distance represents $\frac{3}{8}$ of the total planned route. What is the total length of the planned route?

b The rover's drill has collected 15 kg of rock samples. This amount is $1\frac{1}{4}$ times the mission's minimum sample goal. What was the minimum sample goal?

c The rover's main battery is damaged. It currently holds 42 hours of charge, which is $\frac{7}{10}$ of a full charge. How many hours is a full charge?

Multiply the numerators and multiply the denominators. Simplify the answer.

$$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$$

$$\frac{2}{3} \times \frac{3}{4} = \frac{6}{12} = \frac{1}{2}$$

$$\frac{11}{12} \times \frac{2}{5} = \frac{22}{60} = \frac{11}{30}$$

1 Evaluate the following:

a $\frac{3}{4} \times \frac{5}{7} =$ _____

b $\frac{4}{7} \times \frac{3}{5} =$ _____

c $\frac{4}{5} \times \frac{1}{7} =$ _____

d $\frac{5}{8} \times \frac{1}{2} =$ _____

e $\frac{2}{3} \times \frac{2}{5} =$ _____

f $\frac{2}{3} \times \frac{4}{5} =$ _____

g $\frac{5}{4} \times \frac{3}{7} =$ _____

h $\frac{2}{5} \times \frac{4}{3} =$ _____

i $\frac{3}{8} \times \frac{8}{12} =$ _____

2 Multiply the following fractions. Give your answer in simplest form.

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

b $\frac{1}{4} \times \frac{3}{5} =$ _____

c $\frac{2}{3} \times \frac{1}{5} =$ _____

d $\frac{3}{8} \times \frac{1}{2} =$ _____

e $\frac{2}{5} \times \frac{2}{3} =$ _____

f $\frac{3}{7} \times \frac{1}{4} =$ _____

g $\frac{1}{6} \times \frac{5}{6} =$ _____

h $\frac{4}{9} \times \frac{1}{2} =$ _____

i $\frac{3}{5} \times \frac{3}{4} =$ _____

j $\frac{5}{8} \times \frac{1}{2} =$ _____

k $\frac{2}{7} \times \frac{2}{5} =$ _____

l $\frac{7}{10} \times \frac{1}{3} =$ _____

3 Simplify the following.

a $\frac{1}{5} \times \frac{5}{3} =$ _____

b $\frac{2}{4} \times \frac{4}{7} =$ _____

c $\frac{6}{8} \times \frac{5}{6} =$ _____

d $\frac{8}{7} \times \frac{3}{8} =$ _____

e $\frac{1}{5} \times \frac{5}{3} =$ _____

f $\frac{4}{7} \times \frac{7}{5} =$ _____

g $\frac{7}{6} \times \frac{3}{7} =$ _____

h $\frac{6}{4} \times \frac{4}{9} =$ _____

i $\frac{5}{3} \times \frac{3}{7} =$ _____

4 Multiply the following fractions. Give your answer in simplest form.

a $\frac{3}{4} \times \frac{8}{9} =$ _____

b $\frac{5}{6} \times \frac{12}{15} =$ _____

c $\frac{7}{10} \times \frac{10}{14} =$ _____

d $\frac{4}{6} \times \frac{6}{8} =$ _____

e $\frac{9}{16} \times \frac{16}{27} =$ _____

f $\frac{15}{22} \times \frac{11}{25} =$ _____

g $\frac{8}{21} \times \frac{7}{16} =$ _____

h $\frac{5}{12} \times \frac{18}{25} =$ _____

i $\frac{7}{25} \times \frac{5}{7} =$ _____

5 Solve the following problems.

a A recipe calls for $\frac{3}{4}$ of a cup of milk.
If you want to make half of the recipe,
how much milk do you need?

b You also need $\frac{4}{5}$ of a cup of flour.
How much flour is needed for
a half batch?

c I have $\frac{12}{15}$ of a block of chocolate.
I need to share it between 4 children.
What fraction will they each get?

d One child said they don't like
chocolate. They left. What fraction of
the block will each child get now?

1 Convert to improper fractions first, then calculate. Write answers as mixed numerals in simplest form.

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

b $2\frac{1}{4} \times 1\frac{1}{5} =$ _____ $\times$ _____ $=$ _____ $=$ _____

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

d $3\frac{1}{3} \times 1\frac{1}{5} =$ _____ $\times$ _____ $=$ _____ $=$ _____

e $1\frac{3}{4} \times 1\frac{1}{7} =$ _____ $\times$ _____ $=$ _____ $=$ _____

2 Evaluate the following.

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

b $2\frac{1}{3} \times \frac{2}{5} =$ _____

c $3\frac{2}{3} \times \frac{1}{5} =$ _____

d $4\frac{2}{3} \times \frac{1}{5} =$ _____

e $3\frac{1}{7} \times \frac{1}{5} =$ _____

f $3\frac{1}{2} \times \frac{1}{6} =$ _____

3 Simplify the following.

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

b $2\frac{1}{4} \times 1\frac{1}{4} =$ _____

c $1\frac{5}{7} \times 1\frac{2}{5} =$ _____

d $1\frac{7}{8} \times 1\frac{1}{7} =$ _____

4 Solve the following problems.

- a A tailor has $3\frac{2}{5}$ m of ribbon.
She uses $\frac{9}{10}$ of the ribbon on a dress.
How much ribbon is left?

- b A landscaper is laying wooden borders.
They use 6 pieces of wood, and each piece
is $1\frac{2}{5}$ m long. What is the total length
of the border?

- c A rectangular garden bed is $2\frac{1}{2}$ m long
and $1\frac{3}{4}$ m wide. What is the area of
the garden bed?

- d A chef buys $4\frac{1}{2}$ kg of apples. They use
 $\frac{2}{3}$ of the apples to bake a large pie.
How many kg of apples are left over?

Decimal place values

$$0.2345 = \frac{2}{10} + \frac{3}{100} + \frac{4}{1,000} + \frac{5}{10,000}$$

1 Write the following as decimals.

a $\frac{3}{10} =$ _____

b $\frac{9}{10} =$ _____

c $\frac{7}{10} =$ _____

d $\frac{43}{10} =$ _____

e $\frac{7}{100} =$ _____

f $\frac{12}{100} =$ _____

g $\frac{93}{100} =$ _____

h $\frac{239}{100} =$ _____

i $\frac{783}{1,000} =$ _____

j $\frac{549}{1,000} =$ _____

k $\frac{6,342}{10,000} =$ _____

l $\frac{764}{10,000} =$ _____

2 Change these decimals to fractions expressed in simplest form.

a 0.2 _____

b 0.8 _____

c 0.5 _____

d 0.25 _____

e 0.05 _____

f 0.75 _____

g 0.002 _____

h 0.0006 _____

i 0.125 _____

j 0.048 _____

k 0.625 _____

l 0.0375 _____

3 Change the following to decimals.

a $5 + \frac{3}{10} =$ _____

b $8 + \frac{9}{10} =$ _____

c $15 + \frac{7}{100} =$ _____

d $28 + \frac{5}{100} =$ _____

e $16 + \frac{1}{100} =$ _____

f $94 + \frac{7}{10} =$ _____

g $123 + \frac{3}{100} =$ _____

h $128 + \frac{8}{10} =$ _____

i $532 + \frac{37}{100} =$ _____

j $81 + \frac{3}{10} =$ _____

k $58 + \frac{7}{10} =$ _____

l $94 + \frac{19}{100} =$ _____

4 Change these to mixed numerals in simplest form

a 1.6 _____

b 2.4 _____

c 3.5 _____

d 2.25 _____

e 1.75 _____

f 4.12 _____

g 6.35 _____

h 3.125 _____

i 1.375 _____

j 5.15 _____

k 7.64 _____

l 10.08 _____

Change fractions to an equivalent fraction over a power of 10, then convert to a decimal.

$$\frac{3}{4} = \frac{3 \times 5}{4 \times 5} = \frac{15}{20} = \frac{15 \times 5}{20 \times 5} = \frac{75}{100} = 0.75$$

$$\frac{6}{15} = \frac{6 \div 3}{15 \div 3} = \frac{2}{5} = \frac{2 \times 2}{5 \times 2} = \frac{4}{10} = 0.4$$

5 Write the following as decimals.

a $\frac{5}{8} =$ _____

b $\frac{6}{15} =$ _____

c $\frac{6}{20} =$ _____

d $\frac{37}{50} =$ _____

e $\frac{103}{500} =$ _____

f $\frac{27}{200} =$ _____

g $\frac{32}{25} =$ _____

h $\frac{11}{40} =$ _____

i $\frac{28}{500} =$ _____

1 Write the place value of each 5.

a $71.598 =$ _____

b $35.293 =$ _____

c $24.056 =$ _____

d $86.415 =$ _____

2 Write the following in decimal form.

a $20 + 4 + \frac{1}{10} + \frac{2}{100} =$ _____

b $300 + 50 + 6 + 8 + \frac{7}{100} =$ _____

c $6 + \frac{5}{10} + \frac{9}{100} + \frac{3}{1,000} =$ _____

d $90 + \frac{3}{10} + \frac{2}{100} + \frac{8}{1,000} =$ _____

e $400 + 9 + \frac{2}{10} + \frac{6}{1,000} =$ _____

f $500 + 20 + \frac{5}{100} + \frac{2}{1,000} =$ _____

3 Write the following in expanded form.

a $73.829 =$ _____

b $4.057 =$ _____

c $987.432 =$ _____

d $91.003 =$ _____

e $10.101 =$ _____

4 Arrange the following numbers in ascending order (smallest first).

a 0.303, 0.33, 0.3, 0.03 _____

b 7.07, 0.707, 0.700, 0.007 _____

c 1.2, 1.02, 1.22, 1.002 _____

d 8.6, 86, 0.86, 0.086 _____

e 8.08, 808, 80.88, 808.8 _____

5 Arrange the following numbers in descending order (largest first).

a 5.35, 0.535, 53.5, 5.05, 3.55 _____

b 0.7, 7.7, 7.07, 0.007, 7.007 _____

c 1.5, 1.05, 1.005, 5.01, 5.001 _____

d 7.53, 7.053, 5.73, 57.3, 75.3 _____

e 2.12, 2.112, 21.12, 211.2, 0.2112 _____

6 Which of the following statements are true (T) or false (F)?

a $0.15 < 0.3$ _____

b $0.80 > 0.8$ _____

c $2.7 < 0.27$ _____

d $0.4 = .4$ _____

e $0.399 < 0.4$ _____

f $0.0001 > 0.002$ _____

7 Complete the following, using $<$, $=$ or $>$.

a 0.1 _____ 0.13

b 0.202 _____ 0.002

c 32.36 _____ 32.63

d 4.45 _____ 4.54

e 3.2 _____ 3.20

f 5.608 _____ 5.605

1 Round to the nearest whole number.

- | | | |
|--------------------------|--------------------------|----------------------------|
| a 70.542 = _____ | b 72.389 = _____ | c 4.175 = _____ |
| d 36.902 = _____ | e 9.741 = _____ | f 52.032 = _____ |
| g 342.689 = _____ | h 42.82 = _____ | i 5.21 = _____ |
| j 5.437 = _____ | k 439.701 = _____ | l 1,780.127 = _____ |

2 Write the following decimals correct to the nearest tenth.

- | | | |
|-------------------------|-------------------------|-------------------------|
| a 81.348 = _____ | b 32.149 = _____ | c 36.481 = _____ |
| d 41.943 = _____ | e 62.458 = _____ | f 92.357 = _____ |
| g 51.318 = _____ | h 39.615 = _____ | i 42.835 = _____ |
| j 28.471 = _____ | k 58.653 = _____ | l 73.852 = _____ |

3 Write the following decimals correct to the nearest hundredth.

- | | | |
|-------------------------|-------------------------|--------------------------|
| a 7.417 = _____ | b 15.632 = _____ | c 28.139 = _____ |
| d 0.941 = _____ | e 33.458 = _____ | f 47.438 = _____ |
| g 53.235 = _____ | h 64.831 = _____ | i 78.356 = _____ |
| j 81.892 = _____ | k 92.635 = _____ | l 125.836 = _____ |

4 Write the following decimals correct to the nearest thousandth.

- | | | |
|---------------------------|---------------------------|---------------------------|
| a 88.6152 = _____ | b 63.3412 = _____ | c 230.3614 = _____ |
| d 95.6487 = _____ | e 94.8325 = _____ | f 512.1581 = _____ |
| g 120.1581 = _____ | h 134.6429 = _____ | i 832.3248 = _____ |
| j 435.2345 = _____ | k 437.1298 = _____ | l 531.6413 = _____ |

5 Estimate the result by rounding to the nearest tenth.

- | | | |
|----------------------------------|---------------------------------|----------------------------------|
| a $14.7 \times 5 =$ _____ | b $8.2 \times 4 =$ _____ | c $11.8 \times 3 =$ _____ |
| d $20.4 \times 6 =$ _____ | e $9.9 \times 7 =$ _____ | f $5.1 \times 12 =$ _____ |
| g $15.2 \div 4 =$ _____ | h $49.6 \div 10 =$ _____ | i $37.4 \div 6 =$ _____ |
| j $65.8 \div 8 =$ _____ | k $22.1 \div 7 =$ _____ | l $91.5 \div 9 =$ _____ |

6 Read the problem. Find an estimated answer, then calculate the actual answer.

- | | |
|--|---|
| a A runner completes 4.1 km every day for 7 days. What is the total distance? | b 2.45 L of juice is poured equally into 5 glasses. How much juice is in each glass? |
|--|---|

Estimate: _____

Answer: _____

Estimate: _____

Answer: _____

Multiplying: The value increases → Digits Shift Left

Example: $3.57 \times 100 = 357$

Hundreds	Tens	Ones	•	Tenths	Hundredths
		3	•	5	7
3	5	7	•		

1 Work out the following.

- | | | |
|--------------------------------|-------------------------------|-----------------------------|
| a $0.5 \times 10 =$ _____ | b $0.41 \times 10 =$ _____ | c $0.64 \times 100 =$ _____ |
| d $8.1 \times 10 =$ _____ | e $3.6 \times 10 =$ _____ | f $7.2 \times 10 =$ _____ |
| g $19.6 \times 100 =$ _____ | h $121.64 \times 100 =$ _____ | i $28.7 \times 100 =$ _____ |
| j $86.5 \times 10 =$ _____ | k $4.93 \times 100 =$ _____ | l $6.4 \times 10 =$ _____ |
| m $0.008 \times 1,000 =$ _____ | n $9.35 \times 1,000 =$ _____ | o $7.5 \times 100 =$ _____ |

Dividing: The value decreases ← Digits Shift Right

Example: $41.6 \div 10 = 4.16$

Hundreds	Tens	Ones	•	Tenths	Hundredths
	4	1	•	6	
		4	•	1	6

2 Calculate the following divisions.

- | | | |
|---------------------------|-----------------------------|-----------------------------|
| a $52 \div 10 =$ _____ | b $88.7 \div 10 =$ _____ | c $935.17 \div 10 =$ _____ |
| d $73.9 \div 100 =$ _____ | e $68.5 \div 100 =$ _____ | f $55.7 \div 1,000 =$ _____ |
| g $33.8 \div 10 =$ _____ | h $99.5 \div 1,000 =$ _____ | i $88.17 \div 100 =$ _____ |
| j $46.9 \div 10 =$ _____ | k $67.8 \div 10 =$ _____ | l $91.35 \div 100 =$ _____ |
| m $35.6 \div 100 =$ _____ | n $53.6 \div 100 =$ _____ | o $63.81 \div 10 =$ _____ |

3 Calculate these multiplications.

- | | | |
|--------------------------------------|------------------------------|-----------------------------|
| a $8 \times 100 =$ _____ | b $3.4 \times 10 =$ _____ | c $29 \times 1,000 =$ _____ |
| d $12.45 \times 10,000 =$ _____ | e $0.512 \times 100 =$ _____ | |
| f $421,900 \times 1,000,000 =$ _____ | | |

4 Calculate these divisions.

- | | | |
|--------------------------------------|----------------------------------|---------------------------|
| a $2 \div 100 =$ _____ | b $4,590 \div 1,000 =$ _____ | c $0.014 \div 10 =$ _____ |
| d $70.80 \div 10,000 =$ _____ | e $1,367.512 \div 1,000 =$ _____ | |
| f $421,900 \div 100,000,000 =$ _____ | | |

5 Calculate these mixed problems written in exponent form:

- | | | |
|--------------------------------|-------------------------------------|---------------------------------|
| a $31 \times 10^2 =$ _____ | b $2,400 \div 10^5 =$ _____ | c $0.0027 \div 10^6 =$ _____ |
| d $90.008 \times 10^4 =$ _____ | e $3.45 \div 10^3 =$ _____ | f $2,159,951 \div 10^3 =$ _____ |
| g $73.805 \times 10^8 =$ _____ | h $1,038,942,756 \div 10^9 =$ _____ | |

Multiply decimals by whole numbers by writing them as fractions.

Example: $12 \times 0.3 \rightarrow 12 \times \frac{3}{10} = \frac{36}{10} = 3.6$

1 Multiply the following.

a $0.3 \times 7 =$ _____

b $0.5 \times 3 =$ _____

c $0.8 \times 9 =$ _____

d $0.06 \times 5 =$ _____

e $0.01 \times 8 =$ _____

f $0.12 \times 5 =$ _____

g $1.2 \times 4 =$ _____

h $0.04 \times 3 =$ _____

i $1.1 \times 9 =$ _____

j $0.02 \times 2 =$ _____

k $0.008 \times 7 =$ _____

l $0.007 \times 5 =$ _____

2 Multiply with powers of 10.

a $0.4 \times 20 =$ _____

b $0.6 \times 60 =$ _____

c $0.8 \times 80 =$ _____

d $0.7 \times 50 =$ _____

e $0.73 \times 200 =$ _____

f $0.58 \times 300 =$ _____

g $7.63 \times 2,000 =$ _____

h $8.92 \times 30 =$ _____

i $12.5 \times 40 =$ _____

j $19.6 \times 90 =$ _____

k $8.65 \times 120 =$ _____

l $36.75 \times 70 =$ _____

3 Multiply with two-digit numbers.

a $2.3 \times 14 =$ _____

b $4.1 \times 25 =$ _____

c $0.9 \times 32 =$ _____

d $6.5 \times 12 =$ _____

e $1.25 \times 16 =$ _____

f $0.75 \times 24 =$ _____

g $10.4 \times 15 =$ _____

h $3.14 \times 22 =$ _____

i $9.43 \times 25 =$ _____

Multiply decimal by decimal the same way.

Example: $0.2 \times 0.3 \rightarrow \frac{2}{10} \times \frac{3}{10} = \frac{6}{100} = 0.06$

4 Multiply decimals by decimals.

a $0.6 \times 0.4 =$ _____

b $0.5 \times 0.7 =$ _____

c $0.3 \times 0.8 =$ _____

d $0.2 \times 0.05 =$ _____

e $0.5 \times 0.21 =$ _____

f $1.003 \times 1.2 =$ _____

g $6.08 \times 0.2 =$ _____

h $7.25 \times 0.02 =$ _____

i $0.03 \times 0.02 =$ _____

j $0.7 \times 0.9 =$ _____

k $5.01 \times 0.4 =$ _____

l $8.012 \times 0.3 =$ _____

5 Crack the code. What is a maths teacher's favourite kind of tree?

E $1.5 \times 4 =$ _____

O $3.2 \times 3 =$ _____

T $4.5 \times 2 =$ _____

R $0.7 \times 6 =$ _____

Y $2.05 \times 4 =$ _____

M $12.1 \times 5 =$ _____

G $0.25 \times 8 =$ _____

2	6	9.6	60.5	6	9	4.2	8.2

Complete these mentally.

- 1 A stopwatch records a runner's sprint time as 14.582 seconds.

Round this time to two decimal places. _____

- 2 A school orders a bulk box of 1,000 library barcode stickers.

If each sticker costs \$0.14, what is the total cost of the order? _____

- 3 45.5 metre spool of 3D printer filament is cut into exactly

10 equal pieces for a class project. How long is each piece? _____

- 4 A calculator gives an answer of \$45.678.

Round this amount to the nearest cent (two decimal places). _____

- 5 A box of 100 identical paperclips weighs exactly 125.6 grams.

What is the weight of a single paperclip? _____

- 6 A pack of 100 blank flashcards costs \$14.50. Calculate the exact

cost of a single flashcard, then round it to the nearest cent. _____

- 7 A school buys 10 identical laptops. If one laptop costs \$849.50,

what is the total cost for all of them? _____

Show your working.

- 8 A student works at a local hardware store earning \$16.25 an hour. When they work an 8-hour shift, how much money do they earn?

- 9 A woodwork student needs 6 pieces of timber. If each piece must be exactly 1.75 metres long, what is the total length of timber required?

- 10 A science teacher fills 15 beakers with water for an experiment. If each beaker holds 0.45 litres, how many litres of water are used altogether?

- 11 Karly earns \$10.50 an hour babysitting. On Saturday she worked for 7.5 hours. How much did she earn?

- 12 Mr Smith needs to buy 28 mechanical pencils for his class. These three brands are on sale.

Noir \$0.45 each

Schwarz \$1.35 for four

Siyah \$3.50 for 7

- a Estimate which deal is the cheapest and how much it will cost to the nearest dollar. _____

- b Calculate which deal is the cheapest and how much it will cost exactly. _____

Fractions and decimals

- Instructions**
- This part consists of 12 multiple-choice questions.
 - Fill in only ONE CIRCLE for each question.
 - Each question is worth 1 mark.
 - Calculators are NOT allowed.

Time allowed: 15 minutes

Total marks: 12

1	Write $\frac{43}{70}$ in simplest form:	(A) $\frac{21}{35}$	(B) $\frac{6}{10}$	(C) $\frac{3}{5}$	(D) $\frac{7}{10}$	☐
2	$\frac{4}{5} \times \frac{15}{16} =$	(A) $\frac{3}{3}$	(B) $\frac{19}{21}$	(C) $\frac{64}{75}$	(D) $\frac{12}{16}$	☐
3	Which improper fraction is equal to $5\frac{4}{7}$?	(A) $\frac{39}{4}$	(B) $\frac{27}{7}$	(C) $\frac{35}{7}$	(D) $\frac{39}{7}$	☐
4	What is $\frac{5}{8}$ of 72?	(A) 45	(B) 115.2	(C) 40	(D) 18	☐
5	If $\frac{4}{5}$ of a number is 32, what is the original number?	(A) 25.6	(B) 40	(C) 128	(D) 32.8	☐
6	A recipe requires $1\frac{3}{4}$ cups of flour. How much flour is needed for 3 batches?	(A) $3\frac{3}{4}$	(B) $4\frac{3}{4}$	(C) $5\frac{1}{4}$	(D) $5\frac{3}{4}$	☐
7	14.8095 rounded to three decimal places (the nearest thousandth) is:	(A) 14.809	(B) 14.81	(C) 14.810	(D) 14.800	☐
8	$2\frac{1}{2} \times 1\frac{3}{5}$ equals:	(A) 4	(B) $2\frac{3}{10}$	(C) $3\frac{4}{7}$	(D) $\frac{40}{10}$	☐
9	$0.07 \times 1,000$ equals:	(A) 7	(B) 70	(C) 700	(D) 0.00007	☐
10	$14.5 \div 100$ equals:	(A) 0.145	(B) 1.45	(C) 1450	(D) 0.0145	☐
11	0.06×15 equals:	(A) 9	(B) 0.09	(C) 0.9	(D) 90	☐
12	What is this number? $200 + 30 + 5 + \frac{8}{10} + \frac{1}{1,000}$	(A) 235.81	(B) 253.801	(C) 235.801	(D) 253.81	☐

Total marks achieved for PART A

12

Fractions and decimals

- Instructions**
- This part consists of 15 questions.
 - Each question is worth 1 mark.
 - Answer each question in the space provided.
 - For any working use the question column. Calculators are NOT allowed.

Time allowed: 20 minutes

Total marks: 15

Questions	Answers	Marks
1 Answer in simplest form. $\frac{7}{12} \times \frac{9}{14} =$		1
2 Answer as mixed numeral in simplest form. $1\frac{3}{4} \times 2\frac{4}{7} =$		1
3 Write $9\frac{7}{12}$ as an improper fraction.		1
4 $3\frac{3}{4} \times 6 =$		1
5 If $\frac{5}{8}$ of a number is 45, what is the whole number?		1
6 A school library replaced $\frac{4}{9}$ of its old computers. If they replaced exactly 44 computers, how many computers does the library have in total?		1
7 A rectangular garden bed is $\frac{3}{5}$ m wide and $\frac{5}{6}$ m long. What is the area?		1
8 Write these numbers in ascending order: 3.1, 3.011, 3.101, 3.01		1
9 Write 1.0996 as a fraction:		1
10 Estimate $89.6 \div 8.8$ by rounding to the nearest whole number.		1
11 $0.7 \div 100 =$		1
12 $4.08 \times 25 =$		1
13 A builder buys 15 lengths of timber for \$5.25 each. What is the total cost?		1
14 A fuel tank is $\frac{3}{5}$ full. If it currently contains 120 litres, how many more litres are needed to completely fill the tank?		1
15 A baker has $\frac{7}{10}$ of 350 grams of flour. How much more flour does she need?		1

Total marks achieved for PART B

15

Chapter 3 Percentages, fractions and decimals

Percentages, fractions and decimals

Percentages, fractions and decimals are used every day – when you:

- calculate a percentage pay rise
- compare amounts of things
- check test scores or grades

Understanding percentages, fractions and decimals allows you to compare different quantities, apply discounts, and calculate parts of a whole in the real world.



Key ideas

✓ The meaning of percentage

A fraction with a denominator of 100.

Example: 30% means 30 out of 100

✓ Converting formats

Changing fluidly between fractions, decimals, and percentages.

Example: $\frac{1}{4} = 0.25 = 25\%$

✓ Comparing and ordering

Placing mixed formats on a number line or in size order and comparing amounts.

Example: $0.4 < 45\% < \frac{1}{2}$

✓ Express quantities as percentages

Describe part of an amount as a percentage of the amount.

Example: 60 is 30% of 200

✓ Percentage of quantity

Finding a specific part of a whole number.

Example: 10% of \$300 = \$30

✓ Percentage increase and decrease

Add or subtract a percentage from an amount.

Example: Increase \$50 by 10% = $\$50 + \$5 = \$55$

✓ Find the whole

Finding the total 100% when you only know a part.

Example: If 40% is 80, the whole 100% is 200

By the end of this chapter, you will be able to:

- identify and understand the meaning of percentage
- convert between fractions, decimals, and percentages
- compare and order different formats
- calculate the percentage of a quantity
- find the 100% whole amount given a percentage
- solve equivalence and proportional word problems

The New Zealand Curriculum Mathematics and Statistics 2025

Knowledge	Practices
Number	Number Structures and Operations
Percentages can be used to proportionally increase or decrease a quantity.	Identifying, reading, writing, and representing fractions, decimals, and percentages
	Comparing, ordering, and converting between fractions, decimals, and percentages
	Finding percentages of whole numbers
	Finding the whole (100%) when given a percentage
	Identifying percentage equivalence in calculations

Fractions	Decimal	Percentage
$\frac{1}{2} = \frac{5}{10} = \frac{50}{100}$	= 0.5	= 50%
$\frac{2}{5} = \frac{4}{10} = \frac{40}{100}$	= 0.4	= 40%

Fractions	Decimal	Percentage
$\frac{1}{4} = \frac{25}{100}$	= 0.25	= 25%
$\frac{5}{100}$	= 0.05	= 5%

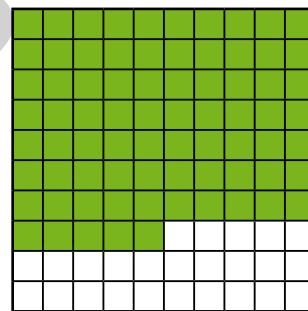
1 Complete the following sentences.

- a A percentage is a fraction with a denominator of _____.
- b The symbol for per cent is _____ and it means out of _____.
- c 30% means 30 out of _____.
- b 80% means 80 out of _____.
- d 7% means 7 out of _____.

2 Look at the diagram on the right.

- a What percentage is shaded? _____
- b What percentage is unshaded? _____

- 3 a If 65% of a diagram is shaded, how much is unshaded? _____
- b If 58% of a diagram is shaded, how much is unshaded? _____
- c If 3% of a diagram is shaded, how much is unshaded? _____



4 In grids of 100 squares, what percentage is unshaded when the following percentages are shaded?

- a 25% _____
- b 20% _____
- c 10% _____
- d 67% _____
- e 89% _____
- f 51% _____
- g 64% _____
- h 78% _____
- i 9% _____

5 Work out the following subtractions.

- a $100\% - 32\% =$ _____
- b $100\% - 47\% =$ _____
- c $100\% - 91\% =$ _____
- d $100\% - 69\% =$ _____
- e $100\% - 37\% =$ _____
- f $100\% - 77\% =$ _____

6 Add the following percentages.

- a $30\% + 47\% =$ _____
- b $80\% + 5\% =$ _____
- c $60\% + 10\% + 7\% =$ _____
- d $12\% + 27\% + 42\% =$ _____

- 7 a If 12% of the students are away from the class, what percentage of students are present?
- _____

- b In a class spelling test if James got 86% of the words correct, what percentage of the words did he spell incorrectly?
- _____

1 Express the following percentages as fractions in simplest form.

a $50\% =$ _____

b $40\% =$ _____

c $30\% =$ _____

d $10\% =$ _____

e $20\% =$ _____

f $60\% =$ _____

g $70\% =$ _____

h $80\% =$ _____

i $25\% =$ _____

j $75\% =$ _____

k $85\% =$ _____

l $100\% =$ _____

m $15\% =$ _____

n $90\% =$ _____

o $95\% =$ _____

Decimal percentages convert to smaller place values.

tens = $\frac{100}{100}$

ones = $\frac{100}{100}$

1 decimal place = $\frac{1,000}{1,000}$

2 decimal places = $\frac{10,000}{10,000}$

$10\% = \frac{10}{100}$

$1\% = \frac{1}{100}$

$1.5\% = \frac{15}{1,000}$

$1.46\% = \frac{146}{10,000}$

2 Express the following percentages as fractions in simplest form.

a $2\% =$ _____

b $4\% =$ _____

c $6\% =$ _____

d $8\% =$ _____

e $12\% =$ _____

f $14\% =$ _____

g $16\% =$ _____

h $18\% =$ _____

i $24\% =$ _____

j $32\% =$ _____

k $44\% =$ _____

l $152\% =$ _____

m $64\% =$ _____

n $74\% =$ _____

o $88\% =$ _____

3 Express the following percentages as fractions in simplest form.

a $2.5\% =$ _____

b $8.2\% =$ _____

c $4.5\% =$ _____

d $36.5\% =$ _____

e $3.5\% =$ _____

f $27.5\% =$ _____

g $84.5\% =$ _____

h $40.2\% =$ _____

i $62.5\% =$ _____

j $0.5\% =$ _____

k $22.5\% =$ _____

l $0.8\% =$ _____

m $31.25\% =$ _____

n $87.5\% =$ _____

o $18.3\% =$ _____

4 Convert the following percentages into fractions in simplest form.

a $38.4\% =$ _____

b $56.8\% =$ _____

c $62.2\% =$ _____

d $25.7\% =$ _____

e $12.9\% =$ _____

f $3.1\% =$ _____

g $3.6\% =$ _____

h $6.75\% =$ _____

i $4.25\% =$ _____

j $4.125\% =$ _____

k $7.875\% =$ _____

l $172.625\% =$ _____

m $42.125\% =$ _____

n $58.875\% =$ _____

o $48.625\% =$ _____

Change fractions to an **equivalent** fraction over a power of 10,
then convert to a **percentage**.

$$\frac{1}{4} \xrightarrow{\times 5} \frac{5}{20} \xrightarrow{\times 5} \frac{25}{100} = 25\% \qquad \frac{6}{15} \xrightarrow{\div 3} \frac{2}{5} \xrightarrow{\times 2} \frac{4}{10} = 40\%$$

1 Express the following fractions as percentages.

a $\frac{30}{100} =$ _____

b $\frac{50}{100} =$ _____

c $\frac{80}{100} =$ _____

d $\frac{40}{100} =$ _____

e $\frac{43}{100} =$ _____

f $\frac{84}{100} =$ _____

g $\frac{62}{100} =$ _____

h $\frac{39}{100} =$ _____

i $\frac{56}{100} =$ _____

j $\frac{25}{100} =$ _____

k $\frac{16}{100} =$ _____

l $\frac{72}{100} =$ _____

2 Express the following fractions as percentages.

a $\frac{5}{10} =$ _____

b $\frac{16}{10} =$ _____

c $\frac{7}{10} =$ _____

d $\frac{4}{5} =$ _____

e $\frac{6}{20} =$ _____

f $\frac{9}{50} =$ _____

g $\frac{9}{25} =$ _____

h $\frac{7}{25} =$ _____

i $\frac{7}{50} =$ _____

3 Change the following fractions to percentages.

a $\frac{3}{4} =$ _____

b $\frac{5}{80} =$ _____

c $\frac{13}{20} =$ _____

d $\frac{7}{60} =$ _____

e $\frac{2}{8} =$ _____

f $\frac{7}{40} =$ _____

g $\frac{9}{60} =$ _____

h $\frac{3}{5} =$ _____

i $\frac{15}{80} =$ _____

4 Express the following as percentages.

a $\frac{3}{8} =$ _____

b $\frac{5}{9} =$ _____

c $\frac{5}{8} =$ _____

d $\frac{7}{11} =$ _____

e $\frac{5}{12} =$ _____

f $\frac{1}{3} =$ _____

5 Write as a fraction, then convert to a percentage. Pay attention to the units.

a 10c from \$6 = _____ = _____

b \$2.50 from \$10 = _____ = _____

c 750 mL from 3 L = _____ = _____

d 650 m from 4 km = _____ = _____

e 12 mm from 60 cm = _____ = _____

f 28 min from 1 hour = _____ = _____

g 15s from 50s = _____ = _____

h 600 g from 8 kg = _____ = _____

i 36s from 2 min = _____ = _____

j 18 hr from 3 days = _____ = _____

6 Write each answer as a percentage.

a Jay has driven 360 km of a 3,000 km trip. What percentage of the trip has he completed?

b Milly drank 144 mL of a 1 litre bottle of juice. What percentage of the juice is left?

c There are 280 school days in a year. After 5 weeks of school, what percentage is done?

1 Express the following percentages as decimals.

- | | | |
|----------------|---------------|---------------|
| a 10% = _____ | b 80% = _____ | c 30% = _____ |
| d 50% = _____ | e 40% = _____ | f 60% = _____ |
| g 20% = _____ | h 70% = _____ | i 90% = _____ |
| j 100% = _____ | k 15% = _____ | l 65% = _____ |

2 Change the following percentages to decimals.

- | | | |
|---------------|---------------|---------------|
| a 16% = _____ | b 19% = _____ | c 39% = _____ |
| d 12% = _____ | e 61% = _____ | f 56% = _____ |
| g 14% = _____ | h 73% = _____ | i 67% = _____ |
| j 98% = _____ | k 81% = _____ | l 78% = _____ |
| m 62% = _____ | n 43% = _____ | o 49% = _____ |

Decimal percentages convert to **smaller place values**.

$$10\% = 0.1$$

$$1\% = 0.01$$

$$1.4\% = 0.014$$

3 Convert the following percentages to decimals.

- | | | |
|----------------|----------------|----------------|
| a 5% = _____ | b 2% = _____ | c 8% = _____ |
| d 9% = _____ | e 6% = _____ | f 7% = _____ |
| g 3% = _____ | h 1% = _____ | i 4% = _____ |
| j 1.5% = _____ | k 2.5% = _____ | l 3.3% = _____ |
| m 2.1% = _____ | n 1.7% = _____ | o 4.9% = _____ |

4 Change the following percentages to decimals.

- | | | |
|-----------------|-----------------|-----------------|
| a 45.5% = _____ | b 89.2% = _____ | c 57.4% = _____ |
| d 63.9% = _____ | e 63.2% = _____ | f 36.5% = _____ |
| g 53.8% = _____ | h 92.7% = _____ | i 69.7% = _____ |
| j 23.7% = _____ | k 15.8% = _____ | l 21.3% = _____ |

Fraction percentages need to be converted to **decimals** first.

$$1\frac{2}{5}\% = 1\frac{4}{10}\% = 1.4\% = 0.014$$

5 Express the following percentages as decimals.

- | | | |
|-----------------------------|-----------------------------|-----------------------------|
| a $33\frac{1}{3}\%$ = _____ | b $\frac{5}{6}\%$ = _____ | c $\frac{3}{8}\%$ = _____ |
| d $1\frac{1}{2}\%$ = _____ | e $66\frac{2}{3}\%$ = _____ | f $12\frac{1}{2}\%$ = _____ |
| g $9\frac{1}{4}\%$ = _____ | h $20\frac{3}{4}\%$ = _____ | i $\frac{7}{9}\%$ = _____ |

1 Express the following decimals as percentages.

- | | | |
|------------------|------------------|------------------|
| a $0.15 =$ _____ | b $0.25 =$ _____ | c $0.35 =$ _____ |
| d $0.95 =$ _____ | e $0.14 =$ _____ | f $0.85 =$ _____ |
| g $0.18 =$ _____ | h $0.55 =$ _____ | i $0.17 =$ _____ |
| j $0.45 =$ _____ | k $0.67 =$ _____ | l $0.65 =$ _____ |
| m $0.91 =$ _____ | n $0.75 =$ _____ | o $0.72 =$ _____ |

2 Express the following decimals as percentages.

- | | | |
|------------------|------------------|------------------|
| a $0.80 =$ _____ | b $0.60 =$ _____ | c $0.1 =$ _____ |
| d $0.50 =$ _____ | e $0.90 =$ _____ | f $0.2 =$ _____ |
| g $0.70 =$ _____ | h $0.4 =$ _____ | i $0.3 =$ _____ |
| j $0.01 =$ _____ | k $0.02 =$ _____ | l $0.05 =$ _____ |
| m $0.04 =$ _____ | n $0.06 =$ _____ | o $0.03 =$ _____ |

Place values smaller than hundredths are expressed as a **decimal percentage**.

$$0.234 = 23.4\%$$

3 Express the following decimals as percentages.

- | | | |
|-------------------|-------------------|-------------------|
| a $0.123 =$ _____ | b $0.625 =$ _____ | c $0.537 =$ _____ |
| d $0.189 =$ _____ | e $0.427 =$ _____ | f $0.139 =$ _____ |
| g $0.835 =$ _____ | h $0.567 =$ _____ | i $0.683 =$ _____ |
| j $0.129 =$ _____ | k $0.816 =$ _____ | l $0.927 =$ _____ |
| m $0.687 =$ _____ | n $0.257 =$ _____ | o $0.369 =$ _____ |

4 Express the following decimals as percentages.

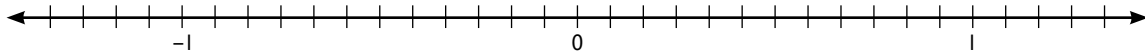
- | | | |
|-------------------|-------------------|-------------------|
| a $0.001 =$ _____ | b $0.910 =$ _____ | c $0.006 =$ _____ |
| d $0.007 =$ _____ | e $0.002 =$ _____ | f $0.009 =$ _____ |
| g $0.810 =$ _____ | h $0.037 =$ _____ | i $0.021 =$ _____ |
| j $0.057 =$ _____ | k $0.089 =$ _____ | l $0.065 =$ _____ |

5 Express the following decimals as percentages.

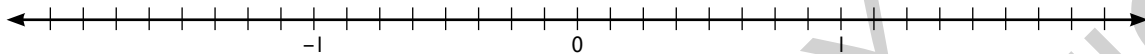
- | | | |
|------------------|------------------|------------------|
| a $1.20 =$ _____ | b $2.50 =$ _____ | c $3.60 =$ _____ |
| d $2.56 =$ _____ | e $1.31 =$ _____ | f $3.57 =$ _____ |
| g $8.25 =$ _____ | h $3.41 =$ _____ | i $5.63 =$ _____ |
| j $5.27 =$ _____ | k $8.03 =$ _____ | i $2.06 =$ _____ |

1 Show the position of the given fractions, decimals or percentages on the given number line.

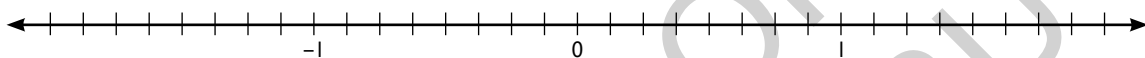
a $1\frac{1}{4}$, $\frac{5}{12}$, $-\frac{2}{3}$, $\frac{1}{6}$, $-\frac{1}{2}$ and $\frac{3}{4}$



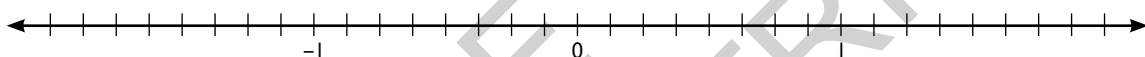
b 0.4, -0.8, 1.5, -0.2, 0.9, and 1.2



c 0.75, $-\frac{2}{5}$, 120%, -0.9, $\frac{1}{4}$, and -1.5



d -1.25, 75%, $1\frac{3}{8}$, $-\frac{3}{4}$, -0.375 and 100%



2 Add the greater than (>), less than (<) or equals (=) symbol to make these statements true.

a $\frac{1}{8}$ _____ $\frac{1}{9}$

b 0.0215 _____ 0.1

c 20% _____ $\frac{1}{5}$

d 72% _____ 0.8

e $\frac{2}{3}$ _____ $\frac{3}{5}$

f 0.65 _____ $\frac{7}{11}$

3 Arrange in ascending order.

a $\frac{1}{2}$, 45%, 0.6

b 0.06, $\frac{2}{3}$, 60%

c $-\frac{3}{4}$, -0.705, $-\frac{7}{10}$

d 0.4, $4\frac{1}{4}\%$, 0.044

4 Arrange in descending order.

a $\frac{2}{3}$, 70%, 0.66

b 1.1, 11%, $\frac{1}{10}$

c 0.45, $\frac{2}{5}$, 42%

d $\frac{7}{8}$, 85%, 0.88

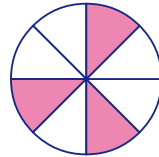
5 a Store A is offering a $\frac{1}{5}$ discount on a new shirt. Store B has a 25% discount on the same shirt. Which store has the better deal?

b Recipe A requires 0.75 cups of sugar. Recipe B requires $\frac{4}{5}$ cups of sugar. Which recipe uses less sugar?

Expressing quantities as a percentage

- 1 a What percentage of the sections are shaded?

$$\frac{\boxed{}}{8} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}\%$$

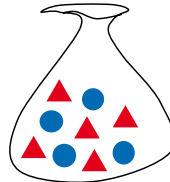


- b What percentage are unshaded?

$$\frac{\boxed{}}{8} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}\%$$

- 2 a What percentage of the shapes are circles?

$$\frac{\boxed{}}{\boxed{}} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}\%$$



- b What percentage are triangles?

$$\frac{\boxed{}}{\boxed{}} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}\%$$

- 3 a What percentage of the sections are shaded?

$$\frac{\boxed{}}{\boxed{}} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}\%$$



- b What percentage are unshaded?

$$\frac{\boxed{}}{\boxed{}} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}\%$$

- 4 Express each quantity as a percentage, with or without a calculator:

- a 65 cents out of \$1

$$\frac{\boxed{}}{100} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

- b 82 cents out of \$1

$$\frac{\boxed{}}{100} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

- c 500 m out of 1 km

$$\frac{\boxed{}}{1,000} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

- d 800 m out of 4 km

$$\frac{\boxed{}}{4,000} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

- e 40 minutes out of 1 hour

$$\frac{\boxed{}}{60} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

- f 18 hours out of 1 day

$$\frac{\boxed{}}{24} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

- 5 Express each quantity as a percentage, with or without a calculator:

- a 8 out of 100

- b 12 cents out of \$1

- c 750 m out of 10 km

- d \$30 out of \$50

- e 9 m out of 20 m

- f 150 cents out of \$3

- g 50 mL out of 60 mL

- h 120 cents out of \$2

- i 8 min out of 60 min

- j 810 m out of 9 km

- k 16 h out of 1 day

- l 12 h out of 2 days

Divide the quantity **by 100** to find **1%**. **Multiply** by the given **percentage**.

3% of \$250 $250 \div 100 = 2.5$ $2.5 \times 3 = 7.5$ **3%** of \$250 = \$7.50

34% of 500 $500 \div 100 = 5$ $5 \times 34 = 170$ **34%** of 500 = 170

1 Evaluate the following.

- a** 10% of 300 = _____
- b** 20% of 5,000 = _____
- c** 30% of 900 = _____
- d** 40% of 630 = _____
- e** 50% of 580 = _____
- f** 75% of 840 = _____
- g** 25% of 370 = _____
- h** 35% of 144 = _____
- i** 5% of 210 = _____
- j** 60% of 225 = _____
- k** 70% of 890 = _____
- l** 100% of 79 = _____
- m** 45% of 125 = _____
- n** 80% of 830 = _____
- o** 85% of 369 = _____
- p** 65% of 1,000 = _____

- 2** 17% of the songs on Jen's playlist are rap. If he has 300 songs on his playlist, how many of them are rap?

$$\frac{\boxed{}}{\boxed{}} \times \boxed{} = \boxed{}$$

- 3** An exam contains 80 multiple-choice questions. If Chris wishes to score 95% on the exam, how many questions does he need to get right?

- 4** At a mass gathering of 1,200 people, 87% of the population were adults.

- a** How many people were adults?

$$\frac{\boxed{}}{\boxed{}} \times \boxed{} = \boxed{}$$

- b** How many people were not adults?

$$1,200 - \boxed{} = \boxed{}$$

- 5** Ren earns a salary of \$136,000 and pays 28% of it to his home loan.

- a** How much does he pay to his home loan?

- b** How much does Ren have left after the payment?

Finding the whole from a percentage

Divide the quantity by the percentage to find 1%. Multiply by 100 to find 100% – the whole amount.

30% is \$60

$$60 \div 30 = 2$$

$$1\% = \$2$$

$$\$2 \times 100 = \$200$$

$$100\% = \$200$$

15% is 240

$$240 \div 15 = 16$$

$$1\% = 16$$

$$16 \times 100 = 1,600$$

$$100\% = 1,600$$

- 1 If 6% of an amount is \$54, what is the whole amount?

$$6\% = \$54$$

$$1\% = 54 \div \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

$$100\% = \underline{\hspace{2cm}} \times 100$$

$$= \underline{\hspace{2cm}}$$

- 2 If 8% of an amount is \$40, what is the whole amount?

$$8\% = \$40$$

$$1\% = 40 \div \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

$$100\% = \underline{\hspace{2cm}} \times 100$$

$$= \underline{\hspace{2cm}}$$

- 3 If 15% of an amount is \$90, what is the whole amount?

$$15\% = \underline{\hspace{2cm}}$$

$$1\% = \underline{\hspace{2cm}} \div \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

$$100\% = \underline{\hspace{2cm}} \times \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

- 4 If 16% of an amount is \$64, what is the whole amount?

$$16\% = \underline{\hspace{2cm}}$$

$$1\% = \underline{\hspace{2cm}} \div \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

$$100\% = \underline{\hspace{2cm}} \times \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

- 5 If 24% of an amount is \$48, what is the whole amount?

- 6 If 35% of an amount is \$105, what is the whole amount?

- 7 If 5% of an amount is \$40, what is the whole amount?

$$40 \div \frac{\boxed{5}}{100} = \underline{\hspace{2cm}}$$

- 8 If 8% of an amount is \$53, what is the total amount?

$$53 \div \frac{\boxed{\hspace{1cm}}}{100} = \underline{\hspace{2cm}}$$

- 9 If 13% of an amount is \$115, what is the full amount?

- 10 If 30% of an amount is \$1,500, what is the total amount?

- 11 What is the whole time if 20% is 124 minutes?

- 12 What is the total length if 37% is 210 cm?

Finding the whole from a percentage

- 1 a** If 50% of a number is 32, what is the number?

- c** If 18% of a number is 9, what is the number?

- 2 a** If 20% of a number is 32, what is the number?

- c** If 15% of a number is 360, what is the number?

- 3** Find 100% of a number if a part of it is given.
- a** 40% is 80; 100% = _____
- c** 25% is 120; 100% = _____
- e** 50% is 70; 100% = _____
- g** 5% is 83; 100% = _____
- i** 2% is 94; 100% = _____
- k** 16% is 46; 100% = _____
- b** Find the total cost if 60% of it is \$90.

- d** If 150% of a number is 60, what is the number?

- b** If 10% of a number is 63, what is the number?

- d** If 48% of a number is 336, what is the number?

- 4 a** If $33\frac{1}{3}\%$ of a number is 9, find the number. _____
- b** John's income increased by 3%. If his income rose by \$645, find his previous income.

- d** The price of a block of land increased by 20%. If this increase was \$28,000, what was the new price? _____
- f** When an amount is increased by 20% it becomes \$65. What is the original amount? is 4,600, what was the population last year?

- c** Alku receives a 15% increase in her weekly wage. If the increase is \$75, find her new weekly wage. _____
- e** Hari spends 40% of his weekly income on rent. If his rent is \$220, find his income.

- g** The population of a small town decreases by 8% every year. If this year's population _____

Increasing or decreasing by a percentage

To **increase** by a percentage: Calculate the **percentage amount**. Then **add** it to the amount.

Increase 40 L by 25%. **25% of 40 L:** $\frac{1}{4} \times 40 = 10 \text{ L}$ $40 \text{ L} + 10 \text{ L} = 50 \text{ L}$

To **decrease** by a percentage: Calculate the **percentage amount**. Then **subtract** it from the amount.

Decrease 40 L by 10%. **10% of 40 L:** $\frac{1}{10} \times 40 = 4 \text{ L}$ $40 \text{ L} - 4 \text{ L} = 36 \text{ L}$

1 Increase the following by the given percentage.

- | | |
|-------------------------|--------------------------------------|
| a \$45 by 30% = _____ | b \$8,000 by 15% = _____ |
| c \$80 by 45% = _____ | d \$3,000 by 60% = _____ |
| e \$350 by 20% = _____ | f \$750 by 35% = _____ |
| g 900 g by 40% = _____ | h 50 min by 20% = _____ |
| i 400 kg by 60% = _____ | j 240 L by 50% = _____ |
| k 36 h by 100% = _____ | l 80 t by 75% = _____ |
| m \$648 by 25% = _____ | n \$320 by 16% = _____ |
| o \$200 by 5% = _____ | p \$150 by $12\frac{1}{2}\%$ = _____ |
| q 80 ha by 20% = _____ | r 600 cm by 70% = _____ |

2 Decrease the following by the given percentage.

- | | |
|------------------------|--------------------------|
| a \$63 by 19% = _____ | b \$84 by 32% = _____ |
| c 4 m by 35% = _____ | d 260 L by 24% = _____ |
| e \$930 by 10% = _____ | f \$6,354 by 20% = _____ |
| g \$134 by 25% = _____ | h \$575 by 30% = _____ |
| i \$928 by 15% = _____ | j \$245 by 50% = _____ |
| k 48 h by 25% = _____ | l \$840 by 70% = _____ |
| m \$365 by 15% = _____ | n \$960 by 45% = _____ |
| o \$96 by 40% = _____ | p \$60 by 80% = _____ |
| q \$940 by 28% = _____ | r \$620 by 35% = _____ |

3 a Bill bought a block of land for \$230,000. If the land rose by 80%, find the new value.

c The price of a new car is \$30,000 and after 1 year it decreases in value by 20%. Find the value of the car after the first year.

b Nathan earns \$1,500 a week. Calculate his new weekly wage if he receives a pay rise of 20%.

d A shirt priced at \$130 was sold at a discount of 25%. Find the sale price.

- 1 38% of some marbles are red and 18% are blue. The rest are green. What percentage of the marbles are green?
- 2 Of 80 cars, 45% are white. How many of the cars are white?
- 3 Out of 1,060 students, 30% were absent. How many of the students were absent?
- 4 102 out of 120 cows have calves. What percentage of the cows have calves?
- 5 If 16% of a mass is 80 kg, find the total mass.
- 6 \$500 is increased by 10% and this result is then decreased by 10%. What is the final result?
- 7 A car bought for \$2,500 is sold for \$2,000. What is the loss as a percentage of the cost price?
- 8 A salesman sold goods worth \$35,000. Find the commission he gained on the sale if the first \$10,000 sales earned 7% and the amount sold above \$10,000 earned 9%.
- 9 Find the simple interest on \$2,000 for 1 year at 9.5% per annum.
- 10 Find the simple interest on \$3,560 for 3 years at $8\frac{1}{4}\%$ p.a.
- 11 Find 55% of \$1,640 and add it to 45% of \$150.
- 12 In an examination, 90% of a class of 30 students passed. How many students failed?
- 13 A discount of 35% will be allowed on a coat priced at \$170. What price will be paid for the coat?
- 14 Of the 960 students at a school, 15% are in Year 8.
- a How many students are in Year 8?
- b There are 81 boys in Year 8. What percentage of Year 8 students are boys?

Percentages, fractions and decimals

- Instructions**
- This part consists of 12 multiple-choice questions.
 - Fill in only ONE CIRCLE for each question.
 - Each question is worth 1 mark.
 - Calculators are NOT allowed.

Time allowed: 15 minutes

Total marks: 12

1	What is 40% of \$200,000?	(A) \$5,000	(B) \$8,000	(C) \$50,000	(D) \$80,000	☐
2	0.3% equals:	(A) $\frac{1}{3}$	(B) $\frac{3}{10}$	(C) $\frac{3}{100}$	(D) $\frac{3}{1,000}$	☐
3	18% of a number is 27. What is the number?	(A) 150	(B) 200	(C) 250	(D) 300	☐
4	Which decimal does $4\frac{1}{2}\%$ equal?	(A) 0.42	(B) 0.45	(C) 0.042	(D) 0.045	☐
5	A jacket is priced at \$120. If it's on sale with a 25% discount, how much it now?	(A) \$25	(B) \$30	(C) \$90	(D) \$95	☐
6	Which calculation will give the same result as finding 20% of 45?	(A) 45% of 20	(B) 20% of 50	(C) 2% of 45	(D) 30% of 90	☐
7	At a roll call, there were 4 students absent and 21 present. What percentage of the roll class was absent?	(A) 16%	(B) 19%	(C) 25%	(D) 84%	☐
8	$\frac{5}{8}$ as a decimal equals:	(A) 0.58	(B) 0.85	(C) 0.72	(D) 0.625	☐
9	Ted pays \$60 after receiving a discount of 20%. What is the normal price?	(A) \$63	(B) \$72	(C) \$75	(D) \$80	☐
10	What percentage is \$3 of \$20?	(A) 10%	(B) 12%	(C) 15%	(D) 18%	☐
11	If 120 is 20% of a number, what is the number?	(A) 24	(B) 96	(C) 480	(D) 600	☐
12	Which numbers are in ascending order?	(A) $\frac{7}{8}$, 87%, 0.78	(B) $\frac{7}{8}$, 0.78, 87%	(C) 0.78, 87%, $\frac{7}{8}$	(D) 0.78, $\frac{7}{8}$, 87%	☐

Total marks achieved for PART A

12

Percentages, fractions and decimals

- Instructions**
- This part consists of 15 questions.
 - Each question is worth 1 mark.
 - Answer each question in the space provided.
 - For any working use the question column. Calculators are NOT allowed.

Time allowed: 20 minutes

Total marks: 15

Questions	Answers	Marks
1 Find 37% of \$300.		1
2 Express 700% as a fraction.		1
3 Which of the fractions $\frac{5}{9}$, $\frac{4}{7}$, or $\frac{11}{20}$ the largest?		1
4 If 15% of an amount is \$140, what is the total amount?		1
5 After 25% of a bill has been paid, \$80 still remains to be paid. How much was the bill?		1
6 A concrete mixture contains one part cement, two parts sand and three parts gravel. What percentage of the mixture is sand?		1
7 What is 200% of \$200?		1
8 Write $\frac{7}{12}$ as a percentage correct to two decimal places.		1
9 Who saves more money: a customer getting 20% off a \$50 item, or 50% off a \$20 item?		1
10 Find 100%, given that 40% is 98.		1
11 Write 2.35 as an improper fraction in simplest form.		1
12 30% of the students in a choir are boys. If there are 12 boys, how many students are in the whole choir?		1
13 How much is 8% of \$25,000?		1
14 A 20% discount on a \$60 jacket saves the same amount as a 10% discount on a \$_____ jacket.		1
15 The price of a television is reduced by 18% to \$1,722. What was the original price?		1

Total marks achieved for PART B

15