Mathletics

The New Zealand Curriculum 2025

Year 8

Contents

Chapter 1 Computation with integers

Computation with integers

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

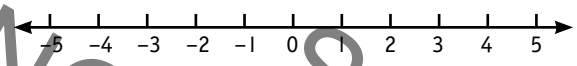
- measure temperatures
- read bank account statements
- estimate costs to stay within budget

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**

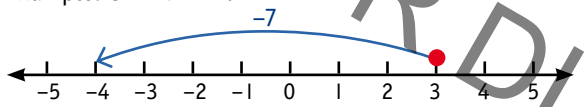
A number and its opposite always add up to zero.

Example: $-5 + 5 = 0$

✓ **Adding and subtracting integers**

Move up or down the number line to find the total.

Example: $3 + -7 = -4$



✓ **Multiplying and dividing integers**

Same signs = positive answer.

Example: $-4 \times -3 = 12$

Different signs = negative answer.

Example: $-4 \times 3 = -12$

✓ **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 → Exponents → × ÷ → + −

Example: $(2 + -4) \times 3^2 = -18$

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

The New Zealand Curriculum Mathematics and Statistics 2025

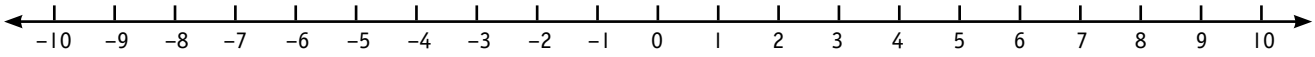
Knowledge	Practices
Number	**Number Structures and Operations**
The number system extends infinitely, including into negative numbers, and can be represented with a number line. Integers are all the whole numbers, including positive whole numbers, negative whole numbers, and zero. Every number has an additive inverse, and their sum is zero (e.g. −5 and 5 are additive inverses; −5 + 5 = 0 and 5 + −5 = 0).	Using exponents for cube numbers up to at least 125 Locating negative and positive numbers on a number line Comparing and ordering negative and positive numbers using a number line Evaluating expressions involving negative numbers, addition and subtraction
Division can result in a remainder expressed as a whole number, fraction, or decimal.	Multiplying and dividing whole numbers
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 (× and ÷), and additive (+ and −) can be used to remember the order of operations.	Evaluating expressions with integers, using the order of operations

Properties of integers

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 _____

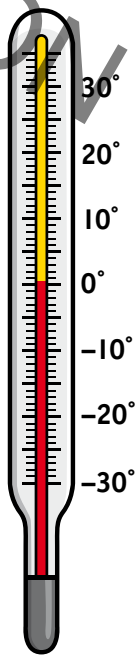
e −87, −32, −6, −24, −60 _____

f 37, −45, 92, −101, −235 _____

6 Write the temperatures onto the thermometer.

a 5° **b** −15° **c** −22°

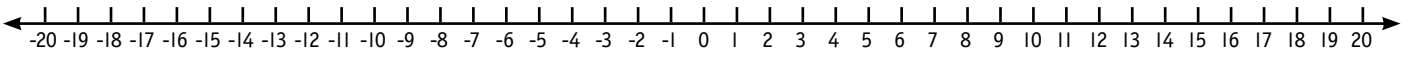
d 17° **e** −2° **f** 11°



Addition of integers

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 = _____

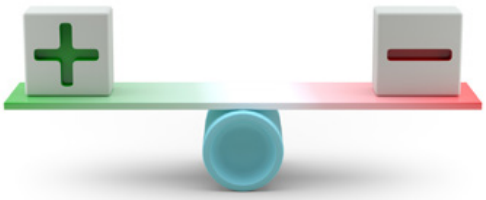
6 Find the missing number.

a 12 + _____ = 21 **b** _____ + −3 = 12 **c** −8 + 14 = _____

d 6 + _____ = −9 **e** −6 + 10 = _____ **f** 8 + _____ = −7

g 15 + _____ = 29 **h** (−8) + −4 = _____ **i** 11 + −11 = _____

Subtraction of integers



Subtracting positive and negative integers

− + = −	− − = +
3 − 4 = 1	3 − −2 = 3 + 2 = 5
−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. _____

Multiplication of integers

Multiplying and dividing positive and negative integers

Same signs = positive answer

$2 \times 3 = 6$ $8 \div 2 = 4$

$-2 \times -3 = 6$ $-8 \div -2 = 4$

Different signs = negative answer

$2 \times -3 = -6$ $-2 \times 3 = -6$

$8 \div -2 = -4$ $-8 \div 2 = -4$

1 Multiply the following.

a $5 \times 2 =$ _____ b $12 \times -7 =$ _____ c $15 \times 10 =$ _____

d $8 \times -3 =$ _____ e $2 \times 6 =$ _____ f $12 \times -8 =$ _____

g $6 \times 9 =$ _____ h $6 \times -15 =$ _____ i $13 \times 4 =$ _____

2 Work out the following.

a $3 \times 2 =$ _____ b $5 \times -3 =$ _____ c $21 \times 9 =$ _____

d $15 \times -8 =$ _____ e $11 \times 4 =$ _____ f $6 \times -7 =$ _____

g $9 \times 3 =$ _____ h $9 \times -7 =$ _____ i $40 \times 9 =$ _____

3 Find the answers to the following.

a $-3 \times 12 =$ _____ b $-4 \times -3 =$ _____ c $-5 \times 11 =$ _____

d $-5 \times -9 =$ _____ e $-6 \times 1 =$ _____ f $-7 \times -20 =$ _____

g $24 \times -1 =$ _____ h $-3 \times -9 =$ _____ i $-4 \times 5 =$ _____

4 Simplify.

a $-3 \times 7 =$ _____ b $-4 \times -6 =$ _____ c $-8 \times 4 =$ _____

d $-2 \times -12 =$ _____ e $-3 \times 15 =$ _____ f $-5 \times -12 =$ _____

g $-6 \times 10 =$ _____ h $-4 \times -8 =$ _____ i $-6 \times 8 =$ _____

5 Find each product.

a $4 \times 8 \times 2 =$ _____ b $-6 \times -3 \times 1 =$ _____

c $-7 \times 5 \times 10 =$ _____ d $9 \times -2 \times -2 =$ _____

e $-4 \times 5 \times -3 =$ _____ f $2 \times -3 \times 4 =$ _____

g $6 \times 8 \times -1 =$ _____ h $-3 \times -10 \times -7 =$ _____

6 Complete the following tables.

a

×	7	11	−4
3			
−7			

b

×	−5	−9	8
7			
−10			

c

×	12	−25	−100
−4			
12			

Division of integers

1 Divide the following.

a $24 \div 4 =$ _____ **b** $42 \div -6 =$ _____

c $54 \div 9 =$ _____ **d** $36 \div -9 =$ _____

e $28 \div 7 =$ _____ **f** $21 \div -3 =$ _____

g $16 \div 8 =$ _____ **h** $55 \div -5 =$ _____

i $48 \div 8 =$ _____ **j** $32 \div -4 =$ _____

Dividing Integers
Same signs = positive
$+ \div + = +$
$- \div - = +$
Different signs = negative
$+ \div - = -$
$- \div + = -$

2 Work out the following divisions.

a $12 \div 2 =$ _____ **b** $24 \div -8 =$ _____ **c** $15 \div 5 =$ _____

d $-20 \div 4 =$ _____ **e** $-45 \div -5 =$ _____ **f** $28 \div -7 =$ _____

g $18 \div 9 =$ _____ **h** $-120 \div 10 =$ _____ **i** $21 \div 3 =$ _____

3 Simplify the following.

a $-27 \div 3 =$ _____ **b** $-24 \div -6 =$ _____ **c** $36 \div 12 =$ _____

d $-27 \div -9 =$ _____ **e** $-63 \div 7 =$ _____ **f** $5 \div -5 =$ _____

g $33 \div -11 =$ _____ **h** $-36 \div -3 =$ _____ **i** $27 \div 3 =$ _____

4 Find the value of:

a $-54 \div -9$ _____ **b** $-50 \div 25$ _____ **c** $90 \div -30$ _____

d $-28 \div 28$ _____ **e** $32 \div -2$ _____ **f** $-60 \div -20$ _____

g $97 \div -97$ _____ **h** $-48 \div -24$ _____ **i** $39 \div -13$ _____

5 Fill in each missing number.

a $-48 \div$ _____ $= -8$ **b** $-50 \div$ _____ $= 10$ **c** $36 \div$ _____ $= -4$

d _____ $\div -5 = -7$ **e** $-49 \div 7 =$ _____ **f** _____ $\div 10 = -8$

g $-300 \div -50 =$ _____ **h** _____ $\div -6 = 4$ **i** $-96 \div$ _____ $= 96$

6 Solve each problem. Write equations to show your working.

a A plane is flying at 9 km above sea level. It descends at –500 metres per minute for 21 minutes until it lands on the runway. What is the elevation of this runway?

_____

_____

b Callie has a debt of –$500. She wants to pay it off in 4 months. How much does she need to reduce the debt by each month?

_____

_____

Mixed questions

1 Find answers to the following.

a $-2 - 4 =$ _____ **b** $-6 + 5 =$ _____ **c** $-2 + 9 =$ _____

d $3 - 7 =$ _____ **e** $2 - -8 =$ _____ **f** $3 + -5 =$ _____

g $-4 - -3 =$ _____ **h** $-2 + -10 =$ _____ **i** $-5 - -12 =$ _____

2 Find the value of the following.

a $-4 \times -8 =$ _____ **b** $-16 \div -8 =$ _____ **c** $54 \div -6 =$ _____

d $-3 \times 7 =$ _____ **e** $11 \times -7 =$ _____ **f** $-56 \div 7 =$ _____

g $-2 \times 5 \times -9 =$ _____ **h** $-100 \div -4 =$ _____ **i** $-3 \times -4 \times -6 =$ _____

3 Work out the following.

a $-3 + -5 =$ _____ **b** $-3 \times -5 =$ _____ **c** $10 \div -2 =$ _____

d $10 - -2 =$ _____ **e** $-15 - 13 =$ _____ **f** $-12 \div -4 =$ _____

g $-6 + 17 =$ _____ **h** $-8 + 8 =$ _____ **i** $-8 \times 8 =$ _____

4 Simplify the following.

a $(3 + 4) \times -2 =$ _____ **b** $5 \times (4 - 5) =$ _____ **c** $(-6 + 4) \times 8 =$ _____

d $-20 \div -5 \div -2 =$ _____ **e** $12 \times 3 \div -9 =$ _____ **f** $-3 - 7 - 8 =$ _____

g $(5 + -5) \times -38 =$ _____ **h** $(-2 - 5) \times -7 =$ _____ **i** $(-4 + 12) \div -2 =$ _____

5 Fill in each missing number.

a $9 +$ _____ $= 7$ **b** _____ $\div 7 = -6$ **c** $-2 -$ _____ $= -3$

d _____ $\times -2 = -100$ **e** _____ $+ 8 = 3$ **f** _____ $- 9 = -1$

g $-81 \div$ _____ $= 9$ **h** $-4 -$ _____ $= 5$ **i** _____ $+ 6 = -2$

6 Complete the following tables.

a

+	3	−7	−9	12	−15
−1					
6					
−8					

b

×	−4	5	−10	8	−9
−5					
11					
−6					

7 Write the equation and solve the problem.

a Mandy has 5 sets of 4 balls plus 12 extra. How many balls altogether?

_____

b Sally has 23 muffins and 31 cupcakes to take to the cake stall. Her boxes hold 6 items. How many boxes does she need?

_____

Exponents

base **exponent**

$3^4 = 81$

$= 3 \times 3 \times 3 \times 3$

1 2 3 4

Negative bases

$(-B)^E = -B \times -B$

$(-2)^4 = -2 \times -2 \times -2 \times -2$

$= +4 \times +4$

$= +16$

$(-B)^E = -(B \times B...)$

$-2^4 = -(2 \times 2 \times 2 \times 2)$

$= -(4 \times 4)$

$= -16$

Odd and even exponents with negative bases

$(-B)^{odd} = -$

$(-2)^3 = -2 \times -2 \times -2$

$= +4 \times -2$

$= -8$

$(-B)^{even} = +$

$(-2)^4 = -2 \times -2 \times -2 \times -2$

$= +4 \times +4$

$= +16$

1 Evaluate the following.

a $2^3 =$ _____ b $5^2 =$ _____

c $3^2 =$ _____ d $4^2 =$ _____

e $-3^5 =$ _____ f $-6^4 =$ _____

g $(-2)^4 =$ _____ h $(-2)^3 =$ _____

i $(-9)^3 =$ _____ j $(-9)^2 =$ _____

k $-3^2 =$ _____ l $-5^2 =$ _____

2 Evaluate the following.

a $(-1)^{10} =$ _____ b $(-5)^4 =$ _____

c $(-1)^{15} =$ _____ d $(-2)^5 =$ _____

e $(-1)^{99} =$ _____ f $(-10)^3 =$ _____

g $(-6)^3 =$ _____ h $(-2)^6 =$ _____

3 Calculate the following.

a $(-2)^3 \times (-3)^2 =$ _____ b $(-9)^2 - (-4) =$ _____

c $4^2 + (-5)^2 =$ _____ d $(-5)^2 + (-10)^2 =$ _____

e $(-1)^5 + (-3)^3 =$ _____ f $(-7)^2 \times (-1)^3 =$ _____

g $8^2 \div (-2)^4 =$ _____ h $(-3)^4 - (-5)^2 =$ _____

4 Evaluate the following.

a $9^2 \div 3 - 4^2 \times 2 =$ _____ b $(-4)^3 \div -4^3 =$ _____

c $4 \times (-2)^2 + 5 \times (-1)^4 =$ _____ d $(-10)^2 \times 5^2 =$ _____

e $2 \times 10^3 + (-10)^2 =$ _____ f $(-5)^2 + 4 \times -10 =$ _____

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.

_____

_____

Order of operations

1 Follow the correct order of operations when finding answers to these.

Grouping ( ) [ ]
Exponents a^x
Multiply and divide × ÷
Add and subtract + −

a $2 + 3 \times 5$

b $12 - 5 \times 3$

c $-3 + 21 \div 3$

d $3 \times 4 - 6 \times 2$

e $-3 \times 7 + 4 \times 8$

f $-9 - 2 \times -6$

g $16 \div 8 - 3$

h $5 - 12 \div 3$

i $-5 \times 20 \div 4$

j $-24 \div 6 + 7$

k $28 \div 7 - 18 \div 2$

l $3 \times -5 - 2 \times -7$

2 Remove the grouping symbols and simplify.

a $(-5 + 8) \times 2$

b $(3 - 7) \times (2 - 5)$

c $-8 + (7 - 3) \div -2$

d $12 \times (-7 + 2)$

e $56 - 2 \times (5 - 9)$

f $(-6 + 14) \div (-5 + 1)$

g $(-3 + 9) \div (-2 \times 3)$

h $36 \div (1 - 4 - 6)$

i $-11 - (2 + 3 \times 4)$

3 Find answers to the following.

a $[(12 - 5) - (3 - 4)] \times -3$

b $9 \times [6 - (5 - 8)]$

c $[4 + (2 - 7) \times 3] \times (-2 + 7)$

d $12 - (-9 + 4) \times 3 \times -2$

e $[(5 + 8) \times (3 - 4) + 6] \times -1$

f $72 \div (-3 + 9) - 56 \div (-2 - 6)$

g $[3 + 12 \div (-2 + 8)] - 5$

h $[-1 - (2 + 3) - 7] \times -2$

i $3 \times [6 \times (4 - 7) \div (-2 + 11)]$

4 Insert grouping symbols to make these statements correct.

a $5 + 7 \div 6 = 2$

b $-3 + 5 \times -1 = -2$

c $5 \times 4 - 6 \times 3 = -30$

d $6 + 3 \times 5 \div -7 = -3$

e $-4 + 7 - 9 \times 2 = -12$

f $54 \div -9 - 2 + 7 = -15$

g $-4 \times 7 - 5 \times -2 = 66$

h $7 - 10 \times 3 - 8 = 15$

i $10 - 7 + 4 \times -3 \div 12 = 4$

Problem solving 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 After it was born, a baby gained 2·5 kg. Then itself it lost 3.5 kg. What was the baby's weight then, compared to its birth weight?

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 $3 \times 3 = 9$. Which other number multiplied by gives 9?

10 What is the combined effect of a profit of $17,000 followed by a loss of $20,000?

11 Find the two numbers whose sum is –8 and product is 15.

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 Two numbers add to 4 but multiply to –12. What are the numbers?

Chapter 1 Checkpoint

Part A

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	1
2	–4 + –7 equals:				
	(A) 3	(B) –3	(C) 11	(D) –11	1
3	Which is equal to 4?				
	(A) –16 ÷ 4	(B) –20 ÷ –5	(C) 32 ÷ –8	(D) –24 ÷ –3	1
4	What is the sum of 4 and –5?				
	(A) 1	(B) –1	(C) 9	(D) –9	1
5	–3 + 2 × 5 equals:				
	(A) 7	(B) –7	(C) 5	(D) –5	1
6	–5 × –4 × –3 equals:				
	(A) –60	(B) 60	(C) –12	(D) 12	1
7	–2 – 3 × –10 equals:				
	(A) 50	(B) –50	(C) 28	(D) –32	1
8	What is the product of –2 and –3?				
	(A) –5	(B) 5	(C) –6	(D) 6	1
9	$(-4)^2$ equals:				
	(A) 8	(B) –8	(C) 16	(D) –16	1
10	–3 – 4 – 5 equals:				
	(A) –12	(B) –2	(C) 2	(D) 12	1
11	–5 × –8 – 10 × –2 equals:				
	(A) 20	(B) –20	(C) –60	(D) 60	1
12	(–7 + 3) × (2 – 6) equals:				
	(A) 16	(B) 32	(C) 40	(D) 80	1

Total marks achieved for PART A 12

Chapter 1 Checkpoint

Part B

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 $-6 - 5 =$		1
2 $9 - (-4) =$		1
3 $-7 + (-11) =$		1
4 $3 \times -5 =$		1
5 $-24 \div -3 =$		1
6 $5 - 3 \times -2 =$		1
7 $8 + 12 \div -4 =$		1
8 $(-10)^3 =$		1
9 $-5 \times -8 \div -4 =$		1
10 $7 \times -2 - 3 \times 5 =$		1
11 $(11 \times -8) + (-4 \times -3) =$		1
12 $-2 \times -1 \times 5 \times -6 =$		1
13 $(6 - 10) \times (-4 - 3) =$		1
14 $-3 \times [-36 \div (-3 - 6)] =$		1
15 At 6 am the temperature was −3 °C. By 9 am it had risen 15 °C. What was the temperature at 9 am?		1

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 and divide numerator and denominator to make equivalent fractions.

Example: $\frac{4}{8} = \frac{2}{4} = \frac{1}{2} = \frac{3}{6} = \frac{6}{12}$

✓ **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**

Move the decimal point to change place value when multiplying by powers of ten.

Example: 4·545 × 100 = 454·5

✓ **Multiplying decimals**

Calculate with base-10 parts of a whole.

Example: 1·75 × 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

Fraction types

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** $\frac{2}{9}$ _____

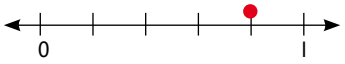
e $5\frac{3}{4}$ _____ **f** $1\frac{1}{2}$ _____ **g** $5\frac{1}{4}$ _____ **h** $9\frac{2}{3}$ _____

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 $\frac{\square}{\square}$



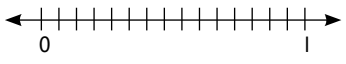
b $\frac{\square}{\square}$

c $\frac{\square}{\square}$

3 Display these fractions on a number line.

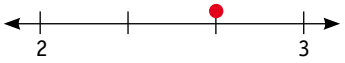
a $\frac{1}{4}$

b $\frac{3}{3}$

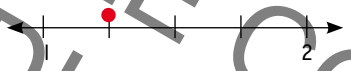


c $\frac{8}{15}$

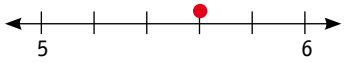
4 Write the mixed number and equivalent improper fraction for the dots plotted on these number lines:



a $\square\frac{\square}{\square} = \frac{\square}{\square}$



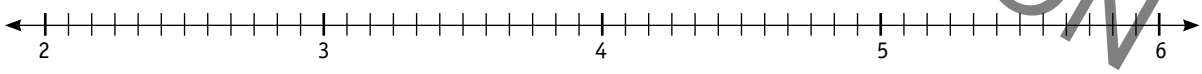
b $\square\frac{\square}{\square} = \frac{\square}{\square}$



c $\square\frac{\square}{\square} = \frac{\square}{\square}$

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

a $\frac{27}{10} = \square\frac{\square}{\square}$ **b** $\frac{11}{2} = \square\frac{\square}{\square}$ **c** $\frac{22}{5} = \square\frac{\square}{\square}$



6 Write the mixed number as an improper fraction.

a $1\frac{2}{5} =$ ____ **b** $3\frac{5}{8} =$ ____ **c** $7\frac{8}{9} =$ ____ **d** $2\frac{5}{6} =$ ____

e $10\frac{1}{2} =$ ____ **f** $21\frac{2}{3} =$ ____ **g** $5\frac{3}{4} =$ ____ **h** $8\frac{1}{5} =$ ____

i $30\frac{2}{3} =$ ____ **j** $10\frac{3}{11} =$ ____ **k** $7\frac{1}{7} =$ ____ **l** $1\frac{9}{10} =$ ____

7 Write each improper fraction as a mixed number.

a $\frac{10}{7} =$ ____ **b** $\frac{5}{2} =$ ____ **c** $\frac{7}{3} =$ ____ **d** $\frac{9}{4} =$ ____

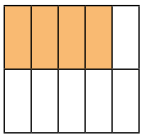
e $\frac{20}{13} =$ ____ **f** $\frac{35}{2} =$ ____ **g** $\frac{84}{9} =$ ____ **h** $\frac{36}{7} =$ ____

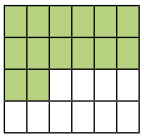
i $\frac{41}{8} =$ ____ **j** $\frac{49}{5} =$ ____ **k** $\frac{63}{8} =$ ____ **l** $\frac{52}{7} =$ ____

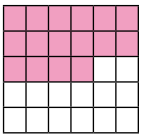
Fractions in simplest form

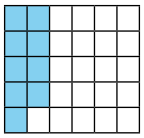
Simplest form: Divide the numerator and denominator by their highest common factor (HCF).
In simplest form, a fraction's numerator and denominator only have 1 as a common factor.

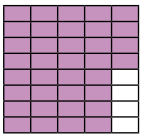
1 Write the fraction for the shaded part of the diagram, then write it in simplest form.

a  $\frac{\square}{\square} = \frac{\square}{\square}$

b  $\frac{\square}{\square} = \frac{\square}{\square}$

c  $\frac{\square}{\square} = \frac{\square}{\square}$

d  $\frac{\square}{\square} = \frac{\square}{\square}$

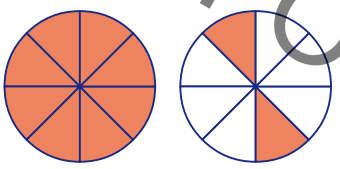
e  $\frac{\square}{\square} = \frac{\square}{\square}$

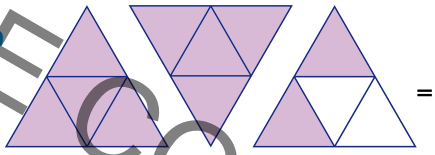
2 Write these fractions in the simplest form.

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.

a  $= \square\ \frac{\square}{\square}$

b  $= \square\ \frac{\square}{\square}$

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

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

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

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. $\frac{\square}{100} = \frac{\square}{\square}$

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

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

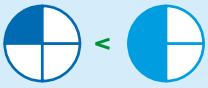
d 40 cents out of $2 $\frac{\square}{200} = \frac{\square}{\square}$

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

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

Work with fractions

To compare fractions either the denominator or the numerator must be the same.
Remember, a larger denominator = a smaller fraction.

$\frac{1}{4} < \frac{1}{2}$ 

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 $\frac{3}{4}$?

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

Answer: $\frac{\square}{\square}$

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

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

Answer: $\frac{\square}{\square}$

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

$\frac{\square}{\square}$ or $\frac{\square}{\square}$

Answer: $\frac{\square}{\square}$

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

$\frac{\square}{\square}$ or $\frac{\square}{\square}$

Answer: $\frac{\square}{\square}$

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

Fractions of a whole number

To find a fraction of a whole number, multiply the fraction by the number:
Multiply numerator by number, then divide by denominator.

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

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? _____

Multiply by improper fractions and mixed numbers

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** $\frac{17}{20} \times 30 =$ _____ **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 $\frac{3}{8}$ m^3. How many small boxes will fit inside the large cargo crate.

_____

_____

Finding the whole amount

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

$\frac{2}{3}$ **is 6 = (6 ÷ 2) × 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? _____

Word problems

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 fractions

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

$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ $\quad \frac{2}{3} \times \frac{3}{4} = \frac{6}{12} = \frac{1}{2}$ $\quad \frac{11}{12} \times \frac{2}{5} = \frac{22}{60} = \frac{11}{30}$

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?

_____

Multiply mixed numbers

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

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

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

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

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

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

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?

_____

Convert between fractions and decimals

Decimal place values

$0{\cdot}2345 = \frac{2}{10} + \frac{3}{100} + \frac{4}{1{,}000} + \frac{5}{10{,}000}$

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.

$\frac{3}{4} \overset{\times 5}{=} \frac{15}{20} \overset{\times 5}{=} \frac{75}{100} = 0{\cdot}75$ $\qquad$ $\frac{6}{15} \overset{\div 3}{=} \frac{2}{5} \overset{\times 2}{=} \frac{4}{10} = 0{\cdot}4$

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

Decimal Fundamentals

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

Rounding decimals

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 × 5 = _____ b 8·2 × 4 = _____ c 11·8 × 3 = _____

d 20·4 × 6 = _____ e 9·9 × 7 = _____ f 5·1 × 12 = _____

g 15·2 ÷ 4 = _____ h 49·6 ÷ 10 = _____ i 37·4 ÷ 6 = _____

j 65·8 ÷ 8 = _____ k 22·1 ÷ 7 = _____ l 91·5 ÷ 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?

Estimate: _____

Answer: _____

b 2·45 L of juice is poured equally into 5 glasses. How much juice is in each glass?

Estimate: _____

Answer: _____

Number Number structures and operations: Rounding decimals to the nearest whole number, tenth, hundredth, or thousandth; Using rounding, estimation, and benchmarks to predict results and to check the reasonableness of calculations

Powers of 10

Multiply and divide by powers of 10: move the **decimal point** the number of **zeros**.

Multiply: move the decimal point to the **right**. **Divide**: move the decimal point to the **left**.

$7{\cdot}089 \times 100 = 708{\cdot}9$ $\qquad$ $234{\cdot}5 \div 100 = 2{\cdot}345$

1 Work out the following.

a $0{\cdot}5 \times 10 =$ _____ b $0{\cdot}41 \times 10 =$ _____ c $0{\cdot}64 \times 100 =$ _____

d $8{\cdot}1 \times 10 =$ _____ e $3{\cdot}6 \times 10 =$ _____ f $7{\cdot}2 \times 10 =$ _____

g $19{\cdot}6 \times 100 =$ _____ h $121{\cdot}64 \times 100 =$ _____ i $28{\cdot}7 \times 100 =$ _____

j $86{\cdot}5 \times 10 =$ _____ k $4{\cdot}93 \times 100 =$ _____ l $6{\cdot}4 \times 10 =$ _____

m $0{\cdot}008 \times 1{,}000 =$ _____ n $9{\cdot}35 \times 1{,}000 =$ _____ o $7{\cdot}5 \times 100 =$ _____

2 Calculate the following divisions.

a $52 \div 10 =$ _____ b $88{\cdot}7 \div 10 =$ _____ c $935{\cdot}17 \div 10 =$ _____

d $73{\cdot}9 \div 100 =$ _____ e $68{\cdot}5 \div 100 =$ _____ f $55{\cdot}7 \div 1{,}000 =$ _____

g $33{\cdot}8 \div 10 =$ _____ h $99{\cdot}5 \div 1{,}000 =$ _____ i $88{\cdot}17 \div 100 =$ _____

j $46{\cdot}9 \div 10 =$ _____ k $67{\cdot}8 \div 10 =$ _____ l $91{\cdot}35 \div 100 =$ _____

m $35{\cdot}6 \div 100 =$ _____ n $53{\cdot}6 \div 100 =$ _____ o $63{\cdot}81 \div 10 =$ _____

3 Calculate these multiplications.

a $8 \times 100 =$ _____ b $3{\cdot}4 \times 10 =$ _____ c $29 \times 1{,}000 =$ _____

d $12{\cdot}45 \times 10{,}000 =$ _____ e $0{\cdot}512 \times 100 =$ _____

f $421{,}900 \times 1{,}000{,}000 =$ _____

4 Calculate these divisions.

a $2 \div 100 =$ _____ b $4{,}590 \div 1{,}000 =$ _____ c $0{\cdot}014 \div 10 =$ _____

d $70{\cdot}80 \div 10{,}000 =$ _____ e $1{,}367{\cdot}512 \div 1{,}000 =$ _____

f $421{,}900 \div 100{,}000{,}000 =$ _____

Here are some of the powers of 10 in exponent from. The power = the number of zeros.

$10^1 = 10$ $\qquad$ $10^2 = 100$ $\qquad$ $10^3 = 1{,}000$

$10^4 = 10{,}000$ $\qquad$ $10^5 = 100{,}000$ $\qquad$ $10^6 = 1{,}000{,}000$

5 Calculate these mixed problems written in exponent form:

a $31 \times 10^2 =$ _____ b $2{,}400 \div 10^5 =$ _____ c $0{\cdot}0027 \div 10^6 =$ _____

d $90{\cdot}008 \times 10^4 =$ _____ e $3{\cdot}45 \div 10^3 =$ _____ f $2{,}159{,}951 \div 10^3 =$ _____

g $73.805 \times 10^8 =$ _____ h $1{,}038{,}942{,}756 \div 10^9 =$ _____

Multiplying decimals

Multiply a decimal by a whole number:	**0·8 × 3 =**	**0·71 × 4 =**	**0·629 × 5 =**
multiply the numbers first.	**8 × 3 = 24**	**71 × 4 = 284**	**629 × 5 = 3,145**
Put the decimal point in at the	**0·8 × 3 = 2·4**	**0·71 × 4 = 2·84**	**0·629 × 5 = 3·145**
same number of decimal places.	**1 place**	**2 places**	**3 places**

1 Multiply the following.

a 0·3 × 7 = _____ **b** 0·5 × 3 = _____ **c** 0·8 × 9 = _____

d 0·06 × 5 = _____ **e** 0·01 × 8 = _____ **f** 0·12 × 5 = _____

g 1·2 × 4 = _____ **h** 0·04 × 3 = _____ **i** 1·1 × 9 = _____

j 0·02 × 2 = _____ **k** 0·008 × 7 = _____ **l** 0·007 × 5 = _____

2 Multiply with powers of 10.

a 0·4 × 20 = _____ **b** 0·6 × 60 = _____ **c** 0·8 × 80 = _____

d 0·7 × 50 = _____ **e** 0·73 × 200 = _____ **f** 0·58 × 300 = _____

g 7·63 × 2,000 = _____ **h** 8·92 × 30 = _____ **i** 12·5 × 40 = _____

j 19·6 × 90 = _____ **k** 8·65 × 120 = _____ **l** 36·75 × 70 = _____

3 Multiply with two-digit numbers.

a 2·3 × 14 = _____ **b** 4·1 × 25 = _____ **c** 0·9 × 32 = _____

d 6·5 × 12 = _____ **e** 1·25 × 16 = _____ **f** 0·75 × 24 = _____

g 10·4 × 15 = _____ **h** 3·14 × 22 = _____ **i** 9·43 × 25 = _____

Multiply two decimals: Use the total decimal places across both factors.

2 places: 0·2 × 0·9 = 0·18 **3 places: 3·12 × 0·4 = 1·248**

4 Multiply decimals by decimals.

a 0·6 × 0·4 = _____ **b** 0·5 × 0·7 = _____ **c** 0·3 × 0·8 = _____

d 0·2 × 0·05 = _____ **e** 0·5 × 0·21 = _____ **f** 1·003 × 1·2 = _____

g 6·08 × 0·2 = _____ **h** 7·25 × 0·02 = _____ **i** 0·03 × 0·02 = _____

j 0·7 × 0·9 = _____ **k** 5·01 × 0·4 = _____ **l** 8·012 × 0·3 = _____

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

E 1·5 × 4 = _____ **O** 3·2 × 3 = _____ **T** 4·5 × 2 = _____ **R** 0·7 × 6 = _____

Y 2·05 × 4 = _____ **M** 12.1 × 5 = _____ **G** 0·25 × 8 = _____

2	6	9·6	60·5	6	9	4·2	8·2

Word problems

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. _____

Chapter 2 Checkpoint

Part A

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**

Marks

1 Write $\frac{43}{70}$ in simplest form:

(A) $\frac{21}{35}$ (B) $\frac{6}{10}$ (C) $\frac{3}{5}$ (D) $\frac{7}{10}$ [1]

2 $\frac{4}{5} \times \frac{15}{16} =$

(A) $\frac{3}{3}$ (B) $\frac{19}{21}$ (C) $\frac{64}{75}$ (D) $\frac{12}{16}$ [1]

3 Which improper fraction is equal to $5\frac{4}{7}$?

(A) $\frac{39}{4}$ (B) $\frac{27}{7}$ (C) $\frac{35}{7}$ (D) $\frac{39}{7}$ [1]

4 What is $\frac{5}{8}$ of 72?

(A) 45 (B) 115·2 (C) 40 (D) 18 [1]

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 [1]

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) $5\frac{3}{4}$ [1]

7 14·8095 rounded to three decimal places (the nearest thousandth) is:

(A) 14·809 (B) 14·81 (C) 14·810 (D) 14·800 [1]

8 $2\frac{1}{2} \times 1\frac{3}{5}$ equals:

(A) 4 (B) $2\frac{3}{10}$ (C) $3\frac{4}{7}$ (D) $\frac{40}{10}$ [1]

9 0·07 × 1,000 equals:

(A) 7 (B) 70 (C) 700 (D) 0·00007 [1]

10 14·5 ÷ 100 equals:

(A) 0·145 (B) 1·45 (C) 1450 (D) 0·0145 [1]

11 0·06 × 15 equals:

(A) 9 (B) 0·09 (C) 0·9 (D) 90 [1]

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 [1]

Total marks achieved for PART A $\frac{\quad}{12}$

Chapter 2 Checkpoint

Part B

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 ÷ 8·8 by rounding to the nearest whole number.		1
11 0·7 ÷ 100 =		1
12 4·08 × 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

The meaning of percentage

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 _____ .

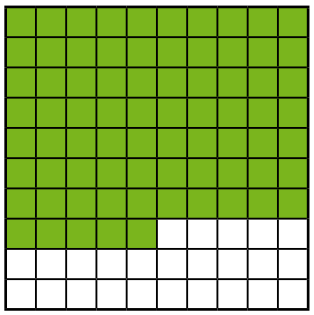
b 80% means 80 out of _____ .

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?

_____

Changing percentages to fractions

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	17% = _____	**n**	90% = _____	**o**	95% = _____

Decimal percentages convert to smaller place values.

tens = $\frac{}{100}$	ones = $\frac{}{100}$	1 decimal place = $\frac{}{1{,}000}$	2 decimal places = $\frac{}{10{,}000}$
$10\% = \frac{10}{100}$	$1\% = \frac{1}{100}$	$1{\cdot}5\% = \frac{15}{1{,}000}$	$1{\cdot}46\% = \frac{146}{10{,}000}$

2 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% = _____

Fraction percentages need to be converted to decimals first.

$\frac{2}{5}\% = \frac{4}{10}\% = 0{\cdot}4\% = \frac{4}{1{,}000}$

3 Change the following percentages to fractions in simplest form.

a	$\frac{1}{2}\%$ = _____	**b**	$\frac{1}{5}\%$ = _____	**c**	$\frac{1}{4}\%$ = _____
d	$\frac{1}{8}\%$ = _____	**e**	$37\frac{1}{2}\%$ = _____	**f**	$52\frac{1}{2}\%$ = _____
g	$5\frac{1}{2}\%$ = _____	**h**	$33\frac{1}{5}\%$ = _____	**i**	$66\frac{3}{5}\%$ = _____
j	$8\frac{1}{2}\%$ = _____	**k**	$91\frac{4}{5}\%$ = _____	**l**	$12\frac{1}{2}\%$ = _____
m	$10\frac{1}{2}\%$ = _____	**n**	$25\frac{1}{2}\%$ = _____	**o**	$35\frac{1}{2}\%$ = _____

4 Convert the following to fractions in simplest form.

a	38% = _____	**b**	56% = _____	**c**	62% = _____
d	$25\frac{1}{5}\%$ = _____	**e**	$12\frac{1}{4}\%$ = _____	**f**	$3\frac{1}{4}\%$ = _____
g	9·5% = _____	**h**	8·6% = _____	**i**	4·8% = _____
j	3·7% = _____	**k**	6·9% = _____	**l**	5·2% = _____
m	42% = _____	**n**	55% = _____	**o**	72% = _____

Changing fractions to percentages

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

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

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?

_____

Changing percentages to decimals

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.

$1\frac{2}{5}\% = 1\frac{4}{10}\% = 1{\cdot}4\% = 0{\cdot}014$

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**	$\frac{7}{9}\%$ = _____

Changing decimals to percentages

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 = _____

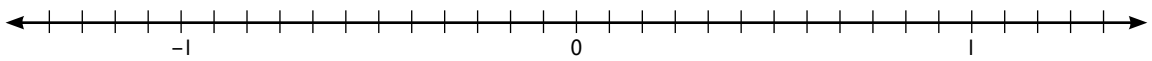
5 Express the following decimals as percentages.

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 = _____

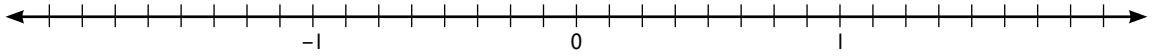
Compare and order

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

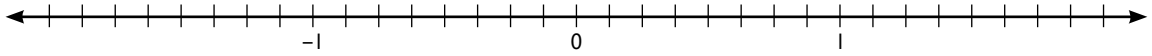
a $1\frac{1}{4}$, $\frac{5}{12}$, $-\frac{2}{3}$, $\frac{1}{6}$, $-\frac{1}{2}$ and $\frac{3}{4}$



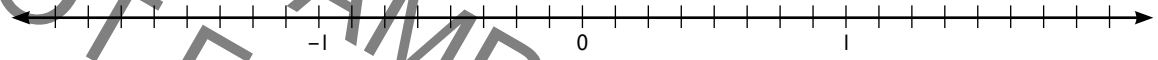
b 0·4, −0·8, 1·5, −0·2, 0·9, and 1·2



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?

_____

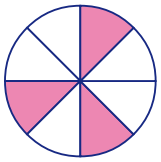
b Recipe A requires 0·75 cups of sugar. Recipe B requires $\frac{4}{5}$ cups of sugar. Which recipe uses less sugar?

_____

Expressing quantities as a percentage

1 **a** What percentage of the sections are shaded?

$\frac{\square}{8} \times \_\_\_\_ = \_\_\_\_ \%$

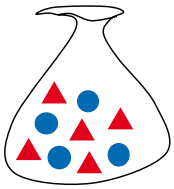


b What percentage are unshaded?

$\frac{\square}{8} \times \_\_\_\_ = \_\_\_\_ \%$

2 **a** What percentage of the shapes are circles?

$\frac{\square}{\square} \times \_\_\_\_ = \_\_\_\_ \%$

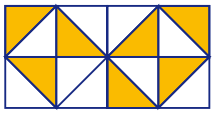


b What percentage are triangles?

$\frac{\square}{\square} \times \_\_\_\_ = \_\_\_\_ \%$

3 **a** What percentage of the sections are shaded?

$\frac{\square}{\square} \times \_\_\_\_ = \_\_\_\_ \%$



b What percentage are unshaded?

$\frac{\square}{\square} \times \_\_\_\_ = \_\_\_\_ \%$

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

a 65 cents out of $1

$\frac{\square}{100} \times \_\_\_\_ = \_\_\_\_$

b 82 cents out of $1

$\frac{\square}{100} \times \_\_\_\_ = \_\_\_\_$

c 500 m out of 1 km

$\frac{\square}{1{,}000} \times \_\_\_\_ = \_\_\_\_$

d 800 m out of 4 km

$\frac{\square}{4{,}000} \times \_\_\_\_ = \_\_\_\_$

e 40 minutes out of 1 hour

$\frac{\square}{60} \times \_\_\_\_ = \_\_\_\_$

f 18 hours out of 1 day

$\frac{\square}{24} \times \_\_\_\_ = \_\_\_\_$

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 _____

Percentage of a quantity

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

3% of $250 250 ÷ 100 = 2.5 2·5 × 3 = 7·5 3% of $250 = $7.50

34% of 500 500 ÷ 100 = 5 5 × 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 Jem's playlist are rap. If he has 300 songs on his playlist, how many of them are rap?

$\frac{\square}{\square}$ × _____ = _____

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?

$\frac{\square}{\square}$ × _____ = _____

b How many people were not adults?

1,200 − _____ = _____

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?

_____

Percentage of a quantity

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

a 15% of $410

$\frac{\square}{100} \times 410 =$ _____

b 24% of $530

$\frac{\square}{100} \times 530 =$ _____

c 53% of 890 g

$\frac{\square}{\square} \times$ _____ = _____

d 84% of 1,050 g

$\frac{\square}{\square} \times$ _____ = _____

e 60% of 1,620 mL

$\frac{\square}{\square} \times$ _____ = _____

f 32% of 2,100 kg

$\frac{\square}{\square} \times$ _____ = _____

2 Work out the following.

a 1% of 48 = _____

b 8·5% of 104 = _____

c 2·5% of 36 = _____

d 3·4% of 230 = _____

e 6·9% of 83 = _____

f 45·6% of 456 = _____

g 4·3% of 55 = _____

h 72·5% of 935 = _____

i 62·5% of 890 = _____

j 36·5% of 830 = _____

k 12·5% of 88 = _____

l 87·5% of 120 = _____

m 37·5% of 120 = _____

n 92·25% of 560 = _____

o $33\frac{1}{5}$% of 180 = _____

p 6·5% of 720 = _____

3 Calculate the following.

a 17% of 500 = _____

b 64% of $350 = _____

c 9% of 67 = _____

d 18·5% of 366 days = _____

e $5\frac{1}{2}$% of 840 = _____

f 2·5% of $80 = _____

g 15% of $120 = _____

h 30% of 4 kg = _____

i 40% of $2 = _____

j 400% of 30 = _____

k 25% of 800 g = _____

l 25% of $812 = _____

m 5% of $1,200 = _____

n 142% of $120 = _____

o 90% of 50 = _____

p 17% of 400 = _____

4 A loaded truck has a mass of 42·5 tonnes. The load makes up 60% of this mass.

a What is the mass of the load? _____

b What is the mass of the truck? _____

5 Out of 150 students, 24% achieved a B grade in Mathematics. 12% achieved an A grade and the rest achieved a C grade.

a How many students got a B? _____

b How many students got an A? _____

c How many students got a C? _____

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 ÷ 30 = 2	1% = $2	$2 × 100 = $200	100% = $200
15% is 240	240 ÷ 15 = 16	1% = 16	16 × 100 = 1,600	100% = 1,600

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

6% = $54

1% = 54 ÷ _____

= _____

100% = _____ × 100

= _____

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

8% = $40

1% = 40 ÷ _____

= _____

100% = _____ × 100

= _____

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

15% = _____

1% = _____ ÷ _____

= _____

100% = _____ × _____

= _____

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

16% = _____

1% = _____ ÷ _____

= _____

100% = _____ × _____

= _____

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?

$40 \div \frac{\boxed{5}}{100} =$ _____

8 If 8% of an amount is $53.60, what is the total amount?

$53{\cdot}60 \div \frac{\square}{100} =$ _____

9 If 13% of an amount is $115.70, 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 210·9 cm?

Finding the whole from a percentage

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

_____

_____

b Find the total cost if 60% of it is $90.

_____

_____

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

_____

_____

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

_____

_____

2 Use the unitary method to solve the following.

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

_____

_____

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

_____

_____

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

_____

_____

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

_____

_____

3 Find 100% of a number if a part of it is given.

a 40% is 80; 100% = _____

b 20% is 92; 100% = _____

c 25% is 120; 100% = _____

d 15% is 60; 100% = _____

e 50% is 70; 100% = _____

f 75% is 450; 100% = _____

g 5% is 83; 100% = _____

h 45% is 119; 100% = _____

i 2% is 94; 100% = _____

j 8% is 34; 100% = _____

k 16% is 46; 100% = _____

l $12\frac{1}{2}$% is 230; 100% = _____

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.

_____

c Alku receives a 15% increase in her weekly wage. If the increase is $75, find her new weekly wage. _____

d The price of a block of land increased by 20%. If this increase was $28,000, what was the new price? _____

e Hari spends 40% of his weekly income on rent. If his rent is $220, find his income.

_____

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?

_____

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:** $\frac{1}{4} \times 40 = 10$ L **40 L + 10 L = 50 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:** $\frac{1}{10} \times 40 = 4$ L **40 L – 4 L = 36 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 $320.80 by 16% = _____
o $199.95 by 5% = _____
p $149.90 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 $928.50 by 15% = _____
j $243.80 by 50% = _____
k 48 h by 25% = _____
l $840 by 70% = _____
m $365 by 15% = _____
n $960 by 45% = _____
o $96 by 40% = _____
p $60.50 by 80% = _____
q $940 by 28% = _____
r $620 by 35% = _____

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

_____

_____

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

_____

_____

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.

_____

_____

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

_____

_____

Problem solving and percentages

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?

Chapter 3 Checkpoint

Part A

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**

Marks

1 What is 40% of $200,000?

(A) $5,000 (B) $8,000 (C) $50,000 (D) $80,000 [1]

2 0·3% equals:

(A) $\frac{1}{3}$ (B) $\frac{3}{10}$ (C) $\frac{3}{100}$ (D) $\frac{3}{1{,}000}$ [1]

3 18% of a number is 27. What is the number?

(A) 150 (B) 200 (C) 250 (D) 300 [1]

4 Which decimal does $4\frac{1}{2}$% equal?

(A) 0·42 (B) 0·45 (C) 0·042 (D) 0·045 [1]

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 [1]

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 [1]

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% [1]

8 $\frac{5}{8}$ as a decimal equals:

(A) 0·58 (B) 0·85 (C) 0·72 (D) 0·625 [1]

9 Ted pays $60 after receiving a discount of 20%. What is the normal price?

(A) $63 (B) $72 (C) $75 (D) $80 [1]

10 What percentage is $3 of $20?

(A) 10% (B) 12% (C) 15% (D) 18% [1]

11 If 120 is 20% of a number, what is the number?

(A) 24 (B) 96 (C) 480 (D) 600 [1]

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% [1]

Total marks achieved for PART A [/12]

Chapter 3 Checkpoint

Part B

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