

Chapters 4, 5, 6 and 7

Illustrated worked solutions

Detailed answers to all 32 questions. Every question has its own solution page, with a labelled visual, a step-by-step explanation, an answer check and a 5-mark guide.

4 Probability

Pages 2-9 | 4.1 Likelihood

5 Multiplication, multiples and factors

Pages 10-17 | 5.1 Tables, multiples and factors; 5.2 Multiplication

6 2D shapes

Pages 18-25 | 6.1 2D shapes and tessellation; 6.2 Symmetry

7 Fractions

Pages 26-33 | 7.1 Understanding fractions; 7.2 Fractions as operators

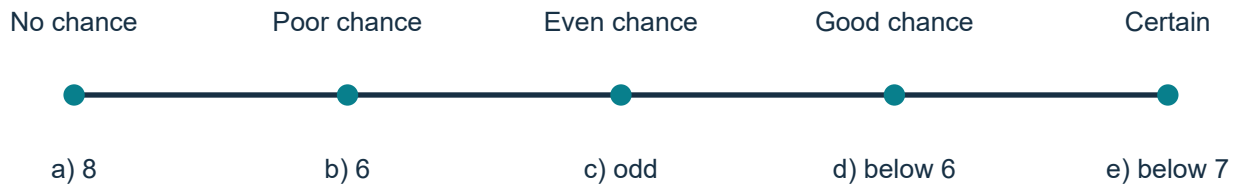
Marking: each numbered question totals 5 marks. Accept equivalent correct methods and sensible alternative drawings. Where working or an explanation is requested, use the stated marking guide. The chance experiments use clearly labelled sample data; the planned investigation has no invented results. Compare fractions using the same-sized whole unless different quantities are stated.

Syllabus basis: the supplied 27971797.pdf, Cambridge Primary Mathematics, Learner's Book 4, second edition (2021), Mary Wood and Emma Low. Printed pages 54-60, 61-73, 75-86 and 88-98; PDF pages 55-61, 62-74, 76-87 and 89-99. Original questions and drawings aligned to these chapter objectives. This is an independently prepared practice resource, not an official Cambridge examination.

Probability

Question 4.1 | 5 marks | Refer to the separate question booklet

4.1 The language of chance



Chance increases from left to right

1. Check the possible results

The six possible results are 1, 2, 3, 4, 5 and 6. A fair die gives each result the same chance.

2. Match each event

- a) 8: no chance, because 8 is not on the die.
- b) 6: poor chance, because only one result is 6 and five are not.
- c) Odd: even chance, because 1, 3 and 5 are odd, while 2, 4 and 6 are even.
- d) Less than 6: good chance, because five results work and only 6 does not.
- e) Less than 7: certain, because all six results work.

a) No chance b) Poor chance c) Even chance d) Good chance e) Certain

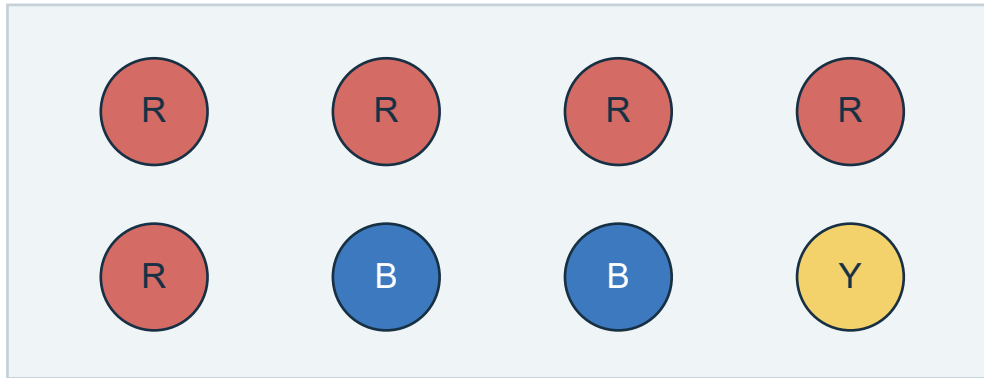
Check: Good chance does not mean certain. A 6 can still occur in part d.

Marking (5 marks): Award 1 mark for each correct phrase. Accept impossible for no chance, unlikely for poor chance, and likely for good chance.

Probability

Question 4.2 | 5 marks | Refer to the separate question booklet

4.2 Counters in a bag



R = red B = blue Y = yellow

1. Count carefully

There are 5 red counters, 2 blue counters and 1 yellow counter: $5 + 2 + 1 = 8$. There are no green counters.

2. Compare colours

- a) Red is most likely: it has the greatest number of counters.
- b) Yellow is least likely among the colours present: it has only one counter.

3. Compare with all other outcomes

c) Red has a good chance: 5 red counters is more than the 3 that are not red. Blue has a poor chance: only 2 are blue and 6 are not blue. Green has no chance because no green counter is in the bag.

a) Red b) Yellow c) Red: good chance; blue: poor chance; green: no chance.

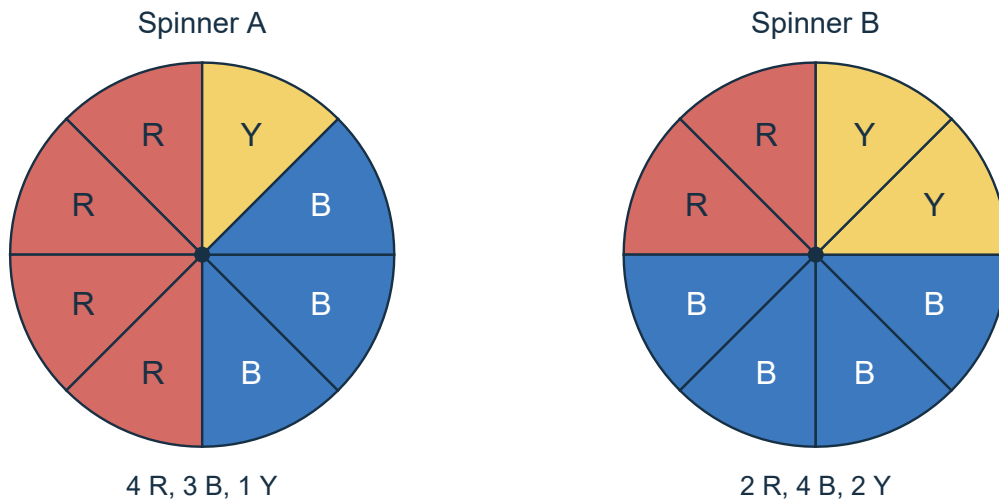
Check: Least likely among colours present means yellow here. Green is impossible, but it is not a colour present in the bag.

Marking (5 marks): 1 mark each: red; yellow; good chance for red; poor chance for blue; no chance for green.

Probability

Question 4.3 | 5 marks | Refer to the separate question booklet

4.3 Compare two spinners



1. Count equal sections

Spinner A has 4 red, 3 blue and 1 yellow section. Spinner B has 2 red, 4 blue and 2 yellow sections. Each has 8 equal sections.

2. Compare the chances

- a) A: red has an even chance, with 4 red and 4 non-red sections. B: red has a poor chance, with 2 red and 6 non-red sections.
- b) Spinner B gives a better chance of yellow: it has 2 yellow sections out of the same total of 8; A has only 1.
- c) Spinner B gives an even chance of blue: 4 blue sections and 4 non-blue sections.

a) A: even chance; B: poor chance. b) B, because 2 yellow sections is more than 1. c) B.

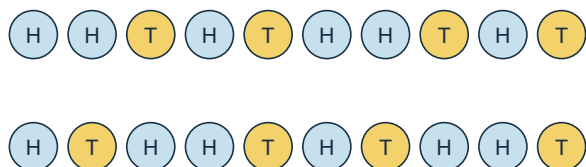
Check: Compare section counts only when the sections are equal in size. Both spinners satisfy that condition.

Marking (5 marks): a) 1 + 1; b) 1 for B and 1 for comparing yellow sections; c) 1 for B.

Probability

Question 4.4 | 5 marks | Refer to the separate question booklet

4.4 Record a coin experiment



Read left to right, top row first.

Result	Tally	Total
Head		12
Tail		8

1. Record every flip once

Count the displayed results in order. There are 12 heads and 8 tails. The check is $12 + 8 = 20$. A bundle of five tally strokes makes counting easier.

2. Read what happened

b) Heads occurred more often. The difference is $12 - 8 = 4$.

3. Separate results from future chance

c) No. The next flip can be heads or tails. With a fair coin, each has an even chance.

d) No. Ten heads is a reasonable prediction for 20 flips, but a fair coin does not guarantee exactly 10. Short experiments often give unequal totals.

a) $H = 12$, $T = 8$. b) Heads, by 4. c) No; either can occur. d) No; results can vary.

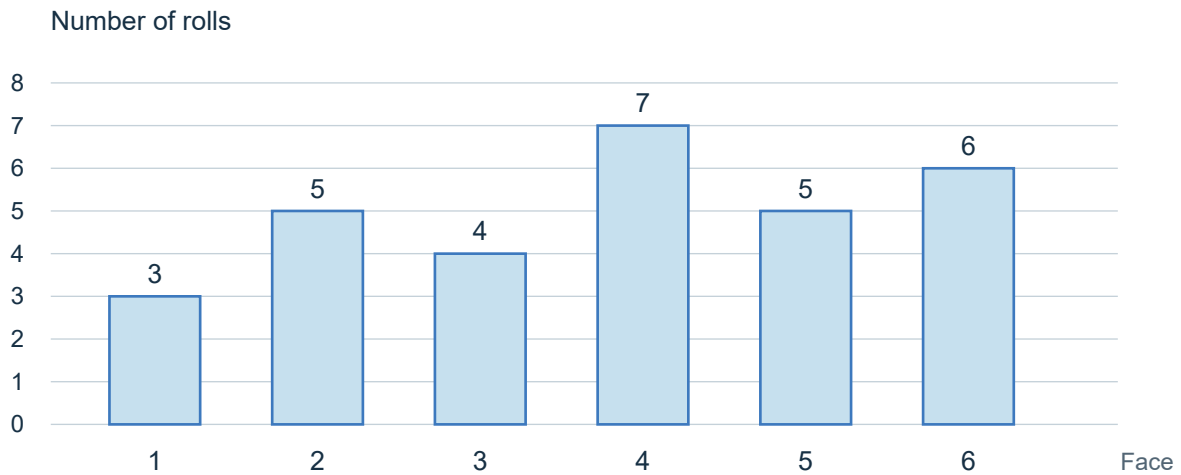
Check: The displayed record is sample data for this question. It is not a claim that a real experiment was performed for this booklet.

Marking (5 marks): a) 1 per correct row, including tally and total; b) 1; c) 1 with explanation; d) 1 with explanation.

Probability

Question 4.5 | 5 marks | Refer to the separate question booklet

4.5 A die experiment



1. Read the record

- a) The number 4 appeared 7 times, the largest count.
 b) Odd numbers are 1, 3 and 5. Their counts are 3, 4 and 5, so there were $3 + 4 + 5 = 12$ odd rolls.

2. Use the fair-die model for the next roll

- c) An odd number has an even chance: 3 faces are odd and 3 are even.
 d) No. There is no 8 on a die numbered 1 to 6.
 e) No. Although 4 appeared most often in this record, a fair die still gives each face the same chance on the next roll.

a) 4 b) 12 rolls c) Even chance d) No chance e) No; every face remains possible.

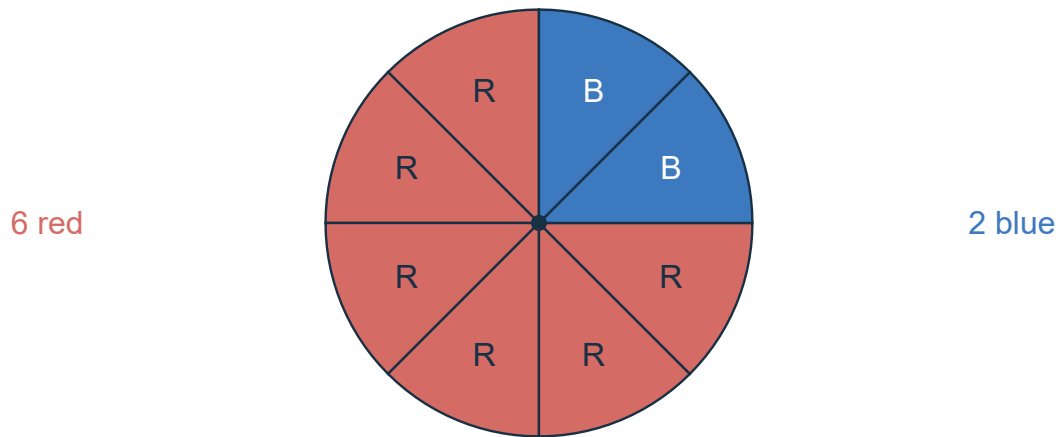
Check: The graph describes the 30 sample outcomes. Its unequal bar heights do not change the next-roll chances of a fair die.

Marking (5 marks): Award 1 mark for each part. Explanations are required for d and e.

Probability

Question 4.6 | 5 marks | Refer to the separate question booklet

4.6 Design a spinner



1. Choose a valid design

One answer uses 6 red sections and 2 blue sections. Other correct answers use 5 red and 3 blue, or 7 red and 1 blue. The positions of the colours may vary.

2. Explain the choices

- b) In the illustrated answer, 6 sections are red and only 2 are not red. Red therefore has a good chance.
- c) There are no green sections, so green has no chance.
- d) Red is not certain. The pointer could stop on either blue section.

Example: 6 red and 2 blue sections. Green is impossible; red is likely but not certain.

Check: Four red and four blue would give an even chance. Eight red would make red certain and would not satisfy the question.

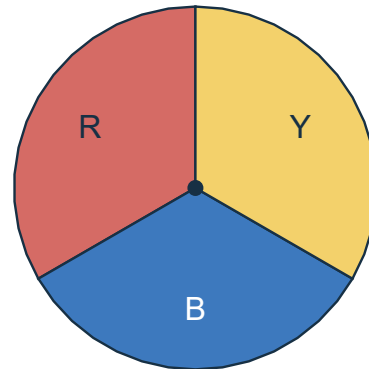
Marking (5 marks): a) 1 for red occupying 5, 6 or 7 sections and 1 for all remaining sections being blue; b), c), d) 1 each with reasons.

Probability

Question 4.7 | 5 marks | Refer to the separate question booklet

4.7 What can results tell us?

Colour	Count
Red	11
Blue	13
Yellow	12
Green	0



One plausible model

1. Propose a model

One plausible spinner has three equal sections: red, blue and yellow. Their counts, 11, 13 and 12, are close. Equal sections can produce slightly different experimental counts.

2. Recognise the limits of a sample

c) No. Zero green outcomes in a short experiment does not prove that a green section is absent. A spinner with a small green section could also give no green in 36 spins.

d) No. The next set can produce different counts. Blue is not guaranteed to be the most frequent result.

A plausible design has 3 equal sections: R, B and Y. This is a possible model, not a uniquely proved design.

Check: Credit other sensible designs supported by the sample. Experimental evidence suggests possibilities; it does not reveal the exact hidden spinner.

Marking (5 marks): a) 1 for a complete labelled spinner and 1 for plausible relative section sizes; b), c), d) 1 each with valid reasoning.

Probability

Question 4.8 | 5 marks | Refer to the separate question booklet

4.8 Plan a fair investigation



Mix
▼
Pick unseen
▼
Record
▼
Replace

Colour	Tally	Total
Red		
Blue		

Record only your actual results.

1. Predict and pick fairly

- a) Each colour has an even chance: there are 2 counters of each colour.
 b) Mix the counters and choose without looking. Use counters of the same size and shape so touch does not reveal the colour.

2. Keep the setup the same

- c) Record the colour, return the counter to the bag and mix before the next pick. Returning it keeps 2 red and 2 blue available each time.

3. Record and interpret

- d) Use rows for red and blue, with tally and total columns. Stop after 20 picks; the two totals should add to 20.
 e) No. Ten of each is a reasonable prediction, but real results can differ. Complete the blank table only if you carry out the experiment.

Predict an even chance; mix, pick unseen, record, replace and repeat. Totals may differ from 10 and 10.

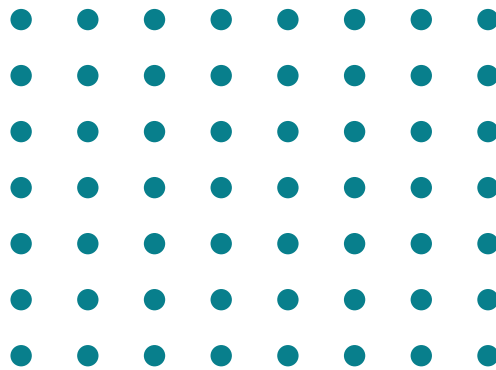
Check: Do not invent experimental results. This question assesses an investigation plan, so the model recording table remains blank.

Marking (5 marks): 1 mark per part. Part c needs replacement and a reason; part d needs both colours and a way to tally and total.

Multiplication, multiples and factors

Question 5.1 | 5 marks | Refer to the separate question booklet

5.1 Table facts and inverse facts



8 counters in each row

7 equal rows

$$7 \times 8 = 56$$

$$56 \div 7 = 8$$

1. Use known facts

- a) $7 \times 8 = 56$. Seven rows of eight counters contain 56 counters.
 b) $9 \times 6 = 54$. One way is $10 \times 6 - 6 = 60 - 6 = 54$.
 c) $7 \times 9 = 63$, so the missing number is 9.

2. Connect multiplication and division

- d) $56 \div 7 = 8$ because $7 \times 8 = 56$. Multiplication and division undo each other.
 e) $10 \times 7 = 70$. Ten groups of seven make seventy.

a) 56 b) 54 c) 9 d) 8 e) 70

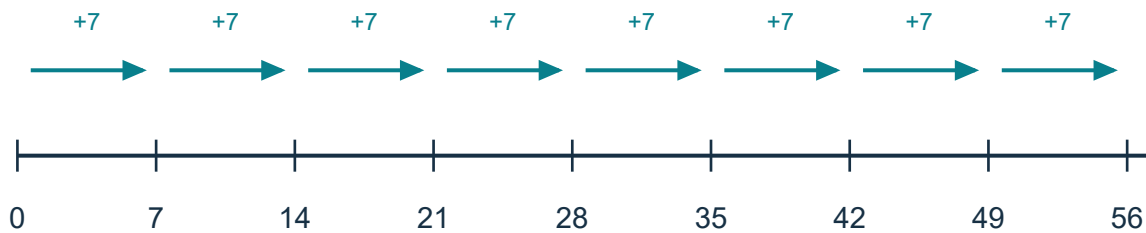
Check: For d, multiply the quotient by the divisor: $8 \times 7 = 56$.

Marking (5 marks): Award 1 mark per correct answer.

Multiplication, multiples and factors

Question 5.2 | 5 marks | Refer to the separate question booklet

5.2 Recognise multiples



Equal jumps of seven

1. Count in equal steps

a) Add 7 each time: 7, 14, 21, 28, 35. These are 1×7 through 5×7 .

2. Check the list with table facts

b) $28 = 4 \times 7$, $35 = 5 \times 7$, $42 = 6 \times 7$, $49 = 7 \times 7$ and $56 = 8 \times 7$. The other listed numbers are not exact multiples of 7.

3. Test the claim

c) The statement is false. For example, $10 = 2 \times 5$ ends in 0. Positive whole-number multiples of 5 end in 0 or 5.

a) 7, 14, 21, 28, 35 b) 28, 35, 42, 49, 56 c) False; for example, 10.

Check: A multiple is a product of the number and a whole number. A factor divides a number exactly; these words describe different roles.

Marking (5 marks): a) 2 for all five; 1 for three or four correct in order. b) 2 for exactly the five required numbers; 1 for one selection error. c) 1 for false with a valid counterexample.

Multiplication, multiples and factors

Question 5.3 | 5 marks | Refer to the separate question booklet

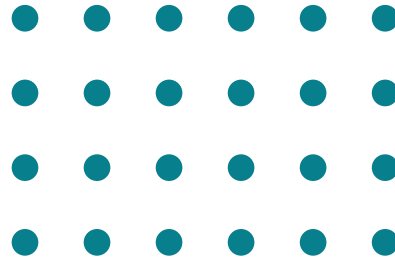
5.3 Find every factor

$$1 \times 24$$

$$2 \times 12$$

$$3 \times 8$$

$$4 \times 6$$



4 rows $\times$ 6 columns = 24

1. Find pairs systematically

a) Test whole numbers in order: 1×24 , 2×12 , 3×8 and 4×6 all give 24. Five does not divide 24 exactly. At 6×4 the pairs begin to repeat, so stop.

2. Collect the factors

b) Take both numbers from every pair and write them once in order: 1, 2, 3, 4, 6, 8, 12, 24.

3. Show a pair as an array

c) The illustrated array has 4 rows and 6 columns. There are $4 \times 6 = 24$ dots. Arrays such as 3×8 or 2×12 are also correct.

Pairs: (1,24), (2,12), (3,8), (4,6). Factors: 1, 2, 3, 4, 6, 8, 12, 24.

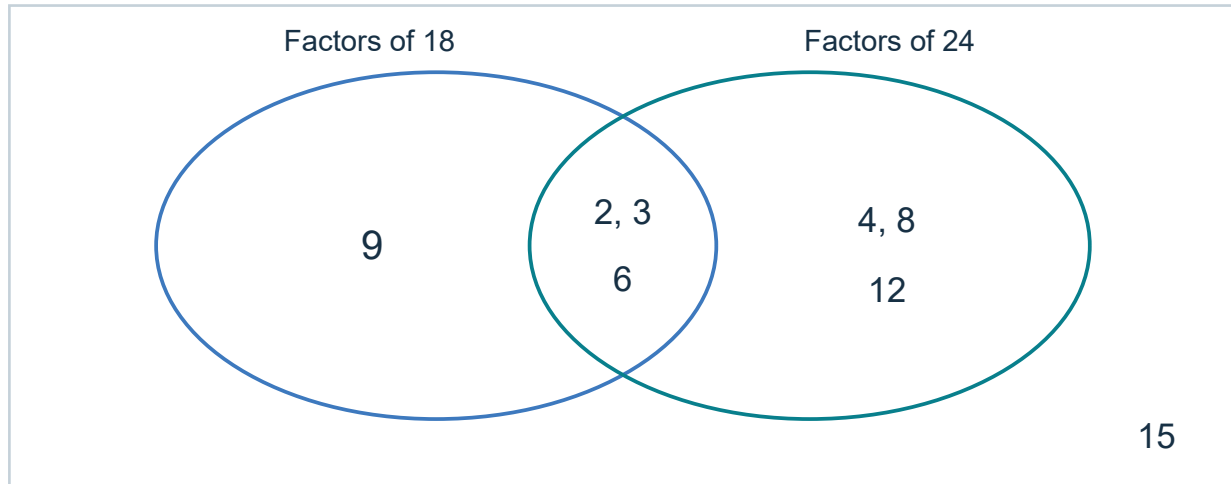
Check: Include both 1 and 24. Each factor divides 24 with no remainder.

Marking (5 marks): a) 2 for all four pairs, 1 for two or three pairs. b) 2 for the complete ordered list, 1 for one omission or extra value. c) 1 for a correct labelled 24-dot array.

Multiplication, multiples and factors

Question 5.4 | 5 marks | Refer to the separate question booklet

5.4 Sort factors in a Venn diagram



1. Test each factor relationship

Factors of 18 are 1, 2, 3, 6, 9 and 18. Factors of 24 are 1, 2, 3, 4, 6, 8, 12 and 24. Only place the eight numbers given in the question.

2. Sort the selected numbers

18 only: 9.

Both 18 and 24: 2, 3, 6.

24 only: 4, 8, 12.

Neither: 15, because it divides neither 18 nor 24 exactly.

3. Read the overlap

b) The greatest number in the overlap is 6. It divides both 18 and 24.

18 only: 9. Both: 2, 3, 6. 24 only: 4, 8, 12. Neither: 15. Greatest in overlap: 6.

Check: The overlap means “both”, not “either one”. Keep 15 inside the outer box but outside both circles.

Marking (5 marks): a) 1 for each completely correct region; b) 1 for 6.

Multiplication, multiples and factors

Question 5.5 | 5 marks | Refer to the separate question booklet

5.5 Group factors efficiently

$$\boxed{7} \times \boxed{2} \times \boxed{5} \longrightarrow 7 \times 10 = 70$$

2 × 5

$$\boxed{25} \times \boxed{4} \times \boxed{3} \longrightarrow 100 \times 3 = 300$$

25 × 4

1. Regroup the first calculation

a) $14 \times 5 = (7 \times 2) \times 5 = 7 \times (2 \times 5) = 7 \times 10 = 70$. Grouping 2 and 5 first makes a familiar multiplication by 10.

2. Make a hundred

b) $25 \times 4 \times 3 = (25 \times 4) \times 3 = 100 \times 3 = 300$. Grouping 25 and 4 first creates 100, which is easy to multiply.

3. Name the idea

The associative law allows the grouping of factors to change without changing the product. The order of the factors stays the same in both worked examples.

a) 70, using $7 \times (2 \times 5)$. b) 300, using $(25 \times 4) \times 3$.

Check: Changing grouping is the associative law. Changing factor order is a different idea, called the commutative law.

Marking (5 marks): a) 1 for substituting 7×2 , 1 for regrouping with a useful explanation, 1 for 70. b) 1 for useful grouping and 1 for 300.

Multiplication, multiples and factors

Question 5.6 | 5 marks | Refer to the separate question booklet

5.6 Estimate and use a grid

×	40	6
7	280	42

$$280 + 42 = 322$$

1. Estimate first

a) 46 rounds to 50 to the nearest ten. The estimate is $50 \times 7 = 350$.

2. Partition and multiply

b) $46 = 40 + 6$.

$40 \times 7 = 280$.

$6 \times 7 = 42$.

3. Combine the parts

$280 + 42 = 322$, so $46 \times 7 = 322$. The grid shows the two parts of the same product, not two unrelated calculations.

Estimate: 350. Exact answer: 322.

Check: The exact answer is 28 below the estimate. Rounding 46 up by 4 added $4 \times 7 = 28$, so $350 - 28 = 322$.

Marking (5 marks): a) 1 for 350 using 50×7 . b) 1 for $40 + 6$, 1 for 280, 1 for 42, 1 for 322.

Multiplication, multiples and factors

Question 5.7 | 5 marks | Refer to the separate question booklet

5.7 Multiply a three-digit number

Thousands	Hundreds	Tens	Ones
	2 carry	3 carry	
	3	6	8
×			4
1	4	7	2

$$300 \times 4 = 1200$$

$$60 \times 4 = 240$$

$$8 \times 4 = 32$$

$$1200 + 240 + 32 = 1472$$

1. Estimate

a) 368 rounds to 400 to the nearest hundred. Estimate: $400 \times 4 = 1600$.

2. Use place value

b) Ones: $8 \times 4 = 32$. Write 2 ones and carry 3 tens.

Tens: 6 tens $\times 4 = 24$ tens; add the carried 3 tens to get 27 tens. Write 7 tens and carry 2 hundreds.

Hundreds: 3 hundreds $\times 4 = 12$ hundreds; add the carried 2 hundreds to get 14 hundreds. Write 1 thousand and 4 hundreds.

3. Compare with the estimate

c) The exact answer is below 1600 because 368 is less than 400 and both are multiplied by the same positive number, 4.

Estimate: 1600. Exact answer: 1472. The exact answer is below the estimate.

Check: A second method gives $1200 + 240 + 32 = 1472$. Rounding up added $32 \times 4 = 128$, and $1600 - 128 = 1472$.

Marking (5 marks): a) 1; b) 1 for each correct place-value stage, or 2 for valid partial products and 1 for their sum; c) 1 with a valid reason.

Multiplication, multiples and factors

Question 5.8 | 5 marks | Refer to the separate question booklet

5.8 A packing problem

136	136	136	136	136	136	136
-----	-----	-----	-----	-----	-----	-----

136	136	136	136	136	136	136
-----	-----	-----	-----	-----	-----	-----

7 equal boxes = 952 pencils; target = 1000

1. Estimate the stock

a) 136 rounds to 140. Estimate: $140 \times 7 = 980$ pencils.

2. Calculate exactly

b) $136 \times 7 = (100 \times 7) + (30 \times 7) + (6 \times 7) = 700 + 210 + 42 = 952$ pencils.

3. Compare with the target

c) There are not enough pencils because 952 is less than 1000. Find the shortage: $1000 - 952 = 48$. The school needs 48 more pencils.

a) About 980 pencils. b) Exactly 952 pencils. c) Not enough; 48 more are needed.

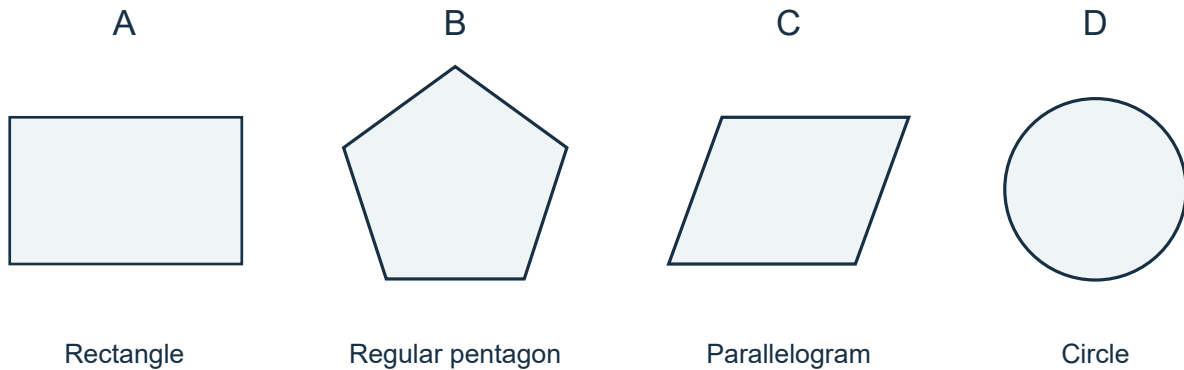
Check: $952 + 48 = 1000$. Keep the unit “pencils” in the final answer.

Marking (5 marks): a) 1; b) 1 for a valid multiplication method and 1 for 952; c) 1 for not enough and 1 for 48 more.

2D shapes

Question 6.1 | 5 marks | Refer to the separate question booklet

6.1 Properties of shapes



1. Count sides and corners

- a) A is a rectangle with 4 straight sides and 4 vertices.
b) B is a regular pentagon with 5 straight sides and 5 vertices. A vertex is a corner where two sides meet.

2. Use precise properties

- c) D is a circle. Its boundary is curved, so it is not a polygon. A polygon is closed and has only straight sides.
d) C is a parallelogram. It has 2 pairs of parallel opposite sides.
e) B is regular because all its sides have equal length and all its interior angles are equal.

a) 4 sides, 4 vertices. b) 5 sides, 5 vertices. c) Curved boundary. d) 2 pairs. e) Equal sides and equal angles.

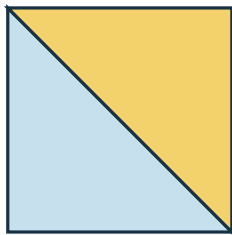
Check: Equal sides alone are not enough to make every polygon regular. Both side lengths and angles must be equal.

Marking (5 marks): 1 per part. Parts a and b each require both counts; e requires both properties.

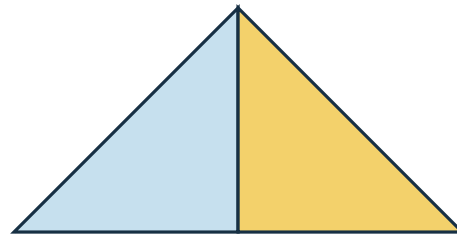
2D shapes

Question 6.2 | 5 marks | Refer to the separate question booklet

6.2 Combine two triangles



Square: join long sides



Triangle: join short sides

1. Make a square

a) Put the two long sides together. The outside boundary has four equal sides and four right angles. The shared long side becomes a diagonal inside the square.

2. Make a larger triangle

b) Put an equal short side of one piece against an equal short side of the other. Turn one piece so the remaining short sides form one straight base. The outside boundary is a larger triangle.

3. Check the joins

c) The shapes are a square and a triangle. Each drawing uses exactly two original pieces. The internal join is not part of the outside boundary.

a) A square split along a diagonal. b) A larger triangle split from its top vertex to the middle of its base.

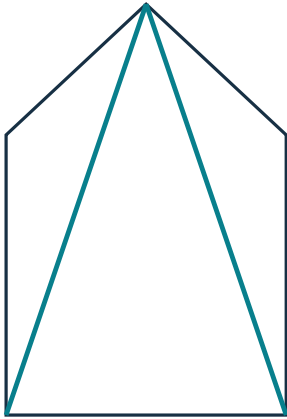
Check: A correct outline alone is not enough: draw the internal join so both original triangles can be seen.

Marking (5 marks): a) 1 for the square and 1 for a correct diagonal join. b) 1 for the larger triangle and 1 for a correct join. c) 1 for both names.

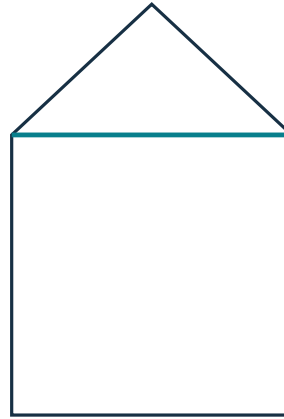
2D shapes

Question 6.3 | 5 marks | Refer to the separate question booklet

6.3 Split a pentagon in two ways



a) Three triangles



b) Square and triangle

1. Make three triangles

a) Draw from the roof tip to each of the two bottom corners. These two lines split the whole shape into a left triangle, a middle triangle and a right triangle.

2. Make a square and a triangle

b) Draw the horizontal line between the two corners where the roof meets the walls. The lower part is a square; the upper part is a triangle.

3. Name the outside shape

c) It is a pentagon because its outside boundary has five straight sides and five vertices. Internal dividing lines do not add outside sides.

a) Join the roof tip to both bottom corners. b) Join the two roof-base corners. c) Five outside sides.

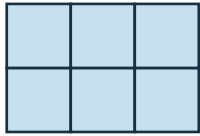
Check: All pieces together must cover the original shape exactly. No piece may overlap another or leave a gap.

Marking (5 marks): a) 1 per correct line producing three triangles. b) 1 for the line and 1 for producing the requested two shapes. c) 1 for five outside sides.

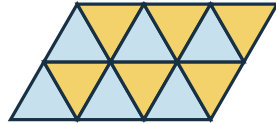
2D shapes

Question 6.4 | 5 marks | Refer to the separate question booklet

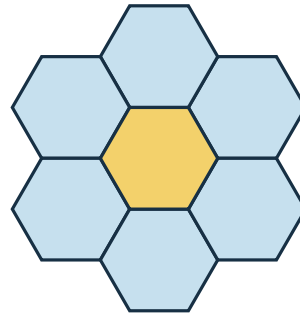
6.4 Which shapes tessellate?



Squares



Equilateral triangles



Hexagons

Each patch can continue without gaps or overlaps.

1. Try repeated copies

- a) Yes: squares fit edge to edge in rows.
- b) Yes: equilateral triangles fit in alternating up and down rows.
- c) Yes: regular hexagons fit in a honeycomb pattern.

2. Check the regular pentagon

- d) No: identical regular pentagons alone do not cover the plane without gaps or overlaps. When three corners meet, a gap remains; bringing in a fourth corner would overlap.

3. State the rule

- e) A tessellation covers a flat surface with shapes and has no gaps and no overlaps. These small repeating patches can continue to cover the surface.

a) Yes b) Yes c) Yes d) No. A tessellation has no gaps or overlaps.

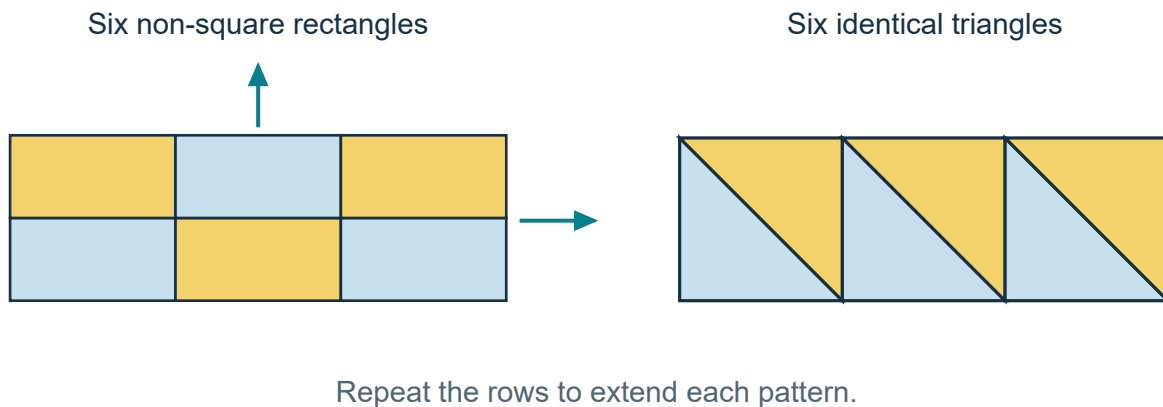
Check: The word regular matters. Some irregular pentagons can tessellate; this question asks about a regular pentagon.

Marking (5 marks): 1 for each of a-d; 1 for stating both no gaps and no overlaps in e.

2D shapes

Question 6.5 | 5 marks | Refer to the separate question booklet

6.5 Draw tessellating patterns



1. Build a rectangle patch

a) Use six rectangles, each two grid squares long and one grid square high. Arrange them in two rows of three. Adjacent rectangles share whole edges.

2. Build a triangle patch

b) Start with three identical squares in a row. Split each square along the same diagonal. The six resulting right-angled triangles are identical and fill the patch.

3. Continue the pattern

c) Repeat the same row above or below, or extend the row sideways. The boundary edges match the next copies, so no gaps or overlaps appear.

Many drawings work. The model uses six 2-by-1 rectangles and six identical half-square triangles.

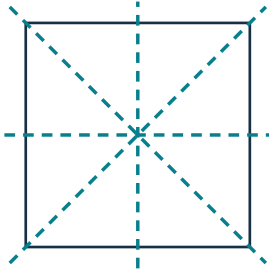
Check: The patch has an outer boundary because only a few tiles are drawn. Tessellation means the rule can continue beyond that boundary.

Marking (5 marks): a) 1 for at least six identical non-square rectangles, 1 for a gap-free, overlap-free patch. b) Same two criteria for triangles. c) 1 for a valid continuation rule.

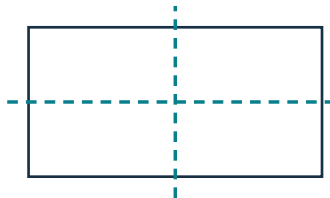
2D shapes

Question 6.6 | 5 marks | Refer to the separate question booklet

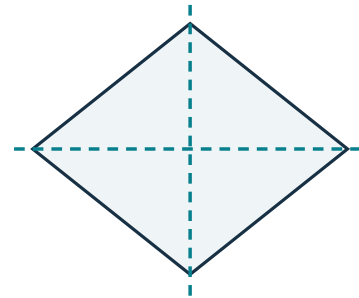
6.6 Find every line of symmetry



a) Square - 4



b) Rectangle - 2



c) Rhombus - 2

1. Use the fold test

A line of symmetry divides a shape so that one half folds exactly onto the other. Test the vertical, horizontal and diagonal directions.

2. Check each shape

a) A square has 4 lines: vertical, horizontal and both diagonals.

b) A non-square rectangle has 2 lines: vertical and horizontal through its centre. Its diagonals do not fold the long and short sides onto each other.

c) A non-square rhombus has 2 lines: its diagonals. In this drawing the diagonals happen to be horizontal and vertical.

a) 4 lines b) 2 lines c) 2 lines

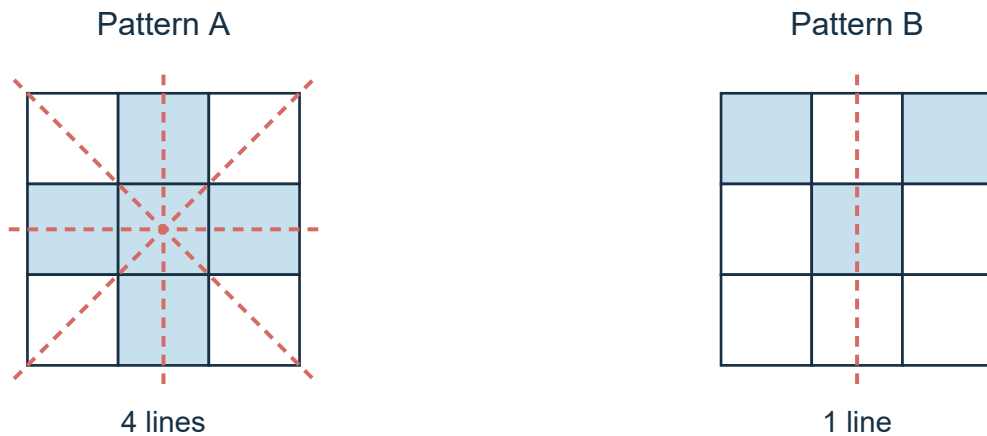
Check: A slanted parallelogram does not always have symmetry. The equal sides of a rhombus are essential for its two diagonal symmetry lines.

Marking (5 marks): a) 1 for count 4, 1 for all four correct lines. b) 1 for count 2 and both correct lines. c) 1 for count 2, 1 for both diagonals.

2D shapes

Question 6.7 | 5 marks | Refer to the separate question booklet

6.7 Symmetry in shaded patterns



1. Reflect the complete pattern

a) Pattern A has 4 lines of symmetry: vertical, horizontal and both diagonals. Along each proposed fold, shaded squares match shaded squares and white squares match white squares.

2. Test the second design

b) Pattern B has just 1 line of symmetry, the vertical centre line. A horizontal fold would send the two shaded top corners to unshaded bottom corners. Diagonal folds also mismatch shaded and unshaded cells.

3. Include the shading

c) The outside boundary alone is a square with four symmetry lines, but the inside design may remove some of them. Both the outline and the shading must match.

A: 4 lines. B: 1 vertical line. Count symmetry of the whole design, including shading.

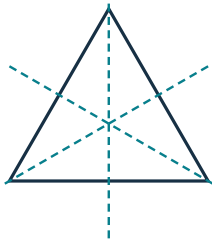
Check: For each proposed mirror line, compare every cell with its reflected partner.

Marking (5 marks): a) 1 for count and 1 for all lines. b) 1 for count and 1 for the vertical line. c) 1 for explaining the need to match shading.

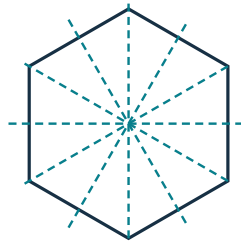
2D shapes

Question 6.8 | 5 marks | Refer to the separate question booklet

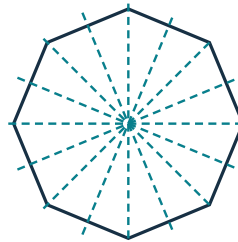
6.8 Regular polygons and a conjecture



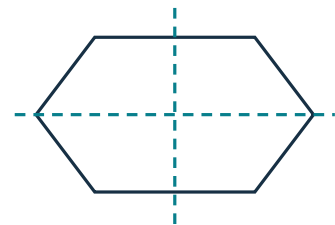
A: triangle



B: hexagon



C: octagon



D: stretched hexagon

1. Use the regular-polygon pattern

a) An equilateral triangle has 3 lines of symmetry. A regular hexagon has 6. A regular octagon has 8. For a regular polygon, the number of symmetry lines equals the number of sides.

2. Test the wider claim

b) The statement is false. The stretched hexagon D still has 6 straight sides, but only 2 symmetry lines: the vertical and horizontal lines through its centre. It is not a regular hexagon.

3. Explain the counterexample

One six-sided polygon with fewer than six symmetry lines disproves the word “every”. Equal side count does not guarantee equal symmetry.

a) 3, 6, 8. b) False: the stretched hexagon has 6 sides but only 2 symmetry lines.

Check: Do not apply the regular-polygon rule to an irregular polygon.

Marking (5 marks): a) 1 per correct count. b) 1 for false and 1 for a valid explanation using D.

Fractions

Question 7.1 | 5 marks | Refer to the separate question booklet

7.1 Read and draw fractions

One whole split into eight equal parts



3 selected parts / 8 equal parts = $\frac{3}{8}$

1. Read the fraction

a) The numerator is 3: it counts the parts selected or shaded. The denominator is 8: the whole is divided into 8 equal parts.

2. Show the fraction

b) Shade any 3 of the 8 equal boxes. The shaded boxes do not have to be next to each other, provided all boxes have equal area.

3. Identify unit fractions

c) Circle $\frac{1}{5}$ and $\frac{1}{9}$.

d) A unit fraction has numerator 1. It represents one of the equal parts of a whole.

a) Numerator 3; denominator 8. b) Shade 3 of 8 equal parts. c) $\frac{1}{5}$ and $\frac{1}{9}$. d) Numerator 1.

Check: The denominator counts all the equal parts, including the shaded ones.

Marking (5 marks): a) 1 for each number with its role. b) 1 for exactly 3 shaded cells. c) 1 for exactly the two unit fractions. d) 1 for numerator 1.

Fractions

Question 7.2 | 5 marks | Refer to the separate question booklet

7.2 Equal parts matter

A: $2/6 = 1/3$



B: $1/2$ shaded; pieces are unequal



1. Count equal parts

a) Two of the six equal parts in strip A are shaded, so the fraction is $2/6$. It is also equal to $1/3$.

2. Spot the unequal division

b) Strip B is cut into one large part and two smaller parts. Counting “one shaded part out of three” is not valid because the parts have different areas.

3. Compare areas

c) The shaded part of B covers half the strip. The two smaller unshaded parts together cover the other half. So B has $1/2$ shaded, not $1/3$.

a) $2/6$, also $1/3$. b) Thirds must be equal parts. c) $1/2$ of B is shaded.

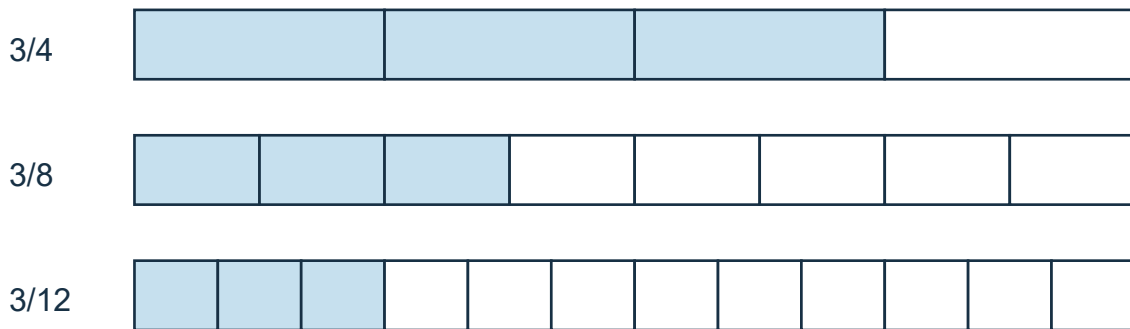
Check: Equal fractions refer to equal amounts of the whole, not simply a count of differently sized pieces.

Marking (5 marks): a) 1; b) 1 for identifying unequal parts and 1 for explaining the equal-parts rule; c) 1 for $1/2$ and 1 for a correct area explanation.

Fractions

Question 7.3 | 5 marks | Refer to the separate question booklet

7.3 Compare fraction sizes



All strips show the same-sized whole.

1. Compare one part

a) Dividing the same whole into more equal parts makes each part smaller. The order is $\frac{1}{8} < \frac{1}{6} < \frac{1}{3} < \frac{1}{2}$.

2. Compare three parts

b) Each fraction selects three parts, but the parts have different sizes. Twelfths are smaller than eighths, and eighths are smaller than quarters. Thus $\frac{3}{12} < \frac{3}{8} < \frac{3}{4}$.

3. State the condition

c) Within each list, the numerator is fixed and the wholes have the same size. A larger denominator makes the equal pieces smaller, so selecting the same number of pieces gives less.

a) $\frac{1}{8} < \frac{1}{6} < \frac{1}{3} < \frac{1}{2}$. b) $\frac{3}{12} < \frac{3}{8} < \frac{3}{4}$.

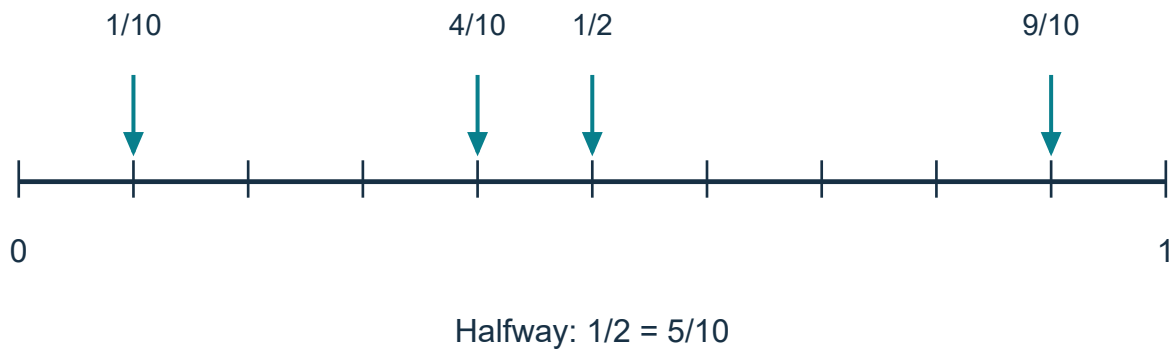
Check: This shortcut needs the same positive numerator and equal-sized wholes. Do not use the denominator alone for every comparison.

Marking (5 marks): a) 2 for all in order, 1 for only one neighbouring pair reversed. b) Same rule. c) 1 for explaining smaller equal parts with the numerator fixed.

Fractions

Question 7.4 | 5 marks | Refer to the separate question booklet

7.4 Fractions on a number line



1. Count intervals, not marks

There are ten equal spaces from 0 to 1. Each space has length $1/10$. Start at zero and count spaces to locate the fractions.

2. Place each fraction

$1/10$ is at the first tick after 0.

$4/10$ is at the fourth tick after 0.

$1/2$ is halfway from 0 to 1, at the fifth tick.

$9/10$ is at the ninth tick, one interval before 1.

3. Name halfway in tenths

b) Five out of ten equal intervals reach halfway, so $1/2 = 5/10$.

a) Positions 1, 4, 5 and 9 intervals after 0. b) $1/2 = 5/10$.

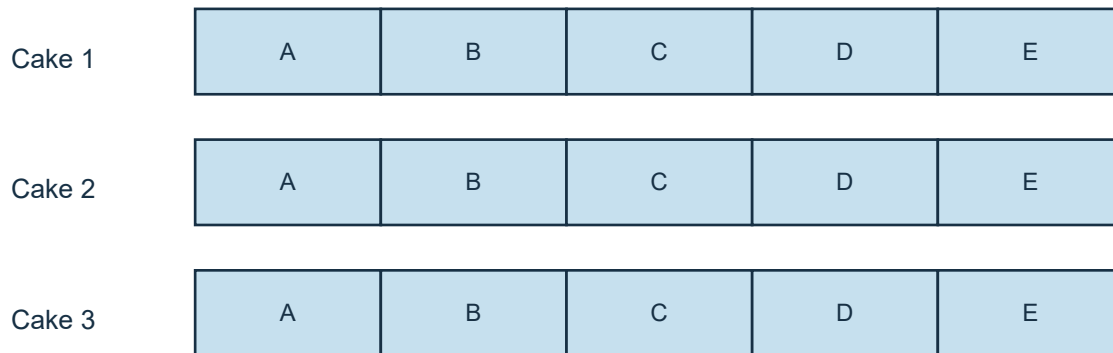
Check: There are 11 tick marks including the endpoints, but only 10 intervals. The intervals determine the denominator.

Marking (5 marks): a) 1 for each correctly positioned and labelled fraction. b) 1 for $5/10$.

Fractions

Question 7.5 | 5 marks | Refer to the separate question booklet

7.5 Sharing is division



Each child receives one fifth from each cake: $\frac{3}{5}$.

1. Write the sharing calculation

a) Three cakes shared among five children is $3 \div 5$.

2. Divide every cake equally

Cut each cake into 5 equal pieces. Give each child one fifth from each cake. Because there are 3 cakes, each child receives three fifths of one cake.

3. Check the distribution

b) $3 \div 5 = \frac{3}{5}$, so each child receives $\frac{3}{5}$ of a cake.

c) In the diagram, letters A-E identify the five children. Each letter appears once in each cake.

d) Each child gets 3 equal fifth-pieces. Altogether, 5 children receive 15 fifth-pieces, which exactly uses the 3 cakes.

$3 \div 5 = \frac{3}{5}$. Each child receives three fifths of one cake.

Check: The answer is not $\frac{5}{3}$. The numerator is the number of cakes being divided; the denominator is the number of equal shares.

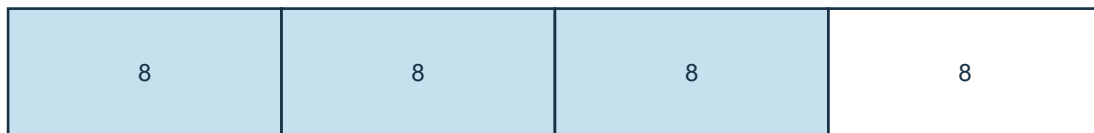
Marking (5 marks): a) 1 for $3 \div 5$; b) 1 for $\frac{3}{5}$ cake; c) 1 for equal partitions and 1 for an equal allocation using all cakes; d) 1 for a valid check.

Fractions

Question 7.6 | 5 marks | Refer to the separate question booklet

7.6 Fractions of quantities

One whole quantity: 32



One quarter = 8; three quarters = $8 + 8 + 8 = 24$

1. Find one equal share

- a) $\frac{1}{3}$ of 42 = $42 \div 3 = 14$.
- b) $\frac{1}{5}$ of 45 = $45 \div 5 = 9$.
- c) $\frac{1}{8}$ of 64 = $64 \div 8 = 8$.
- d) $\frac{1}{10}$ of 90 = $90 \div 10 = 9$.

2. Find more than one share

e) First find one quarter: $32 \div 4 = 8$. Then take three quarters: $3 \times 8 = 24$. The bar shows four equal groups of 8, with three selected.

3. Explain the rule

For $\frac{1}{n}$ of a quantity, divide the quantity by n . For $\frac{3}{4}$, divide by 4 to find one quarter and then multiply by 3.

a) 14 b) 9 c) 8 d) 9 e) 24

Check: For e, the selected 24 and remaining 8 add to 32. Dividing by 3 would not find quarters.

Marking (5 marks): Award 1 per correct answer with appropriate working; e needs both $\div 4$ and $\times 3$ steps.

Fractions

Question 7.7 | 5 marks | Refer to the separate question booklet

7.7 Halve a recipe

Ingredient	For 12 cakes	For 6 cakes
Flour	240 g	120 g
Butter	100 g	50 g
Sugar	60 g	30 g
Milk	120 ml	60 ml

Divide every amount by 2.

1. Choose the scale

Six cakes is half of twelve cakes: 6 is $\frac{1}{2}$ of 12. To keep the same recipe, halve every ingredient.

2. Calculate each quantity

Flour: $240 \div 2 = 120$ g.

Butter: $100 \div 2 = 50$ g.

Sugar: $60 \div 2 = 30$ g.

Milk: $120 \div 2 = 60$ ml.

3. Keep the recipe balanced

b) Every ingredient must be reduced in the same proportion. Using one half for all four ingredients keeps the ingredient balance the same while making half as many cakes.

120 g flour; 50 g butter; 30 g sugar; 60 ml milk.

Check: Double each new amount to recover the original recipe. Keep g for mass and ml for liquid volume.

Marking (5 marks): a) 1 per correct amount with unit. b) 1 for explaining that all ingredients must be halved to keep the same proportions.

Fractions

Question 7.8 | 5 marks | Refer to the separate question booklet

7.8 Compare amounts and find the whole

36 tokens



63 tokens



Find whole



The top two bars use the same scale.

1. Calculate the actual amounts

a) $\frac{1}{2}$ of 36 = $36 \div 2 = 18$ tokens.

$\frac{1}{3}$ of 63 = $63 \div 3 = 21$ tokens.

2. Compare the results

b) One third of 63 gives more: $21 - 18 = 3$ tokens more. Although one half is greater than one third for the same whole, these wholes are different sizes.

3. Work backwards from a part

c) If one quarter is 9 tokens, all four quarters contain $4 \times 9 = 36$ tokens.

d) Multiply the known quarter by 4 to recover the whole. Check: $36 \div 4 = 9$.

a) 18 and 21 tokens. b) $\frac{1}{3}$ of 63 gives 3 more. c) 36 tokens. d) 9×4 .

Check: When the whole amounts differ, calculate each share before comparing. A larger fraction symbol can represent a smaller actual amount.

Marking (5 marks): a) 1 + 1; b) 1 for the correct choice and difference; c) 1 for 36; d) 1 for explaining four groups of 9.