Day 287 **B Tier 10-a-day: Model Solutions**

1 Simplifying ratios

Write the ratio 1.4 m : 160 cm in its simplest form.

Change to the same units: 1.4 m = 140 cm
140 : 160
Divide both by 20 to get 7 : 8
Answer: 7 : 8

2 Symmetry

What is the order of rotational symmetry of an isosceles triangle?

An isosceles triangle only looks the same after a full turn, so the order is 1
Answer: 1

3 Cost formulae

A plumber charges a call-out fee of £6 plus £9 for each hour of work.
(a) Work out the total cost for 9 hours.
(b) The total cost is £87. Work out the number of hours.

(a) 9 × 9 = 81, then 6 + 81 = 87
(b) Take off the fixed charge: 87 − 6 = 81
Divide by the cost for each: 81 ÷ 9 = 9
Answer: (a) £87 (b) 9

4 Pythagoras' theorem

Find the length of x.
The diagram is not drawn accurately.

Use Pythagoras: $a^2 + b^2 = c^2$, where c is the longest side
$x^2 + 6^2 = 10^2$
$x^2 = 100 - 36 = 64$
$x = \sqrt{64} = 8$
Answer: x = 8 cm

5 Using the nth term

The nth term of a sequence is 9n + 9
(a) Work out the 7th term.
(b) Is 216 a term in the sequence? You must show how you get your answer.

(a) Replace n with 7: 9 × 7 + 9 = 72
(b) Solve 9n + 9 = 216: 9n = 207
n = 207 ÷ 9 = 23, a whole number, so 216 is in the sequence
Answer: (a) 72 (b) Yes, it is term number 23

6 Direct proportion

C is directly proportional to t.
When t = 2, C = 4.
Find a formula for C in terms of t.

C = kt
4 = k × 2, so k = 4 ÷ 2 = 2
Answer: C = 2t

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7 LCM problems

Two buses leave a bus station at 08:30.
One bus leaves every 25 minutes.
The other bus leaves every 15 minutes.
At what time do both buses next leave together?

Multiples of 25: 25, 50, 75
Multiples of 15: 15, 30, 45, 60, 75
The first common multiple is 75, so the LCM is 75 minutes
08:30 + 75 minutes = 09:45
Answer: 09:45

8 Similar shapes

The two triangles are similar.
(a) Work out the scale factor of the enlargement from the smaller triangle to the larger triangle.
(b) Work out the value of x.
The diagram is not drawn accurately.

(a) Scale factor = 16 ÷ 4 = 4
(b) x is on the smaller triangle, so divide: 12 ÷ 4 = 3
Answer: (a) 4 (b) x = 3 m

9 Bounds

The length of a rectangle is 10 cm and its width is 22 cm.
Both measurements are correct to the nearest cm.
Work out the lower bound for the area of the rectangle.

Lower bound of each side = value − 0.5: 9.5 cm and 21.5 cm
Area = 9.5 × 21.5 = 204.25 cm^2
Answer: 204.25 cm^2

10 Percentage increase and decrease

A coat costs £20. In a sale the price is reduced by 40%.
(a) Work out the new price.
(b) A car is worth £2000. Its value goes down by 15% in a year. Work out its new value.

(a) The multiplier is 0.6, so new price = £20 × 0.6 = £12
(b) The multiplier is 0.85, so new value = £2000 × 0.85 = £1700
Answer: (a) £12 (b) £1700