Day 302 **B Tier 10-a-day: Model Solutions**

1 Simplifying ratios

Write the ratio 3.5 m : 450 cm in its simplest form.

Change to the same units: 3.5 m = 350 cm
350 : 450
Divide both by 50 to get 7 : 9
Answer: 7 : 9

2 Compound areas

A sheet of card measures 12 cm by 8 cm.
A rectangle measuring 5 cm by 3 cm is cut out.
Work out the area that is left.

Whole area = 12 × 8 = 96
Area cut out = 5 × 3 = 15
96 − 15 = 81
Answer: 81 cm^2

3 Fuel use

A car travels 25 km on each litre of petrol. (Calculator)
Petrol costs £1.30 per litre.
Work out the cost of the petrol for a journey of 625 km.

Litres needed = 625 ÷ 25 = 25
Cost = 25 × £1.30 = £32.50
Answer: £32.50

4 Tables of values for quadratics

Complete the table of values for $y = x^2 + 2x - 3$

$x = -2$: $y = (-2)^2 + 2 \times (-2) + (-3) = -3$
$x = -1$: $y = (-1)^2 + 2 \times (-1) + (-3) = -4$
$x = 0$: $y = 0^2 + 2 \times 0 + (-3) = -3$
$x = 1$: $y = 1^2 + 2 \times 1 + (-3) = 0$
Answer: x = −2: −3, x = −1: −4, x = 0: −3, x = 1: 0

5 Prisms and density

A triangular prism has a right-angled triangle as its cross-section.
The two shorter sides of the triangle are 5 m and 6 m.
The length of the prism is 4 m.
Work out the volume of the prism.

Area of triangle = ½ × 5 × 6 = 15
Volume = 15 × 4 = 60
Answer: 60 m^3

6 HCF and LCM from prime factors

A = $3^2 \times 5$
B = 5×7^2
Write down, as a product of prime factors,
(a) the HCF of A and B
(b) the LCM of A and B

(a) HCF: take the smaller power of each prime that is in both: 5
(b) LCM: take the larger power of every prime: $3^2 \times 5 \times 7^2$
Answer: (a) 5 (b) $3^2 \times 5 \times 7^2$

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7 Reflection

The diagram shows triangle ABC on a grid.
(a) Write down the coordinates of the image of A after a reflection in the line x = 2.
(b) Write down the coordinates of the image of B after a reflection in the x-axis.

(a) A is at (4, 3). Reflect in the line x = 2: (0, 3)
(b) B is at (1, 3). Reflect in the x-axis: (1, −3)
Answer: (a) (0, 3) (b) (1, −3)

8 Average speed

A cyclist travels at 50 km/h for 3 hours and then at 20 km/h for 3 hours.
Work out its average speed for the whole journey.

Distance: 50 × 3 = 150 km and 20 × 3 = 60 km
Total distance = 210 km and total time = 6 hours
Average speed = 210 ÷ 6 = 35
Answer: 35 km/h

9 Number machines

Here is a number machine.
Input → + 7 → − 8 → Output
(a) The input is 8. Work out the output.
(b) The output is 9. Work out the input.

(a) 8 + 7 = 15, then 15 − 8 = 7
(b) Work backwards: undo − 8 to get 17, then undo + 7 to get 10
Answer: (a) 7 (b) 10

10 Mixed numbers

Work out $2\frac{2}{3} \times 2\frac{1}{5}$

Give your answer as a mixed number.

Write as improper fractions: $\frac{8}{3} \times \frac{11}{5}$

Multiply: $\frac{88}{15}$

As a mixed number: $5\frac{13}{15}$

Answer: $\mathbf{5\frac{13}{15}}$