Day 8 **B Tier 10-a-day: Model Solutions**

1 Symmetry

How many lines of symmetry does a scalene triangle have?

A scalene triangle has no lines of symmetry

Answer: 0

2 Equations with unknowns on both sides

Solve $4x - 8 = 2x + 4$

Subtract 2x from both sides: $2x - 8 = 4$
Add 8 to both sides: $2x = 12$
Divide both sides by 2

Answer: $x = 6$

3 Bearings

A boat travels on a bearing of 040°.
It then turns right through 70° and continues in a straight line.
Work out the new bearing.

Turning right means adding 70°
40 + 70 = 110

Answer: 110°

4 Expanding squared brackets

Expand and simplify $(x - 4)^2$

Write as a product of two brackets: $(x - 4)(x - 4)$
$x^2 - 4x - 4x + 16$
$x^2 - 8x + 16$

Answer: $x^2 - 8x + 16$

5 Area of 2D shapes

Find the area of the parallelogram.
The diagram is not drawn accurately.

Area of a parallelogram = base × perpendicular height
The slanting side is not needed
14 × 12 = 168

Answer: 168 mm^2

6 Compound percentages

The population of a town is 20,000. (Calculator)
It increases by 8% each year.
Work out the population after 2 years.
Give your answer to the nearest whole number.

Multiplier = 1.08

Population = $20{,}000 \times 1.08^2$
= 23,328.00, which is 23,328 to the nearest whole number

Answer: 23,328

7 Ratio with a difference

Sam and Gita share some money in the ratio 8 : 1.
Sam gets £105 more than Gita.
How much money does Sam get?

Difference in parts: 8 − 1 = 7
7 parts = £105, so 1 part = £15
Sam gets 8 × £15 = £120

Answer: £120

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8 Metric units

(a) Change 0.1 m to cm.
(b) Change 2800 g to kg.

(a) 1 m = 100 cm, so multiply by 100: 0.1 × 100 = 10
(b) 1 kg = 1000 g, so divide by 1000: 2800 ÷ 1000 = 2.8
Answer: (a) 10 cm (b) 2.8 kg

9 Tree diagrams

A bag contains 5 green beads and 2 yellow beads.
Maya takes one at random and does not replace it, then takes a second.
Work out the probability that both are green.

P(first green) = $\frac{5}{7}$

P(second green) = $\frac{2}{3}$

P(both green) = $\frac{5}{7} \times \frac{2}{3} = \frac{10}{21}$

Answer: $\frac{10}{21}$

10 Fraction problems

A fuel tank is $\frac{1}{2}$ full.

27 litres of fuel are added.

The fuel tank is now $\frac{3}{5}$ full.

Work out the capacity of the fuel tank.

Fraction added = $\frac{3}{5} - \frac{1}{2} = \frac{1}{10}$

$\frac{1}{10}$ of the capacity = 27 litres
Whole capacity = 27 × 10 = 270 litres
Answer: 270 litres