Day 132 **B Tier 10-a-day: Model Solutions**

1 Substitution with negative numbers

Work out the value of $6a - 4b$
when $a = -6$ and $b = 5$

Substitute: $6 \times (-6) - 4 \times 5$
$-36 - 20 = -56$
Answer: -56

2 Reflection

The diagram shows triangle ABC on a grid.
(a) Write down the coordinates of the image of C after a reflection in the line y = 1.
(b) Write down the coordinates of the image of B after a reflection in the line x = 1.

(a) C is at (1, 4). Reflect in the line y = 1: (1, −2)
(b) B is at (3, 4). Reflect in the line x = 1: (−1, 4)
Answer: (a) (1, −2) (b) (−1, 4)

3 Fuel use

A car uses 30 litres of petrol to travel 240 km.
Work out how many kilometres it travels on each litre of petrol.

240 ÷ 30 = 8
Answer: 8 km per litre

4 Exterior angles of polygons

Each interior angle of a regular polygon is 156°.
Work out the number of sides of the polygon.

Exterior angle = 180° − 156° = 24°
Number of sides = 360 ÷ 24 = 15
Answer: 15 sides

5 Pay and overtime

Aisha earns £12 per hour for the first 30 hours worked each week.
Any extra hours are paid at double time.
Last week Aisha worked 36 hours.
Work out Aisha's total pay for last week.

Normal pay: 30 × £12 = £360
Overtime rate: 2 × £12 = £24 per hour
Overtime pay: 6 × £24 = £144
Total = £360 + £144 = £504
Answer: £504

6 Simplifying expressions

Simplify fully
(a) $5p \times 5p$
(b) $30pq \div 5p$

(a) $5 \times 5 = 25$ and $p \times p = p^2$
(b) Divide the numbers: 30 ÷ 5 = 6. The p cancels, leaving 6q
Answer: (a) $25p^2$ (b) 6q

7 Error intervals

The length of a pencil is 15.53 cm, correct to 2 decimal places.
Write down the error interval for the length.
Use the letter L.

The rounding unit is 0.01, so half of it is 0.005
Lower bound = 15.53 − 0.005 = 15.525
Upper bound = 15.53 + 0.005 = 15.535
Answer: $15.525 \leq L < 15.535$

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8 Volume of a cylinder

A cylinder has radius 5 cm and height 4 cm.
Work out its volume.
Give your answer in terms of π.

Volume = $\pi \times \text{radius}^2 \times \text{height}$
$\pi \times 5^2 \times 4 = \pi \times 25 \times 4$
$= 100\pi$
Answer: 100π cm^3

9 Tree diagrams

A bag contains 2 mint sweets and 3 toffee sweets.
Amy takes one at random and does not replace it, then takes a second.
Work out the probability that both are mint.

P(first mint) = $\frac{2}{5}$

P(second mint) = $\frac{1}{4}$

P(both mint) = $\frac{2}{5} \times \frac{1}{4} = \frac{1}{10}$

Answer: $\frac{1}{10}$

10 Reverse repeated percentages

In a sale, the price of a sofa is reduced by 50%. (Calculator)
Two weeks later it is reduced by a further 20% of the new price.
The final price is £80.
Work out the original price of the sofa.

Multipliers: 0.5 and 0.8
Overall multiplier = 0.5 × 0.8 = 0.4
Original price = £80 ÷ 0.4 = £200
Answer: £200