Day 239 **B Tier 10-a-day: Model Solutions**

1 Expected outcomes

The probability that a biased coin lands on heads is 0.8.
Work out how many times you would expect this to happen in 240 throws of the coin.

Expected number = probability × number of trials
0.8 × 240 = 192
Answer: 192

2 Scale drawings and maps

The scale of a map is 1 : 1000.
A church and a school are 2.5 cm apart on the map.
Work out the real distance between them.
Give your answer in metres.

Real distance = 2.5 × 1000 = 2500 cm
100 cm = 1 m, so divide by 100: 25 m
Answer: 25 m

3 Substitution

Work out the value of 8x + 1 when x = 6

Replace x with 6: 8 × 6 + 1
48 + 1 = 49
Answer: 49

4 Bearings

The bearing of Y from X is 330°.
Work out the bearing of X from Y.

330 is more than 180, so subtract 180°
330 − 180 = 150
Answer: 150°

5 Percentage change

The number of members of a club goes from 300 to 405.
Work out the percentage increase.

Increase = 405 − 300 = 105

Percentage increase = $\frac{105}{300}$ × 100 = 35%

Answer: 35% increase

6 Gradient of a line

Work out the gradient of the straight line that passes through the points (1, 1) and (3, −7).

Gradient = $\frac{\text{change in y}}{\text{change in x}}$
Change in y = −7 − 1 = −8
Change in x = 3 − 1 = 2

Gradient = $\frac{-8}{2}$ = −4

Answer: −4

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7 Area of shaded regions

The diagram shows two circles with the same centre.
The radius of the larger circle is 8 cm.
The radius of the smaller circle is 2 cm.
Work out the area of the shaded region.
Give your answer in terms of π.
The diagram is not drawn accurately.

Area of large circle = $\pi \times 8^2 = 64\pi$
Area of small circle = $\pi \times 2^2 = 4\pi$
$64\pi - 4\pi = 60\pi$
Answer: 60π cm^2

8 Error intervals

The time of a race is 1.35 seconds, correct to 2 decimal places.
Write down the error interval for the time.
Use the letter t.

The rounding unit is 0.01, so half of it is 0.005
Lower bound = 1.35 − 0.005 = 1.345
Upper bound = 1.35 + 0.005 = 1.355
Answer: $1.345 \leq t < 1.355$

9 Average speed

A lorry travels at 30 km/h for 1.5 hours and then at 60 km/h for 1 hour.
Work out its average speed for the whole journey.

Distance: 30 × 1.5 = 45 km and 60 × 1 = 60 km
Total distance = 105 km and total time = 2.5 hours
Average speed = 105 ÷ 2.5 = 42
Answer: 42 km/h

10 Simultaneous equations problem

A takeaway sells burgers and portions of chips.
1 burger and 2 portions of chips cost £8.
4 burgers and 2 portions of chips cost £20.
Work out the cost of one burger and the cost of one portion of chips.

Let a = cost of one burger and b = cost of one portion of chips
1a + 2b = 8 and 4a + 2b = 20
Subtract: 3a = 20 − 8 = 12, so a = 4
Substitute: 1 × 4 + 2b = 8, so 2b = 4 and b = 2
Answer: One burger costs £4 and one portion of chips costs £2