Day 209 **B Tier 10-a-day: Model Solutions**

1 Fractions in simplest form

What fraction of £7.50 is 40p?
Give your answer in its simplest form.

£7.50 = 750 pence

$\frac{40}{750} = \frac{4}{75}$

Answer: $\frac{4}{75}$

2 Cost formulae

A gym charges a joining fee of £10 and £11 for each month of membership.
(a) Work out the total cost for 3 months.
(b) The total cost is £76. Work out the number of months.

(a) 11 × 3 = 33, then 10 + 33 = 43
(b) Take off the fixed charge: 76 − 10 = 66
Divide by the cost for each: 66 ÷ 11 = 6
Answer: (a) £43 (b) 6

3 Ratio to fraction and percentage

The ratio of adults to children at a concert is 6 : 5.
What fraction of them are adults?

Total parts = 6 + 5 = 11
adults are 6 out of 11 parts

Answer: $\frac{6}{11}$

4 Equations with fractions

Solve $\frac{6x}{5} + 4 = 52$

Subtract 4 from both sides: $\frac{6x}{5} = 48$
Multiply both sides by 5: 6x = 240
Divide both sides by 6
Answer: x = 40

5 Exterior angles of polygons

Each exterior angle of a regular polygon is 15°.
Work out the number of sides of the polygon.

Exterior angles add up to 360°
Number of sides = 360 ÷ 15 = 24
Answer: 24 sides

6 Currency conversion

£1 = 1.2 Swiss francs
A holiday costs 120 francs.
Work out the cost in pounds.

Divide by the rate: 120 ÷ 1.2
= £100
Answer: £100

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7 Repeated percentage change

The price of a laptop is £60.
The price is first reduced by 40%, then the new price is reduced by 5%.
(a) Work out the final price.
(b) Work out the overall percentage decrease in the price.

(a) Multipliers: 0.6 and 0.95
60 × 0.6 × 0.95 = £34.20
(b) Overall multiplier = 0.57
Overall decrease = 43%
Answer: (a) £34.20 (b) 43% decrease

8 Gradient of a line

Work out the gradient of the straight line that passes through the points (2, −3) and (5, −7).

Gradient = $\frac{\text{change in y}}{\text{change in x}}$
Change in y = −7 − (−3) = −4
Change in x = 5 − 2 = 3
Gradient = $\frac{-4}{3} = -\frac{4}{3}$
Answer: $\mathbf{-\frac{4}{3}}$

9 Trigonometry in isosceles triangles

Triangle ABC is isosceles with AB = AC = 17 m. (Calculator)
The base BC = 22 m.
Work out the size of angle ABC.
Give your answer correct to 1 decimal place.

Split the triangle into two right-angled triangles. Half the base = 22 ÷ 2 = 11
cos B = $\frac{11}{17}$
Angle ABC = $\cos^{-1}(\frac{11}{17})$ = 49.680...
= 49.7° (1 d.p.)
Answer: 49.7°

10 Average speed

A lorry travels at 30 km/h for 3 hours and then at 24 km/h for 1 hour.
Work out its average speed for the whole journey.

Distance: 30 × 3 = 90 km and 24 × 1 = 24 km
Total distance = 114 km and total time = 4 hours
Average speed = 114 ÷ 4 = 28.5
Answer: 28.5 km/h