Day 25 **B Tier 10-a-day: Model Solutions**

1 Speed

A car travels 192 km in 2 hours.
Work out its average speed in km per hour.

Speed = distance ÷ time
Time = 2 hours
192 ÷ 2 = 96
Answer: 96 km per hour

2 Angles in triangles

Triangle XYZ is isosceles with XY = XZ.
Angle XYZ = 29°.
Work out the size of angle YXZ.

Angle XZY is also 29° because the base angles are equal
29 + 29 = 58
180 − 58 = 122
Answer: 122°

3 Adding fractions

Work out
(a) $\frac{1}{4} + \frac{4}{9}$
(b) $\frac{3}{4} - \frac{2}{3}$
Give each answer in its simplest form.

(a) Common denominator 36: $\frac{9}{36} + \frac{16}{36} = \frac{25}{36}$
(b) Common denominator 12: $\frac{9}{12} - \frac{8}{12} = \frac{1}{12}$
Answer: (a) $\frac{25}{36}$ (b) $\frac{1}{12}$

4 Distance, speed and time

A tractor travels at a constant speed of 12 km/h for 40 minutes.
How far does it travel?

40 minutes = $\frac{2}{3}$ hour
Distance = speed × time = $12 \times \frac{2}{3} = 8$
Answer: 8 km

5 Equation of a line

A straight line has gradient −1 and passes through the point (2, 3).
Find the equation of the line.

The equation is $y = -1x + c$
Substitute $x = 2$ and $y = 3$: $3 = -1 \times 2 + c$
$3 = -2 + c$
$c = 3 - (-2) = 5$
Answer: $y = -x + 5$

6 Missing value from a mean

After 4 tests, Tara's mean mark is 73.
After her next test, her mean mark is 76.
What mark did she get in her next test?

Total after 4 tests = 4 × 73 = 292
Total after 5 tests = 5 × 76 = 380
Next mark = 380 − 292 = 88
Answer: 88

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7 Interior angles of regular polygons

Work out the sum of the interior angles of an octagon.

Sum = $(n - 2) \times 180°$
$(8 - 2) \times 180 = 6 \times 180 = 1080°$
Answer: 1080°

8 Simultaneous equations

Solve the simultaneous equations
$x - 2y = -10$
$4x + y = -4$

Multiply the second equation by 2: $8x + 2y = -8$
The y terms have opposite signs, so add the equations: $9x = -18$
$x = -2$
Substitute $x = -2$ into the first equation: $-2y = -10 - (-2) = -8$
$y = 4$
Answer: $x = -2$, $y = 4$

9 Repeated percentage change

The price of a laptop is £100.
The price is first increased by 25%, then the new price is increased by 20%.
(a) Work out the final price.
(b) Work out the overall percentage increase in the price.

(a) Multipliers: 1.25 and 1.2
$100 \times 1.25 \times 1.2 = £150$
(b) Overall multiplier = 1.5
Overall increase = 50%
Answer: (a) £150 (b) 50% increase

10 Reverse repeated percentages

In a sale, the price of a sofa is reduced by 25%. (Calculator)
Two weeks later it is reduced by a further 20% of the new price.
The final price is £240.
Work out the original price of the sofa.

Multipliers: 0.75 and 0.8
Overall multiplier = $0.75 \times 0.8 = 0.6$
Original price = $£240 \div 0.6 = £400$
Answer: £400