Day 312 **B Tier 10-a-day: Model Solutions**

1 Angles in triangles

Triangle DEF is isosceles with DE = DF.
Angle EDF = 124°.
Work out the size of angle DEF.

The base angles of an isosceles triangle are equal
Angles in a triangle add up to 180°
180 − 124 = 56
56 ÷ 2 = 28
Answer: 28°

2 Equations with unknowns on both sides

Solve $8y - 5 = 5y - 17$

Subtract 5y from both sides: $3y - 5 = -17$
Add 5 to both sides: $3y = -12$
Divide both sides by 3
Answer: $y = -4$

3 Fuel use

A car travels 12 km on each litre of petrol. (Calculator)
Petrol costs £1.45 per litre.
Work out the cost of the petrol for a journey of 360 km.

Litres needed = 360 ÷ 12 = 30
Cost = 30 × £1.45 = £43.50
Answer: £43.50

4 HCF and LCM

Find the (a) highest common factor (HCF), (b) lowest common multiple (LCM) of 28 and 63.

$28 = 2^2 \times 7$ and $63 = 3^2 \times 7$
(a) HCF: multiply the primes in both lists, using the smaller power: 7
(b) LCM: use the larger power of every prime: $2^2 \times 3^2 \times 7 = 252$
Answer: (a) 7 (b) 252

5 Gradient and intercept

A straight line has equation y = 4x + 8
(a) Write down the gradient of the line.
(b) Write down the equation of a line that is parallel to this line and passes through the point (0, 4).

(a) The line is in the form y = mx + c, so the gradient m is the number in front of x
(b) Parallel lines have the same gradient, 4
It crosses the y-axis at 4, so c = 4
Answer: (a) 4 (b) y = 4x + 4

6 Fractions and decimals

(a) Write $\frac{1}{40}$ as a decimal.

(b) Write $\frac{1}{12}$ as a recurring decimal.

For part (b), write down the first 8 decimal places and say which digits repeat.

(a) 1 ÷ 40 = 0.025
(b) 1 ÷ 12: use short division, adding zeros
1 ÷ 12 = 0.08333333...
The digit 3 repeats
Answer: (a) 0.025 (b) 0.08333333... (3 repeats)

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7 Pressure

A crate exerts a force of 600 newtons on the floor.
The area in contact with the floor is 20 m^2.
Work out the pressure on the floor.
Give your answer in N/m^2.

Pressure = force ÷ area
600 ÷ 20 = 30
Answer: 30 N/m^2

8 Quadratic graphs

The diagram shows the graph of
$y = x^2 + 8x + 15$
(a) Write down the solutions of $x^2 + 8x + 15 = 0$
(b) Write down the coordinates of the minimum point of the graph.

(a) The solutions are where the graph crosses the x-axis
(b) The lowest point of the curve is halfway between the two solutions, at $x = -4$
Answer: (a) $x = -5$ and $x = -3$ (b) $(-4, -1)$

9 Volume of cones and pyramids

A cone has base radius 6 m and vertical height 9 m.
Volume of a cone = $\frac{1}{3}\pi r^2 h$
Work out the volume of the cone.
Give your answer in terms of π.

Volume = $\frac{1}{3} \times \pi \times 6^2 \times 9$
$= \frac{1}{3} \times \pi \times 36 \times 9 = 108\pi$
Answer: 108π m^3

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 5% of the new price.
The final price is £285.
Work out the original price of the sofa.

Multipliers: 0.75 and 0.95
Overall multiplier = 0.75 × 0.95 = 0.7125
Original price = £285 ÷ 0.7125 = £400
Answer: £400