Day 137 **B Tier 10-a-day: Model Solutions**

1 Angles in triangles

The angles in a triangle are x°, 3x° and (x + 15)°.
(a) Work out the value of x.
(b) Work out the size of the largest angle.

(a) x + 3x + x + 15 = 180
5x + 15 = 180
5x = 165, so x = 33
(b) The angles are 33°, 99° and 48°
Answer: (a) x = 33 (b) 99°

2 Points on a line

Does the point (3, −5) lie on the line
y = −2x + 1 ?
You must show your working.

Put x = 3 into the equation: y = −2 × 3 + 1 = −5
The y-coordinate of the point is −5, which is −5
Answer: Yes, when x = 3 the line has y = −5

3 Percentages of amounts

Work out
(a) 80% of £400
(b) 10% of 500

(a) 10% of £400 = £40
80% = 8 × £40 = £320
(b) 10% of 500 = 50
10% = 50 = 50
Answer: (a) £320 (b) 50

4 Growth and decay

A new car is worth £15,000. (Calculator)
Each year its value falls by 20% of its value at the start of that year.
Work out the value of the car after 2 years.

Multiplier = 1 − 20 ÷ 100 = 0.8
Value = $15{,}000 \times 0.8^2$
= £9,600
Answer: £9,600

5 Volume of a prism

Here is a prism.
Its cross-section is an isosceles triangle.
Work out the volume of the prism.
The diagram is not drawn accurately.

Area of cross-section = ½ × 4 × 5 = 10
Volume of prism = area of cross-section × length
10 × 9 = 90
Answer: 90 cm^3

6 Standard form calculations

Work out $(6.2 \times 10^4) + (4.7 \times 10^4)$
Give your answer in standard form.

The powers of 10 are the same, so add the numbers: 6.2 + 4.7 = 10.9
$10.9 \times 10^4 = 1.09 \times 10^5$ in standard form
Answer: 1.09×10^5

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7 Capture-recapture

20 birds in a lake are caught, tagged and returned to the lake.
Later, a sample of 80 birds is caught and 2 of them are tagged.
Estimate the total number of birds in the lake.

Proportion tagged in the sample = 2 ÷ 80
This is the same proportion as 20 out of the whole population
Population ≈ 20 × 80 ÷ 2 = 800
Answer: 800

8 Percentage change

Will bought a guitar for £250 and sold it for £325.
Work out the percentage profit.

Profit = selling price − cost = £75

Percentage profit = $\frac{£75}{£250} \times 100 = 30\%$

Answer: 30% profit

9 Scatter graphs

The scatter graph shows information about temperature and ice creams sold.
A line of best fit is drawn.
(a) Describe the correlation.
(b) Use the line of best fit to estimate the ice creams sold when temperature is 24.

(a) As one variable goes up, the other goes up
This is positive correlation
(b) Go up from 24 on the horizontal axis to the line, then across to the vertical axis
The reading is about 62
Answer: (a) Positive correlation (b) about 62

10 Trial and improvement

The equation $x^3 - x = 113$ has a solution between 4 and 5. (Calculator)
Use trial and improvement to find this solution.
Give your answer correct to 1 decimal place.

x = 4.5: $4.5^3 - 4.5 = 86.625$ (too small)
x = 4.7: $4.7^3 - 4.7 = 99.123$ (too small)
x = 4.8: $4.8^3 - 4.8 = 105.792$ (too small)
x = 4.9: $4.9^3 - 4.9 = 112.749$ (too small)
x = 4.95: value = 116.337 (too big), so the solution is below 4.95
So x = 4.9 to 1 decimal place
Answer: x = 4.9