Day 18 **B Tier 10-a-day: Model Solutions**

1 Cost formulae

A hire company charges £9 plus £7 for each day a van is hired.
(a) Work out the total cost for 7 days.
(b) The total cost is £65. Work out the number of days.

(a) 7 × 7 = 49, then 9 + 49 = 58
(b) Take off the fixed charge: 65 − 9 = 56
Divide by the cost for each: 56 ÷ 7 = 8
Answer: (a) £58 (b) 8

2 Scale drawings and maps

On a map, 1 cm represents 5 km.
Two towns are 6 cm apart on the map.
(a) Work out the real distance between the towns.
(b) Write the scale of the map in the form 1 : n.

(a) 6 × 5 = 30 km
(b) 5 km = 500 000 cm
So 1 cm on the map is 500 000 cm in real life
Answer: (a) 30 km (b) 1 : 500 000

3 Stem and leaf diagrams

The stem and leaf diagram shows 9 values.
(a) Find the median.
(b) Work out the range.

(a) 9 values, so the median is the 5th value
Reading in order: 20, 23, 25, 30, 35, 38, 40, 42, 49
Median = 35
(b) Range = 49 − 20 = 29
Answer: (a) 35 (b) 29

4 Pythagoras' theorem

Calculate the length of x. (Calculator)
Give your answer correct to 1 decimal place.
The diagram is not drawn accurately.

Use Pythagoras: $a^2 + b^2 = c^2$
$x^2 = 12^2 + 14^2 = 144 + 196 = 340$
$x = \sqrt{340} = 18.439...$
x = 18.4 cm (1 d.p.)
Answer: x = 18.4 cm

5 Simple interest

Zara invests £2000 for 2 years.
The account pays 4% simple interest per year.
(a) Work out the interest earned each year.
(b) Work out the total amount in the account after 2 years.

(a) 4% of £2000 = 2000 ÷ 100 × 4 = £80
(b) Interest over 2 years: 2 × £80 = £160
Total = £2000 + £160 = £2160
Answer: (a) £80 (b) £2160

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6 Ratio and changes

In a room, the ratio of Year 10 students to Year 11 students is 5 : 9.
There are 18 Year 11 students.
More Year 10 students join so that there are equal numbers of Year 10 students and Year 11 students.
How many Year 10 students join?

9 parts = 18, so 1 part = 2
Originally there are 5 × 2 = 10 Year 10 students
To equal 18, add 18 − 10 = 8
Answer: 8

7 Expanding squared brackets

Expand and simplify $(x - 7)^2$

Write as a product of two brackets: $(x - 7)(x - 7)$
$x^2 - 7x - 7x + 49$
$x^2 - 14x + 49$
Answer: $x^2 - 14x + 49$

8 Area of a triangle using sine

In triangle PQR, PQ = 14 cm, QR = 11 cm and angle PQR = 48°. (Calculator)
Work out the area of the triangle.
Give your answer correct to 1 decimal place.

Area = ½ab sin C
Area = ½ × 14 × 11 × sin 48°
= 57.222...
= 57.2 cm^2 (1 d.p.)
Answer: 57.2 cm^2

9 Fraction problems

A fuel tank is $\frac{1}{3}$ full.

25 litres of fuel are added.

The fuel tank is now $\frac{1}{2}$ full.

Work out the capacity of the fuel tank.

Fraction added = $\frac{1}{2} - \frac{1}{3} = \frac{1}{6}$

$\frac{1}{6}$ of the capacity = 25 litres
Whole capacity = 25 × 6 = 150 litres
Answer: 150 litres

10 Reading pie charts

The pie chart shows the favourite choices of 180 people.
The angle for Pizza is not shown.
Work out how many people chose Pizza.

Angle for Pizza = 360° − (110° + 20° + 150°) = 360° − 280° = 80°
80 ÷ 360 × 180 = 40
Answer: 40