Day 52 **B Tier 10-a-day: Model Solutions**

1 Compound areas

A rectangular lawn measures 16 m by 12 m.
A rectangle measuring 4 m by 6 m is cut out.
Work out the area that is left.

Whole area = 16 × 12 = 192
Area cut out = 4 × 6 = 24
192 − 24 = 168
Answer: 168 m^2

2 Reading pie charts

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

Angle for Pasta = 360° − (20° + 80° + 120°) = 360° − 220° = 140°
140 ÷ 360 × 180 = 70
Answer: 70

3 Expanding and simplifying

Expand and simplify 4(x − 6) + 3(x + 5)

Expand each bracket: 4x − 24 + 3x + 15
Collect like terms: 7x − 9
Answer: 7x − 9

4 Scatter graphs

The scatter graph shows information about speed and stopping distance.
A line of best fit is drawn.
(a) Describe the correlation.
(b) Use the line of best fit to estimate the stopping distance when speed is 64.

(a) As one variable goes up, the other goes up
This is positive correlation
(b) Go up from 64 on the horizontal axis to the line, then across to the vertical axis
The reading is about 53 m
Answer: (a) Positive correlation (b) about 53 m

5 Transformations of a point

(a) The point P(−4, −5) is enlarged with scale factor −1 and centre the origin. Write down the coordinates of the image.
(b) The point P(−4, −5) is translated by the vector $\begin{pmatrix} -4 \\ -3 \end{pmatrix}$. Write down the coordinates of the image.

(a) Multiply each coordinate by −1: (4, 5)
(b) Add the vector: (−4 − 4, −5 − 3) = (−8, −8)
Answer: (a) (4, 5) (b) (−8, −8)

6 Types of number

Here is a list of numbers.
58, 19, 26, 8, 31, 86, 49, 59
From the list, write down
(a) a cube number
(b) a multiple of 7

(a) 8 (2 × 2 × 2) is a whole number multiplied by itself twice
(b) 49 (7 × 7) is in the 7 times table
Answer: (a) 8 (b) 49

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7 Equation of a line

Line L has equation $y = -x - 6$
Line M is parallel to line L and passes through the point $(-2, -5)$.
Find the equation of line M.

Parallel lines have the same gradient, so line M is $y = -1x + c$
Substitute $x = -2$ and $y = -5$: $-5 = -1 \times (-2) + c$
$c = -5 - 2 = -7$
Answer: $y = -x - 7$

8 Speed unit conversion

A cheetah runs at 4 metres per second.
Work out this speed in kilometres per hour.

In 1 hour (3600 s) it travels $4 \times 3600 = 14{,}400$ m
14,400 m = 14.4 km
Answer: 14.4 km/h

9 Trial and improvement

The equation $x^3 + 2x = 82$ has a solution between 4 and 5. (Calculator)
Use trial and improvement to find this solution.
Give your answer correct to 1 decimal place.

$x = 4.5$: $4.5^3 + 2 \times 4.5 = 100.125$ (too big)
$x = 4.2$: $4.2^3 + 2 \times 4.2 = 82.488$ (too big)
$x = 4.1$: $4.1^3 + 2 \times 4.1 = 77.121$ (too small)
$x = 4.15$: value = 79.773 (too small), so the solution is above 4.15
So $x = 4.2$ to 1 decimal place
Answer: $x = 4.2$

10 Rounding

Write 9442.3504
(a) correct to 1 decimal place,
(b) correct to 2 significant figures.

(a) Look at the next digit after the first decimal place: 5
So 9442.3504 rounds to 9442.4
(b) The first significant figure is the first non-zero digit. Count 2 figures and look at the next digit.
9442.3504 rounds to 9400
Answer: (a) 9442.4 (b) 9400