Day 99 **B Tier 10-a-day: Model Solutions**

1 Powers and roots

Work out

(a) $\sqrt[3]{27} \times 9$

(b) the square root of 81

(a) $\sqrt[3]{27} = 3$ because $3 \times 3 \times 3 = 27$, so $3 \times 9 = 27$

(b) $9 \times 9 = 81$, so the square root is 9

Answer: (a) 27 (b) 9

2 Points on a line

Does the point $(2, -14)$ lie on the line

$y = -5x - 3$?

You must show your working.

Put $x = 2$ into the equation: $y = -5 \times 2 - 3 = -13$

The y-coordinate of the point is -14, which is not -13

Answer: No, when $x = 2$ the line has $y = -13$

3 Fractions of amounts

Sophie has £160.

They spends $\frac{3}{4}$ of the money on a book.

They then spends $\frac{1}{2}$ of the money left on a drink.

How much money is left?

Book: £160 ÷ 4 × 3 = £120

Left: £160 − £120 = £40

Drink: £40 ÷ 2 × 1 = £20

Money left: £40 − £20 = £20

Answer: £20

4 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 19.

(a) As one variable goes up, the other goes up

This is positive correlation

(b) Go up from 19 on the horizontal axis to the line, then across to the vertical axis

The reading is about 47

Answer: (a) Positive correlation (b) about 47

5 Transformations of a point

(a) The point $P(-3, -4)$ is translated by the vector $\begin{pmatrix} -3 \\ 0 \end{pmatrix}$. Write down the coordinates of the image.

(b) The point $P(-3, -4)$ is reflected in the line $y = x$. Write down the coordinates of the image.

(a) Add the vector: $(-3 - 3, -4 + 0) = (-6, -4)$

(b) Reflecting in $y = x$ swaps x and y: $(-4, -3)$

Answer: (a) $(-6, -4)$ (b) $(-4, -3)$

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6 Venn diagrams

The Venn diagram shows information about 28 people in a street.
One of them is chosen at random.
Find the probability that the person chose Cats or Dogs or both.

Inside the circles = 13 + 5 + 8 = 26
Total = 28
P = 26 out of 28
Answer: $\frac{13}{14}$

7 Solving quadratic equations

Solve $x^2 - 16 = 0$

Factorise as a difference of two squares: $(x - 4)(x + 4) = 0$
Either $x - 4 = 0$ or $x + 4 = 0$
Answer: $x = -4$ or $x = 4$

8 Bounds

The length of a rectangle is 24 cm and its width is 10 cm.
Both measurements are correct to the nearest cm.
Work out the lower bound for the area of the rectangle.

Lower bound of each side = value − 0.5: 23.5 cm and 9.5 cm
Area = $23.5 \times 9.5 = 223.25$ cm^2
Answer: 223.25 cm^2

9 Chords and the centre of a circle

A circle has centre O and radius 13 m.
AB is a chord and M is the midpoint of AB. OM is perpendicular to AB.
Work out the value of x.
The diagram is not drawn accurately.

Triangle OMA has a right angle at M, and OA is the hypotenuse
$AM^2 = 13^2 - 12^2 = 169 - 144 = 25$
$AM = \sqrt{25} = 5$
$x = 2 \times AM = 10$
Answer: x = 10 m

10 Surface area of a cylinder

A can has radius 7 cm and height 5 cm.
It is open at one end (no lid).
Work out the total outside surface area.
Give your answer in terms of π.

One circle: $\pi \times 7^2 = 49\pi$
Curved surface: $2 \times \pi \times 7 \times 5 = 70\pi$
Total = $49\pi + 70\pi = 119\pi$
Answer: 119π cm^2