Day 40 **B Tier 10-a-day: Model Solutions**

1 Mode and median from a table

The table shows the books read by each member of a club in a month.
(a) Write down the mode.
(b) Work out the median.

(a) The highest frequency is 10, for 4
(b) Total frequency = 46, so the median is the numbers 23 and 24 values
Running totals of frequency: 9, 13, 23, 32, 39, 46
The median is 4.5
Answer: (a) 4 (b) 4.5

2 Types of number

Here is a list of numbers.
67, 71, 50, 47, 75, 17, 62, 2
From the list, write down
(a) an odd number that is not prime
(b) a factor of 60

(a) 75 is odd but has more than two factors
(b) 2 (60 ÷ 2 = 30) divides exactly into 60
Answer: (a) 75 (b) 2

3 Forming equations

I think of a number.
I multiply it by 5 and then subtract 6.
The answer is 29.
Work out my number.

Let the number be n: $5n - 6 = 29$
Add 6: $5n = 35$
Divide by 5
Answer: 7

4 Missing value from a mean

The mean of 5 numbers is 11.
Four of the numbers are 7, 15, 10, 12.
Work out the fifth number.

Total = $5 \times 11 = 55$
Given total = 44
Fifth = $55 - 44 = 11$
Answer: 11

5 Trigonometry: finding a side

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

Label the sides: x is the hypotenuse and 5 cm is the opposite
We use sin (opposite and hypotenuse)

$\sin 53° = \frac{5}{x}$

$x = \frac{5}{\sin 53°} = 6.261...$

x = 6.3 cm (1 d.p.)
Answer: x = 6.3 cm

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6 Equations with brackets

Solve $5(x - 7) = 0$

Divide both sides by 5: $x - 7 = 0$
Add 7 to both sides: $1x = 7$
Answer: x = 7

7 Area of shaded regions

The diagram shows two circles with the same centre.
The radius of the larger circle is 6 cm.
The radius of the smaller circle is 3 cm.
Work out the area of the shaded region.
Give your answer in terms of π.
The diagram is not drawn accurately.

Area of large circle = $\pi \times 6^2 = 36\pi$
Area of small circle = $\pi \times 3^2 = 9\pi$
$36\pi - 9\pi = 27\pi$
Answer: 27π cm^2

8 Algebraic proof

Show that $(n + 5)^2 - (n - 5)^2$ is a multiple of 20 for any whole number n.

Expand: $(n + 5)^2 = n^2 + 10n + 25$ and $(n - 5)^2 = n^2 - 10n + 25$
Subtract: the n^2 terms and the 25s cancel, leaving $20n$
$20n$ is a multiple of 20
Answer: 20n is a multiple of 20

9 Pie charts

In a pie chart showing the answers of 36 people, the angle for car is 80°.
How many people chose car?

80° out of 360° = $\frac{2}{9}$

$\frac{2}{9}$ of 36 = 8
Answer: 8

10 Reverse repeated percentages

In a sale, the price of a sofa is reduced by 20%. (Calculator)
Two weeks later it is reduced by a further 5% of the new price.
The final price is £76.
Work out the original price of the sofa.

Multipliers: 0.8 and 0.95
Overall multiplier = $0.8 \times 0.95 = 0.76$
Original price = £76 ÷ 0.76 = £100
Answer: £100