Day 182 **B Tier 10-a-day: Model Solutions**

1 Cost formulae

A gym charges a joining fee of £5 and £13 for each month of membership.
(a) Work out the total cost for 9 months.
(b) The total cost is £96. Work out the number of months.

(a) 13 × 9 = 117, then 5 + 117 = 122
(b) Take off the fixed charge: 96 − 5 = 91
Divide by the cost for each: 91 ÷ 13 = 7
Answer: (a) £122 (b) 7

2 Symmetry

How many lines of symmetry does an equilateral triangle have?

A equilateral triangle has 3 lines of symmetry
Answer: 3

3 Median and range

Here are the number of books read by some students.
24, 27, 17, 11, 15
(a) Find the median.
(b) Work out the range.

(a) Put in order: 11, 15, 17, 24, 27
The middle value is number 3: 17
(b) Range = largest − smallest = 27 − 11 = 16
Answer: (a) 17 (b) 16

4 Laws of indices

Write each answer as a single power of 10.
(a) $10^7 \times 10^4$
(b) $10^{11} \div 10^4$

(a) Add the powers: 7 + 4 = 11
(b) Subtract the powers: 11 − 4 = 7
Answer: (a) 10^{11} (b) 10^7

5 Growth and decay

Tom invests £500 for 5 years at 6% simple interest per year.
Work out the total interest he earns.

Interest each year = 6% of £500 = £30
Over 5 years: 5 × £30 = £150
Answer: £150

6 Significant figures

Work out the value of this expression. (Calculator)

$$\frac{9.3}{1.8} + \frac{4.5}{1.8}$$

Give your answer correct to 2 significant figures.

Use a calculator: the full display is 7.666667...
Round to 2 significant figures: 7.7
Answer: 7.7

7 Harder linear equations

Solve 11 − 2x = 4x − 25

Add 2x to both sides: 11 = 6x − 25
Add 25 to both sides: 36 = 6x
Divide both sides by 6
Answer: x = 6

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8 Compound interest

Maya invests £2,000 in an account paying 5% compound interest per year. (Calculator)
Work out the value of her investment after 2 years.

Multiplier = 1 + 5 ÷ 100 = 1.05

Value = $2{,}000 \times 1.05^2$
= £2,205

Answer: £2,205

9 Area of an isosceles trapezium

An isosceles trapezium has parallel sides of length 23 m and 5 m.
Each sloping side is 15 m long.
(a) Work out the perpendicular height of the trapezium.
(b) Work out the area of the trapezium.

(a) The difference in the parallel sides is 23 − 5 = 18, so each end sticks out 9
$h^2 = 15^2 - 9^2 = 225 - 81 = 144$, so h = 12
(b) Area = ½ × (23 + 5) × 12 = 168

Answer: (a) 12 m (b) 168 m^2

10 Reverse repeated percentages

In a sale, the price of a sofa is reduced by 40%. (Calculator)
Two weeks later it is reduced by a further 5% of the new price.
The final price is £42.75.
Work out the original price of the sofa.

Multipliers: 0.6 and 0.95
Overall multiplier = 0.6 × 0.95 = 0.57
Original price = £42.75 ÷ 0.57 = £75

Answer: £75