Day 122 **B Tier 10-a-day: Model Solutions**

1 Ordering fractions

Write these in order of size.
Start with the smallest.

$\frac{2}{5}$, 28%, 0.2, 60%

Write each as a decimal:

$\frac{2}{5}$ = 0.4, 28% = 0.28, 0.2 = 0.2, 60% = 0.6

Order: 0.2, 28%, $\frac{2}{5}$, 60%

Answer: 0.2, 28%, $\frac{2}{5}$, 60%

2 Equations with brackets

Solve 6(x + 1) = 0

Divide both sides by 6: x + 1 = 0
Subtract 1 from both sides: 1x = −1
Answer: x = −1

3 Percentage increase and decrease

A train ticket costs £400. The price goes up by 30%.
(a) Work out the new price.
(b) A car is worth £2500. Its value goes down by 20% in a year. Work out its new value.

(a) The multiplier is 1.3, so new price = £400 × 1.3 = £520
(b) The multiplier is 0.8, so new value = £2500 × 0.8 = £2000
Answer: (a) £520 (b) £2000

4 The nth term

Here are the first four terms of a sequence.
47, 43, 39, 35
Find an expression, in terms of n, for the nth term of this sequence.

The terms go down by 4 each time, so the nth term starts with −4n
When n = 1: −4 and the first term is 47, so we need to add 51
nth term = −4n + 51
Answer: −4n + 51

5 Stem and leaf diagrams

The stem and leaf diagram shows 13 values.
(a) Find the median.
(b) Work out the range.

(a) 13 values, so the median is the 7th value
Reading in order: 30, 32, 34, 36, 40, 43, 44, 45, 48, 52, 55, 56, 57
Median = 44
(b) Range = 57 − 30 = 27
Answer: (a) 44 (b) 27

6 Ordering standard form

Write these numbers in order of size.
Start with the smallest.

7.5×10^{-3}, 7900, 9.8×10^{-1}, 68

Write each in standard form: 7.5×10^{-3}, 7.9×10^{3}, 9.8×10^{-1}, 6.8×10^{1}
Compare the powers of 10 first (the bigger the power, the bigger the number)
Order: 7.5×10^{-3}, 9.8×10^{-1}, 68, 7900
Answer: 7.5×10^{-3}, 9.8×10^{-1}, 68, 7900

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7 Capture-recapture

60 deer in a lake are caught, tagged and returned to the lake.
Later, a sample of 40 deer is caught and 3 of them are tagged.
Estimate the total number of deer in the lake.

Proportion tagged in the sample = 3 ÷ 40
This is the same proportion as 60 out of the whole population
Population ≈ 60 × 40 ÷ 3 = 800
Answer: 800

8 Gradient of a line

Work out the gradient of the straight line that passes through the points (2, −2) and (0, 7).

Gradient = $\frac{\text{change in y}}{\text{change in x}}$
Change in y = 7 − (−2) = 9
Change in x = 0 − 2 = −2
Gradient = $\frac{9}{-2} = -\frac{9}{2}$
Answer: $\mathbf{-\frac{9}{2}}$

9 Area of a triangle using sine

In triangle PQR, PQ = 17 m, QR = 14 m and angle PQR = 140°. (Calculator)
Work out the area of the triangle.
Give your answer correct to 1 decimal place.

Area = ½ab sin C
Area = ½ × 17 × 14 × sin 140°
= 76.492...
= 76.5 m^2 (1 d.p.)
Answer: 76.5 m^2

10 Radius from area or circumference

The circumference of a circle is 47 cm. (Calculator)
Work out the diameter of the circle.
Give your answer correct to 1 decimal place.

Circumference = π × diameter
Diameter = 47 ÷ π = 14.961...
= 15.0 cm (1 d.p.)
Answer: 15.0 cm