Day 42 **B Tier 10-a-day: Model Solutions**

1 Bar charts

The bar chart shows some information.
(a) How many more were there for Wed than for Tue?
(b) Work out the total of all five bars.

(a) Wed: 10, Tue: 6
$10 - 6 = 4$
(b) $4 + 6 + 10 + 6 + 12 = 38$
Answer: (a) 4 (b) 38

2 Scale drawings and maps

The scale of a map is 1 : 10 000.
Two villages are 8 cm apart on the map.
Work out the real distance between them.
Give your answer in metres.

Real distance = $8 \times 10\,000 = 80\,000$ cm
100 cm = 1 m, so divide by 100: 800 m
Answer: 800 m

3 Metric units

A jug holds 2.4 litres of juice.
Each glass holds 150 ml.
How many glasses can be filled from the jug?

2.4 litres = $2.4 \times 1000 = 2400$ ml
$2400 \div 150 = 16$
Answer: 16 glasses

4 Tables of values

Complete the table of values for $y = -3x - 5$

$x = -1$: $y = -3 \times (-1) - 5 = -2$
$x = 0$: $y = -3 \times 0 - 5 = -5$
$x = 1$: $y = -3 \times 1 - 5 = -8$
Answer: $x = -1$: -2, $x = 0$: -5, $x = 1$: -8

5 Powers and roots

Work out
(a) $3^2 + 2^3$
(b) $\sqrt{16} - 2^2$

(a) $3^2 = 9$ and $2^3 = 8$, so $9 + 8 = 17$
(b) $\sqrt{16} = 4$ and $2^2 = 4$, so $4 - 4 = 0$
Answer: (a) 17 (b) 0

6 Mode and median from a table

The table shows the shoe sizes of students in a class.
(a) Write down the mode.
(b) Work out the median.

(a) The highest frequency is 8, for 4
(b) Total frequency = 20, so the median is the numbers 10 and 11 values
Running totals of frequency: 8, 12, 18, 20
The median is 5
Answer: (a) 4 (b) 5

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7 Substitution into formulae

$s = ut + \frac{1}{2}at^2$

Work out the value of s when u = 6, a = 3 and t = 4

$s = 6 \times 4 + \frac{1}{2} \times 3 \times 4^2$

$s = 24 + \frac{1}{2} \times 3 \times 16$

$s = 24 + 24 = 48$

Answer: s = 48

8 Average speed

A lorry travels at 80 km/h for 1 hour and then at 90 km/h for 1.5 hours.
Work out its average speed for the whole journey.

Distance: $80 \times 1 = 80$ km and $90 \times 1.5 = 135$ km
Total distance = 215 km and total time = 2.5 hours
Average speed = $215 \div 2.5 = 86$
Answer: 86 km/h

9 Bounds

The length of a rectangle is 39 cm and its width is 7 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: 38.5 cm and 6.5 cm
Area = $38.5 \times 6.5 = 250.25$ cm^2
Answer: 250.25 cm^2

10 Bearings with Pythagoras and trigonometry

A boat sails 4 m on a bearing of 270° from P to Q, then 3 m on a bearing of 000° to R. (Calculator)
(a) Work out the distance PR.
(b) Work out the bearing of R from P.
Give your answers correct to 1 decimal place.

(a) Triangle PQR has a right angle at Q
$PR^2 = 4^2 + 3^2 = 25$
$PR = \sqrt{25} = 5$ m

(b) tan (angle QPR) = $\frac{3}{4}$, so angle QPR = 36.870° (to 3 d.p.)

PQ is on a bearing of 270°, and R is a further 36.870° clockwise from PQ
Bearing = 270 + 36.870 = 306.9°
Answer: (a) 5 m (b) 306.9°