**Day 123** **B Tier 10-a-day: Model Solutions**

## 1 Mean

Here are the number of goals scored by a team in each match.
2, 4, 0, 4, 5
Work out the mean.

Add the values: 2 + 4 + 0 + 4 + 5 = 15
Divide by the number of values: 15 ÷ 5 = 3
**Answer: 3 goals**

## 2 Expanding brackets

Expand
(a) 3(2x + 2)
(b) 2x(x + 6)

(a) 3 × 2x = 6x and 3 × 2 = 6
(b) 2x × x = $2x^2$ and 2x × 6 = 12x
**Answer: (a) 6x + 6 (b) $2x^2$ + 12x**

## 3 Fractions in simplest form

What fraction of 1 hour is 25 minutes?
Give your answer in its simplest form.

1 hour = 60 minutes
$\frac{25}{60} = \frac{5}{12}$
**Answer: $\frac{5}{12}$**

## 4 Density

A bar of lead has a density of 11.3 g/$cm^3$ and a mass of 1130 g.
Work out its volume.

Volume = mass ÷ density
1130 ÷ 11.3 = 100
**Answer: 100 $cm^3$**

## 5 Negative and zero indices

Work out
(a) $2^{-2}$
(b) $5^0 + \sqrt{100}$

(a) A negative power means the reciprocal: $2^{-2} = \frac{1}{2^2} = \frac{1}{4}$

(b) Anything to the power 0 is 1, so $5^0 = 1$
$\sqrt{100} = 10$, so 1 + 10 = 11
**Answer: (a) $\frac{1}{4}$ (b) 11**

## 6 Changing the subject

Make r the subject of the formula
C = 2πr

Divide both sides by 2π
**Answer: r = $\frac{C}{2\pi}$**

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## 7 Perimeter and area of compound shapes

The diagram shows the shape of a playground.
All the corners are right angles. All lengths are in m.
(a) Calculate the perimeter.
(b) Calculate the area.

(a) Missing lengths: 13 − 5 = 8 and 12 − 9 = 3
Perimeter = 13 + 9 + 8 + 3 + 5 + 12 = 50
(b) Split into two rectangles: 13 × 9 = 117 and 5 × 3 = 15
117 + 15 = 132

**Answer: (a) 50 m (b) 132 $m^2$**

## 8 Midpoint of a line segment

A is the point (−7, −2) and B is the point (5, −6).
Find the coordinates of the midpoint of AB.

Add the x-coordinates and halve: (−7 + 5) ÷ 2 = −1
Add the y-coordinates and halve: (−2 − 6) ÷ 2 = −4
**Answer: (−1, −4)**

## 9 Average speed

A cyclist travels at 45 km/h for 3 hours and then at 36 km/h for 3 hours.
Work out its average speed for the whole journey.

Distance: 45 × 3 = 135 km and 36 × 3 = 108 km
Total distance = 243 km and total time = 6 hours
Average speed = 243 ÷ 6 = 40.5
**Answer: 40.5 km/h**

## 10 Volume of a prism

This prism has a right-angled triangle as its cross-section.
Find the volume of this prism.
The diagram is not drawn accurately.

Area of cross-section = ½ × 6 × 10 = 30
Volume of prism = area of cross-section × length
30 × 5 = 150
**Answer: 150 $m^3$**