**Day 322** **B Tier 10-a-day: Model Solutions**

## 1 Metric conversions

(a) Convert 8000 ml to litres.

(b) Convert 4 000 000 $cm^3$ to $m^3$.

(a) ml → litres: divide by 1000: 8000 ÷ 1000 = 8

(b) 1 m = 100 cm, so 1 $m^3$ = 100 × 100 × 100 = 1 000 000 $cm^3$. 4 000 000 ÷ 1 000 000 = 4

**Answer: (a) 8 litres (b) 4 $m^3$**

## 2 Percentages of amounts

Work out

(a) 80% of £360

(b) 85% of 200

(a) 10% of £360 = £36

80% = 8 × £36 = £288

(b) 10% of 200 = 20

5% of 200 = 10

85% = 8 × 20 + 10 = 170

**Answer: (a) £288 (b) 170**

## 3 Circumference and area of a circle

The diagram shows a circle with radius 10 cm. (Calculator)

Work out the circumference of the circle.

Give your answer correct to 1 decimal place.

The diagram is not drawn accurately.

Circumference = 2 × π × radius

2 × π × 10 = 62.832...

= 62.8 cm (1 d.p.)

**Answer: 62.8 cm**

## 4 HCF and LCM

Find the (a) highest common factor (HCF), (b) lowest common multiple (LCM) of 18 and 21.

$18 = 2 \times 3^2$ and $21 = 3 \times 7$

(a) HCF: multiply the primes in both lists, using the smaller power: 3

(b) LCM: use the larger power of every prime: $2 \times 3^2 \times 7 = 126$

**Answer: (a) 3 (b) 126**

## 5 Pythagoras in context

A rectangle is 24 cm long and 7 cm wide.

Work out the length of a diagonal of the rectangle.

The diagonal is the hypotenuse of a right-angled triangle

$d^2 = 24^2 + 7^2 = 625$

$d = \sqrt{625} = 25$

**Answer: 25 cm**

## 6 Percentage change

Farah bought a games console for £800 and sold it for £440.

Work out the percentage loss.

Loss = cost − selling price = £360

Percentage loss = $\frac{£360}{£800} \times 100 = 45\%$

**Answer: 45% loss**

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## 7 Algebraic fractions

Simplify fully $\frac{x^2 + 8x}{x}$

Factorise the top: x(x + 8)
Cancel the x on the top and bottom
**Answer: x + 8**

## 8 Missing value from a mean

The mean of 5 numbers is 28.
Four of the numbers are 26, 30, 27, 29.
Work out the fifth number.

Total = 5 × 28 = 140
Given total = 112
Fifth = 140 − 112 = 28
**Answer: 28**

## 9 Changing the subject

Make v the subject of the formula

$a = \frac{v - u}{t}$

Multiply both sides by t: at = v − u
Add u to both sides
**Answer: v = u + at**

## 10 Tree diagrams

A bag contains 5 black socks and 3 white socks.
Liam takes one at random, replaces it, then takes a second.
Work out the probability that both are black.

P(first black) = $\frac{5}{8}$

P(second black) = $\frac{5}{8}$

P(both black) = $\frac{5}{8} \times \frac{5}{8} = \frac{25}{64}$

**Answer: $\frac{25}{64}$**