Day 16 **B Tier 10-a-day: Model Solutions**

1 Percentage as a fraction of

(a) Mohammed scores 101 out of 200 in a test. Write this as a percentage.
(b) Write 70p as a percentage of £10.

(a) $\frac{101}{200} \times 100 = 50.5\%$

(b) Change both to pence: 70p and 1000p

$\frac{70}{1000} \times 100 = 7\%$

Answer: (a) 50.5% (b) 7%

2 Metric conversions

(a) Convert 12.5 kg to g.
(b) Convert 8 litres to cm^3.

(a) kg → g: multiply by 1000: 12.5 × 1000 = 12 500

(b) 1 litre = 1000 cm^3. 8 × 1000 = 8000

Answer: (a) 12 500 g (b) 8000 cm^3

3 Equations with fractions

Solve $\frac{2x + 12}{5} = 4$

Multiply both sides by 5: 2x + 12 = 20
Subtract 12 from both sides: 2x = 8
Divide both sides by 2
Answer: x = 4

4 Factors and multiples

Write down all the common factors of 28 and 63.

Factors of 28: 1, 2, 4, 7, 14, 28
Factors of 63: 1, 3, 7, 9, 21, 63
The common factors are the numbers in both lists
Answer: 1, 7

5 Equations with fractional answers

Solve 2x − 1 = 4
Give your answer as a fraction in its simplest form.

Add 1 to both sides: 2x = 5

Divide both sides by 2: x = $\frac{5}{2}$

Answer: x = $\frac{5}{2}$

6 Venn diagram problems

33 households were asked.
17 of them have a cat and 16 of them have a dog.
9 of them did both.
(a) How many did neither?
(b) One is chosen at random. Find the probability that they have a cat but do not have a dog.

(a) Union = 17 + 16 − 9 = 24
Neither = 33 − 24 = 9
(b) Only have a cat = 17 − 9 = 8
P = 8 out of 33

Answer: (a) 9 (b) $\frac{8}{33}$

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7 Error intervals

The mass of a parcel is 16.9 kg, correct to 1 decimal place.
Write down the error interval for the mass.
Use the letter m.

The rounding unit is 0.1, so half of it is 0.05
Lower bound = 16.9 − 0.05 = 16.85
Upper bound = 16.9 + 0.05 = 16.95
Answer: $16.85 \leq m < 16.95$

8 Independent events

The probability that Amy is late for school on any day is 0.4.
The probability that Ben is late on any day is 0.6.
Whether each is late is independent of the other.
Work out the probability that at least one of them is late on Monday.

P(neither late) = (1 − 0.4) × (1 − 0.6) = 0.6 × 0.4 = 0.24
P(at least one late) = 1 − 0.24 = 0.76
Answer: 0.76

9 Solving quadratic equations

Solve $x^2 + 7x - 8 = 0$

Factorise: $(x - 1)(x + 8) = 0$
Either $x - 1 = 0$ or $x + 8 = 0$
Answer: $x = -8$ or $x = 1$

10 Chords and the centre of a circle

A circle has centre O and radius 13 m. (Calculator)
AB is a chord and M is the midpoint of AB. OM is perpendicular to AB.
Work out the value of x. Give your answer correct to 1 decimal place.
The diagram is not drawn accurately.

AM = 18 ÷ 2 = 9
Triangle OMA has a right angle at M, and OA is the hypotenuse
$x^2 = 13^2 - 9^2 = 169 - 81 = 88$
$x = \sqrt{88} = 9.381...$
x = 9.4 m (1 d.p.)
Answer: x = 9.4 m