Day 256 **B Tier 10-a-day: Model Solutions**

1 Collecting like terms

Simplify 6x + 9y + 6x + 8y

Collect the x terms: 6x + 6x = 12x
Collect the y terms: 9y + 8y = 17y
Answer: 12x + 17y

2 Fraction problems

A water tank is $\frac{1}{3}$ full.

130 litres of water are added.

The water tank is now $\frac{2}{3}$ full.

Work out the capacity of the water tank.

Fraction added = $\frac{2}{3} - \frac{1}{3} = \frac{1}{3}$

$\frac{1}{3}$ of the capacity = 130 litres

Whole capacity = 130 × 3 = 390 litres
Answer: 390 litres

3 Volume of cuboids

A cube has volume 1000 cm^3.
Work out the side length of the cube.

Side length = the cube root of 1000
10 × 10 × 10 = 1000, so the side is 10
Answer: 10 cm

4 Bar charts

The bar chart shows some information.
(a) Write down the mode.
(b) What fraction of the total is Apple? Give your answer in its simplest form.

(a) The tallest bar is Grape
(b) Total = 15 + 10 + 15 + 30 + 5 = 75
Apple = 15, so the fraction is 15 out of 75
Answer: (a) Grape (b) $\frac{1}{5}$

5 Midpoint of a line segment

M is the midpoint of AB.
A is the point (7, 8) and M is the point (4, 8).
Find the coordinates of B.

From A to M, x changes by −3 and y changes by 0
Do the same change again from M to get to B: x = 4 − 3 = 1, y = 8 + 0 = 8
Answer: (1, 8)

6 Metric conversions

(a) Convert 0.75 kg to g.
(b) Convert 2.5 m^3 to cm^3.

(a) kg → g: multiply by 1000: 0.75 × 1000 = 750
(b) 1 m = 100 cm, so 1 m^3 = 100 × 100 × 100 = 1 000 000 cm^3. 2.5 × 1 000 000 = 2 500 000
Answer: (a) 750 g (b) 2 500 000 cm^3

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7 Compound interest

Maya invests £200 in an account paying 5% compound interest per year. (Calculator)
Work out the value of her investment after 2 years.

Multiplier = 1 + 5 ÷ 100 = 1.05
Value = 200×1.05^2
= £220.50
Answer: £220.50

8 Area of a triangle using sine

In triangle XYZ, XY = 12 m, YZ = 17 m and angle XYZ = 65°. (Calculator)
Work out the area of the triangle.
Give your answer correct to 1 decimal place.

Area = ½ab sin C
Area = ½ × 12 × 17 × sin 65°
= 92.443...
= 92.4 m^2 (1 d.p.)
Answer: 92.4 m^2

9 Simultaneous equations problem

A theme park sells adult tickets and child tickets.
4 adult tickets and 2 child tickets cost £64.
3 adult tickets and 2 child tickets cost £51.
Work out the cost of one adult ticket and the cost of one child ticket.

Let a = cost of one adult ticket and b = cost of one child ticket
4a + 2b = 64 and 3a + 2b = 51
Subtract: 1a = 64 − 51 = 13, so a = 13
Substitute: 4 × 13 + 2b = 64, so 2b = 12 and b = 6
Answer: One adult ticket costs £13 and one child ticket costs £6

10 Reverse repeated percentages

In a sale, the price of a sofa is reduced by 40%. (Calculator)
Two weeks later it is reduced by a further 5% of the new price.
The final price is £85.50.
Work out the original price of the sofa.

Multipliers: 0.6 and 0.95
Overall multiplier = 0.6 × 0.95 = 0.57
Original price = £85.50 ÷ 0.57 = £150
Answer: £150