Day 117 **B Tier 10-a-day: Model Solutions**

1 Metric conversions

(a) Convert 750 mm to m.

(b) Convert 50 000 cm^2 to m^2.

(a) mm → m: divide by 1000: 750 ÷ 1000 = 0.75

(b) 1 m = 100 cm, so 1 m^2 = 100 × 100 = 10 000 cm^2. 50 000 ÷ 10 000 = 5

Answer: (a) 0.75 m (b) 5 m^2

2 Forming equations

I think of a number.

I add 15 and then multiply the result by 3.

The answer is 63.

Work out my number.

Let the number be n: 3(n + 15) = 63

Divide by 3: n + 15 = 21

Subtract 15

Answer: 6

3 Stem and leaf diagrams

The stem and leaf diagram shows 11 values.

(a) Find the median.

(b) Work out the range.

(a) 11 values, so the median is the 6th value

Reading in order: 34, 35, 40, 41, 44, 45, 47, 49, 53, 54, 57

Median = 45

(b) Range = 57 − 34 = 23

Answer: (a) 45 (b) 23

4 Solving inequalities

Solve $7y + 7 \leq 63$

Subtract 7 from both sides: $7y \leq 56$

Divide both sides by 7 (a positive number, so the inequality sign stays the same)

Answer: $y \leq 8$

5 Currency conversion

£1 = 1.5 dollars

A holiday costs $30.

Work out the cost in pounds.

Divide by the rate: 30 ÷ 1.5

= £20

Answer: £20

6 Mixed numbers

Work out $3\frac{5}{6} + 1\frac{1}{2}$

Give your answer as a mixed number.

Whole numbers: 3 + 1 = 4

Fractions: $\frac{5}{6} + \frac{1}{2} = \frac{8}{6} = 1\frac{1}{3}$

Total = $5\frac{1}{3}$

Answer: $5\frac{1}{3}$

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7 Grouped frequency tables

The table shows the masses of some parcels.
(a) Write down the modal class.
(b) Work out an estimate for the mean.

(a) The highest frequency is 9
(b) Use the midpoint of each class: 2.5, 7.5, 12.5, 17.5
Sum of midpoint × frequency = 2.5 × 3 + 7.5 × 5 + 12.5 × 9 + 17.5 × 8 = 297.5
Total frequency = 25
Estimate = 297.5 ÷ 25 = 11.9
Answer: (a) $10 < m \leq 15$ (b) 11.9

8 Solving quadratic equations

Solve $x^2 - 144 = 0$

Factorise as a difference of two squares: $(x - 12)(x + 12) = 0$
Either $x - 12 = 0$ or $x + 12 = 0$
Answer: $x = -12$ or $x = 12$

9 Surface area of a cylinder

A cylinder has radius 3 m and height 15 m. (Calculator)
It is closed.
Work out the total outside surface area.
Give your answer correct to 1 decimal place.

Two circles: $2 \times \pi \times 3^2 = 18\pi$
Curved surface: $2 \times \pi \times 3 \times 15 = 90\pi$
Total = $18\pi + 90\pi = 108\pi$
= 339.3 m^2 (1 d.p.)
Answer: 339.3 m^2

10 Reverse repeated percentages

In a sale, the price of a sofa is reduced by 30%. (Calculator)
Two weeks later it is reduced by a further 50% of the new price.
The final price is £70.
Work out the original price of the sofa.

Multipliers: 0.7 and 0.5
Overall multiplier = 0.7 × 0.5 = 0.35
Original price = £70 ÷ 0.35 = £200
Answer: £200