Day 261 **B Tier 10-a-day: Model Solutions**

1 Mean from a frequency table

The table shows the books read by each member of a club in a month.
Work out the mean.

Multiply each value by its frequency and add: 1 × 6 + 2 × 5 + 3 × 1 + 4 × 1 + 5 × 8 = 63
Total frequency = 6 + 5 + 1 + 1 + 8 = 21
Mean = 63 ÷ 21 = 3
Answer: 3

2 Using the nth term

The nth term of a sequence is 9n − 3
(a) Work out the 5th term.
(b) Is 244 a term in the sequence? You must show how you get your answer.

(a) Replace n with 5: 9 × 5 − 3 = 42
(b) Solve 9n − 3 = 244: 9n = 247
n = 247 ÷ 9 = 27.44, which is not a whole number, so 244 is not in the sequence
Answer: (a) 42 (b) No, n is not a whole number

3 Surface area of cuboids

A cereal box measures 11 cm by 6 cm by 7 cm.
Work out the total surface area.

Top and bottom: 2 × 11 × 6 = 132
Front and back: 2 × 11 × 7 = 154
Two sides: 2 × 6 × 7 = 84
132 + 154 + 84 = 370
Answer: 370 cm^2

4 Time

A train leaves at 10:44.
It arrives at 14:39.
How long does the journey take?

From 10:44 to 13:44 is 3 hours.
From 13:44 to 14:39 is 55 minutes.
Total time: 3 hours 55 minutes
Answer: 3 hours 55 minutes

5 Angles in quadrilaterals

PQRS is an isosceles trapezium with PQ parallel to SR.
Angle SPQ = 84°.
(a) Write down the size of angle PQR.
(b) Work out the size of angle PSR.

(a) In an isosceles trapezium the base angles are equal, so angle PQR = 84°
(b) Co-interior angles add up to 180°
180 − 84 = 96
Answer: (a) 84° (b) 96°

6 Real-life graphs

A company hires out bikes. There is a fixed charge plus a cost for each hour.
The graph shows the total cost.
(a) Write down the fixed charge.
(b) Work out the cost for each hour.

(a) The fixed charge is the cost when nothing has been used, where the line meets the vertical axis
(b) Take two points on the line, for example (0, 7) and (6, 19)
Cost for each hour = (19 − 7) ÷ 6 = 2
Answer: (a) £7 (b) £2

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7 Ratio to fraction and percentage

The ratio of sweet to salted packets of crisps is 3 : 7.
What percentage of them are sweet?

Total parts = 3 + 7 = 10

Fraction = $\frac{3}{10}$

3 ÷ 10 × 100 = 30%

Answer: 30%

8 Fraction problems

A water tank is $\frac{1}{4}$ full.

98 litres of water are added.

The water tank is now $\frac{3}{5}$ full.

Work out the capacity of the water tank.

Fraction added = $\frac{3}{5} - \frac{1}{4} = \frac{7}{20}$

$\frac{7}{20}$ of the capacity = 98 litres

$\frac{1}{20}$ of the capacity = 98 ÷ 7 = 14 litres

Whole capacity = 14 × 20 = 280 litres

Answer: 280 litres

9 Tree diagrams

A bag contains 5 mint sweets and 7 toffee sweets.
Holly takes one at random and does not replace it, then takes a second.
Work out the probability that the two are different colours.

P(mint then toffee) = $\frac{35}{132}$

P(toffee then mint) = $\frac{35}{132}$

Add: $\frac{35}{132} + \frac{35}{132} = \frac{35}{66}$

Answer: $\frac{35}{66}$

10 Simultaneous equations problem

A theme park sells adult tickets and child tickets.
4 adult tickets and 3 child tickets cost £85.
1 adult ticket and 3 child tickets cost £28.
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 + 3b = 85 and 1a + 3b = 28
Subtract: 3a = 85 − 28 = 57, so a = 19
Substitute: 4 × 19 + 3b = 85, so 3b = 9 and b = 3
Answer: One adult ticket costs £19 and one child ticket costs £3