Day 211 **B Tier 10-a-day: Model Solutions**

1 Metric conversions

(a) Convert 3.5 m to mm.
(b) Convert 1.5 cm^2 to mm^2.

(a) m → mm: multiply by 1000: 3.5 × 1000 = 3500
(b) 1 cm = 10 mm, so 1 cm^2 = 10 × 10 = 100 mm^2. 1.5 × 100 = 150
Answer: (a) 3500 mm (b) 150 mm^2

2 Expanding brackets

Expand
(a) 5(x + 6)
(b) 2(4y − 8)

(a) 5 × x = 5x and 5 × 6 = 30
(b) 2 × 4y = 8y and 2 × (−8) = −16
Answer: (a) 5x + 30 (b) 8y − 16

3 Pythagoras in context

A TV screen is a rectangle 100 cm wide and 75 cm high.
Work out the length of the diagonal of the screen.

$d^2 = 100^2 + 75^2 = 10000 + 5625 = 15625$
$d = \sqrt{15625} = 125$
Answer: 125 cm

4 Stratified sampling

A stratified sample of 40 students is taken from the 1000 students in the table.
Work out how many students should be sampled from Group B.

Sample fraction = 40 ÷ 1000
Group B: 400 ÷ 1000 × 40 = 16
Answer: 16

5 Where a line crosses the axes

A straight line has equation y = 4x + 20
(a) Write down the coordinates of the point where the line crosses the y-axis.
(b) Work out the coordinates of the point where the line crosses the x-axis.

(a) When x = 0, y = 20
(b) The line crosses the x-axis when y = 0: 4x + 20 = 0
4x = −20
x = −5
Answer: (a) (0, 20) (b) (−5, 0)

6 Wages and overtime

George is paid £10 per hour for a 35 hour week. (Calculator)
Overtime is paid at time and a half.
In one week he works 5 hours of overtime.
Work out his total pay for that week.

Normal pay: 35 × £10 = £350
Overtime rate: £10 × 1.5 = £15 per hour
Overtime pay: 5 × £15 = £75
Total: £350 + £75 = £425
Answer: £425

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7 Scatter graphs

The scatter graph shows information about temperature and ice creams sold.
A line of best fit is drawn.
(a) Describe the correlation.
(b) Use the line of best fit to estimate the ice creams sold when temperature is 15.

(a) As one variable goes up, the other goes up
This is positive correlation
(b) Go up from 15 on the horizontal axis to the line, then across to the vertical axis
The reading is about 35
Answer: (a) Positive correlation (b) about 35

8 Mixed numbers

Work out $2\frac{2}{3} \times 2\frac{1}{3}$

Give your answer as a mixed number.

Write as improper fractions: $\frac{8}{3} \times \frac{7}{3}$

Multiply: $\frac{56}{9}$

As a mixed number: $6\frac{2}{9}$

Answer: $6\frac{2}{9}$

9 Pressure

A table exerts a force of 80 newtons on the floor.
The area in contact with the floor is 4 m^2.
Work out the pressure on the floor.
Give your answer in N/m^2.

Pressure = force ÷ area
80 ÷ 4 = 20
Answer: 20 N/m^2

10 Tables of values

Complete the table of values for y = 4x + 5

x = 2: y = 4 × 2 + 5 = 13
x = 3: y = 4 × 3 + 5 = 17
x = 4: y = 4 × 4 + 5 = 21
Answer: x = 2: 13, x = 3: 17, x = 4: 21