Day 41 **B Tier 10-a-day: Model Solutions**

1 Adding fractions

Work out

(a) $\frac{1}{8} + \frac{2}{5}$

(b) $\frac{5}{6} - \frac{1}{4}$

Give each answer in its simplest form.

(a) Common denominator 40: $\frac{5}{40} + \frac{16}{40} = \frac{21}{40}$

(b) Common denominator 12: $\frac{10}{12} - \frac{3}{12} = \frac{7}{12}$

Answer: (a) $\frac{21}{40}$ (b) $\frac{7}{12}$

2 Volume of cuboids

A cuboid has volume 300 cm^3.
The length of the cuboid is 6 cm and the width is 10 cm.
Work out the height of the cuboid.

Volume = length × width × height
300 = 6 × 10 × height
300 = 60 × height
Height = 300 ÷ 60 = 5
Answer: 5 cm

3 Order of operations

Work out

(a) $4 + 4 \times 5^2$

(b) $(3 + 6) \times 8 - 14$

(a) Powers first: $5^2 = 25$
Then multiply: 4 × 25 = 100
Then add: 4 + 100 = 104
(b) Brackets first: 3 + 6 = 9
Multiply: 9 × 8 = 72
Subtract: 72 − 14 = 58
Answer: (a) 104 (b) 58

4 Area of 2D shapes

This is a parallelogram.
Calculate the area of this parallelogram.
The diagram is not drawn accurately.

Area of a parallelogram = base × perpendicular height
The slanting side is not needed
20 × 12 = 240
Answer: 240 mm^2

5 Factorising quadratics

Factorise $x^2 - 4x + 4$

Find two numbers that multiply to give 4 and add to give −4
The numbers are −2 and −2
Answer: (x − 2)(x − 2)

Day 41 **B Tier 10-a-day: Model Solutions**

6 Inverse proportion

3 pumps take 10 minutes to empty a pool.
All the pumps work at the same rate.
How long would it take 2 pumps?

The total work stays the same: 3 × 10 = 30 pumps-minutes
With 2 pumps: 30 ÷ 2 = 15 minutes
Answer: 15 minutes

7 Bounds

The length of a rectangle is 27 cm and its width is 20 cm.
Both measurements are correct to the nearest cm.
Work out the lower bound for the area of the rectangle.

Lower bound of each side = value − 0.5: 26.5 cm and 19.5 cm
Area = 26.5 × 19.5 = 516.75 cm^2
Answer: 516.75 cm^2

8 Equation of a line

A straight line has gradient −1 and passes through the point (−2, 6).
Find the equation of the line.

The equation is $y = -1x + c$
Substitute $x = -2$ and $y = 6$: $6 = -1 \times (-2) + c$
$6 = 2 + c$
$c = 6 - 2 = 4$
Answer: $y = -x + 4$

9 Cumulative frequency

The cumulative frequency graph shows the times taken by 40 students to complete a puzzle.
(a) Use the graph to estimate the median.
(b) Work out an estimate for the interquartile range.

(a) Median is at 40 ÷ 2 = 20: read across from 20 on the vertical axis to the curve, then down: 77.5
(b) Lower quartile at 10: 45. Upper quartile at 30: 95
IQR = 95 − 45 = 50
Answer: (a) 77.5 minutes (b) 50 minutes

10 Expanding double brackets

Expand and simplify (2x − 4)(x + 5)

Multiply every term in the first bracket by every term in the second:
$2x^2 + 10x - 4x - 20$
Collect the x terms: $2x^2 + 6x - 20$
Answer: $2x^2 + 6x - 20$