Day 155 **B Tier 10-a-day: Model Solutions**

1 Collecting like terms

Simplify 9m + 6n + 6m + 6n

Collect the m terms: 9m + 6m = 15m
Collect the n terms: 6n + 6n = 12n
Answer: 15m + 12n

2 Symmetry

How many lines of symmetry does a regular hexagon have?

A regular hexagon has 6 lines of symmetry
Answer: 6

3 Relative frequency

A spinner has coloured sections. It is spun 150 times and lands on blue 135 times.
What is the relative frequency of blue?
Give your answer as a decimal.

135 ÷ 150 = 0.9
Answer: 0.9

4 Reflection

The diagram shows triangle ABC on a grid.
(a) Write down the coordinates of the image of A after a reflection in the line y = x.
(b) Write down the coordinates of the image of C after a reflection in the line x = 2.

(a) A is at (2, 1). Reflect in the line y = x: (1, 2)
(b) C is at (4, 4). Reflect in the line x = 2: (0, 4)
Answer: (a) (1, 2) (b) (0, 4)

5 Tables of values for quadratics

Complete the table of values for $y = x^2 - 3x + 2$

$x = 0$: $y = 0^2 + (-3) \times 0 + 2 = 2$
$x = 1$: $y = 1^2 + (-3) \times 1 + 2 = 0$
$x = 2$: $y = 2^2 + (-3) \times 2 + 2 = 0$
$x = 3$: $y = 3^2 + (-3) \times 3 + 2 = 2$
Answer: x = 0: 2, x = 1: 0, x = 2: 0, x = 3: 2

6 Standard form calculations

Work out $(3.7 \times 10^4) \times (6 \times 10^7)$
Give your answer in standard form.

Multiply the numbers: 3.7 × 6 = 22.2
Add the powers: $10^4 \times 10^7 = 10^{11}$
$22.2 \times 10^{11} = 2.22 \times 10^{12}$ in standard form
Answer: 2.22×10^{12}

7 Combined mean

In a test, the mean mark of 20 Class A is 46.
The mean mark of 5 Class B is 51.
Work out the mean mark of all 25 students.

Total for Class A = 20 × 46 = 920
Total for Class B = 5 × 51 = 255
Overall mean = (920 + 255) ÷ 25 = 1175 ÷ 25 = 47
Answer: 47

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8 Mixed numbers

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

Give your answer as a mixed number.

Whole numbers: 3 + 3 = 6

Fractions: $\frac{2}{3} + \frac{1}{2} = \frac{7}{6} = 1\frac{1}{6}$

Total = $7\frac{1}{6}$

Answer: $7\frac{1}{6}$

9 Algebraic proof

Show that 3(2n + 1) + 3(2n + 7) is always a multiple of 12, where n is a whole number.

Expand: 6n + 3 + 6n + 21
Collect like terms: 12n + 24
Factorise: 12(n + 2), which is a multiple of 12
Answer: 12(n + 2) is a multiple of 12

10 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: 20
(b) Lower quartile at 10: 15. Upper quartile at 30: 40
IQR = 40 − 15 = 25
Answer: (a) 20 minutes (b) 25 minutes