Day 210 **B Tier 10-a-day: Model Solutions**

1 Collecting like terms

Simplify 6a + 9b + 5a + 2b

Collect the a terms: 6a + 5a = 11a
Collect the b terms: 9b + 2b = 11b
Answer: 11a + 11b

2 Factors and multiples

Write down all the common factors of 16 and 32.

Factors of 16: 1, 2, 4, 8, 16
Factors of 32: 1, 2, 4, 8, 16, 32
The common factors are the numbers in both lists
Answer: 1, 2, 4, 8, 16

3 Probability of not happening

The probability that a seed grows is 30%.
Work out the probability that a seed does not grow.

Probabilities add up to 100%
100% − 30% = 70%
Answer: 70%

4 Solving equations

Solve n − 16 = 4

Add 16 to both sides
Answer: n = 20

5 Column vectors

$\mathbf{a} = \begin{pmatrix} 1 \\ -6 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 6 \\ -6 \end{pmatrix}$

Work out
(a) $3\mathbf{a} + \mathbf{b}$
(b) $4\mathbf{a} + \mathbf{b}$

(a) $\begin{pmatrix} 3 \\ -18 \end{pmatrix} + \begin{pmatrix} 6 \\ -6 \end{pmatrix} = \begin{pmatrix} 9 \\ -24 \end{pmatrix}$
(b) $\begin{pmatrix} 4 \\ -24 \end{pmatrix} + \begin{pmatrix} 6 \\ -6 \end{pmatrix} = \begin{pmatrix} 10 \\ -30 \end{pmatrix}$
Answer: (a) $\begin{pmatrix} \mathbf{9} \\ \mathbf{-24} \end{pmatrix}$ **(b)** $\begin{pmatrix} \mathbf{10} \\ \mathbf{-30} \end{pmatrix}$

6 Gradient and intercept

A straight line has equation y = 7x + 7
(a) Write down the gradient of the line.
(b) Write down the equation of a line that is parallel to this line and passes through the point (0, −6).

(a) The line is in the form y = mx + c, so the gradient m is the number in front of x
(b) Parallel lines have the same gradient, 7
It crosses the y-axis at −6, so c = −6
Answer: (a) 7 (b) y = 7x − 6

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7 Prisms and density

A block of concrete is a cuboid measuring 9 cm by 7 cm by 8 cm.
The density of concrete is 2.5 g/cm^3.
Work out the mass of the block.

Volume = 9 × 7 × 8 = 504 cm^3
Mass = density × volume
2.5 × 504 = 1260 g
Answer: 1260 g

8 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 22.

(a) As one variable goes up, the other goes up
This is positive correlation
(b) Go up from 22 on the horizontal axis to the line, then across to the vertical axis
The reading is about 56
Answer: (a) Positive correlation (b) about 56

9 Wages and overtime

Will is paid £10 per hour for a 30 hour week. (Calculator)
Overtime is paid at double time.
In one week he works 6 hours of overtime.
Work out his total pay for that week.

Normal pay: 30 × £10 = £300
Overtime rate: £10 × 2 = £20 per hour
Overtime pay: 6 × £20 = £120
Total: £300 + £120 = £420
Answer: £420

10 Perimeter with algebra

An equilateral triangle has sides of length (2x + 8) m.
The perimeter of the triangle is 96 m.
Work out the value of x.

3(2x + 8) = 96
2x + 8 = 32
2x = 24
x = 12
Answer: x = 12