Day 325 **B Tier 10-a-day: Model Solutions**

1 Pie charts

In a pie chart showing the answers of 40 people, the angle for football is 162°.
How many people chose football?

162° out of 360° = $\frac{9}{20}$

$\frac{9}{20}$ of 40 = 18

Answer: 18

2 Continuing sequences

Here are the first four terms of a sequence.
6, 6, 12, 18
(a) Write down the next two terms.
(b) Describe the rule for continuing the sequence.

Each term is the sum of the two terms before it: 6 + 6 = 12
12 + 18 = 30 and 18 + 30 = 48
Answer: (a) 30, 48 (b) Add the two previous terms

3 Sharing in a ratio

Amy, Chloe and Aisha share 143 marbles in the ratio 4 : 5 : 4.
Work out how many Aisha gets.

4 + 5 + 4 = 13 parts
1 part = 143 ÷ 13 = 11
Aisha gets 4 × 11 = 44
Answer: 44

4 Column vectors

$\mathbf{a} = \begin{pmatrix} -4 \\ -3 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 1 \\ 6 \end{pmatrix}$

Work out
(a) $\mathbf{a} + 2\mathbf{b}$
(b) $3\mathbf{a} + 2\mathbf{b}$

(a) $\begin{pmatrix} -4 \\ -3 \end{pmatrix} + \begin{pmatrix} 2 \\ 12 \end{pmatrix} = \begin{pmatrix} -2 \\ 9 \end{pmatrix}$

(b) $\begin{pmatrix} -12 \\ -9 \end{pmatrix} + \begin{pmatrix} 2 \\ 12 \end{pmatrix} = \begin{pmatrix} -10 \\ 3 \end{pmatrix}$

Answer: (a) $\begin{pmatrix} \mathbf{-2} \\ \mathbf{9} \end{pmatrix}$ **(b)** $\begin{pmatrix} \mathbf{-10} \\ \mathbf{3} \end{pmatrix}$

5 HCF and LCM

Find the (a) highest common factor (HCF), (b) lowest common multiple (LCM) of 28 and 49.

$28 = 2^2 \times 7$ and $49 = 7^2$
(a) HCF: multiply the primes in both lists, using the smaller power: 7
(b) LCM: use the larger power of every prime: $2^2 \times 7^2 = 196$
Answer: (a) 7 (b) 196

6 Changing the subject

Make x the subject of the formula

$y = \frac{x + 6}{3}$

Multiply both sides by 3: 3y = x + 6
Subtract 6 from both sides
Answer: x = 3y − 6

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7 Significant figures

Work out the value of this expression. (Calculator)

$$\frac{7.9 + 3.8}{1.4 \times 2.8}$$

Give your answer correct to 2 significant figures.

Use a calculator: the full display is 2.984694...
Round to 2 significant figures: 3.0
Answer: 3.0

8 Unitary method

7 apples cost £2.80.
(a) Work out the cost of 3 apples.
(b) How many apples can be bought for £2.80?

(a) 1 apple costs £2.80 ÷ 7 = 40p
3 × 40p = £1.20
(b) £2.80 ÷ 40p = 7
Answer: (a) £1.20 (b) 7

9 Prisms and density

A block of ice is a cuboid measuring 4 cm by 10 cm by 7 cm.
The density of ice is 0.9 g/cm^3.
Work out the mass of the block.

Volume = 4 × 10 × 7 = 280 cm^3
Mass = density × volume
0.9 × 280 = 252 g
Answer: 252 g

10 Simultaneous equations problem

A theme park sells adult tickets and child tickets.
1 adult ticket and 2 child tickets cost £26.
3 adult tickets and 2 child tickets cost £58.
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
1a + 2b = 26 and 3a + 2b = 58
Subtract: 2a = 58 − 26 = 32, so a = 16
Substitute: 1 × 16 + 2b = 26, so 2b = 10 and b = 5
Answer: One adult ticket costs £16 and one child ticket costs £5