Day 355 **B Tier 10-a-day: Model Solutions**

1 Scatter graphs

The scatter graph shows information about age of car and value.
A line of best fit is drawn.
(a) Describe the correlation.
(b) Use the line of best fit to estimate the value when age of car is 5.

(a) As one variable goes up, the other goes down
This is negative correlation
(b) Go up from 5 on the horizontal axis to the line, then across to the vertical axis
The reading is about £13 000
Answer: (a) Negative correlation (b) about £13 000

2 Scale drawings and maps

A road is 0.4 km long.
It is drawn on a map with scale 1 : 10 000.
Work out the length of the road on the map, in cm.

0.4 km = 40 000 cm
40 000 ÷ 10 000 = 4 cm
Answer: 4 cm

3 Ratio, one part known

The ratio of adults to children among the people on a bus is 3 : 2.
There are 12 adults.
How many children are there?

3 parts = 12 adults
1 part = 12 ÷ 3 = 4
children: 2 × 4 = 8
Answer: 8

4 Adding fractions

Work out
(a) $\frac{2}{5} + \frac{1}{9}$
(b) $\frac{7}{9} - \frac{1}{6}$
Give each answer in its simplest form.

(a) Common denominator 45: $\frac{18}{45} + \frac{5}{45} = \frac{23}{45}$
(b) Common denominator 18: $\frac{14}{18} - \frac{3}{18} = \frac{11}{18}$
Answer: (a) $\frac{23}{45}$ (b) $\frac{11}{18}$

5 Transformations of a point

(a) The point P(2, 4) is reflected in the line y = x. Write down the coordinates of the image.
(b) The point P(2, 4) is rotated 180° about the origin. Write down the coordinates of the image.

(a) Reflecting in y = x swaps x and y: (4, 2)
(b) A half turn takes (x, y) to (−x, −y): (−2, −4)
Answer: (a) (4, 2) (b) (−2, −4)

6 Tables of values for quadratics

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

x = −2: $y = (-2)^2 + (-1) \times (-2) + 2 = 8$
x = 0: $y = 0^2 + (-1) \times 0 + 2 = 2$
x = 2: $y = 2^2 + (-1) \times 2 + 2 = 4$
x = 3: $y = 3^2 + (-1) \times 3 + 2 = 8$
Answer: x = −2: 8, x = 0: 2, x = 2: 4, x = 3: 8

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7 Percentage as a fraction of

(a) Hannah scores 57 out of 125 in a quiz. Write this as a percentage.
(b) Write £1.70 as a percentage of £5.

(a) $\frac{57}{125} \times 100 = 45.6\%$

(b) Change both to pence: 170p and 500p

$\frac{170}{500} \times 100 = 34\%$

Answer: (a) 45.6% (b) 34%

8 Combining ratios

In a bag of counters, the ratio of black to white is 4 : 7.
The ratio of white to green is 5 : 3.
Write down the ratio black : white : green.

Make the white part the same in both ratios: lowest common multiple of 7 and 5 is 35
black : white = 20 : 35
white : green = 35 : 21
black : white : green = 20 : 35 : 21

Answer: 20 : 35 : 21

9 Difference of two squares

Factorise $a^2 - 64$

$64 = 8^2$, so this is a difference of two squares

$a^2 - 8^2 = (a - 8)(a + 8)$

Answer: $(a - 8)(a + 8)$

10 Perimeter expressions

A rectangle has length $(3x + 4)$ cm and width $(2x + 3)$ cm.
Write down an expression, in terms of x, for the perimeter of the rectangle.
Give your answer in its simplest form.

Perimeter = 2 × length + 2 × width
$2(3x + 4) + 2(2x + 3) = 6x + 8 + 4x + 6$
$= 10x + 14$

Answer: $10x + 14$ cm