Day 111 **B Tier 10-a-day: Model Solutions**

1 Substitution

Work out the value of 6m + 15 when m = 7

Replace m with 7: 6 × 7 + 15
42 + 15 = 57
Answer: 57

2 Decimal calculations

Work out
(a) 4.7 × 0.4
(b) 0.17 × 5

(a) 47 × 4 = 188
There are 2 decimal places in total, so the answer is 1.88
(b) 17 × 5 = 85, then divide by 100: 0.85
Answer: (a) 1.88 (b) 0.85

3 Sharing in a ratio

Ravi, Kira and Harry share 60 stamps in the ratio 1 : 3 : 2.
Work out how many Kira gets.

1 + 3 + 2 = 6 parts
1 part = 60 ÷ 6 = 10
Kira gets 3 × 10 = 30
Answer: 30

4 Factorising

Factorise $t^2 - 5t$

Both terms have t as a factor
$t^2 \div t = t$ and $-5t \div t = -5$
Answer: $t(t - 5)$

5 Transformations of a point

(a) The point P(4, 2) is rotated 90° anticlockwise about the origin. Write down the coordinates of the image.
(b) The point P(4, 2) is rotated 90° clockwise about the origin. Write down the coordinates of the image.

(a) A 90° anticlockwise turn takes (x, y) to (−y, x): (−2, 4)
(b) A 90° clockwise turn takes (x, y) to (y, −x): (2, −4)
Answer: (a) (−2, 4) (b) (2, −4)

6 Frequency trees

There are 100 students.

$\frac{1}{5}$ of them are boys and the rest are girls.

$\frac{2}{5}$ of the boys and $\frac{2}{5}$ of the girls walk to school.

One person is chosen at random. Work out the probability that they walk to school.

boys: $\frac{1}{5} \times 100 = 20$ and girls: $100 - 20 = 80$

boys who walk to school: $\frac{2}{5} \times 20 = 8$

girls who walk to school: $\frac{2}{5} \times 80 = 32$

P = (8 + 32) out of 100

Answer: $\frac{2}{5}$

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7 Percentage change

Beth bought a bike for £2000 and sold it for £500.
Work out the percentage loss.

Loss = cost − selling price = £1500

Percentage loss = $\frac{£1500}{£2000} \times 100 = 75\%$

Answer: 75% loss

8 Mean from a frequency table

The table shows the books read by each member of a club in a month.
Work out the mean.

Multiply each value by its frequency and add: $1 \times 2 + 2 \times 5 + 3 \times 7 + 4 \times 5 + 5 \times 9 = 98$
Total frequency = 2 + 5 + 7 + 5 + 9 = 28
Mean = 98 ÷ 28 = 3.5
Answer: 3.5

9 Quadratic equation problem

A rectangle has length (x + 5) cm and width (x − 1) cm.
The area of the rectangle is 27 cm^2.
(a) Show that $x^2 + 4x - 32 = 0$
(b) Hence work out the length of the rectangle.

(a) Area = length × width: $(x + 5)(x - 1) = 27$
Expand: $x^2 + 4x - 5 = 27$
Subtract 27 from both sides: $x^2 + 4x - 32 = 0$
(b) Factorise: $(x - 4)(x + 8) = 0$, so $x = 4$ or $x = -8$
A length cannot be negative, so x = 4. Length = 4 + 5 = 9
Answer: (b) 9 cm

10 Scale drawings and maps

A road is 5 km long.
It is drawn on a map with scale 1 : 50 000.
Work out the length of the road on the map, in cm.

5 km = 500 000 cm
500 000 ÷ 50 000 = 10 cm
Answer: 10 cm