Day 154 **B Tier 10-a-day: Model Solutions**

1 Angles in triangles

Triangle DEF is isosceles with DE = DF.
Angle EDF = 32°.
Work out the size of angle DEF.

The base angles of an isosceles triangle are equal
Angles in a triangle add up to 180°
180 − 32 = 148
148 ÷ 2 = 74
Answer: 74°

2 Comparing fractions and percentages

Leah has $\frac{4}{5}$ of £100.

Ella has 35% of £140.
Who has more money? You must show your working.

Leah: 100 ÷ 5 × 4 = £80
Ella: 140 ÷ 100 × 35 = £49
£80 is more than £49, so Leah has more
Answer: Leah

3 Rates

Kira types at 40 words per minute.
(a) How many words does Kira type in 5 minutes?
(b) How long does Kira take to type 600 words?

(a) 40 × 5 = 200
(b) 600 ÷ 40 = 15 minutes
Answer: (a) 200 words (b) 15 minutes

4 Substitution with negative numbers

Work out the value of 2a − 3b
when a = −5 and b = 6

Substitute: 2 × (−5) − 3 × 6
−10 − 18 = −28
Answer: −28

5 Percentage change

The number of members of a club goes from 500 to 350.
Work out the percentage decrease.

Decrease = 500 − 350 = 150

Percentage decrease = $\frac{150}{500}$ × 100 = 30%

Answer: 30% decrease

6 Mode and median from a table

The table shows the pets owned by each student in a class.
(a) Write down the mode.
(b) Work out the median.

(a) The highest frequency is 9, for 2
(b) Total frequency = 27, so the median is the number 14 value
Running totals of frequency: 9, 17, 22, 23, 25, 27
The median is 3
Answer: (a) 2 (b) 3

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7 Where a line crosses the axes

A straight line has equation y = 5x + 5
(a) Write down the coordinates of the point where the line crosses the y-axis.
(b) Work out the coordinates of the point where the line crosses the x-axis.

(a) When x = 0, y = 5
(b) The line crosses the x-axis when y = 0: 5x + 5 = 0
5x = −5
x = −1
Answer: (a) (0, 5) (b) (−1, 0)

8 Combining ratios

In a bag of counters, the ratio of black to white is 1 : 5.
The ratio of white to blue is 3 : 2.
Write down the ratio black : white : blue.

Make the white part the same in both ratios: lowest common multiple of 5 and 3 is 15
black : white = 3 : 15
white : blue = 15 : 10
black : white : blue = 3 : 15 : 10
Answer: 3 : 15 : 10

9 Chords and the centre of a circle

A circle has centre O and radius 10 cm.
AB is a chord and M is the midpoint of AB. OM is perpendicular to AB.
Work out the value of x.
The diagram is not drawn accurately.

Triangle OMA has a right angle at M, and OA is the hypotenuse
$AM^2 = 10^2 - 6^2 = 100 - 36 = 64$
$AM = \sqrt{64} = 8$
x = 2 × AM = 16
Answer: x = 16 cm

10 Bounds

The length of a rectangle is 40 cm and its width is 11 cm.
Both measurements are correct to the nearest cm.
Work out the upper bound for the perimeter of the rectangle.

Upper bound of each side = value + 0.5: 40.5 cm and 11.5 cm
Perimeter = 2 × (40.5 + 11.5) = 104 cm
Answer: 104 cm