Day 357 **B Tier 10-a-day: Model Solutions**

1 Perimeter expressions

A triangle has sides of length (2x + 5) cm, (4x − 5) cm and (3x + 1) cm.
Write down an expression, in terms of x, for the perimeter of the triangle.
Give your answer in its simplest form.

Add the three sides: (2x + 5) + (4x − 5) + (3x + 1)
x terms: 2x + 4x + 3x = 9x. Numbers: 5 − 5 + 1 = 1
Answer: 9x + 1 cm

2 Circumference and area of a circle

The diagram shows a circle with diameter 14 cm.
Work out the area of the circle.
Give your answer in terms of π.
The diagram is not drawn accurately.

Area = π × radius^2
Radius = 14 ÷ 2 = 7
π × 7^2 = 49π
Answer: 49π cm^2

3 Bar charts

The bar chart shows some information.
(a) Write down the mode.
(b) What fraction of the total is Grape? Give your answer in its simplest form.

(a) The tallest bar is Grape
(b) Total = 5 + 15 + 5 + 25 + 20 = 70
Grape = 25, so the fraction is 25 out of 70
Answer: (a) Grape (b) $\frac{5}{14}$

4 Rounding

Write 3708.9302
(a) correct to 2 decimal places,
(b) correct to 3 significant figures.

(a) Look at the next digit after the second decimal place: 0
So 3708.9302 rounds to 3708.93
(b) The first significant figure is the first non-zero digit. Count 3 figures and look at the next digit.
3708.9302 rounds to 3710
Answer: (a) 3708.93 (b) 3710

5 Missing value from a mean

The mean of 6 numbers is 19.
5 of the numbers are 24, 25, 18, 15, 22.
Work out the other number.

Total of all 6 numbers = 6 × 19 = 114
Total of those given = 104
Missing number = 114 − 104 = 10
Answer: 10

6 Prisms and density

A prism has a cross-section with area 55 cm^2.
The length of the prism is 11 cm.
Work out the volume of the prism.

Volume = area of cross-section × length
55 × 11 = 605
Answer: 605 cm^3

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7 Ratio with a difference

Chloe and Priya share some money in the ratio 5 : 3.
Chloe gets £4 more than Priya.
Work out the total amount of money.

Difference in parts: 5 − 3 = 2
2 parts = £4, so 1 part = £2
Total parts = 5 + 3 = 8
Total = 8 × £2 = £16
Answer: £16

8 Bounds

The length of a rectangle is 14 cm and its width is 30 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: 14.5 cm and 30.5 cm
Perimeter = 2 × (14.5 + 30.5) = 90 cm
Answer: 90 cm

9 Algebraic proof

Show that (n + 5)(n + 3) − n(n + 8) has the same value for every whole number n.

Expand the first part: $n^2 + 3n + 5n + 15 = n^2 + 8n + 15$
Expand the second part: $n^2 + 8n$
Subtract: the n^2 terms and the n terms cancel, leaving 15
Answer: The value is always 15

10 Reverse repeated percentages

In a sale, the price of a sofa is reduced by 40%. (Calculator)
Two weeks later it is reduced by a further 25% of the new price.
The final price is £180.
Work out the original price of the sofa.

Multipliers: 0.6 and 0.75
Overall multiplier = 0.6 × 0.75 = 0.45
Original price = £180 ÷ 0.45 = £400
Answer: £400