Day 196 **B Tier 10-a-day: Model Solutions**

1 Collecting like terms

Simplify $3p + 3q - 5p + 3q$

Collect the p terms: $3p - 5p = -2p$
Collect the q terms: $3q + 3q = 6q$
Answer: $-2p + 6q$

2 Ratio to fraction and percentage

The ratio of adults to children at a concert is 9 : 2.
What fraction of them are children?

Total parts = 9 + 2 = 11
children are 2 out of 11 parts
Answer: $\frac{2}{11}$

3 Prisms and density

A prism has a cross-section with area 58 cm^2.
The length of the prism is 16 cm.
Work out the volume of the prism.

Volume = area of cross-section × length
58 × 16 = 928
Answer: 928 cm^3

4 Comparing fractions and percentages

Priya has $\frac{7}{10}$ of £40.

Ella has 40% of £60.
Who has more money? You must show your working.

Priya: 40 ÷ 10 × 7 = £28
Ella: 60 ÷ 100 × 40 = £24
£28 is more than £24, so Priya has more
Answer: Priya

5 Equations with fractional answers

Solve $6x - 5 = 9$
Give your answer as a fraction in its simplest form.

Add 5 to both sides: $6x = 14$
Divide both sides by 6: $x = \frac{14}{6}$
Simplify the fraction
Answer: $x = \frac{7}{3}$

6 Population density

Village C has a population of 1,000.
Its area is 5 km^2.
Work out the population density.
Give your answer in people per km^2.

Population density = population ÷ area
1,000 ÷ 5 = 200
Answer: 200 people per km^2

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7 Proving a triangle is right-angled

A triangle has sides of length 19 cm, 16 cm and 12 cm.
Is the triangle right-angled?
You must show your working.

The longest side is 19. Check whether $a^2 + b^2 = c^2$
$12^2 + 16^2 = 144 + 256 = 400$
$19^2 = 361$
These are not equal, so the triangle is not right-angled
Answer: No, $12^2 + 16^2 = 400$ but $19^2 = 361$

8 Error intervals

The number x is rounded to the nearest 100.
The result is 8400.
Write down the error interval for x.

The rounding unit is 100, so x can be up to half of this, 50, either side of 8400
Lower bound = 8400 − 50 = 8350 and upper bound = 8400 + 50 = 8450
Answer: $8350 \leq x < 8450$

9 Growth and decay

A new car is worth £20,000. (Calculator)
Each year its value falls by 25% of its value at the start of that year.
Work out the value of the car after 2 years.

Multiplier = 1 − 25 ÷ 100 = 0.75
Value = $20{,}000 \times 0.75^2$
= £11,250
Answer: £11,250

10 Volume of cones and pyramids

A cone has base radius 4 m and vertical height 8 m. (Calculator)

Volume of a cone = $\frac{1}{3}\pi r^2 h$

Work out the volume of the cone.
Give your answer correct to 1 decimal place.

Volume = $\frac{1}{3} \times \pi \times 4^2 \times 8$
= 134.041...
= 134.0 m^3 (1 d.p.)
Answer: 134.0 m^3