Day 245 **B Tier 10-a-day: Model Solutions**

1 Collecting like terms

Simplify $3p + 6q - 6p + 9q$

Collect the p terms: $3p - 6p = -3p$
Collect the q terms: $6q + 9q = 15q$
Answer: $-3p + 15q$

2 Bar charts

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

(a) The tallest bar is Golf
(b) Total = 30 + 20 + 10 + 25 + 5 = 90
Chess = 10, so the fraction is 10 out of 90
Answer: (a) Golf (b) $\frac{1}{9}$

3 Congruent triangles

Triangle PQR has two sides of 4 cm and 9 cm with an angle of 60° between them.
Triangle DEF has two sides of 9 cm and 4 cm with an angle of 60° between them.
Are the two triangles congruent?
Give a reason for your answer.

Two pairs of equal sides, with the same angle between them
So the triangles are congruent (SAS)
Answer: Yes, SAS (two sides and the included angle)

4 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 8, for 3
(b) Total frequency = 22, so the median is the numbers 11 and 12 values
Running totals of frequency: 3, 10, 18, 22
The median is 3
Answer: (a) 3 (b) 3

5 Factorising quadratics

Factorise $x^2 - 14x + 48$

Find two numbers that multiply to give 48 and add to give -14
The numbers are -8 and -6
Answer: $(x - 8)(x - 6)$

6 Compound percentages

The population of a town is 20,000. (Calculator)
It increases by 3% each year.
Work out the population after 2 years.
Give your answer to the nearest whole number.

Multiplier = 1.03
Population = $20{,}000 \times 1.03^2$
= 21,218.00, which is 21,218 to the nearest whole number
Answer: 21,218

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7 Similar shapes

The two triangles are similar.
(a) Write down the scale factor of the enlargement from the smaller triangle to the larger triangle.
(b) Work out the value of x.
The diagram is not drawn accurately.

(a) Scale factor = 15 ÷ 10 = 1.5
(b) x = 8 × 1.5 = 12
Answer: (a) 1.5 (b) x = 12 cm

8 Solving quadratic equations

Solve $x^2 - 2x = 0$

Factorise: $x(x - 2) = 0$
Either $x = 0$ or $x - 2 = 0$
Answer: x = 0 or x = 2

9 Frequency trees

There are 200 bus passengers.
$\frac{3}{10}$ of them are adults and the rest are children.
$\frac{2}{5}$ of the adults and $\frac{2}{5}$ of the children have a pass.
One person is chosen at random. Work out the probability that they have a pass.

adults: $\frac{3}{10} \times 200 = 60$ and children: $200 - 60 = 140$

adults who have a pass: $\frac{2}{5} \times 60 = 24$

children who have a pass: $\frac{2}{5} \times 140 = 56$

P = (24 + 56) out of 200

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

10 Growth in standard form

There are 3.6×10^5 cells in a sample.
The number doubles every day.
How many are there after 6 days?
Give your answer in standard form.

Each day multiply by 2, so multiply by $2^6 = 64$
$3.6 \times 10^5 \times 64 = 230.4 \times 10^5$
In standard form: 2.304×10^7
Answer: 2.304×10^7