Day 259 **B Tier 10-a-day: Model Solutions**

1 Collecting like terms

Simplify 6a + 5b + 9a − 4b

Collect the a terms: 6a + 9a = 15a
Collect the b terms: 5b − 4b = b
Answer: 15a + b

2 Two-way tables

The table shows some information about 90 people at a meeting.
A person is chosen at random.
Find the probability that the person is in the group "Female" and chose "Tea".

Female who chose Tea = 90 − 53 − 23 = 14
P = 14 out of 90
Answer: $\frac{7}{45}$

3 Metric units

A jug holds 0.875 litres of juice.
Each glass holds 125 ml.
How many glasses can be filled from the jug?

0.875 litres = 0.875 × 1000 = 875 ml
875 ÷ 125 = 7
Answer: 7 glasses

4 Forming equations

I think of a number.
I divide it by 5 and then add 4.
The answer is 12.
Work out my number.

Let the number be n: $\frac{n}{5} + 4 = 12$

Subtract 4: $\frac{n}{5} = 8$

Multiply by 5
Answer: 40

5 Angles on a line and round a point

The diagram shows 2 angles on a straight line.
Work out the value of b.
The diagram is not drawn accurately.

Angles on a straight line add up to 180°
(b + 40) + (4b + 90) = 180
5b + 130 = 180
5b = 50
b = 50 ÷ 5 = 10
Answer: b = 10°

6 Fractions and decimals

(a) Write $\frac{1}{16}$ as a decimal.

(b) Write $\frac{5}{12}$ as a recurring decimal.

For part (b), write down the first 8 decimal places and say which digits repeat.

(a) 1 ÷ 16 = 0.0625
(b) 5 ÷ 12: use short division, adding zeros
5 ÷ 12 = 0.41666666...
The digit 6 repeats
Answer: (a) 0.0625 (b) 0.41666666... (6 repeats)

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7 Simultaneous equations

Solve the simultaneous equations
$x + 2y = 13$
$3x + 4y = 25$

Multiply the first equation by 2: $2x + 4y = 26$
The y terms have the same sign, so subtract the first equation from the second: $x = -1$
$x = -1$
Substitute $x = -1$ into the first equation: $2y = 13 - (-1) = 14$
$y = 7$
Answer: $x = -1$, $y = 7$

8 Speed unit conversion

A car travels at 162 km/h.
Work out its speed in metres per second.

162 km = 162,000 m
1 hour = 3600 seconds
162,000 ÷ 3600 = 45 m/s
Answer: 45 m/s

9 Volume of cones and pyramids

A cone has base radius 2 cm and vertical height 9 cm.

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

Work out the volume of the cone.
Give your answer in terms of π.

Volume = $\frac{1}{3} \times \pi \times 2^2 \times 9$

$= \frac{1}{3} \times \pi \times 4 \times 9 = 12\pi$

Answer: 12π cm^3

10 Chords and the centre of a circle

A circle has centre O and radius 17 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.

AM = 16 ÷ 2 = 8
Triangle OMA has a right angle at M, and OA is the hypotenuse
$x^2 = 17^2 - 8^2 = 289 - 64 = 225$
$x = \sqrt{225} = 15$
Answer: $x = 15$ cm