Day 160 **B Tier 10-a-day: Model Solutions**

1 Angles in triangles

Triangle DEF is isosceles with DE = DF.
Angle EDF = 20°.
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 − 20 = 160
160 ÷ 2 = 80
Answer: 80°

2 Equations with unknowns on both sides

Solve 4y + 4 = 3y + 8

Subtract 3y from both sides: y + 4 = 8
Subtract 4 from both sides: 1y = 4
Divide both sides by 1
Answer: y = 4

3 Counting outcomes

A club has 9 members.
They choose a captain and a vice-captain from the members.
The two jobs must be done by different people.
How many different ways can the jobs be given out?

9 choices for the captain
8 choices left for the vice-captain
9 × 8 = 72
Answer: 72

4 Surface area of cuboids

An open box (no lid) is a cuboid measuring 9 cm by 4 cm by 4 cm.
The base is 9 cm by 4 cm.
Work out the total area of card needed to make the box.

Base: 9 × 4 = 36
Two long sides: 2 × 9 × 4 = 72
Two short sides: 2 × 4 × 4 = 32
36 + 72 + 32 = 140
Answer: 140 cm^2

5 Algebraic fractions

Simplify fully $\frac{15x^2}{5x}$

15 ÷ 5 = 3 and $x^2 \div x = x$
Answer: 3x

6 Mean from a frequency table

The table shows the books read by each member of a club in a month.
Work out the mean.

Multiply each value by its frequency and add: 1 × 1 + 2 × 5 + 3 × 6 + 4 × 2 + 5 × 8 = 77
Total frequency = 1 + 5 + 6 + 2 + 8 = 22
Mean = 77 ÷ 22 = 3.5
Answer: 3.5

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7 Circumference and area of a circle

The diagram shows a circle with radius 10 mm.
Work out the circumference of the circle.
Give your answer in terms of π.
The diagram is not drawn accurately.

Circumference = 2 × π × radius
2 × π × 10 = 20π
Answer: 20π mm

8 Average speed

A cyclist travels at 80 km/h for 1.5 hours and then at 20 km/h for 1.5 hours.
Work out its average speed for the whole journey.

Distance: 80 × 1.5 = 120 km and 20 × 1.5 = 30 km
Total distance = 150 km and total time = 3 hours
Average speed = 150 ÷ 3 = 50
Answer: 50 km/h

9 Growth in standard form

There are 3.1×10^4 cells in a sample.
The number doubles every day.
How many are there after 4 days?
Give your answer in standard form.

Each day multiply by 2, so multiply by $2^4 = 16$
$3.1 \times 10^4 \times 16 = 49.6 \times 10^4$
In standard form: 4.96×10^5
Answer: 4.96×10^5

10 Ordering standard form

Write these numbers in order of size.
Start with the smallest.
9.4×10^6, 920,000, 7.2×10^{-1}, 900

Write each in standard form: 9.4×10^6, 9.2×10^5, 7.2×10^{-1}, 9×10^2
Compare the powers of 10 first (the bigger the power, the bigger the number)
Order: 7.2×10^{-1}, 900, 920,000, 9.4×10^6
Answer: 7.2×10^{-1}, 900, 920,000, 9.4×10^6