Day 72 **B Tier 10-a-day: Model Solutions**

1 Faces, edges and vertices

Write down the number of faces, edges and vertices of a square-based pyramid.

Faces: a 4-sided base and 4 triangles = 5
Edges: 4 on the base plus 4 up to the point = 8
Vertices: 4 on the base plus the top point = 5
Answer: faces: 5 edges: 8 vertices: 5

2 Metric units

(a) Change 7 km to m.
(b) Change 2770 cm to m.

(a) 1 km = 1000 m, so multiply by 1000: 7 × 1000 = 7000
(b) 1 m = 100 cm, so divide by 100: 2770 ÷ 100 = 27.7
Answer: (a) 7000 m (b) 27.7 m

3 Perimeter expressions

A triangle has sides of length (4x + 2) cm, (x − 2) cm and (4x + 4) 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: (4x + 2) + (x − 2) + (4x + 4)
x terms: 4x + x + 4x = 9x. Numbers: 2 − 2 + 4 = 4
Answer: 9x + 4 cm

4 Rates

Electricity costs 12p per unit.
There is also a standing charge of £8.
Work out the total bill for 200 units.

Cost of units: 200 × 12p = 2400p = £24
Add the standing charge: £24 + £8 = £32
Answer: £32

5 Volume of a prism

Here is a prism.
Its cross-section is an isosceles triangle.
Work out the volume of the prism.
The diagram is not drawn accurately.

Area of cross-section = ½ × 6 × 8 = 24
Volume of prism = area of cross-section × length
24 × 11 = 264
Answer: 264 m^3

6 Inverse proportion

3 pumps take 12 minutes to empty a pool.
All the pumps work at the same rate.
How long would it take 2 pumps?

The total work stays the same: 3 × 12 = 36 pumps-minutes
With 2 pumps: 36 ÷ 2 = 18 minutes
Answer: 18 minutes

7 Loci

A point P is always exactly 8 km from a radio transmitter, L.
Describe the locus of the point P.

The points are all the same distance from L
This forms a circle
Answer: A circle with centre L and radius 8 km

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8 Growth in standard form

There are 4.6×10^6 bacteria in a dish.
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 $2^4 = 16$

$4.6 \times 10^6 \times 16 = 73.6 \times 10^6$

In standard form: 7.36×10^7

Answer: 7.36×10^7

9 Forming equations

I think of a number.
I divide it by 5 and then add 2.
The answer is 5.
Work out my number.

Let the number be n: $\frac{n}{5} + 2 = 5$

Subtract 2: $\frac{n}{5} = 3$

Multiply by 5

Answer: 15

10 Continuing sequences

Here are the first four terms of a sequence.
4, 6, 10, 16
(a) Write down the next two terms.
(b) Describe the rule for continuing the sequence.

Each term is the sum of the two terms before it: 4 + 6 = 10

10 + 16 = 26 and 16 + 26 = 42

Answer: (a) 26, 42 (b) Add the two previous terms