Day 75 **B Tier 10-a-day: Model Solutions**

1 Money

Mohammed buys 2 sandwiches at £2.15 each and 3 pens at £1.75 each.
He pays with a £10 note.
Work out how much change he gets.

2 × £2.15 = £4.30
3 × £1.75 = £5.25
Total = £4.30 + £5.25 = £9.55
Change = £10 − £9.55 = 45p
Answer: 45p

2 Term-to-term rules

The first term of a sequence is 3.
The term-to-term rule is: double the term, then add 4.
Work out the 5th term.

2nd term: 2 × 3 + 4 = 10
3rd term: 2 × 10 + 4 = 24
4th term: 2 × 24 + 4 = 52
5th term: 2 × 52 + 4 = 108
Answer: 108

3 Pie charts

In a pie chart showing the answers of 36 people, the angle for walk is 60°.
How many people chose walk?

60° out of 360° = $\frac{1}{6}$

$\frac{1}{6}$ of 36 = 6
Answer: 6

4 Volume of a cylinder

A tin of beans has radius 8 m and height 15 m.
Work out its volume.
Give your answer in terms of π.

Volume = π × radius^2 × height
π × 8^2 × 15 = π × 64 × 15
= 960π
Answer: 960π m^3

5 Factorising

Factorise $y^2 - 4y$

Both terms have y as a factor
$y^2 \div y = y$ and $-4y \div y = -4$
Answer: y(y − 4)

6 Population density

Town A has a population of 2,000.
Its area is 8 km^2.
Work out the population density.
Give your answer in people per km^2.

Population density = population ÷ area
2,000 ÷ 8 = 250
Answer: 250 people per km^2

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7 Repeated percentage change

The price of a laptop is £40.
The price is first reduced by 5%, then the new price is reduced by 20%.
(a) Work out the final price.
(b) Work out the overall percentage decrease in the price.

(a) Multipliers: 0.95 and 0.8
40 × 0.95 × 0.8 = £30.40
(b) Overall multiplier = 0.76
Overall decrease = 24%
Answer: (a) £30.40 (b) 24% decrease

8 Loci

AB is a straight fence 4 m long.
A path is always exactly 1 m from the fence AB, on both sides, and also goes round each end.
Describe the shape of the path.

On each side, the path is a straight line parallel to AB, 1 m away
At each end the path is a semicircle of radius 1 m
Answer: Two parallel lines 4 m long, joined at each end by a semicircle of radius 1 m

9 Algebraic proof

Show that the sum of three consecutive even numbers is always a multiple of 6.

Let the smallest even number be 2n. The others are 2n + 2 and 2n + 4
Sum = 2n + (2n + 2) + (2n + 4) = 6n + 6
6n + 6 = 6(n + 1), which is a multiple of 6
Answer: 6(n + 1) is a multiple of 6

10 Direct proportion

F is directly proportional to m.
When m = 12, F = 9.
Find the value of m when F = 5.25.

F = km
k = 9 ÷ 12 = 0.75
m = 5.25 ÷ 0.75 = 7
Answer: m = 7