Day 288 **B Tier 10-a-day: Model Solutions**

1 Compound areas

A rectangular pond is 8 m by 6 m.
There is a path of width 2 m all the way round the outside of the pond.
Work out the area of the path.

Outer rectangle: (8 + 4) × (6 + 4) = 12 × 10 = 120
Pond: 8 × 6 = 48
120 − 48 = 72
Answer: 72 m^2

2 Types of number

Here is a list of numbers.
68, 81, 78, 51, 98, 94, 19, 27
From the list, write down
(a) a square number
(b) a prime number

(a) 81 (9 × 9) is a whole number multiplied by itself
(b) 19 has exactly two factors, 1 and itself
Answer: (a) 81 (b) 19

3 Probability of not happening

The probability that a train is on time is 50%.
Work out the probability that a train is not on time.

Probabilities add up to 100%
100% − 50% = 50%
Answer: 50%

4 Bearings

The bearing of M from L is 116°.
Work out the bearing of L from M.

116 is less than 180, so add 180°
116 + 180 = 296
Answer: 296°

5 Function notation

f(x) = 2x + 3
(a) Work out f(6)
(b) Solve f(x) = 21

(a) f(6) = 2 × 6 + 3 = 15
(b) 2x + 3 = 21
Subtract 3 from both sides: 2x = 18
Divide both sides by 2
Answer: (a) 15 (b) x = 9

6 Ordering standard form

Write these numbers in order of size.
Start with the smallest.
1.6×10^2, 0.047, 8.6×10^{-5}, 0.28

Write each in standard form: 1.6×10^2, 4.7×10^{-2}, 8.6×10^{-5}, 2.8×10^{-1}
Compare the powers of 10 first (the bigger the power, the bigger the number)
Order: 8.6×10^{-5}, 0.047, 0.28, 1.6×10^2
Answer: 8.6×10^{-5}, 0.047, 0.28, 1.6×10^2

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7 Sequences from patterns

Matchsticks are used to make a row of hexagons.
1 hexagon needs 6 matchsticks, 2 hexagons need 11 and 3 hexagons need 16.
(a) Find an expression, in terms of n, for the number of matchsticks needed for n hexagons.
(b) Dan uses 151 matchsticks to make a row. How many hexagons are in his row?

(a) The number of matchsticks goes up by 5 each time, so the rule starts with 5n
When n = 1 we need 6, and 5 × 1 = 5, so add 1: 5n + 1
(b) 5n + 1 = 151
5n = 150
n = 150 ÷ 5 = 30
Answer: (a) 5n + 1 (b) 30

8 Wages and overtime

Priya is paid £14.50 per hour for a 37 hour week. (Calculator)
Overtime is paid at time and a half.
In one week she works 6 hours of overtime.
Work out her total pay for that week.

Normal pay: 37 × £14.50 = £536.50
Overtime rate: £14.50 × 1.5 = £21.75 per hour
Overtime pay: 6 × £21.75 = £130.50
Total: £536.50 + £130.50 = £667
Answer: £667

9 Circle theorems

A, B and C are points on a circle, centre O.
Angle ACB = 51°.
Work out the size of angle AOB, marked b.
Give a reason for your answer.
The diagram is not drawn accurately.

The angle at the centre is twice the angle at the circumference
b = 2 × 51 = 102°
Answer: b = 102°

10 Reading pie charts

The pie chart shows the favourite choices of 360 people.
The angle for PE is not shown.
Work out how many people chose PE.

Angle for PE = 360° − (110° + 40° + 160°) = 360° − 310° = 50°
50 ÷ 360 × 360 = 50
Answer: 50