Day 113 **B Tier 10-a-day: Model Solutions**

1 Interior angles of regular polygons

Work out the size of one interior angle of a regular polygon with 15 sides.

Exterior angle = 360° ÷ 15 = 24°
Interior angle = 180° − 24° = 156°
Answer: 156°

2 Substitution into formulae

Here is a formula.
v = u + at
Work out the value of v when u = 4, a = 6 and t = 4

v = 4 + 6 × 4
v = 28
Answer: v = 28

3 Frequency trees

There are 150 visitors.
$\frac{3}{5}$ of them are men and the rest are women.
$\frac{1}{5}$ of the men and $\frac{3}{5}$ of the women buy a drink.
One person is chosen at random. Work out the probability that they buy a drink.

men: $\frac{3}{5} \times 150 = 90$ and women: 150 − 90 = 60

men who buy a drink: $\frac{1}{5} \times 90 = 18$

women who buy a drink: $\frac{3}{5} \times 60 = 36$

P = (18 + 36) out of 150

Answer: $\frac{\mathbf{9}}{\mathbf{25}}$

4 Prime factors

Write 396 as a product of its prime factors.
Give your answer in index form.

Divide by prime numbers, smallest first:
396 ÷ 2 = 198, 198 ÷ 2 = 99, 99 ÷ 3 = 33, 33 ÷ 3 = 11, 11 is prime
396 = 2 × 2 × 3 × 3 × 11
In index form: $396 = 2^2 \times 3^2 \times 11$
Answer: $\mathbf{2^2 \times 3^2 \times 11}$

5 Gradient and intercept

A straight line has equation y = 7x + 9
(a) Write down the gradient of the line.
(b) Write down the equation of a line that is parallel to this line and passes through the point (0, −1).

(a) The line is in the form y = mx + c, so the gradient m is the number in front of x
(b) Parallel lines have the same gradient, 7
It crosses the y-axis at −1, so c = −1
Answer: (a) 7 (b) y = 7x − 1

Day 113 **B Tier 10-a-day: Model Solutions**

6 Growth and decay

A new car is worth £8,000. (Calculator)
Each year its value falls by 20% of its value at the start of that year.
Work out the value of the car after 2 years.

Multiplier = 1 − 20 ÷ 100 = 0.8
Value = $8{,}000 \times 0.8^2$
= £5,120
Answer: £5,120

7 Arc length and sector area

The diagram shows a sector of a circle with radius 12 m and angle 60°.
Work out the length of the arc of the sector.
Give your answer in terms of π.
The diagram is not drawn accurately.

Arc length = $\frac{60}{360} \times 2 \times \pi \times 12$
= $\frac{60}{360} \times 24\pi = 4\pi$
Answer: 4π m

8 Combined mean

In a test, the mean mark of 20 boys is 55.
The mean mark of 5 girls is 70.
Work out the mean mark of all 25 students.

Total for boys = 20 × 55 = 1100
Total for girls = 5 × 70 = 350
Overall mean = (1100 + 350) ÷ 25 = 1450 ÷ 25 = 58
Answer: 58

9 Error intervals

The mass of a parcel is 0.43 kg, correct to 2 decimal places.
Write down the error interval for the mass.
Use the letter m.

The rounding unit is 0.01, so half of it is 0.005
Lower bound = 0.43 − 0.005 = 0.425
Upper bound = 0.43 + 0.005 = 0.435
Answer: $0.425 \leq m < 0.435$

10 Bounds

The length of a rectangle is 29 cm and its width is 15 cm.
Both measurements are correct to the nearest cm.
Work out the upper bound for the perimeter of the rectangle.

Upper bound of each side = value + 0.5: 29.5 cm and 15.5 cm
Perimeter = 2 × (29.5 + 15.5) = 90 cm
Answer: 90 cm