Day 345 **B Tier 10-a-day: Model Solutions**

1 Unitary method

9 bottles of water cost £1.35.
Work out the cost of 6 bottles of water.

1 bottle of water costs £1.35 ÷ 9 = 15p
6 bottles of water cost 6 × 15p = 90p
Answer: 90p

2 Angles on a line and round a point

The diagram shows 2 angles on a straight line.
Work out the value of y.
The diagram is not drawn accurately.

Angles on a straight line add up to 180°
(2y + 20) + 110 = 180
2y + 130 = 180
2y = 50
y = 50 ÷ 2 = 25
Answer: y = 25°

3 Probability of not happening

The probability that a seed grows is $\frac{9}{10}$.

Work out the probability that a seed does not grow.

Probabilities add up to 1

$1 - \frac{9}{10} = \frac{1}{10}$

Answer: $\frac{1}{10}$

4 Expanding double brackets

Expand and simplify $(3x - 6)(x + 6)$

Multiply every term in the first bracket by every term in the second:
$3x^2 + 18x - 6x - 36$
Collect the x terms: $3x^2 + 12x - 36$
Answer: $3x^2 + 12x - 36$

5 Chords and the centre of a circle

A circle has centre O and radius 14 m. (Calculator)
AB is a chord and M is the midpoint of AB. OM is perpendicular to AB.
Work out the value of x. Give your answer correct to 1 decimal place.
The diagram is not drawn accurately.

AM = 16 ÷ 2 = 8
Triangle OMA has a right angle at M, and OA is the hypotenuse
$x^2 = 14^2 - 8^2 = 196 - 64 = 132$
$x = \sqrt{132} = 11.489...$
x = 11.5 m (1 d.p.)
Answer: x = 11.5 m

6 Stratified sampling

A stratified sample of 40 students is taken from the 1000 students in the table.
Work out how many students should be sampled from Year 7.

Sample fraction = 40 ÷ 1000
Year 7: 375 ÷ 1000 × 40 = 15
Answer: 15

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7 Wages and overtime

Leah is paid £8 per hour for a 35 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: 35 × £8 = £280
Overtime rate: £8 × 1.5 = £12 per hour
Overtime pay: 6 × £12 = £72
Total: £280 + £72 = £352
Answer: £352

8 Trigonometry in isosceles triangles

Triangle XYZ is isosceles with XY = XZ = 13 cm. (Calculator)
The base YZ = 8 cm.
Work out the size of angle XYZ.
Give your answer correct to 1 decimal place.

Split the triangle into two right-angled triangles. Half the base = 8 ÷ 2 = 4

cos Y = $\frac{4}{13}$

Angle XYZ = $\cos^{-1}(\frac{4}{13})$ = 72.080...

= 72.1° (1 d.p.)
Answer: 72.1°

9 Bounds

The length of a rectangle is 16 cm and its width is 9 cm.
Both measurements are correct to the nearest cm.
Work out the lower bound for the area of the rectangle.

Lower bound of each side = value − 0.5: 15.5 cm and 8.5 cm

Area = 15.5 × 8.5 = 131.75 cm^2

Answer: 131.75 cm^2

10 Harder linear equations

Solve 6(x − 5) = 2(x − 5)

Expand the brackets: 6x − 30 = 2x − 10
Subtract 2x from both sides: 4x − 30 = −10
Subtract −30 from both sides: 4x = 20
Divide both sides by 4
Answer: x = 5