Day 339 **B Tier 10-a-day: Model Solutions**

1 Function notation

$g(x) = x^2 + 2$
(a) Work out g(4)
(b) Work out g(−4)

(a) $g(4) = 4^2 + 2 = 18$
(b) $g(-4) = (-4)^2 + 2 = 18$
Answer: (a) 18 (b) 18

2 Angles on a line and round a point

The diagram shows 3 angles round a point.
Work out the value of y.
The diagram is not drawn accurately.

Angles round a point add up to 360°
$4y + 3y + 2y = 360$
$9y = 360$
$y = 360 \div 9 = 40$
Answer: y = 40°

3 Fuel use

A car uses 50 litres of petrol to travel 800 km.
Work out how many kilometres it travels on each litre of petrol.

$800 \div 50 = 16$
Answer: 16 km per litre

4 Laws of indices

Write each answer as a single power of 3.
(a) $(3^3)^4$
(b) $3^8 \times 3^4 \div 3^4$

(a) Multiply the powers: $3 \times 4 = 12$
(b) Add then subtract: $8 + 4 - 4 = 8$
Answer: (a) 3^{12} (b) 3^8

5 Reading pie charts

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

Angle for Tennis = 360° − (120° + 60° + 30°) = 360° − 210° = 150°
$150 \div 360 \times 360 = 150$
Answer: 150

6 Substitution into formulae

$y = 3x^2 + 4x - 6$
Work out the value of y when x = 4

$y = 3 \times 4^2 + 4 \times 4 + (-6)$
$y = 48 + 16 + (-6) = 58$
Answer: y = 58

7 Pythagoras in context

A TV screen is a rectangle 60 cm wide and 25 cm high.
Work out the length of the diagonal of the screen.

$d^2 = 60^2 + 25^2 = 3600 + 625 = 4225$
$d = \sqrt{4225} = 65$
Answer: 65 cm

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8 Trial and improvement

The equation $x^3 + x = 90$ has a solution between 4 and 5. (Calculator)
Use trial and improvement to find this solution.
Give your answer correct to 1 decimal place.

$x = 4.5$: $4.5^3 + 4.5 = 95.625$ (too big)
$x = 4.2$: $4.2^3 + 4.2 = 78.288$ (too small)
$x = 4.3$: $4.3^3 + 4.3 = 83.807$ (too small)
$x = 4.4$: $4.4^3 + 4.4 = 89.584$ (too small)
$x = 4.45$: value = 92.571 (too big), so the solution is below 4.45
So x = 4.4 to 1 decimal place
Answer: x = 4.4

9 Error intervals

The number x is rounded to the nearest 10.
The result is 370.
Write down the error interval for x.

The rounding unit is 10, so x can be up to half of this, 5, either side of 370
Lower bound = 370 − 5 = 365 and upper bound = 370 + 5 = 375
Answer: $365 \leq x < 375$

10 Bounds

The length of a rectangle is 12 cm and its width is 6 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: 11.5 cm and 5.5 cm
Area = $11.5 \times 5.5 = 63.25$ cm^2
Answer: 63.25 cm^2