Day 127 **B Tier 10-a-day: Model Solutions**

1 Interior angles of regular polygons

Work out the sum of the interior angles of a dodecagon.

Sum = $(n - 2) \times 180°$
$(12 - 2) \times 180 = 10 \times 180 = 1800°$
Answer: 1800°

2 Integer inequalities

n is an integer.
Write down all the values of n for which
$1 \leq n \leq 7$

Both end values are included because of the $\leq$ signs
Answer: 1, 2, 3, 4, 5, 6, 7

3 Rounding

Write 94.4443
(a) correct to 2 decimal places,
(b) correct to 3 significant figures.

(a) Look at the next digit after the second decimal place: 4
So 94.4443 rounds to 94.44
(b) The first significant figure is the first non-zero digit. Count 3 figures and look at the next digit.
94.4443 rounds to 94.4
Answer: (a) 94.44 (b) 94.4

4 Volume of a cylinder

A cylinder has radius 4 m and height 18 m.
Work out its volume.
Give your answer in terms of π.

Volume = $\pi \times \text{radius}^2 \times \text{height}$
$\pi \times 4^2 \times 18 = \pi \times 16 \times 18$
$= 288\pi$
Answer: 288π m^3

5 Tables of values for quadratics

Complete the table of values for $y = x^2 + 2x - 3$

$x = -2$: $y = (-2)^2 + 2 \times (-2) + (-3) = -3$
$x = -1$: $y = (-1)^2 + 2 \times (-1) + (-3) = -4$
$x = 0$: $y = 0^2 + 2 \times 0 + (-3) = -3$
$x = 3$: $y = 3^2 + 2 \times 3 + (-3) = 12$
Answer: $x = -2$: -3, $x = -1$: -4, $x = 0$: -3, $x = 3$: 12

6 Scatter graphs

The scatter graph shows information about temperature and ice creams sold.
A line of best fit is drawn.
(a) Describe the correlation.
(b) Use the line of best fit to estimate the ice creams sold when temperature is 22.

(a) As one variable goes up, the other goes up
This is positive correlation
(b) Go up from 22 on the horizontal axis to the line, then across to the vertical axis
The reading is about 56
Answer: (a) Positive correlation (b) about 56

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7 Trigonometry in context

Sam stands 26 m from the base of a tree on level ground. (Calculator)
The angle of elevation of the top of the tree is 42°.
Work out the height of the tree.
Give your answer correct to 1 decimal place.

The distance is the adjacent side and the height is the opposite side

$\tan 42° = \frac{h}{26}$

$h = 26 \times \tan 42° = 23.411...$
$h = 23.4$ m (1 d.p.)
Answer: 23.4 m

8 Repeated percentage change

The price of a laptop is £60.
The price is first increased by 40%, then the new price is increased by 20%.
(a) Work out the final price.
(b) Work out the overall percentage increase in the price.

(a) Multipliers: 1.4 and 1.2
$60 \times 1.4 \times 1.2 = £100.80$
(b) Overall multiplier = 1.68
Overall increase = 68%
Answer: (a) £100.80 (b) 68% increase

9 Simultaneous equations problem

A takeaway sells burgers and portions of chips.
4 burgers and 2 portions of chips cost £22.
3 burgers and 2 portions of chips cost £17.
Work out the cost of one burger and the cost of one portion of chips.

Let a = cost of one burger and b = cost of one portion of chips
$4a + 2b = 22$ and $3a + 2b = 17$
Subtract: $1a = 22 - 17 = 5$, so $a = 5$
Substitute: $4 \times 5 + 2b = 22$, so $2b = 2$ and $b = 1$
Answer: One burger costs £5 and one portion of chips costs £1

10 Compound interest

Maya invests £2,000 in an account paying 4% compound interest per year. (Calculator)
Work out the value of her investment after 2 years.

Multiplier = $1 + 4 \div 100 = 1.04$
Value = $2{,}000 \times 1.04^2$
= £2,163.20
Answer: £2,163.20