Day 216 **IGCSE 10-a-day**

1 $f(x) = -x^3 + 8x - 4$

(a) Find $f'(x)$.

(b) Work out the value of $f'(2)$.

2 $\mathbf{a} = \begin{pmatrix} 5 \\ -4 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} 6 \\ 0 \end{pmatrix}$.

(a) Work out $\mathbf{a} + \mathbf{b}$.

(b) Work out $3\mathbf{a} - 2\mathbf{b}$.

3 Expand and simplify $(x + 4)(x + 5)(x - 3)$

4 $y = 2x^3 - 18x^2 + 2x - 6$

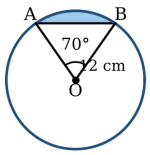
(a) Find $\frac{d^2y}{dx^2}$.

(b) Find the value of x for which $\frac{d^2y}{dx^2} = 0$, and work out the gradient of the curve at this value of x.

5 The circle has centre O and radius 12 cm. A and B are points on the circle and angle AOB = 70°. (Calculator)

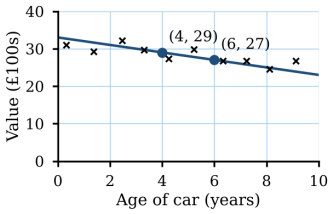
Work out the area of the shaded segment. Give your answer correct to 3 significant figures.

The diagram is not drawn accurately.



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6 The scatter graph shows age of car (x) and value (y).
The equation of the line of best fit is $y = -x + 33$.
(a) Estimate y when x = 7.
(b) Explain why an estimate of y when x = 15 may be unreliable.



7 The curve $y = x^3 + 6x^2 + 9x + 6$ has two stationary points, A and B.
Work out the vertical distance between A and B.

8 x and y satisfy $x \geq 0$, $y \geq 0$,
$4x + y \leq 44$ and $2x + 5y \leq 40$.
Find the greatest value of $P = 9x + 7y$ and the values of x and y that give it.

9 A train travels at a constant speed of 36 km/h.
It takes 40 seconds to go completely through a tunnel which is 290 m long.
Work out the length of the train, in metres.

10 The side length of a square is decreased by 60%.
Work out the percentage change in the area of the square.