Day 299 **IGCSE 10-a-day**

1 Here are five numbers: $3x + 4$, $3x$, $x + 4$, $x - 1$, $2x - 2$.
The mean of the five numbers is 17.
(a) Work out the value of x.
(b) Work out the range of the five numbers.

2 A particle P moves on a straight line. At time t seconds ($t > 0$), its distance from a point O is s metres, where

$s = 3t^2 + \frac{384}{t}$

Show that P is at its minimum distance from O when $t = 4$, and find this minimum distance.

3 $A = \begin{pmatrix} -3 & 0 \\ -1 & -2 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & 0 \\ -2 & -1 \end{pmatrix}$.
(a) Work out AB.
(b) Work out BA.

4 A curve has equation $y = x^2 + 2x + 2$.
Find the equation of the tangent to the curve at the point where $x = -2$.

5 $\mathbf{a} = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} 0 \\ -4 \end{pmatrix}$
Work out the exact length of the vector $\mathbf{a} + 2\mathbf{b}$.
Give your answer as a simplified surd.

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6 $y = (x + 1)^2(x + 3)$

Show that $\frac{dy}{dx} = (x + 1)(3x + 7)$.

7 Write $\frac{1 + \sqrt{2}}{2 + \sqrt{2}}$ in the form $p + q\sqrt{2}$

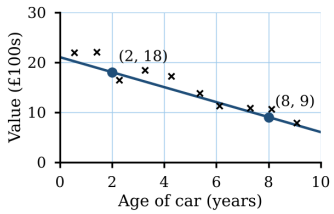
where p and q are rational numbers.

8 The scatter graph shows age of car (x) and value (y).

The line of best fit passes through (2, 18) and (8, 9).

(a) Find its equation in the form $y = mx + c$.

(b) Explain what its gradient tells you.



9 Solve the simultaneous equations

$y = x^2 + x + 5$

$y = -4x - 1$

10 A sequence is defined by $u_{n+2} = u_{n+1} + u_n$.

$u_1 = 1$ and $u_2 = x$.

(a) Show that $u_5 = 3x + 2$.

(b) Given that $u_5 = 20$, find x and hence work out u_8.