Day 276 **IGCSE 10-a-day**

1 $y = x^3 + 3x^2 + 4$

(a) Find the coordinates of the stationary points.

(b) Use $\frac{d^2y}{dx^2}$ to decide whether each is a maximum or a minimum.

2 $\mathbf{p} = \begin{pmatrix} 5 \\ 4 \end{pmatrix}$, $\mathbf{q} = \begin{pmatrix} -4 \\ 2 \end{pmatrix}$ and $\mathbf{r} = \begin{pmatrix} 6 \\ 6 \end{pmatrix}$.

Work out $\mathbf{p} + 2\mathbf{q} - \mathbf{r}$.

3 A particle P moves in a straight line. After t seconds its displacement from a fixed point O is s metres, where

$s = t^3 + t^2 + 5t + 5$ $(t > 0)$

Find (a) the velocity of P, (b) the acceleration of P, when $t = 1$.

4 (a) Write 378 and 6 as products of prime factors.

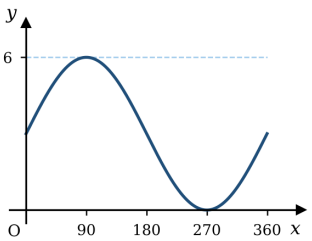
(b) Find the HCF and the LCM of 378 and 6.

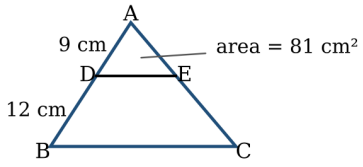
Give your answers as numbers.

5 The diagram shows the graph of $y = a \sin x + c$.

(a) Write down the value of a and the value of c.

(b) Work out the value of y when $x = 330°$.



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6 $\mathbf{OA} = 2\mathbf{a} - 3\mathbf{b}$, $\mathbf{OB} = 8\mathbf{a} - 11\mathbf{b}$ and $\mathbf{OC} = -\mathbf{a} + \mathbf{b}$. Show that A, B and C lie on a straight line.	
7 The curve $y = x^3 + 6x^2 + 9x - 8$ has two stationary points, A and B. Work out the vertical distance between A and B.	
8 Show that $\frac{3}{x-5} - \frac{2}{x+2}$ can be written as $\frac{x+16}{(x-5)(x+2)}$	
9 In the diagram, DE is parallel to BC. AD = 9 cm, DB = 12 cm and the area of triangle ADE is 81 cm^2. Work out the area of the trapezium DBCE. The diagram is not drawn accurately. 	
10 The mean of the heights in cm for the men is 72. The mean of the heights in cm for the women is 67. The mean for all of the men and women together is 71. Work out the ratio of the number of men to the number of women.	