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**9.**

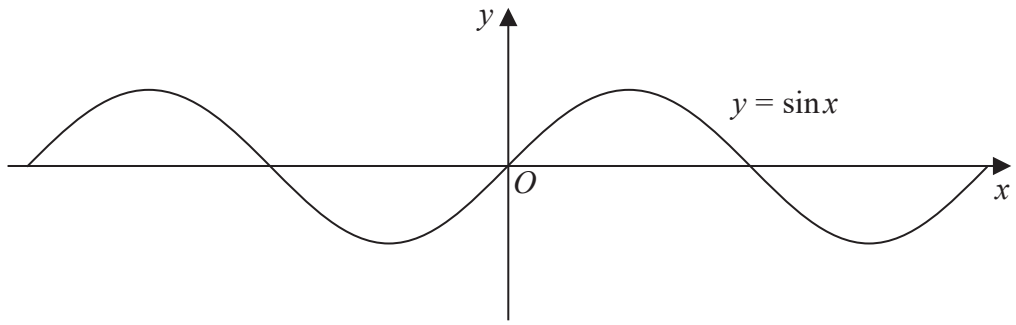


**Figure 4**

Figure 4 shows part of the graph of the curve with equation $y = \sin x$

Given that $\sin \alpha = p$, where $0 < \alpha < 90°$

(a) state, in terms of $p$, the value of

(i) $2 \sin (180° - \alpha)$

(ii) $\sin (\alpha - 180°)$

(iii) $3 + \sin (180° + \alpha)$

**(3)**

A copy of Figure 4, labelled Diagram 1, is shown on page 27.

On Diagram 1,

(b) sketch the graph of $y = \sin 2x$

**(2)**

(c) Hence find, in terms of $\alpha$, the $x$ coordinates of any points in the interval $0 < x < 180°$ where

$$\sin 2x = p$$

**(3)**

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**Question 9 continued**

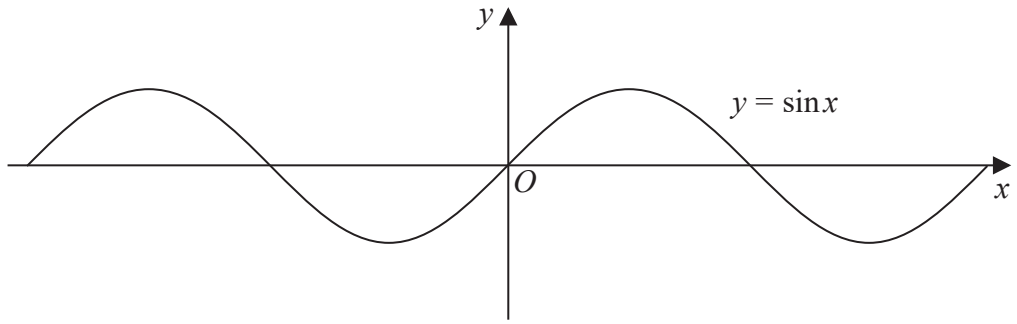


**Diagram 1**

**Q9**

**(Total 8 marks)**

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**10.**

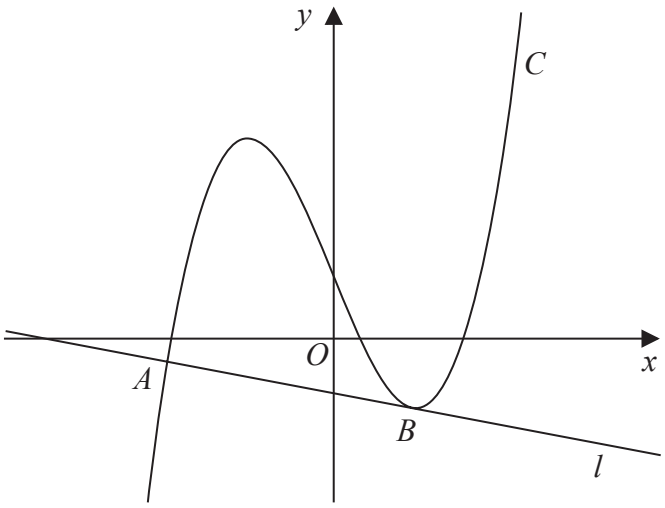


**Figure 5**

Figure 5 shows a sketch of the curve $C$ with equation

$$y = \frac{2}{7}x^3 + \frac{1}{7}x^2 - \frac{5}{2}x + k$$

where $k$ is a constant.

(a) Find $\dfrac{\mathrm{d}y}{\mathrm{d}x}$

**(2)**

The line $l$, shown in Figure 5, is the normal to $C$ at the point $A$ with $x$ coordinate $-\dfrac{7}{2}$

Given that $l$ is also a tangent to $C$ at the point $B$,

(b) show that the $x$ coordinate of the point $B$ is a solution of the equation

$$12x^2 + 4x - 33 = 0$$

**(4)**

(c) Hence find the $x$ coordinate of $B$, justifying your answer.

**(2)**

Given that the $y$ intercept of $l$ is $-1$

(d) find the value of $k$.

**(4)**

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