

MEI Core 1 Cubic Functions Questions Jan 05 - May 09

1 A cubic polynomial is given by $f(x) = x^3 + x^2 - 10x + 8$.

(i) Show that $(x - 1)$ is a factor of $f(x)$.

Factorise $f(x)$ fully.

Sketch the graph of $y = f(x)$.

[7]

(ii) The graph of $y = f(x)$ is translated by $\begin{pmatrix} -3 \\ 0 \end{pmatrix}$.

Write down an equation for the resulting graph. You need not simplify your answer.

Find also the intercept on the y -axis of the resulting graph.

[5]

2 In the cubic polynomial $f(x)$, the coefficient of x^3 is 1. The roots of $f(x) = 0$ are $-1, 2$ and 5 .

(i) Write $f(x)$ in factorised form.

Show that $f(x)$ may be written as

$$f(x) = x^3 - 6x^2 + 3x + 10. \quad [3]$$

(ii) Sketch the graph of $y = f(x)$.

[3]

(iii) Show that $x = 4$ is one root of the equation $f(x) + 10 = 0$.

Hence find a quadratic equation which is satisfied by the other two roots of the equation $f(x) + 10 = 0$. [6]

3 (i) Sketch the graph of $y = x(x - 3)^2$. [3]

(ii) Show that the equation $x(x - 3)^2 = 2$ can be expressed as $x^3 - 6x^2 + 9x - 2 = 0$. [2]

(iii) Show that $x = 2$ is one root of this equation and find the other two roots, expressing your answers in surd form.

Show the location of these roots on your sketch graph in part (i). [8]

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4 You are given that $f(x) = x^3 + 9x^2 + 20x + 12$.

- (i) Show that $x = -2$ is a root of $f(x) = 0$. [2]
- (ii) Divide $f(x)$ by $x + 6$. [2]
- (iii) Express $f(x)$ in fully factorised form. [2]
- (iv) Sketch the graph of $y = f(x)$. [3]
- (v) Solve the equation $f(x) = 12$. [3]

5

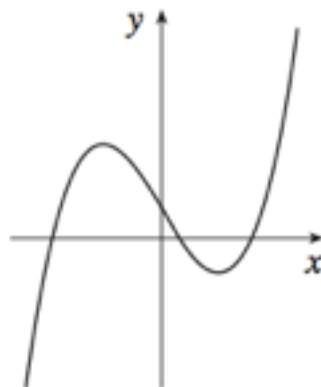


Fig. 13

Fig. 13 shows a sketch of the curve $y = f(x)$, where $f(x) = x^3 - 5x + 2$.

- (i) Use the fact that $x = 2$ is a root of $f(x) = 0$ to find the exact values of the other two roots of $f(x) = 0$, expressing your answers as simply as possible. [6]
- (ii) Show that $f(x - 3) = x^3 - 9x^2 + 22x - 10$. [4]
- (iii) Write down the roots of $f(x - 3) = 0$. [2]