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Factor Theorem | Past Paper Question | C2 Edexcel June 2012 Q4

$f(x) = 2x^3 - 7x^2 - 10x + 24$

(a) Use the factor theorem to show that $(x + 2)$ is a factor of $f(x)$. (2)

(b) Factorise $f(x)$ completely. (4)

If $f(x)$ is a polynomial and $f(a) = 0$, then $(x - a)$ is a factor of $f(x)$

a) $f(-2) = 2(-2)^3 - 7(-2)^2 - 10(-2) + 24$
 $= -16 - 28 + 20 + 24$
 $= 0$
 $\therefore x + 2$ is a factor of $f(x)$

$f(x) \equiv (x + 2)(ax^2 + bx + c)$
 $\therefore ax^2 + bx + c \equiv \frac{f(x)}{x + 2}$

$$\begin{array}{r} 2x^2 - 11x + 12 \\ x + 2 \overline{) 2x^3 - 7x^2 - 10x + 24} \\ \underline{2x^3 + 4x^2} \\ -11x^2 - 10x \\ \underline{-11x^2 - 22x} \\ 12x + 24 \\ \underline{12x + 24} \\ 0 \end{array}$$

$12x + 2bx \equiv -10x$
 $\therefore 2bx \equiv -22x$
 $\therefore b \equiv -11$

$f(x) \equiv (x + 2)(2x^2 - 11x + 12)$
 $\equiv (x + 2)(2x - 3)(x - 4)$

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