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3. (a) Find the first 4 terms, in ascending powers of x, in the binomial expansion of

$$\left(1+\frac{x}{4}\right)^{12}$$

giving each coefficient in its simplest form.

(3)

(b) Find the term independent of x in the expansion of

$$\left(\frac{x^2+8}{x^5}\right)\left(1+\frac{x}{4}\right)^{12}$$

(3)

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Question 3 continued

Q3

(Total 6 marks)

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4. $f(x) = (x - 3)(3x^2 + x + a) - 35$ where a is a constant

(a) State the remainder when $f(x)$ is divided by $(x - 3)$.

(1)

Given $(3x - 2)$ is a factor of $f(x)$,

(b) show that $a = -17$

(2)

(c) Using algebra and showing each step of your working, fully factorise $f(x)$.

(5)

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