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A LEVEL MATHS

(36) Polynomial Division

WORKING AT D/E

(1) Show, using long division that there is no remainder when $x^3 + 4x^2 - 15x - 18$ is divided by $(x + 1)$

(2) (a) Show, using long division that there is no remainder when $x^3 + 13x^2 + 52x + 60$ is divided by $(x + 2)$
(b) Hence, show that $x^3 + 13x^2 + 52x + 60$ can be factorised to give $(x + 2)(x + a)(x + b)$ where a and b are integers.

(3) Using polynomial division, find the remainder when $x^3 + 3x^2 - 16x + 7$ is divided by $(x - 3)$

WORKING AT B/C

(1) (a) Show, using polynomial division that when $x^3 - 7x - 6$ is divided by $(x + 1)$ there is no remainder.

(b) Hence write $x^3 - 7x - 6$ in the form $(x + 1)(x + a)(x + b)$

(2) (a) Show, using polynomial division that when $2x^3 + 13x^2 - 8x - 7$ is divided by $(2x + 1)$ there is no remainder.

$$g(x) = 2x^3 + 13x^2 - 8x - 7$$

(b) Using your answer to part (a) show that the solutions to $g(x) = 0$ are $x = -\frac{1}{2},\ x = 1$ and $x = -7$.

(3) (a) Show, using polynomial division that $x^3 - 4x^2 - 2x - 15$ has no remainder when divided by $(x - 5)$

(b) Using your answer to part (a) show that $x = 5$ is the only real solution to the equation

$$x^3 - 4x^2 - 2x - 15 = 0$$

WORKING AT A*/A

(1) When $x^3 + 1$ is divided by $(x + 1)$ there is no remainder. Use polynomial division to express $x^3 + 1$ as a product of three linear factors.

(2) (a) The volume of a cuboid can be written as $V = x^3 + 2x^2 - 11x - 12$. One side length has an express of $x + 4$. Find an expression for the lengths of the remaining two sides in the form $(x + a)$ and $(x + b)$ where a and b are integers.

(b) State, with a reason why $x > 3$

(3) Show, using polynomial division that $x^2 + 1$ is a factor of $x^4 - 1$ and find the remaining factors of $x^4 - 1$.