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A LEVEL MATHS

(71) Differentiation (Gradient Functions)

WORKING AT D/E

(1) $f(x) = 8x^2 + 4x + 1$
(a) Find an expression for $f'(x)$
(b) Hence sketch the graph of the gradient function showing where the graph crosses the coordinate axes.

(2) $g(x) = 3x^3 + \frac{3}{2}x^2 - 2x + 9$
(a) Find an expression for $g'(x)$
(b) Hence, show that $g(x)$ is stationary when $x = -\frac{2}{3}$ and when $x = \frac{1}{3}$
(c) Sketch the graph of the gradient function of $g(x)$

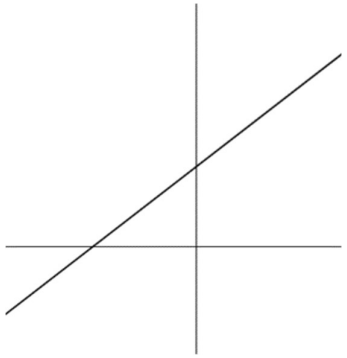
(3) Complete the sentence:
"The graph of the gradient function of a quartic equation will be a_____function"

WORKING AT B/C

(1) $f(x) = 6x^4 + 4x^3 - 12x^2 - 12x + 7$
(a) Find an expression for $f'(x)$
(b) Find the values of x for which $f(x)$ is stationary.
(c) Hence sketch the graph of the gradient function showing where the graph crosses the coordinate axes.

(2) $g(x) = -x^3 + \frac{11}{2}x^2 + 20x - 5$
(a) Show that $g(x)$ is stationary when $x = 5$ and $x = -\frac{4}{3}$
(b) Sketch the graph of the gradient function of $g(x)$ showing where the graph crosses the coordinate axes.

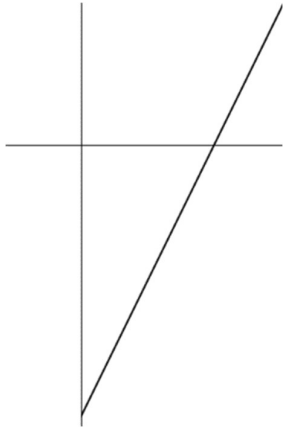
(3) Part of the graph of the gradient function of $h(x)$ is shown below.



Explain why $h(x)$ could be written in the form $h(x) = Ax^2$

WORKING AT A*/A

(1) The graph of the gradient function of $f(x) = Ax^2 + Bx + C,\ x > 0$, is shown below.



(a) Find the set of value of the constant A
(b) Write down where the line crosses the x axis in terms of A and B.
(c) Explain why the set of values of C cannot be determined from the graph.

(2) $g(x) = Ax^3 - Bx$, where A and B are positive constants.

Sketch the graph of the gradient function of $g(x)$ showing where the graph crosses the coordinate axes giving the coordinates in terms of A and B.