

Higher Ink Exercise
Block 1 – Differentiation (A)

Calculators should only be used when necessary

1. Given that $f(x) = x^3 - 4x + 7$, find $f'(-2)$ (3)

2. If $v = 10t^2$ and the rate of change of t is 160, find the value of t . (3)

3. Find $\frac{dy}{dx}$ where $y = \frac{4x^3 - 3}{2x}$ (2)

4. Given that $f(x) = \sqrt{x} + \frac{2}{x^2}$, find $f'(4)$. (4)

5. Find the equation of the tangent to the curve with equation $y = 3x^2 - 2x$ at the point where $x = 2$. (5)

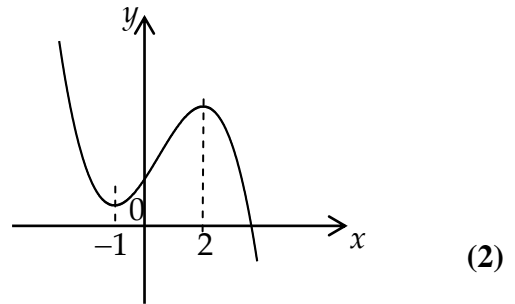
6. Find the stationary points on the curve given by $y = x^3 - 9x^2 + 24x - 2$ and determine their nature. (7)

7. For what values of x is $f(x) = x^3 - 12x + 2$ decreasing? (4)

8. The diagram shows part of the graph of a cubic with equation $y = g(x)$.

The graph has turning points at $x = -1$ and $x = 2$.

Sketch the graph of $y = g'(x)$?



9. Find the equation of the median AD of triangle ABC where the coordinates of A, B and C are $(-2, 3)$, $(-3, -4)$ and $(5, 2)$ respectively. (3)

10. An aeroplane flies in a straight line at a constant speed. It takes 3 hours to fly from A to B and 4 hours to fly from B to C.

Relative to coordinate axes, A is $(0, -1, 6)$ and C is $(7, 6, -1)$.



Find the coordinates of B. (3)

11. Given the roots of the equation $kx^2 - 6x + 3k = 0$ are equal. Find the value of k where $k > 0$. (4)

TOTAL = 40 MARKS