

1. Given that

$$y = 4x^3 - 1 + 2x^{\frac{1}{2}}, \quad x > 0,$$

find $\frac{dy}{dx}$.

(4)

Q1

(Total 4 marks)



2. (a) Express $\sqrt[3]{108}$ in the form $a\sqrt[3]{3}$, where a is an integer. (1)

(b) Express $(2 - \sqrt{3})^2$ in the form $b + c\sqrt{3}$, where b and c are integers to be found. (3)

(Total 4 marks)

Q2



3. Given that $f(x) = \frac{1}{x}, x \neq 0,$

(a) sketch the graph of $y = f(x) + 3$ and state the equations of the asymptotes. (4)

(b) Find the coordinates of the point where $y = f(x) + 3$ crosses a coordinate axis. (2)



6. (a) Show that $(4 + 3\sqrt{x})^2$ can be written as $16 + k\sqrt{x} + 9x$, where k is a constant to be found.

(2)

(b) Find $\int (4 + 3\sqrt{x})^2 dx$.

(3)

(Total 5 marks)

Q6



10. (a) On the same axes sketch the graphs of the curves with equations

(i) $y = x^2(x - 2)$, (3)

(ii) $y = x(6 - x)$, (3)

and indicate on your sketches the coordinates of all the points where the curves cross the x -axis.

(b) Use algebra to find the coordinates of the points where the graphs intersect. (7)



