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Mathematics

9709/12

Paper 1 Pure Mathematics 1

May/June 2023

Question No (1)

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- 1 The equation of a curve is such that  $\frac{dy}{dx} = \frac{4}{(x-3)^3}$  for  $x > 3$ . The curve passes through the point (4, 5).

Find the equation of the curve.

Solution:

Given  $\frac{dy}{dx} = \frac{4}{(x-3)^3}$

$$dy = \frac{4}{(x-3)^3} dx$$

$$dy = 4(x-3)^{-3} dx$$

To find equation of curve, integrate

$$\int dy = \int 4(x-3)^{-3} dx$$

$$y = \frac{4(x-3)^{-3+1}}{-3+1} + C \rightarrow \text{(constant of inte)}$$

As curve passes through (4, 5)

$$5 = \frac{4(4-3)^{-3+1}}{-3+1} + C \rightarrow 5 = -2 + C \rightarrow C = 7$$

put  $C = 7$  in equation (1)

$$y = \frac{4(x-3)^{-3+1}}{-3+1} + 7 \rightarrow y = -2(x-3)^2 + 7$$

HERO NOTES