Que 4:

The area (in sq. units) of the region bounded by the curve $x^2 = 4y$ and the straight line $x = 4y - 2$ is :

[Main Jan. 11, 2019 (I)]

(a) $\frac{5}{4}$

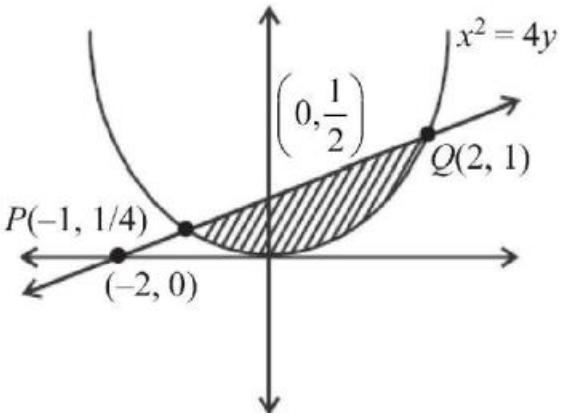
(b) $\frac{9}{8}$

(c) $\frac{7}{8}$

(d) $\frac{3}{4}$

solution:

(b)



Let points of intersection of the curve and the line be P and Q

$$x^2 = 4\left(\frac{x+2}{4}\right) \Rightarrow x^2 - x - 2 = 0 \Rightarrow x = 2, -1$$

Point are $(2, 1)$ and $\left(-1, \frac{1}{4}\right)$

$$\text{Area} = \int_{-1}^{2}\left[\left(\frac{x+2}{4}\right) - \left(\frac{x^2}{4}\right)\right]dx = \left[\frac{x^2}{8} + \frac{1}{2}x - \frac{x^3}{12}\right]_{-1}^{2}$$

$$= \left(\frac{1}{2} + 1 - \frac{2}{3}\right) - \left(\frac{1}{8} - \frac{1}{2} + \frac{1}{12}\right) = \frac{9}{8}$$