

3. Find the area of the region bounded by the curve $y = x^3$ and $y = x + 6$ and $x = 0$.

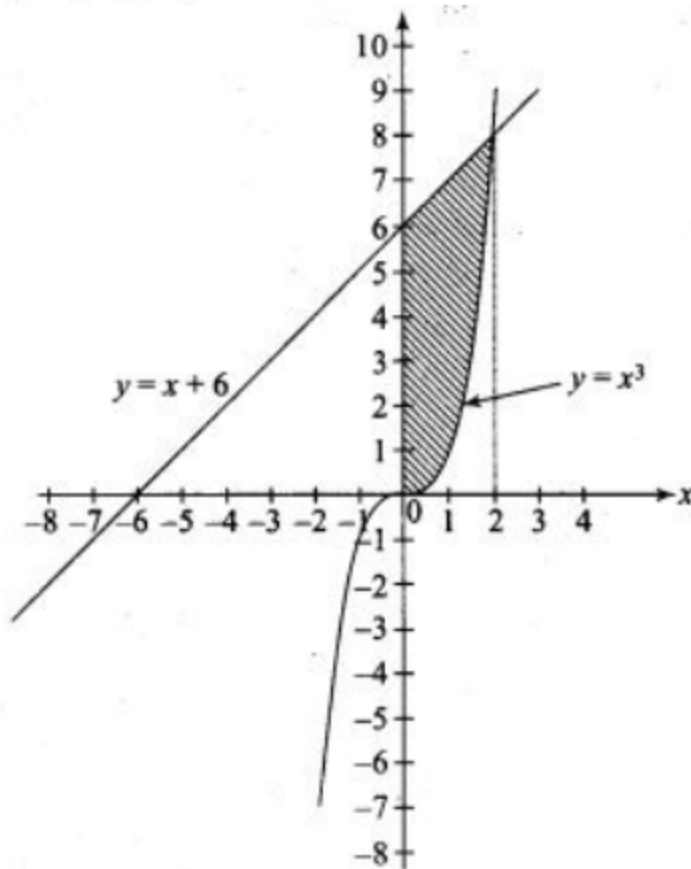
Sol. We have, $y = x^3$, $y = x + 6$ and $x = 0$

Graph of function are as shown in the following figure

Solving $y = x^3$ and $y = x + 6$, we get

$$x^3 = x + 6$$

$$\Rightarrow x^3 - x - 6 = 0$$



Clearly $x = 2$ satisfies the above equation.

Also from the figure it is clear that there is only point of intersection.

\therefore From the figure, area of shaded region,

$$\begin{aligned} A &= \int_0^2 (x + 6 - x^3) dx \\ &= \left[\frac{x^2}{2} + 6x - \frac{x^4}{4} \right]_0^2 = \frac{4}{2} + 12 - \frac{16}{4} = 10 \text{ sq. units} \end{aligned}$$