AOD

① $\frac{dV}{dt} = 35 \; cc/min = cm^3/min$

$\frac{d}{dt}\left(\frac{4}{3}\pi r^3\right) = 35 \Rightarrow \frac{4}{\cancel{3}}\pi \cdot \cancel{3}r^2 \cdot \frac{dr}{dt} = 35 \Rightarrow \boxed{\frac{dr}{dt} = \frac{35}{4\pi \cdot r^2}}$

find → $\frac{dA}{dt} = ? \rightarrow \underline{Dia} = 14 \, cm$

$\frac{d}{dt}(4\pi r^2) = 4\pi \cdot 2r \cdot \frac{dr}{dt}$

$\Rightarrow \cancel{4\pi} \cdot 2\cancel{r} \cdot \frac{35}{\cancel{4\pi} \cdot r\cancel{r}}$

$\therefore \frac{dA}{dt} = \frac{70}{r}$

So $\left.\frac{dA}{dt}\right|_{r=7} = \frac{\cancel{70}}{\cancel{7}} = 10 \; cm^2/min$ Ans

ii) $x \to l \to \frac{dx}{dt} = -5 \; cm/min$

$y \to b \to \frac{dy}{dt} = 4 \; cm/min$

→ perimeter → $\boxed{x = 8,\ y = 6}$

a) $\frac{dP}{dt} = ? \Rightarrow \frac{d}{dt}[2(x+y)] \Rightarrow 2\left[\frac{dx}{dt} + \frac{dy}{dt}\right]$

$= 2[-5+4] = -2 \; cm/min$ Ans

b) $\frac{dA}{dt} = \frac{d}{dt}(x \cdot y) = x \cdot \frac{dy}{dt} + y \cdot \frac{dx}{dt} \Rightarrow 8 \times 4 + 6 \times (-5)$

$= 32 - 30 = 2 \; cm^2/min$ Ans

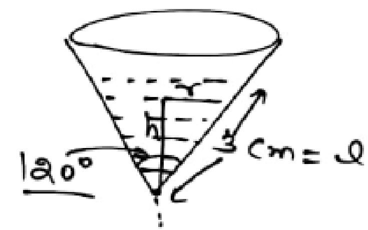
AOD

Ex:- Water is dripping out of conical Funnel at a uniform rate of 4 cc/sec. through a tiny hole at the vertex in bottom. When the slant height of water is 3 cm, find the rate of decrease of slant height. its given that vertical angle is 120°.

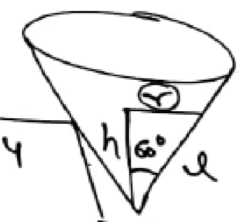
Solⁿ:- given:- Slant Height $l = 3\,cm$, $\frac{dv}{dt} = -4\,cc/sec.$

vertical angle $= 120°$

find:- $\left[\frac{dl}{dt} = ?\right]$ at $\boxed{l = 3\,cm}$



$\Rightarrow \because \frac{dv}{dt} = -4 \Rightarrow \frac{d}{dt}\left(\frac{1}{3}\pi r^2 h\right) = -4 \Rightarrow \boxed{\frac{1}{3}\pi\left[\frac{d}{dt}(r^2 h)\right] = -4}$ —(1)



from fig. → $\sin\theta = \frac{P}{H} \Rightarrow \sin 60° = \frac{r}{l} \Rightarrow \boxed{r = \frac{\sqrt{3}}{2}l}$

→ $\cos\theta = \frac{B}{H} \Rightarrow \cos 60 = \frac{h}{l} \Rightarrow \boxed{h = \frac{l}{2}}$

from eqⁿ (1):- $\frac{1}{3}\pi\left[\frac{d}{dt}\left(\frac{3}{4}l^2\right)\times\left(\frac{l}{2}\right)\right] = -4 \Rightarrow \frac{1}{\cancel{3}}\pi\times\frac{\cancel{3}}{8}\times\frac{d}{dt}(l^3) = -4 \Rightarrow$

$\frac{\pi}{8}\times 3l^2\times\frac{dl}{dt} = -4$

$\Rightarrow \frac{dl}{dt} = \frac{-4\times 8}{3\pi l^2}$

$\Rightarrow \left.\frac{dl}{dt}\right|_{l=3} = \frac{-32}{3\pi\cdot 9} = \frac{-32}{27\pi}$ cm/sec. Ans

ABLES® KOTA

AOD

Ex:- The total cost $C(x)$ in Rs associated with the production of x units of an item is give by $\boxed{C(x) = 0.007x^3 - 0.003x^2 + 15x + 4000}$ find the $\boxed{\text{Marginal Cost}}$ when $\boxed{\text{17 units}}$ are produced.

Soln: given Total Cost $\Rightarrow C(x) = 0.007x^3 - 0.003x^2 + 15x + 4000$

find $\rightarrow$ Marginal cost at $\boxed{x=17}$

$\Rightarrow$ So Marginal Cost $\rightarrow M(x) = \frac{d}{dx}(C) = \frac{d}{dx}\left[0.007x^3 - 0.003x^2 + 15x + 4000\right]$

$M(x) = \frac{d}{dx}(C) = 0.021x^2 - 0.006x + 15 = 20.967$

So: $x=17 \Rightarrow M(17) = 0.021\times(289) - 0.006\times 17 + 15$ As

Q. The total revenue in Rs. received from the sale of x units of a product given by $\boxed{R(x) = 13x^2 + 26x + 15.}$ Find the Marginal revenue when $x = 7.$

diff wrt x $\rightarrow$ 208