



(a) ~~11/11~~ $\frac{x^2}{2} + y^2 = 8$

When $y = 0$

$$\frac{x^2}{2} + 0 = 8$$

$$x^2 = 16$$

$$\therefore x = \pm\sqrt{16}$$

$$= \pm 4$$

But we can see that it lies in the first quadrant,

$$\therefore x = 4$$

$$\therefore V = \pi \int_0^4 y^2 dx$$

$$\frac{x^2}{2} + y^2 = 8$$

$$\therefore y^2 = 8 - \frac{x^2}{2}$$

$$\therefore V = \pi \int_0^4 \left(8 - \frac{x^2}{2}\right) dx$$

~~$$\pi \int_0^4$$~~

$$= \pi \left[8x - \frac{x^3}{6} \right]_0^4$$

$$= \pi \left[8(4) - \frac{4^3}{6} - \left(8(0) - \frac{0^3}{6} \right) \right]$$

$$= \pi \left[32 - \frac{32}{3} \right]$$

$$= \frac{64}{3} \pi \text{ square units}$$



(b) (i) $P(\text{connecting 2nd time}) = \cancel{P(E\bar{E}E)}$

$$= P(\bar{E}E)$$

$$= 0.25 \times 0.75$$

$$= 0.1875 \text{ or } \frac{3}{16}$$

(ii) $P(\text{not connected}) = P(\bar{E}\bar{E}\bar{E})$

$$= 0.25 \times 0.25 \times 0.25$$

$$= 0.015625 \text{ or } \frac{1}{64}$$

(c) (i) When $t=0$

$$x = \frac{0-2}{0+2}$$

$$= -1$$

\therefore Displacement when $t=0$ is -1 metres.

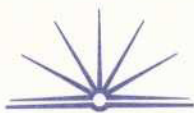
(ii) $x = \frac{t-2}{t+2}$

~~$x = \frac{t-2}{t+2}$~~ Also, $x = \frac{1-4}{t+2}$

Solving simultaneously

$$\therefore 1 - \frac{4}{t+2} = \frac{t-2}{t+2}$$

$$1 = \frac{t-2}{t+2} + \frac{4}{t+2}$$



$$\therefore 1 = \frac{t-2+4}{t+2}$$

$$= \frac{t+2}{t+2}$$

$$= 1$$

$$= \text{LHS}$$

$$\therefore x = 1 - \frac{4}{t+2}$$

$$\therefore V = \frac{dx}{dt}$$

$$= \frac{\cancel{t+2}^2}{(t+2)^2} \cdot \frac{-4}{(t+2)^2}$$

$$\therefore A = \frac{dv}{dt}$$

$$= \frac{8}{(t+2)^3}$$

(iii) Particle is at rest when $V=0$

$$\therefore \frac{-4}{(t+2)^2} = 0$$

$$\therefore t = 0$$

\therefore particle is at rest only when $t=0$

(iv) The velocity is decreasing as t increases indefinitely,

and it is slowly approaching 0.

\therefore Limiting Velocity $= 0$