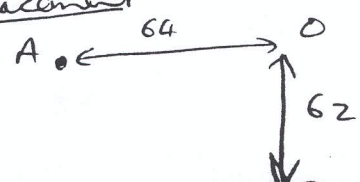


HLC 1995 Q 2

Relative Motion

a) Velocity  $\vec{v}_A = 6\hat{i}$

Displacement

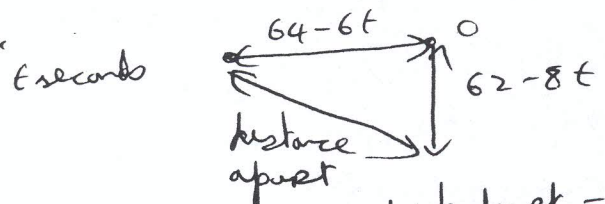


(i)  $\vec{v}_B = 6\hat{j}$

Distance travelled by A in  $t$  seconds =  $6t$  towards junction  
 Distance travelled by B in  $t$  seconds =  $8t$  towards the junction.

$\therefore$  Dist of A from O after  $t$  seconds =  $64 - 6t$   
 Dist of B from O after  $t$  seconds =  $62 - 8t$ .

a(ii)



By Pythagoras  $\text{dist apart} = \sqrt{(64 - 6t)^2 + (62 - 8t)^2}$

When  $\text{dist apart} = 50 \Rightarrow 50 = \sqrt{(64 - 6t)^2 + (62 - 8t)^2}$   
 $\Rightarrow (50)^2 = (64 - 6t)^2 + (62 - 8t)^2$

$\Rightarrow 2500 = 4096 - 768t + 36t^2 + 3844 - 992t + 64t^2$

$\Rightarrow 0 = 100t^2 - 1760t + 5440$

$\Rightarrow 0 = 10t^2 - 176t + 544$

$\Rightarrow 0 = (t - 4)(10t - 136)$

$\Rightarrow t = 4 \text{ seconds}$  or  $t = 13.6 \text{ seconds}$