

Back-to-the-future.

1990

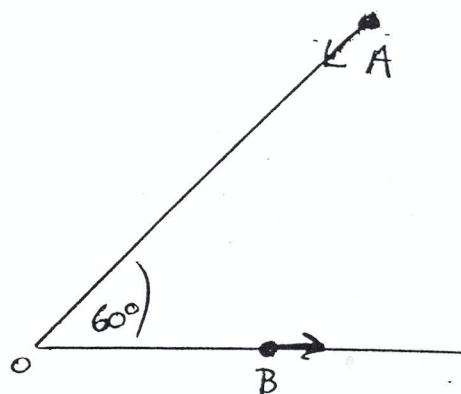
A is moving at 16 m/s, B at 20 m/s.

(a) Calculate the velocity of A relative to B

(b) If A is 450 m and B 200 m

from O, find the time interval until

- (i) They are nearest each other
- (ii) They are equidistant from O.



$$\vec{v}_B = 20\vec{i}$$

$$\vec{v}_A = -16\cos 60^\circ \vec{i} - 16\sin 60^\circ \vec{j} = -8\vec{i} - 13.856\vec{j}$$

$$\therefore \vec{v}_{AB} = \vec{v}_A - \vec{v}_B$$

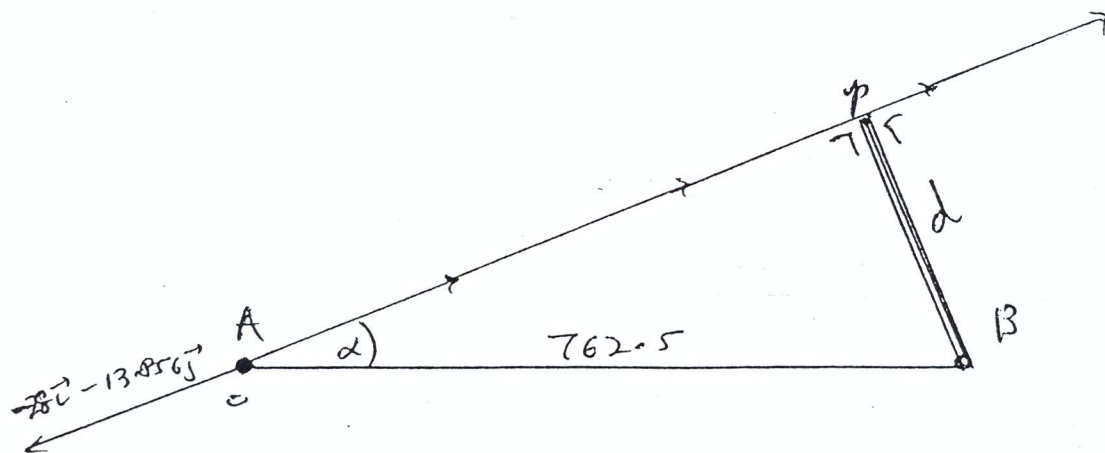
$$= -8\vec{i} - 13.856\vec{j} - 20\vec{i} = -28\vec{i} - 13.856\vec{j}$$

WAIT until A is at the junction, O.

This takes $\frac{450}{16} = 28.125$ seconds.

B will now be $200 + 20 \times 28.125 = 762.5$ m from O.

SITUATION in 28.125 s.



$$\text{Magnitude} = |\vec{v}_{AB}| = \sqrt{976} = 31.241$$

$$\text{Direction: } \tan^{-1}\left(\frac{13.856}{28}\right) = 26.329^\circ = \alpha$$

$$d = H \sin \alpha = 762.5 (\sin 26.329^\circ) = 338.18576$$