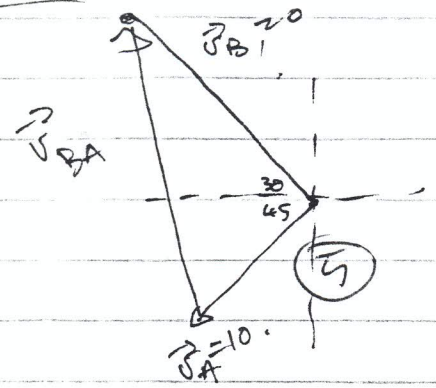
1979

Q2



(5)

$\vec{v}_{BA} = \vec{v}_B - \vec{v}_A$ (3)

$\vec{v}_B = -20\sin 30\,\vec{i} + 20\cos 30\,\vec{j}$.

$\vec{v}_B = -17.32\,\vec{i} + 10\,\vec{j}$. (3)

$\vec{v}_A = -10\sin 45^\circ\,\vec{i} - 10\cos 45^\circ\,\vec{j}$

$\vec{v}_A = -7.07\,\vec{i} - 7.07\,\vec{j}$ (5)

$\vec{v}_{BA} = \vec{v}_B - \vec{v}_A$

$\Rightarrow \vec{v}_{BA} = -17.32\,\vec{i} + 10\,\vec{j} + 7.07\,\vec{i} + 7.07\,\vec{j}$

$= -10.25\,\vec{i} + 17.07\,\vec{j}$ (3)

$|\vec{v}_{BA}| = \sqrt{396.5} = 19.9$ knots (5)

$\vec{v}_{BA}$ dirn

E Θ N

$\theta = \tan^{-1}\frac{17.07}{10.25}$

$\theta = 59^\circ$.

Ans 20 knots ~~due~~ N ~~W~~ 59° N. (5)

$\vec{v}_B = -17.32\,\vec{i} + 10\,\vec{j}$ (1)

$v_A = -(.707)\,\vec{i} - (.707)\,\vec{j}$. (5).

$\vec{v}_{BA} = y\,\vec{j}$ (B to appear to be going North) (5).

$\therefore \vec{v}_{BA} = \vec{v}_B - v_A \Rightarrow$

$y\,\vec{j} = -17.32\,\vec{i} + 10\,\vec{j} + .707x\,\vec{i} + .707x\,\vec{j}$

$\vec{j} \Rightarrow y = 10 + .707x$ (1)

$\vec{i} \Rightarrow 0 = -17.32 + .707x$ (2).

$\Rightarrow x = \frac{17.32}{.707} = 24.5$ knots (5).

So A must increase speed by 14.5 knots (4).