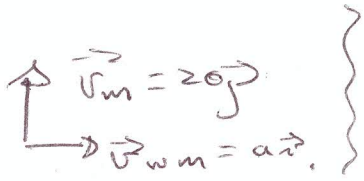
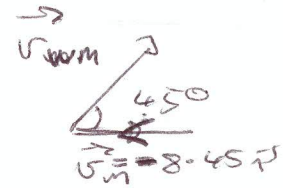
H 1989 Q2





$\vec{v}_{wm} = b\vec{i} + b\vec{j}$.

(i) $\vec{v}_w = \vec{v}_{wm} + \vec{v}_m$ in both cases

$\Rightarrow$ $a\vec{i} + 20\vec{j} = b\vec{i} + b\vec{j} - 8.45\vec{i}$.

$\Rightarrow$ $\vec{i}$: $a = b - 8.45$

$\vec{j}$: $20 = b$

$\Rightarrow a = 20 - 8.45$

$a = 11.55$

$\therefore$ $\vec{v}_w = \vec{v}_{wm} + \vec{v}_m$

$= a\vec{i} + 20\vec{j}$.

$= 11.55\vec{i} + 20\vec{j}$,

[mag^n 23.1 ms^{-1} and Dir^n ~~N 60° E~~ E 60° N]

(ii) $\vec{v}_w = 11.55\vec{i} + 20\vec{j}$.

$\vec{v}_m = -8\cos 30\vec{i} + 8\sin 30\vec{j}$. $= -4\sqrt{3}\vec{i} + 4\vec{j}$

$\vec{v}_{wm} = \vec{v}_w - v_m$

$= 11.55\vec{i} + 20\vec{j} - [-4\sqrt{3}\vec{i} + 4\vec{j}]$

$= 18.48\vec{i} + 16\vec{j}$.

Dir^n: E $\tan^{-1}\frac{16}{18.48}$ N = E 40.886° N.