77 $v_{S/D} = ?$ S = snow D = driver

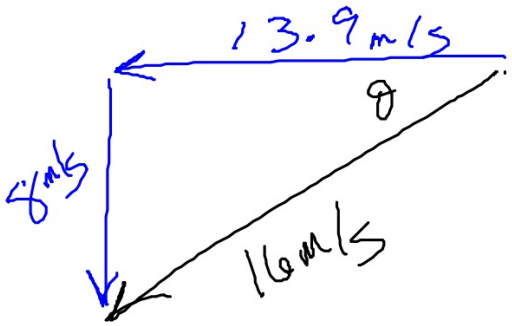
G = ground/earth

$v_{S/G} = 8\,m/s, -90° = (0\hat{i} - 8\hat{j})\,m/s$

$v_{D/G} = 13.9\,m/s, 0° = (13.9\hat{i} + 0\hat{j})\,m/s$

$v_{S/D} = v_{S/G} + v_{G/D} = v_{S/G} - v_{D/G}$

$$\begin{array}{r} (0\hat{i} - 8\hat{j}) \\ -(13.9\hat{i} + 0\hat{j}) \\ \hline v_{S/D} = (-13.9\hat{i} - 8\hat{j}) \end{array}$$



$$\tan\theta = \frac{8}{13.9}$$

$$\theta = 29.9^\circ$$

angle w/vert. $= 60^\circ$

79 $V_{A/E} = 24$ knots, $135° = (-16.97\hat{i} + 16.97\hat{j})$

$V_{B/E} = 28$ knots, $230° = (-18.00\hat{i} - 21.45\hat{j})$

$V_{A/B} = ?$ $\vec{V}_{A/B} = \vec{V}_{A/E} + \vec{V}_{E/B} = \vec{V}_{A/E} - \vec{V}_{B/E}$

$$\begin{array}{r} (-16.97\hat{i} + 16.97\hat{j}) \\ -(-18.00\hat{i} - 21.45\hat{j}) \\ \hline V_{A/E} = (1.03\hat{i} + 38.42\hat{j}) \end{array}$$

$V_{A/B} = 38.4$ knots, 89°

N of E

c) $t = ?$ $\quad |r_A - r_B| = 160$

$$\frac{\Delta r_{A/B}}{t} = v_{A/B}$$

$$\frac{160}{t} = 38.4 \qquad t = 4.17 \text{ hrs}$$

d) at $t = 4.17$ h, what is the direction of the vector from A to B?

The opposite of A's velocity w/ respect to B!

73. m = motorist P = police G = ground

$v_{m/P} = ?$

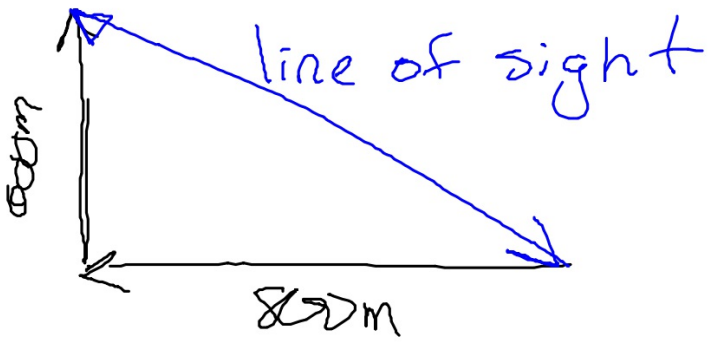
$v_{m/G} = 60\ km/h, -90^\circ = (0\hat{\imath} - 60\hat{\jmath})\ km/h$

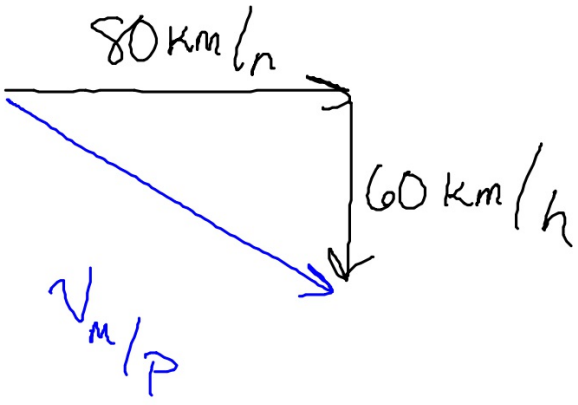
$v_{P/G} = 80\ km/h, 180^\circ = (-80\hat{\imath} + 0\hat{\jmath})\ km/h$

$v_{m/P} = v_{m/G} + v_{G/P} = v_{m/G} - v_{P/G}$

$v_{m/P} = (80\hat{\imath} - 60\hat{\jmath})\ km/h$

b)





angle between
$= 0°$ (or 180°
depending on if
you are a math
or english teacher

c) If the cars maintian their velocities, the triangles remain similar, so the answers to a abd b stay the same!