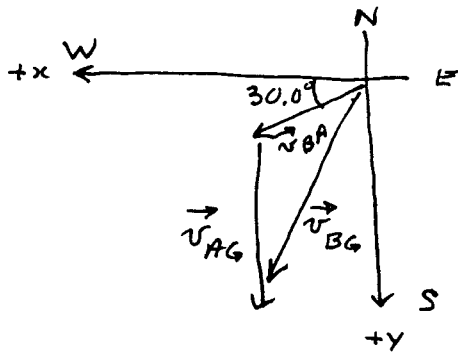


Problem 7-31

- let B = bird, A = air, G = ground.

- choose +x West, +y South



$$\vec{v}_{BG} = \vec{v}_{BA} + \vec{v}_{AG}$$

$$v_{BA,x} = 35.0 \cos 30.0^\circ = 30.31 \text{ km/h}$$

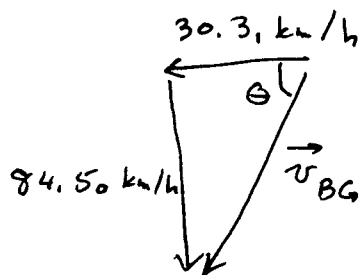
$$v_{BA,y} = 35.0 \sin 30.0^\circ = 17.50 \text{ km/h}$$

$$v_{AG,x} = 0$$

$$v_{AG,y} = 67 \text{ km/h}$$

$$\therefore v_{BG,x} = v_{BA,x} + v_{AG,x} = 30.31 \text{ km/h}$$

$$v_{BG,y} = v_{BA,y} + v_{AG,y} = 84.50 \text{ km/h}$$



$$v_{BG} = \sqrt{(30.31)^2 + (84.50)^2} \text{ km/h}$$
$$= 89.77 \text{ km/h}$$

\therefore distance travelled in 1.50 h

$$\text{is } (89.77 \text{ km/h})(1.50 \text{ h}) = 135 \text{ km}$$

$$\theta = \tan^{-1}\left(\frac{84.50}{30.31}\right) = 70.3^\circ$$

\therefore displacement is 135 km, 70.3° south of west