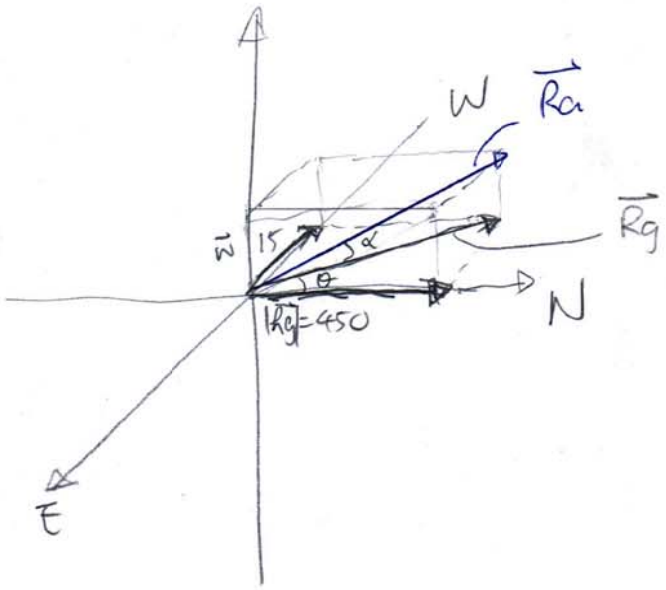
p.423 #19 Ch.7 Practice Test



$$\vec{R_g} = \vec{h_g} + \vec{w}$$

$$= [0, 450, 0] + [-15, 0, 0]$$

$$\vec{R_g} = [-15, 450, 0]$$

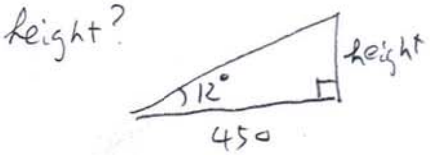
$$|\vec{R_g}| = \sqrt{(-15)^2 + 450^2 + 0^2}$$

$$= 450.2 \text{ km/h}$$

$$\tan\theta = \frac{15}{450}$$

$\theta = 1.9^\circ$ $\quad 360^\circ - 1.9^\circ = 358^\circ$

∴ Resultant ground velocity is 450.2 km/h at a true bearing of 358°



$$\tan 12^\circ = \frac{\text{height}}{450}$$

$$\text{height} = 450 \tan 12^\circ$$

$$\vec{R_a} = [-15, 450, 450 \tan 12^\circ]$$

$$|\vec{R_a}| = \sqrt{(-15)^2 + (450)^2 + (450 \tan 12^\circ)^2}$$

$$= 460.3 \text{ km/h}.$$

$$\cos\alpha = \frac{|\vec{R_g}|}{|\vec{R_a}|}$$

$$\cos\alpha = \frac{450.2}{460.3}$$

$$\alpha = 12^\circ$$

∴ Resultant air velocity is 460.3 km/h at an angle of climb of 12°