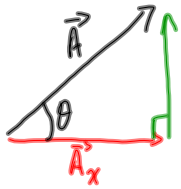
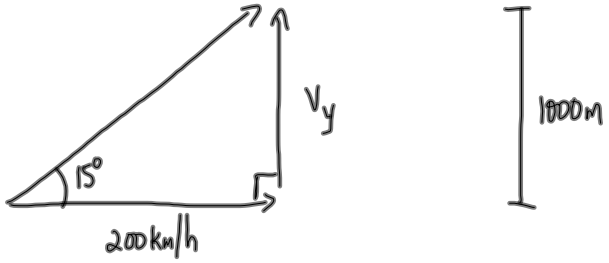


$|\vec{A}_y| = |\vec{A}| \sin\theta$ $\left(\sin\theta = \frac{|\vec{A}_y|}{|\vec{A}|}\right)$

$|\vec{A}_x| = |\vec{A}| \cos\theta$

$\left(\cos\theta = \frac{|\vec{A}_x|}{|\vec{A}|}\right)$

4 b)



$\tan\theta = \frac{opp}{adj}$

$\tan 15° = \frac{V_y}{200\,km/h}$

$V_y = 200\,km/h\,(\tan 15°)$

$\vec{V}_y = 54\ km/h\ [up]$

$\vec{V} = \frac{\Delta\vec{d}}{\Delta t}$

$\Delta t = \frac{\Delta\vec{d}}{\vec{V}}$ > directions must match

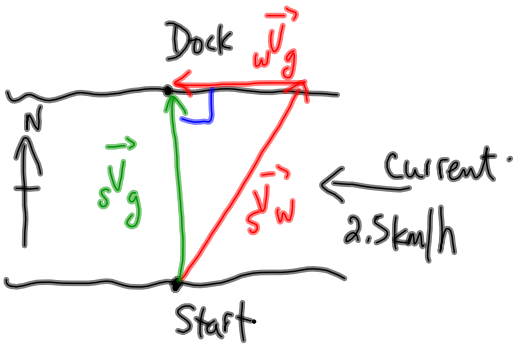
$\Delta t = \frac{1000m\,[up]}{54000\,m/h\,[up]}$

$\Delta t = 0.019\ h$ $\times 3600\frac{s}{h}$

or 67 s

Relative Motion Problems

SP 3



$c^2 = a^2 + b^2$

$4.0^2 = 2.5^2 + b^2$

$b^2 = 4.0^2 - 2.5^2$

$b = 3.1$ km/h

$\sin\theta = \frac{opp}{hyp}$

$\sin\theta = \frac{2.5}{4.0}$

$\theta = 39°$

The swimmer needs to head [N 39° E] in order to go straight across.

b) 2.0km wide $\Rightarrow \Delta t = ??$

$$\vec{v} = \frac{\Delta \vec{d}}{\Delta t}$$

$$\Delta t = \frac{\Delta \vec{d}}{\vec{v}}$$ > directions must match

$$\Delta t = \frac{2.0\text{km [N]}}{3.1\text{km/h [N]}}$$

$\Delta t = 0.64$ h or 38 min

Practice

3.