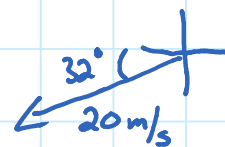


# Vectors II

Monday, February 20, 2017 9:05 AM

## Review Questions

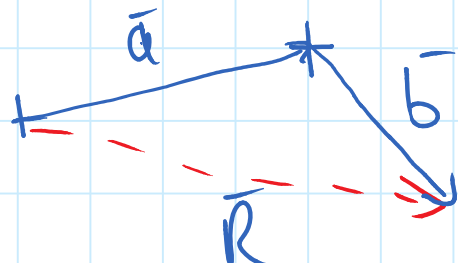
1) Sketch  $20 \text{ m/s}$  @  $32^\circ$  [S of W]



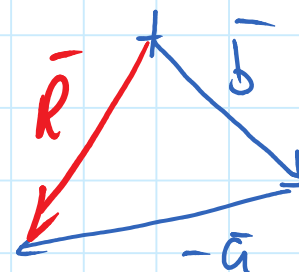
2)  $\vec{a}$

$\vec{b}$

a)  $\vec{a} + \vec{b}$

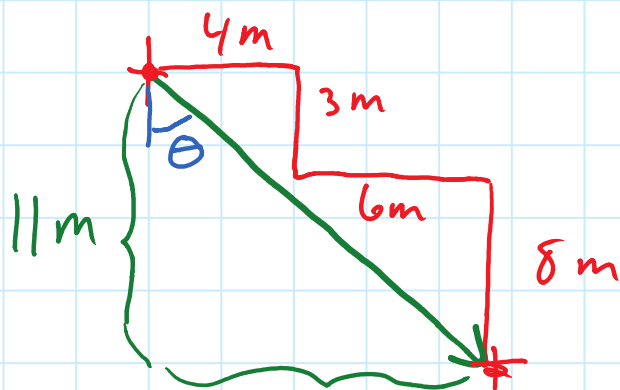


b)  $\vec{b} - \vec{a}$   
 $\vec{b} + (-\vec{a})$



## Displacement vs Distance

- distance is the total length covered
- displacement is length from beginning to end (direct route)



$$\text{distance} = 21 \text{ m}$$

$$\text{displacement } 10^2 + 11^2 = x^2$$
$$x = 14.9 \text{ m @ } 42^\circ \text{ [E of S]}$$

$\angle \dots -1/10 \dots$



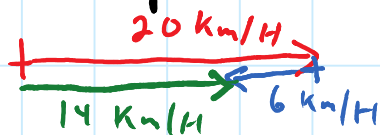
$$\tan^{-1}\left(\frac{10}{11}\right) = 42^\circ$$

## Velocity & Speed

$$\text{speed} = \frac{\text{distance}}{\text{time}}, \quad \text{velocity} = \frac{\text{displacement}}{\text{time}}$$

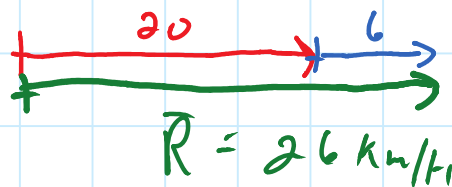
Ex A train travels at  $20 \text{ km/h}$  [E]. A passenger can walk at  $6 \text{ km/h}$ . Find his/w. resultant velocity, if:

a) walking to the back of the train



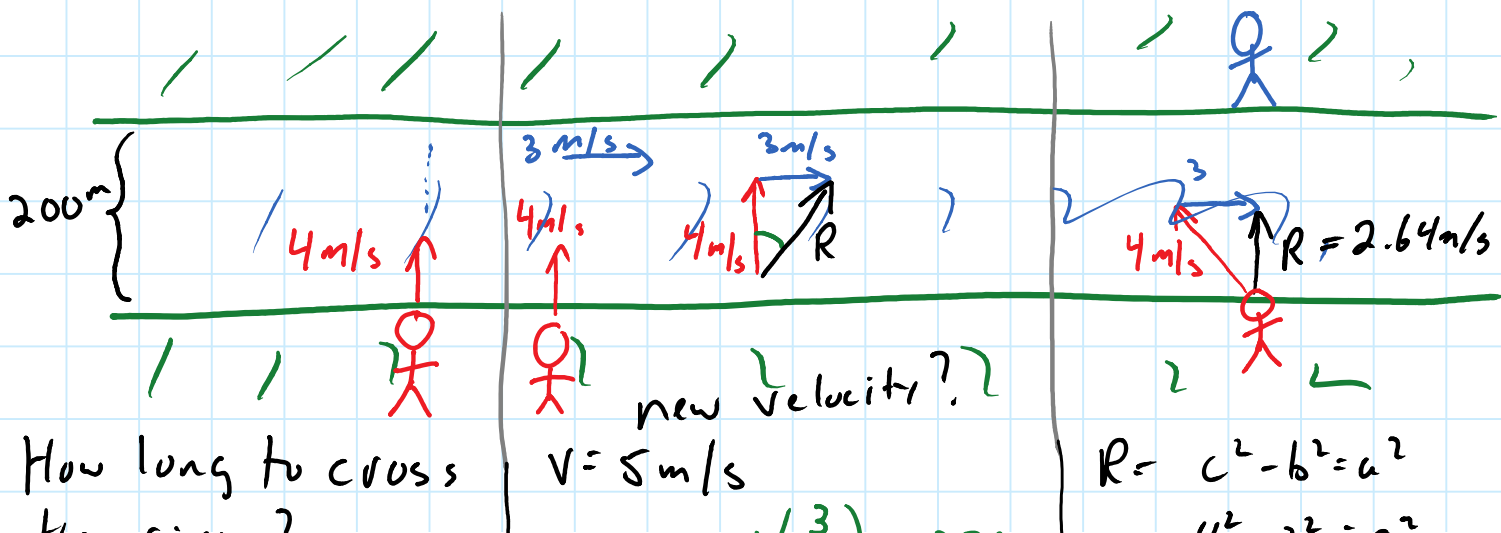
$$\vec{R} = 14 \text{ km/h [E]}$$

b) the front of train



$$\vec{R} = 26 \text{ km/h}$$

## Crossing the River



How long to cross  
the river?

$$v = \frac{d}{t}, \quad t = \frac{d}{v} = \frac{200\text{m}}{4\text{m/s}}$$

$$t = 50\text{s}$$

$$v = 5\text{m/s}$$

$$\theta = \tan^{-1}\left(\frac{3}{4}\right) = 37^\circ$$

How far downstream  
do you land?

$$\begin{aligned} d &= v \cdot t \\ &= (3)(50\text{s}) \\ &= 150\text{m} \end{aligned}$$

$$R = c^2 - b^2 = a^2$$

$$4^2 - 3^2 = a^2$$

$$a = 2.64\text{m/s}$$

$$t = \frac{d}{v} = \frac{200\text{m}}{2.64} = 76\text{s}$$