Read 10.1 - 10.7

Bonus H.w available

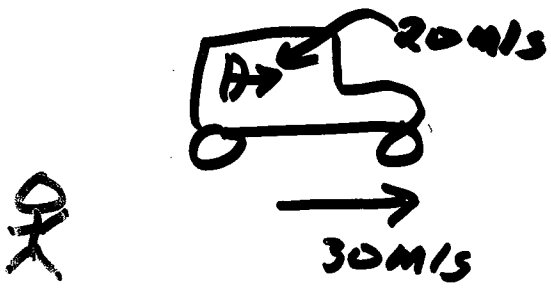
Logic questionaire today

Bonus clickers

Relative Velocity

Velocity of arrow from bow = 20 m/s

If I shoot arrow from a car traveling at 30 m/s, what is velocity of arrow relative to ground?



$\vec{v}_{ag}$ = Velocity of arrow relative to ground

$\vec{v}_{ac}$ = " " " car

$\vec{v}_{cg}$ = " " car " " ground

$\vec{v}_{ag} = \vec{v}_{ac} + \vec{v}_{cg}$

$= 20\,m/s + 30\,m/s = \underline{50\,m/s}$

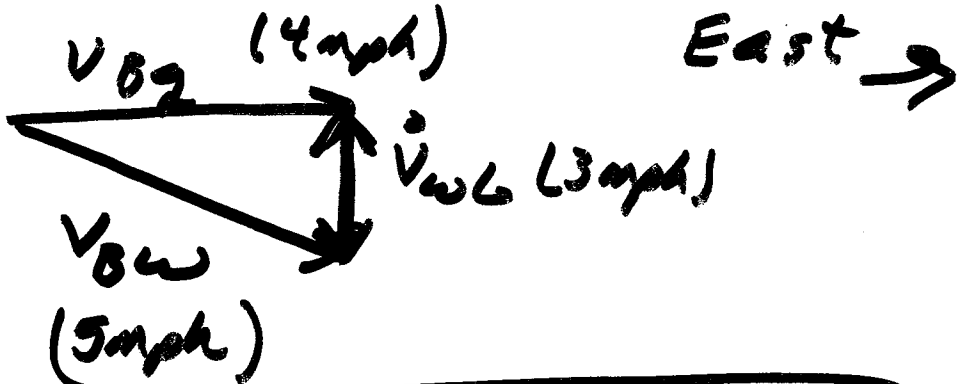
Suppose you are traveling east riding a bike. You can pedal at 5mph with no wind. There is a wind from south at 3mph. How fast are you traveling?

$\vec{V}_{BW} = 5\text{mph}$

$\vec{V}_{WG} = 3\text{mph}$

$\vec{V}_{BG} = ?$

$\vec{V}_{BG} = \vec{V}_{BW} + \vec{V}_{WG}$

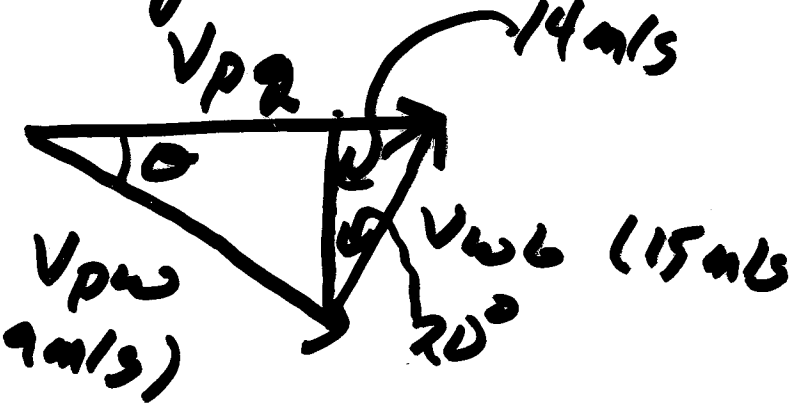


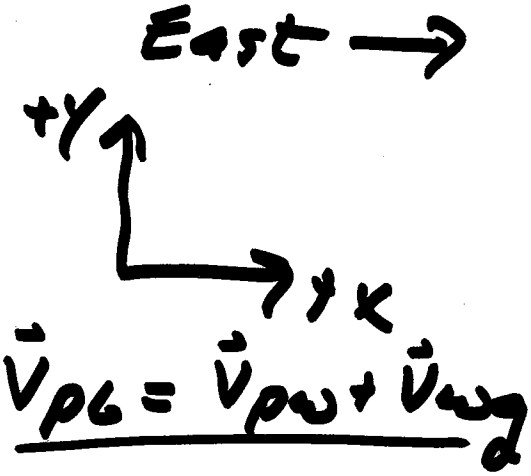
traveling at 4mph

A plane can fly at 19 m/s in still air. It is trying to fly east There is a wind blowing 20° East of north at 15 m/s

a) what direction must plane fly in order to travel east?

b) How fast is plane moving relative to ground?





$V_{wgx} = V_{wg} \sin 20° = 5.1$ m/s

$V_{wgy} = V_{wg} \cos 20° = \underline{14 \text{ m/s}}$

$V_{pgy} = 0$

$V_{pgy} = V_{pwy} + V_{wgy} = 0$

$V_{pwy} = -V_{wgy} = \underline{-14 \text{ m/s}}$

$$V_{pg_y} = V_{pw_y} + V_{wg_y} = 0$$

$$V_{pw_y} = -V_{wg_y} = \underline{-14 \text{ m/s}}$$

$$\sin\theta = \frac{14}{19}$$

$$\underline{\theta = 47^\circ \text{ south of east}}$$

$$V_{pw_x} = V_{pw}\cos 47^\circ$$
$$= 19 \text{ m/s} \cdot \cos 47^\circ = 13 \text{ m/s}$$

$$V_{pg_x} = \underline{V_{pw_x}} + \underline{V_{wg_x}}$$
$$= 13 \text{ m/s} + 5.1 \text{ m/s} = \boxed{18.1 \text{ m/s}}$$

A plane can fly at 100 miles/hour in still air. If there is a wind blowing, what is the speed of the plane relative to the ground

- A) Less than 100 mi/hour
- B) More than 100 mi/hour
- C) 100 mi/hour
- D) Cannot determine with given information

A plane can fly east at 100 miles/hour in still air. If there is a strong wind blowing west, what is the speed of the plane relative to the ground

- A) Less than 100 mi/hour
- B) More than 100 mi/hour
- C) 100 mi/hour
- D) Cannot determine with given information

Interactive Question

A boat that can travel at 4 km/hr in still water crosses a river with a current of 2 km/hr. At what angle relative to the shore must the boat be pointed to get across the river quickest?

A) 27°

B) 30°

C) 60°

D) 63°

E) 90°