Wednesday, October 3/12
Physics 122/121

Bus Supervision PM

1. Torque Lab - Procedure Manuals - Page 67 - Experiment 10.2
   1 Day Late

2. Questions re Torque Problems?

Stopped Here P6

3. Mock Quiz - Friday - 2 Problems

4. Intro to Relative Velocity

Stopped Here P1

Torque Problems

Handout - Torque

Textbook - Page 501 #31
Page 529 #27

Textbook - Page 501 #33 (a)
Page 529 #28 (a)

Handout - More Torque Problems

Relative Velocity

Relative Velocity

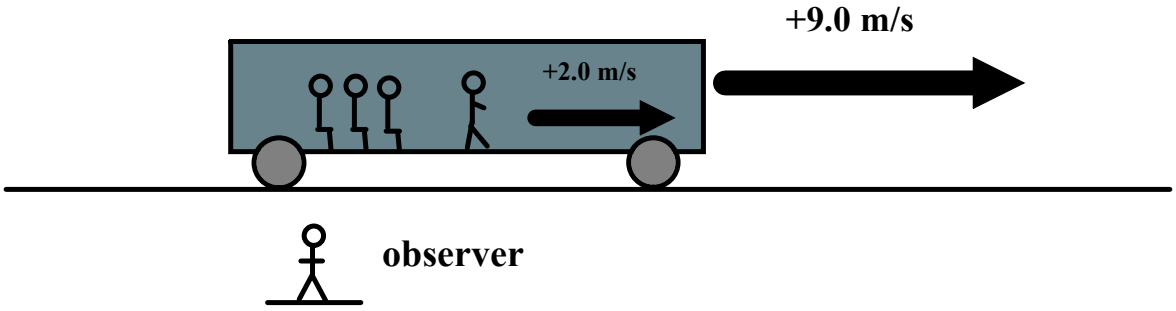
The velocity of an object is relative to the observer who is making the measurement.

Velocities Along The Same Line

When velocities are along the same line, simple addition or subtraction is sufficient to obtain relative velocity.

Train Example

Example: A passenger walks to the front of a moving train. People on the train see the passenger walking with a velocity of +2.0 m/s. Suppose the train is moving with a velocity of +9.0 m/s relative to an observer standing on the ground. What would be the velocity of the passenger as observed by a ground-based observer?



The ground-based observer would see the passenger moving with a velocity of +11 m/s.

If the passenger had been walking toward the rear of the train, the velocity relative to the ground-based observer would have been +7.0 m/s.

It is easy to make a mistake by adding or subtracting the wrong velocities.

Along with a diagram, try using the following labelling system.

Label each velocity using two subscripts:

- the first refers to the object
- the second refers to the reference frame in which the object has this velocity.

$\overrightarrow{V_{pt}}$ -> the velocity of the passenger relative to the train = +2.0 m/s

$\overrightarrow{V_{tg}}$ -> the velocity of the train relative to the ground = +9.0 m/s

$\overrightarrow{V_{pg}}$ -> the velocity of the passenger relative to the ground

$$\overrightarrow{V_{pg}} = \overrightarrow{V_{pt}} + \overrightarrow{V_{tg}}$$

first last

$$\overrightarrow{V_{pg}} = 2.0 \text{ m/s} + 9.0 \text{ m/s}$$

$$\overrightarrow{V_{pg}} = 11.0 \text{ m/s}$$

For any two objects or reference frames, A and B, the velocity of A relative to B has the same magnitude but opposite direction as the velocity of B relative to A.

$$\vec{V}_{BA} = -\vec{V}_{AB}$$

IF: $\vec{v}_{AC} = \vec{v}_{AB} + \vec{v}_{BC}$

THEN: $\vec{v}_{AC} = \vec{v}_{AB} - \vec{v}_{CB}$

Try:

Three cars A, B and C are moving along a straight section of highway.

$\vec{V}_{AB}$	$\vec{V}_{AC}$	$\vec{V}_{CB}$
	+40 m/s	+30 m/s
+60 m/s	+20 m/s	
-50 m/s		+10 m/s

Boat Problems / Planes Problems

Boat Simulation