Relative Velocity in All of its Spectacular Glory.

1. Consider the scene below.



14m/s 19m/s 11m/s 28m/s

  

A B C D

All of the velocities are measured relative to the tree. The tree is stationary relative to the Earth, as are most trees. But not Ents.

First make a list of all of the given velocities with proper subscripts use subscript T for tree.

a. Find the velocity of A relative to B b. Find the velocity of B relative to A

c. Find **v**CD d. Find **v**DC e. Find **v**CB f. Find **v**BC

g. Find **v**AC h. Find **v**CA i. Find **v**BD j. Find **v**DB

2. Consider the situation depicted below.

N

B A

6.00m/s

C

Boat

The velocities of each boat relative to still water are: **vAw**=9.00m/s south, **v**Bw=5.00m/s east, **v**Cw=8.00m/s north.

The velocity of the water relative to the shore is 6.00m/s east. Find the following velocities:

**INCLUDE VECTOR DIAGRAMS!**

a. **v**As b. **v**Bs c. **v**Cs d. **v**AC e. **v**CA f. **v**AB g. **v**BA

3. Consider the situation shown below.

1

11m/s

2

18m/s

a. Find the velocity of car 1 relative to car 2.

b. Find the velocity of car 2 relative to car 1.

**INCLUDE VECTOR DIAGRAMS!**

**Use a separate sheet of paper for the following. INCLUDE VECTOR DIAGRAMS!**

4. A man, named Gerald, who was recently transferred from the I.T. department to the Walnut Research Department (WRD) of a large nut corporation, is travelling on a B.C. Ferry. The ferry is named the ‘Queen of Crustaceans’. The ferry is travelling at 12m/s north relative to the water, and Gerald is walking straight across the deck, due east at 2.6m/s. What is Gerald’s velocity relative to the water?

If the current in the water is 4.40m/s @ 58o North of East, what is Gerald’s velocity relative to land?

5. A boat can travel at 9.0m/s relative to still water. A boater heads out due south across a 1.00km wide river with a current that flows at 3.50m/s west.

a. What is the boat’s velocity relative to the shore?

b. How long (time) will it take for the boat to cross the river?

c. How far downstream will boat end up?

d. If the driver wants to head due south across the river to the opposite shore, what should her heading be?

e. How much time would that trip require?

6. A car accelerates from 12.8m/s **x** to 14.7m/s **y**. Find the change in velocity.

7. A pilot wishes to travel from Vancouver to San Francisco, 1300km south. The pilot calculates that her heading must be 15.0o west of south to compensate for the wind. If the air speed of the plane is 96.0m/s and the trip requires 4.0hours, find the velocity of the wind relative to the ground.

8. Two cars approach an intersection. Car A has a velocity of 16.0m/s @ 39.0o below –x. Car B has a velocity of 24.0m/s @ 76.0o above –x. Find **v**BA.