Relative Motion – Discovery Task

You have had time to read the appropriate section in your text and have had a brief demonstration in class. Using this new knowledge, complete the following in small groups.

You will need a piece of graph paper each. For all diagrams, up on the page is north and right is east. These are your reference coordinates. Include on each drawing.

1. a) Use a scale of 1 square = 500 m. Draw a lake that is 3 km across in a north/south direction. A paddler in a canoe starts across at the rate of 1.0 km/h. Draw the paddler's progress for each hour as she makes her way across the lake. Draw the canoe as such:

b) How long does it take her to cross the 3km lake?

2. a) Use the same scale as above but now the same paddler is crossing a river that is 3 km across in the north/south direction. She paddles directly north. The river flows east at 0.5 km/h. Draw the paddler's progress for each hour as she makes her way across the river. Remember the current. Draw the canoe as above but remember she is facing north and stays facing north as she progresses across.

*** SHOW THIS DIAGRAM TO THE TEACHER BEFORE PROCEEDING ***

b) Where does the paddler land? Ie: how far east of her original starting point?

*** SHOW THIS ANSWER TO THE TEACHER BEFORE PROCEEDING ***

c) Use your diagram to determine how long it takes for the paddler to cross the 3 km river. Compare your answer to 1 b) above.

d) Which component of the paddler's velocity determines how long it takes to cross the river?

e) Which component of the paddler's velocity determines how far down the river she drifts?

f) If an observer is standing on the shore, the paddler's movement is the sum of both the paddling and the current . What is the paddler's velocity relative to the observer on the shore?

3. Now a friend wishes to cross the same river, but wants to arrive directly north of the starting point. Use your knowledge of trigonometry and pythagorean to help you determine both the angle at which the paddler needs to aim and how long it takes him to cross. Include a diagram of his progress each hour and how his boat is facing.