Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Physics 11

**Worksheet 3.3**

**“Boat-River” Problems**

**1D Problems**

1. Robin Hood is riding his horse at 60 m/s due north. He pulls out an arrow and notches it to his bow, which fires arrows at 80 m/s. Find the velocity of the arrow *relative to the ground* if Robin fires it
   1. Straight ahead (north)
   2. To the rear (south)
2. A plane is flying to a destination 250 km north of its starting point. The plane flies with an airspeed of 325 km/h and the wind is blowing at 50 km/h due north.
   1. How long does it take to get to the destination?
   2. How long does it take to return to the starting point?
3. A tourist starts at the back of a train that is 45 m long and walks towards the front with a walking speed of 1.5 m/s. The train is moving at 12 m/s.
   1. How long does it take for the tourist to reach the front of the train?
   2. How far has the tourist moved relative to the ground outside the train by the time they reach the front?
   3. If the tourist decides to run all the way back to the end of the train at 5 m/s, how far have they traveled relative to the ground outside in this time?
4. You are down at the railyard at 4:30 am to watch a taping of an Alias episode. You watch as a train goes by at 5 m/s south. On top of the train, Agent Sydney Bristow is running north. You see Sydney moving at 8 m/s north. At what speed does the camera crew on the train see Sydney running and in what direction?

**2D Problems**

1. Later on in the shoot (from question 4), the train goes by you at 10 m/s south while Sydney runs across a flatbed car at 6 m/s west *from the perspective of the camera crew*. You are watching from a platform above the train. What is Sydney’s velocity from your perspective?
2. Your boat can go 40 km/h through the water and you want to make a direct crossing to the north side of a river which is flowing at 20 km/h west and is 2 km wide.
   1. What heading do you need to have?
   2. How long will it take to cross the river?
3. You are in the back of a pickup truck on a warm summer day and you have just finished eating an apple. The core is in your hand and you notice the truck is just passing an open dumpster 7m west of you. The truck is going 30 km/h north and you can throw at 60 km/h.
   1. In what direction should you throw the core to put it in the dumpster?
   2. How long will it take to get there?
4. Bobo the clown can swim at 2 m/s. He needs to make a landing directly across to the north side of the Styx river, which is 100 m wide. The river flows at 6 m/s due east at this point. Bobo’s biggest problem is that he can only swim while facing due north. How far must Bobo walk up the shore before he starts swimming?

Answers: 1a) 140 m/s north 1b) 20 m/s south 2a) 40 minutes 2b) 54.5 minutes 3a) 30 s  
3b) 405 m 3c) 63 m 4) 13 m/s north 5) 11.7 m/s [31o W of S] 6a) 60o N of E 6b) 3.46 min  
7a) 60o W of S 7b) 0.48 s 8) 300 m