Physics 121

Assignment # 1

Due September 13th, 2013

Physics 12

Assignment #1

Vectors

Due Friday, September 13th, 2013 (Beginning of class)

1. Hazel sets out to paddle east across a river that is 200m wide. She paddles at 4m/s. The problem is that the river is flowing S10°E at 6m/s. a) What is her resultant velocity? b) What would her velocity (including direction) need to be in order for her to land directly across from where she started in 80 seconds?

2. What happens to the resultant as the angle between two applied forces increase? What happens to the equilibrant?

3. Four forces act concurrently on point B. The first force is 165.0N at an angle of 105°. The second force is 150.0 N at a bearing of 300°. The third force is 280.0 N at a bearing of 185°. Force number 4 is 245.0 N at a bearing of 75°. a) Find the resultant of these four forces. b) What is the force that will produce equilibrium (equilibrant force)?

4. Two tow trucks are used to pull a railway car back onto a track. The first truck pulls with 50000 N, while the second pulls with 40000 N. The angle between the two tow cables is 20°. a) What is the magnitude and direction of the resultant? You can use the cosine law/sin law method if you prefer. b) Express the answer in $\hat{i}, \hat{j}$ form

5. Do question 4 graphically to check your work. (If you did them graphically then do them mathematically) Label all your vectors and remember to clearly show the arrow heads.

6. Frank is a bush pilot in the Northwest Territories. He leaves his home airport at 8am on a Tuesday morning. He travels at 200km/h for 8 hours at a heading of W40S. He lands, drops his cargo, refuels and is in the air again in 1 hour. At 10:55pm Tuesday night he sends a distress message saying he is going to crash. A search and rescue party finds Frank's plane 1800km away from the home airport at a heading of W44N. If the plane crashed 5 minutes after the distress call, determine his average velocity for the second leg of the trip.

7. A plane is travelling at 200km./h at E25°S then changes direction to S5°W while maintaining the same speed. What is the change in velocity?