

Physics 122

Assignment #1

Vectors

Due Friday, February 15th, 2019 (Beginning of class)

Note/Reminder: When doing vectors read the question to see if you are looking for the resultant vector or if it is given and you are looking for one of the initial vectors.

1. 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 W40N. 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 1400km away from the home airport at a heading of W30S. If the plane crashed 5 minutes after the distress call, determine his average velocity for the second leg of the trip.
2. 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 i, j form.
3. Do question 1 or 2 graphically to check your work. (If you did it graphically then do them mathematically) Label all your vectors and remember to clearly show the arrow heads.

Practice Problems (I will update with solutions in the near future)

1. 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)?
2. A plane is travelling at 100km./h at E25°S then changes direction to N5°W while maintaining the same speed. a) What is the change in velocity? b) What is the acceleration if it takes 20 seconds until the plane is pointed in the new direction? (Note : change in velocity indicates you use $v_2 - v_1$)

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