Vector Problems HW

1) Jimmy walks 5 m East, then 7 m West and finally 4 m East. Graphically determine the resultant.

2) Two people push at the same time on a box. Person one can push with a maximum force of 200 Newtons and person two with a maximum force of 250 Newtons.
a) What is the maximum possible resultant? How should they push to do this?
b) What is the minimum possible resultant? How should they push to do this?
c) Is it possible to get a magnitude of resultant of 25 N? 300 N?

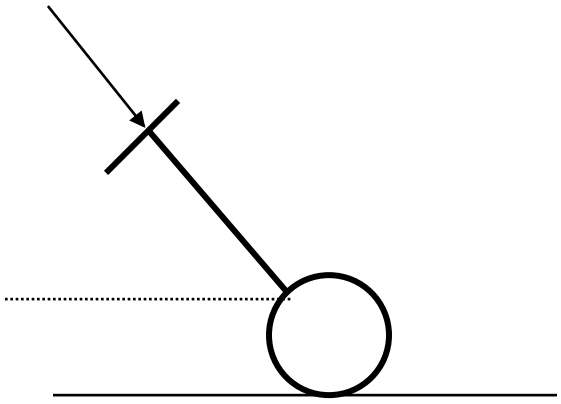
3) Sally walks 3 km east and then 7 km north.
a) Graphically determine the resultant.
b) Mathematically determine the resultant.

4) A river flows south at 5 m/s. A swimmer can swim 2.5 m/s in still water. This swimmer attempts to swim straight across by swimming east.
a) Graphically determine the velocity of the swimmer as seen by someone on the shore.
b) Mathematically check your answer
*c) What direction would the swimmer have to swim to end up exactly across the river from where they started?
*d) For the path described in c) what would be the speed of the swimmer as seen by an observer on land?

5) Bobby leaves his house and walks 100 m north, 30 m east, 50 m south, 70 m west, 20 m south and 10 meters west.
a) Graphically determine the resultant.
b) Check mathematically.
c) What would be the direction and magnitude of the path to walk directly from the end point back to his house?

6) Find the components of a 400 m/s velocity directed 37^{o} N of E.

7) You push a lawn mower with a force of 250 N as shown. What are the components?



8) Brenda walks 60 ft due east. She then turns and walks 40 m at 40^{o} N of W.
a) Find her resultant graphically.
b) Find her resultant analytically (i.e. mathematically)

9) A crazy dog runs 200 m North then 500 m @ 60^{o} S of E and then 300 meters @ 20^{o} N of W.
a) Find the resultant graphically
b) Find the resultant analytically.

10) An airplane is trying to fly from city x to city y. City y is directly north of city x. Unfortunately there is a strong wind that is blowing towards the South East at 200 m/s. If the plane has an air speed of 350 m/s in calm air,
a) What direction does the plane have to fly in order to achieve this path
b) What is the air speed of the plane as seen by an observer on the ground?
(No need to solve these two in order).

11) In a bizarre tug of war, 5 ropes are attached to a center ring. Four of the ropes are shown. The ropes are pulled with the following forces:
A = 250 N B = 500 N C = 420 N D = 190 N

Find the direction and magnitude of the pull of rope E such that all of the forces on the ring cancel out.