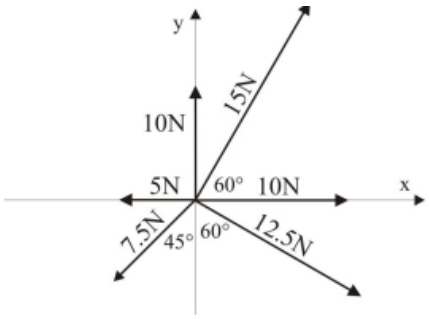
First Name:_____ Last Name: _____ Student ID: _____

Applications of Vectors (2)

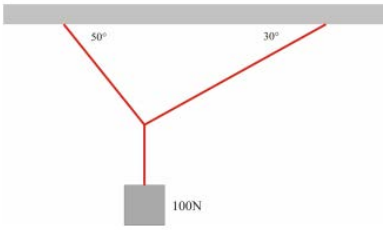
1. Prove that the points A(2,−1,0) , B(−1,0,2) , and C(0,1,2) are not collinear.

2. Prove that the vectors $\vec{a}$ = (−1,2,−7), $\vec{b}$ = (2,0,1), and $\vec{c}$ = (−7,6,0) are not coplanar.

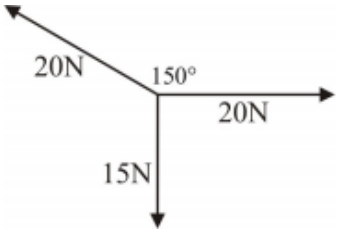
3. Find the resultant of the following system of forces (magnitude and direction).



4. Find the tensions in each string such that the body is at equilibrium.



5. Find an equilibrant for the following system of forces.



6. A car is traveling at $\overrightarrow{v_c}$ = 100km/ h[E], a motorcycle is traveling at $\overrightarrow{v_m}$ = 80km/ h[W], a truck is traveling at $\overrightarrow{v_t}$ =120km/ h[N] and an SUV is traveling at $\overrightarrow{v_s}$ = 100km/ h[SW]. Find the relative velocity of the car relative to:

a) motorcycle

b) truck

c) SUV

7. A plane is scheduled to travel from the airport A to an airport B where $\overrightarrow{AB}$ = 600km[060°] . The speed of the plane relative to air is 300km/ h and a strong wind of 100km/ h is blowing eastward.

a) Draw a diagram to illustrate the situation.

b) In what direction should the pilot head the plane?

c) What is the speed of the plane relative to ground?

d) How long will the trip last?

8. Thieves are fleeing in a stolen boat travelling at 30 km/h due west. A police boat is sent to catch them. When the stolen boat is 3 km due north of the police, the police set out at a speed of 40 km/h.

a. In what direction must the police head in order to intercept the thieves?
b. When will the interception occur?

9. Find if a system of three forces with $\left|\overrightarrow{F_1}\right|$=12, $\left|\overrightarrow{F_2}\right|$= 3 and $\left|\overrightarrow{F_3}\right|$= 5 may be in equilibrium.

10. A wrench 30cm long is used to loose a bolt by applying a force of 20N (see the figure below). Find the magnitude of the torque.