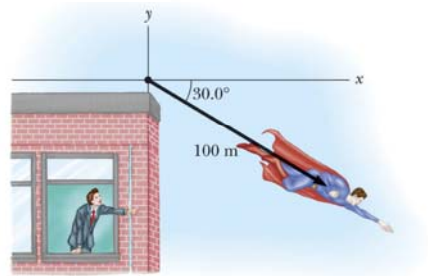


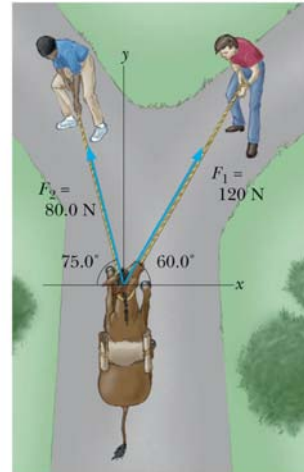
***Physics 110***  
***Spring 2006***  
***Vectors***

1. A map suggests that Atlanta is 730mi in a direction  $5^\circ$  north of east from Dallas. This same map shows that Chicago is 560mi in a direction  $21^\circ$  west of north from Atlanta. Assuming that the Earth is flat, use this information to find the displacement from Dallas to Chicago.
2. Find the horizontal and vertical components of a 100m displacement of a superhero that flies from the top of a tall building following the path shown below.



3. The polar coordinates of a point are  $r = 5.5\text{m}$  and  $\theta = 240^\circ$ . What are the Cartesian coordinates of this point?
4. An airplane flies 200km due west from city A to city B then flies 300km in the direction  $30^\circ$  north of west from city B to city C.
  - a. In straight-line distance, how far is city C from city A?
  - b. Relative to city A, in what direction is city C?

5. In the figure below two people are pulling on a stubborn mule.
- What is the single force that is equivalent to the two forces (in units of Newtons) show?
  - What is the force that a third person would have to exert on the mule to make the resultant force equal to zero?



6. As it passes over an island in the Caribbean, the eye of a hurricane is moving in a direction  $60^\circ$  north of west with a speed of  $41 \text{ km/hr}$ . Three hours later, the course of the hurricane shifts due north and its speed is  $25 \text{ km/hr}$ . How far, in magnitude, from this Caribbean Island is the hurricane eye 4.5 hours after it passes?