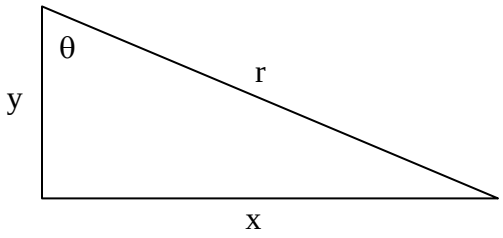
Trigonometry and Vectors Review

Complete the following on a separate sheet of paper drawing all appropriate diagrams and showing your work.

1. For the right triangle given below, write four equations that express x as a function of any two of y, r, and θ.



(1) x =

(2) x =

(3) x =

(4) x =

2. A student wishes to determine the height of the campus bell tower. She walks 20 m away from it along a level path. At that point she pulls a flashlight out of her backpack and places it on the ground. Then she shines it toward the top of the bell tower. When the beam hits the top of the tower, the flashlight makes an angle of 70^o with the path. How tall is the bell tower?

3. Julie walks 40 m at 30° north of east. What are the north and east components of her displacement?

4. An ant crawls 3.0 m south, then 2.0 m up a wall. What are the magnitude and direction of the ant's net displacement?

5. A bicyclist rides 25 km due southeast from his starting position. He then cycles 40 km in a direction 60^o north of east to his destination. He then finishes his trip by traveling an additional 15 km due west. The entire trip takes him 4 hours.
   (a) Sketch a diagram for the bicyclist's trip.
   (b) Determine the components of each of the three displacements in the bicyclist's trip.
   (c) Determine the components of the bicyclist's total displacement for the trip.
   (d) Determine the magnitude and direction of the total displacement.
   (e) Determine the bicyclist's average speed during the trip.
   (f) Determine the bicyclist's average velocity during the trip.