APPLICATIONS OF RIGHT TRIANGLE TRIGONOMETRY - WORKSHEET #3

For each of the following problems:
- Draw a right triangle depicting the problem.
- Label the given information.
- Identify the part(s) of the triangle.
- Set up an equation to solve for those parts.
- Round all angle measurements to the nearest minute.
- Round all lengths to the nearest tenth. Remember to put units with these answers.

1. Suppose you have been assigned the job of measuring the height of the local water tower. Climbing makes you dizzy, so you decide to do the whole job at ground level. From a point of 47.3 meters from the base of the tower, you must look up at an angle of 53° to see the top of the tower. *How tall is the tower?*

2. A ship passing through the Strait of Gibraltar is closest to the radar station at 2400 meters. Later, the ship is determined to be 2650 meters from the radar station. *(a) By what angle did the ship's bearing from the radar station change? (b) How far did the ship travel between the two observations?*

3. A 6.7-meter ladder is leaning against a wall. It makes an angle of 63° with the level ground. *How high up the wall is the top of the ladder?*

4. It has been determined that the flagpole needs a new rope. To determine the length needed, you observe that the pole casts an 11.6-meter shadow on the ground at the time the angle of elevation of the sun is 36°50'. *How tall is the pole?*

5. A cat is trapped on a tree branch 6.5 meters above the ground. The only ladder available is 6.7 meters long. When placing the tip of the ladder on the branch, *what angle will the ladder make with the level ground?*

6. The CN Tower in Toronto, Ontario is 552 meters tall. At a certain time of day, it casts a shadow of 1100 meters onto the ground. *What is the angle of elevation of the sun at that time of day?*

7. Scientists estimate the heights of features on the moon by measuring the lengths of the shadows they cast on the moon's surface. From a photograph, it is determined that the rim of a crater casts a 325-meter shadow on its surface. At the time the photograph was taken, the sun's angle of elevation from this place on the moon's surface was 23°37'. *How deep is the crater?*

8. An observer in a lighthouse, 80-feet above the surface of the water, measures an angle of depression of 0°42' to a distant ship. *How many MILES is the ship from the base of the lighthouse?*

9. Commercial airliners fly at an altitude of about 6 miles. They start descending toward the airport when they are still far away so that they will not have to dive at a steep angle. *(a) If the pilot wants the plane's path to make an angle of 3° with the ground, how many air miles from the airport must he start the descent? (b) If he starts the descent 300 ground miles from the airport, what angle will the plane's path make with the horizontal?*

10. A beam of gamma rays is to be used to treat a tumor known to be 5.7-centimeters beneath the patient's skin. To avoid damaging a vital organ, the radiologist moves the source over 8.3-centimeters. *(a) At what angle to the skin must the radiologist aim the gamma rays to hit the tumor? (b) How far will the beam have to travel through the patient's body to reach the tumor?*

11. A block bordering Market Street is a right triangle. A man walking around the block takes 125 paces on Market Street and 102 paces on Pine Street. *(a) At what angle do Pine Street and Market Street intersect? (b) How many paces must he take on Front street to complete the trip?*