

# RIGHT TRIANGLE WORKSHEET

1. Suppose you have been assigned to measure 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 47.3 meters from the base of the water tower, you find that you must look up at an angle of  $53^\circ$  to see the top of the tower. How tall is the tower? Draw the triangle.
2. A ship is passing through the Strait of Gibraltar. At its closest point of approach, Gibraltar radar determines that it is 2400 meters away. Later, the radar determines that it is 2650 meters away. By what angle did the ship's bearing from Gibraltar change? How far did the ship travel during the two observations?
3. You lean a ladder 6.7 meters long against the wall. It makes an angle of  $63^\circ$  with the level ground. How high up is the top of the ladder?
4. You must order a new rope for the flagpole. To find out what length of rope is needed, you observe that pole casts a shadow 11.6 meters long on the ground. The angle between the sun's rays and the ground is  $36.8^\circ$ . How tall is the pole?
5. Your cat is trapped on a tree branch 6.5 meters above the ground. Your ladder is only 6.7 meters long. If you place the ladder's tip on the branch, what angle will the ladder make with the ground?
6. The tallest freestanding structure in the world is the 553 meter tall CN tower in Toronto, Ontario. Suppose that at a certain time of day it casts a shadow 1100 meters long on 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, you find that the shadow cast on the inside of a crater by its rim is 325 meters long. At the time the photograph was taken, the sun's angle to the horizontal surface was  $23.6^\circ$ . How high does the rim rise above the inside of the crater?
8. A beam of gamma rays is to be used to treat a tumor known to be 5.7 cm beneath the patient's skin. To avoid damaging a vital organ, the radiologist moves the source over 8.3 cm. At what angle to the patient's skin must the radiologist aim the gamma ray source to hit the tumor? How far will the gamma rays have to pass through the body to hit the tumor?
9. When surveyors measure land that slopes significantly, the distance which is measured will be longer than the horizontal distance which must be drawn on a map. Suppose that the distance from the top edge of the Okapi Creek bed to the edge of the water is 37.8 meters. The land slopes downward at  $27.6^\circ$  to the horizontal. a) What is the horizontal distance from the top of the banks to the edge of the creek? b) How far is the surface of the creek below the level of the surrounding land?
10. From a point on the North Rim of the Grand Canyon, a surveyor, sighting the South Rim a little below the North Rim, measures the angle to be  $1.3^\circ$ . From an aerial photograph, he determines that the horizontal distance between the two points is 1600 meters. How many meters is the South Rim below the North Rim?
11. A submarine at the surface of the ocean makes an emergency dive, its path making an angle of  $21^\circ$  with the surface. If it goes for 300 meters along its downward path, how deep will it be? What horizontal distance is it from its starting point?
12. An observer 5.2 kilometers from the launch pad observes a missile ascending. At a particular, the angle of elevation is  $37.6^\circ$ . How high is the missile?
13. Suppose that you are on a salvage ship in the Gulf of Mexico. Your sonar system has located a sunken Spanish galleon at a slant distance of 683 meters from your ship, with an angle to the horizontal of  $27.8^\circ$ . How deep is the water at the galleon's location? How far must you sail to be directly above the galleon?