RIGHT TRIANGLE PROBLEMS

Use trigonometry to solve each problem. Round all lengths to three decimal places. Round all angles to the nearest degree.

1. *Ladder Problem:* You lean a ladder 6.7m long against the wall. It makes an angle of 63° with the level ground. How high up is the top of the ladder?

2. *Cat Problem:* Your cat is trapped on a tree branch 6.5m above the ground. Your ladder is only 6.7m long. If you place the ladder's tip on the top branch, what angle will the ladder make with the ground?

3. *Grand Canyon Problem:* From a point on the North Rim of the Grand Canyon, a surveyor measures an angle of depression of 1.3° to a point on the South Rim. From an aerial photograph, he determines that the horizontal distance between the two points is 10 miles. How many feet is the South Rim below the North Rim?

4. *Lighthouse Problem:* An observer 80 ft. above the surface of the water measures an angle of depression of 0.7° to a distant ship. How many miles is the ship from the base of the lighthouse? (5,280 ft = 1 mile)

5. *Airplane Landing Problem:* Commercial airliners fly at an altitude of about 10 km. They start descending toward the airport when they are 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, at what horizontal distance must she start descending?

    b. If the pilot starts descending a ground distance of 300 km from the airport, what angle will the plane's path make with the horizontal?

6. *Radiotherapy Problem:* 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.
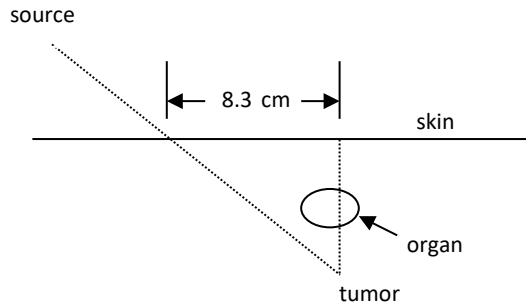
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a. At what angle to the patient's skin must the radiologist aim the gamma ray source to hit the tumor?

b. How far will the beam have to travel through the patient's body before reaching the tumor?

7. *Surveying Problem:* When surveyors measure land that slopes significantly, the distance that is measured will be longer than the horizontal distance that must be drawn on the map. Suppose that the distance from the top edge of the Cibolo Creek bed to the edge of the water is 37.8m. The land slopes downward at 27.6° to the horizontal.
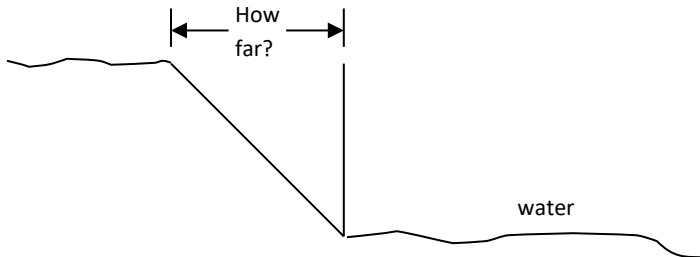
a. What is the horizontal distance from the top of the bank to the edge of the creek?

b. How far is the surface of the creek below the level of the surrounding land?

8. *Submarine Problem:* A submarine at the surface of the ocean makes an emergency dive, its path making an angle of 21° with the surface. If it travels for 300m along a downward path, how deep will it be?

9. *Pyramid Problem:* The Great Pyramid of Cheops in Egypt has a square base 230m on each side. The faces of the pyramid make an angle of 51.8° with the horizontal.

51.8°
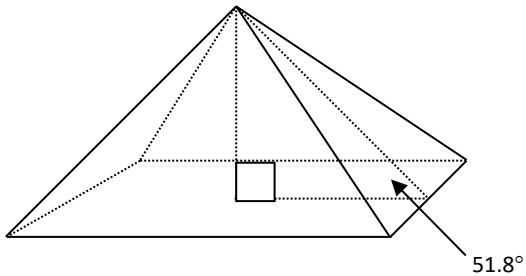
    a. How tall is the pyramid?

    b. What is the shortest distance you would have to climb up a face to reach the top?