

Right Triangle Trig Word Problems

Key

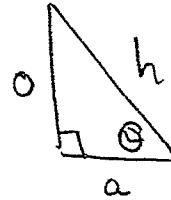
Trigonometric functions are often used to analyze real-life situations. The easiest way to understand these problems is to first draw a diagram to illustrate the problem.

Define the following

Angle of Depression:

Angle of Elevation:

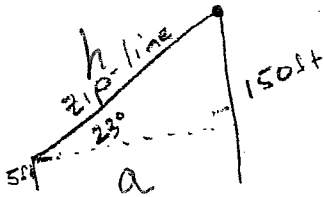
Reminder



$$a^2 + a^2 = h^2$$

Problems: Use the diagrams to help solve the problem. Round to the nearest hundredth.

1) A steel cable zip-line is being constructed for competition on a reality television show. One end of the zip-line is attached to a platform on top of a 150 foot pole. The other end of the zip-line is attached to the top of a 5 foot stake. The angle of elevation from the top of the stake to the top of the platform is  $23^\circ$ .



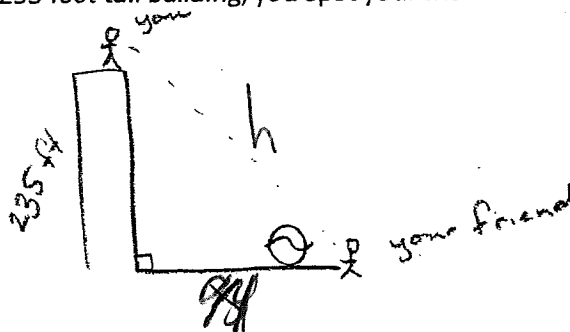
a) How long is the zip-line?

~~sin~~  $h = \text{zip-line}$   $384 \text{ ft}$

b) How far is the stake from the pole?

tan  $a = 353 \text{ ft}$

2) Standing on top of a 235 foot tall building, you spot your friend on the ground who is 94 feet away from the building.



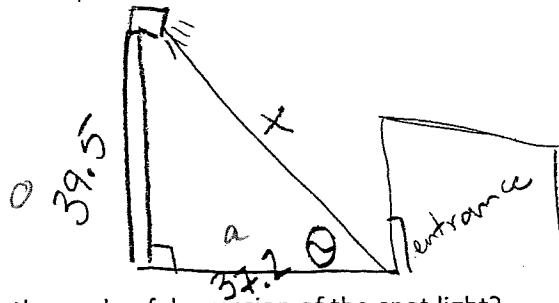
a) What is the angle of depression you had to look to spot your friend?

tan  $\theta = \frac{235}{94}, \theta =$

b) What is the distance between you and your friend?

sin or cos  $h = \frac{94}{\cos(\ )}$  or  $h = \frac{235}{\sin(\ )}$

3) To illuminate the entrance of Seven Lakes High School, a spot light is mounted on a 39.5 foot pole. The base of the pole is 37.2 feet from the entrance.



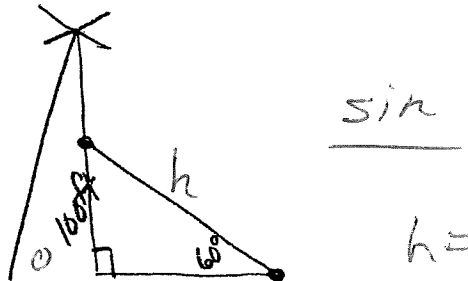
a) What is the angle of depression of the spot light?

$$\tan \theta = \frac{39.5}{37.2} \quad \theta =$$

b) How far does the spotlight shine?

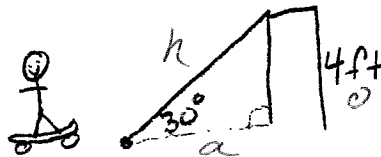
$$h = \frac{39.5}{\sin(\quad)} \quad h = \frac{37.2}{\cos(\quad)} =$$

4) The guy wire to support a radio tower is positioned 100 feet up the tower. It forms a 60° angle with the ground. How long is the wire?



$$\frac{\sin}{h} =$$

5) A skateboard ramp is placed on a 4 foot high wall with the angle of elevation to be 30° with the ground.



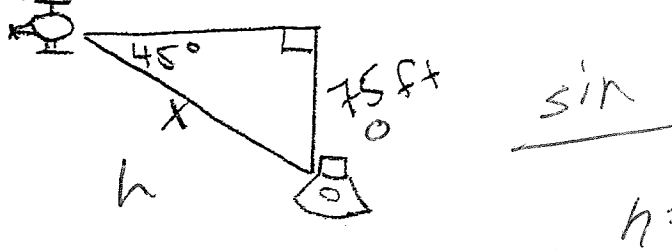
a) What is the length of the skateboard ramp?

$$\frac{\sin}{h} =$$

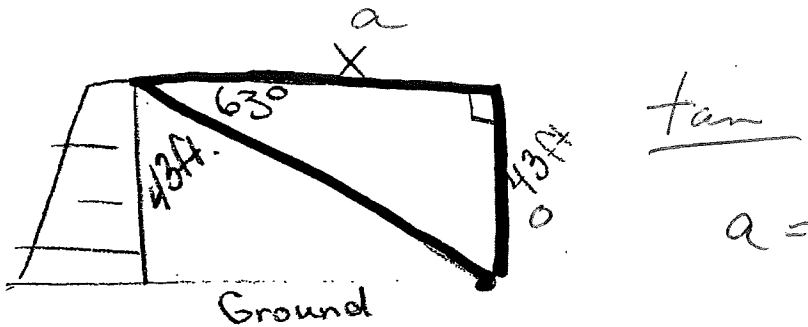
b) How far away is the base of the skateboard ramp with the wall?

$$\frac{\tan}{a} =$$

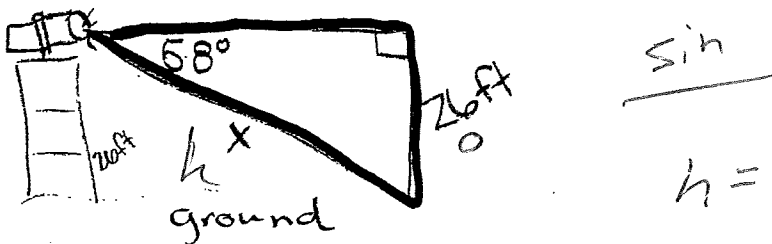
6) A NASA recovery helicopter hovers 75 feet above a space capsule. If the angle of depression to the recovery ship is  $45^\circ$ , how far is the ship from the space capsule?



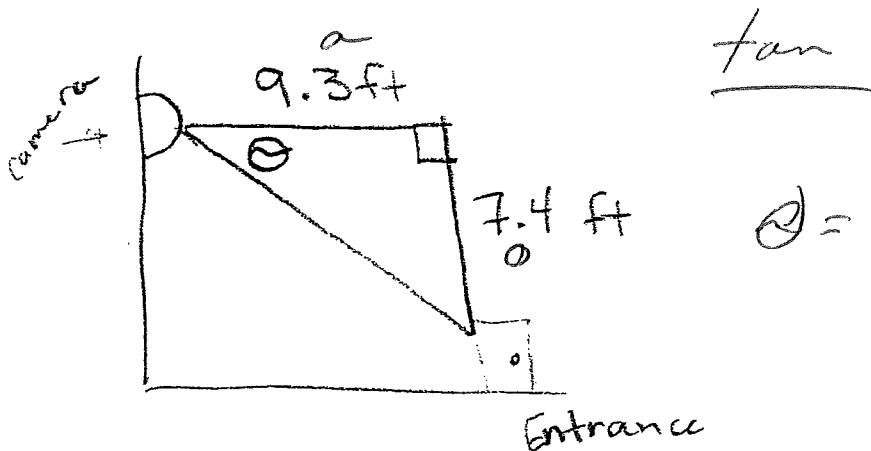
1) The angle of depression is measured from the top of a 43-foot tower to a reference point on the ground. Its value is found to be  $63^\circ$ . How far is the base of the tower from the point on the ground?



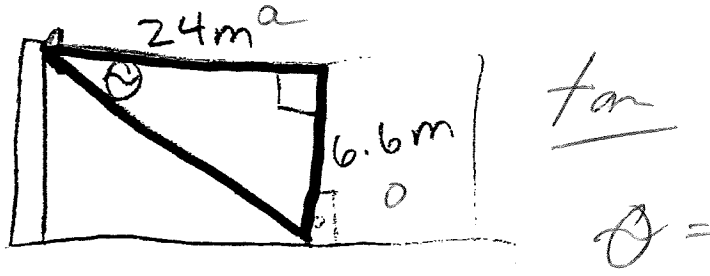
2) The angle of depression from a searchlight to its target is  $58^\circ$ . How long is the beam of light, if the searchlight is 26 feet above the ground?



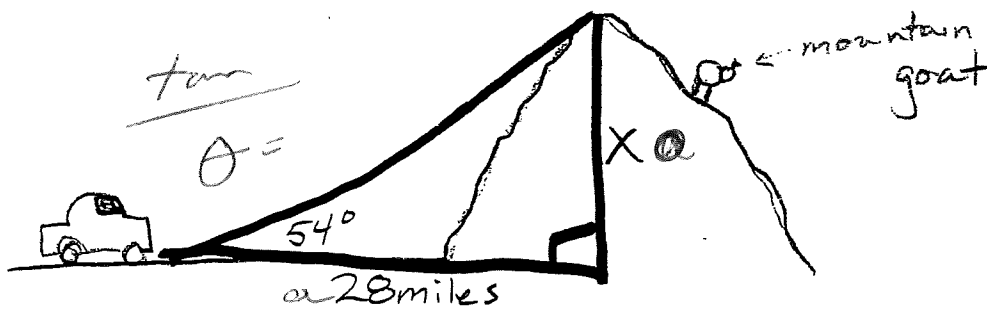
3) A closed circuit television camera is mounted on a wall 7.4 feet above a security desk in an office building. It is used to view an entrance door 9.3 feet from the desk. Find the angle of depression from the camera lens to the entrance door.



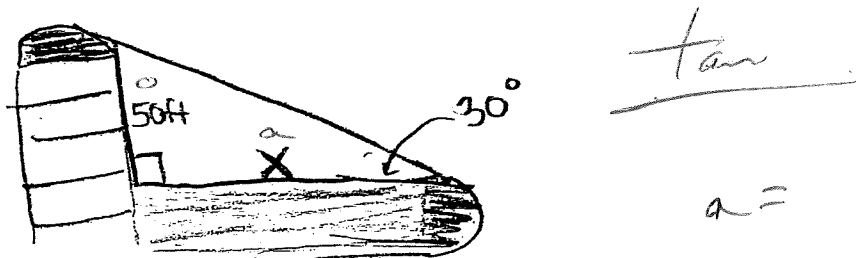
4) To illuminate the entrance of an apartment building, a night light is mounted on a 6.6 meter pole. If the base of the pole is 24 m from the entrance, find the angle of depression from the light.



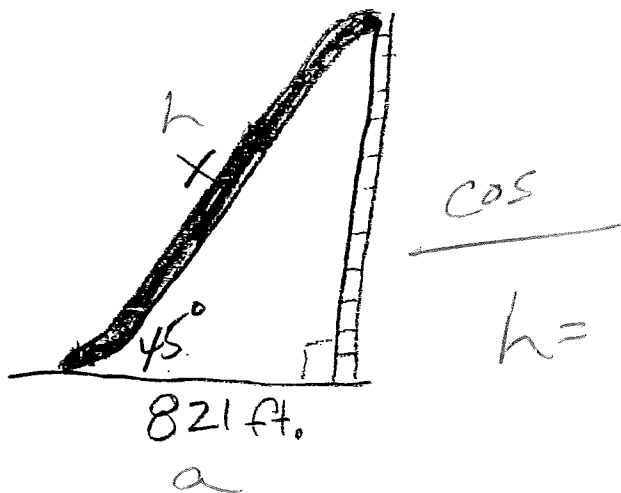
5) Driving on a flat road, you spot a mountain 28 miles away. The angle of elevation from the car to the top of the mountain is  $54^\circ$ . How tall is the mountain?



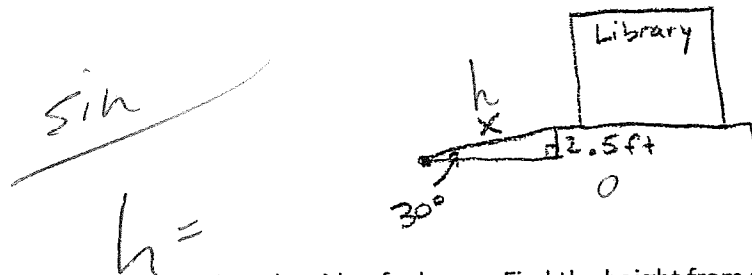
6) The sun is  $30^\circ$  above the horizon. Find the length of a shadow cast by a silo that is 50 feet tall.



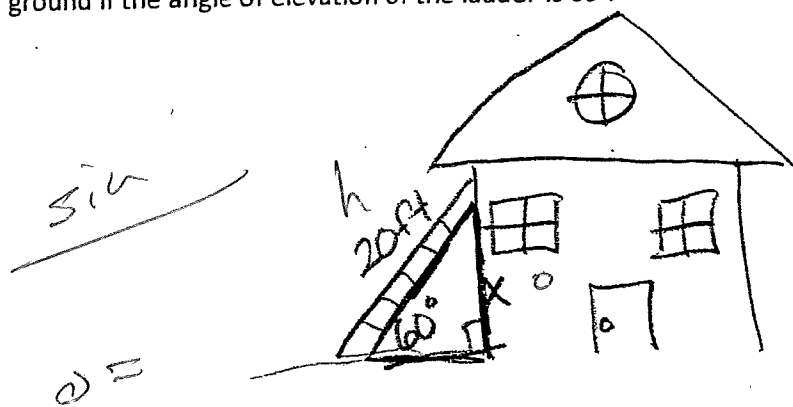
7) The angle of elevation from the bottom of the world's longest slide, located in Peru, Vermont, is approximately  $45^\circ$ . The slide covers a horizontal distance of 821 feet. Find the length of the slide.



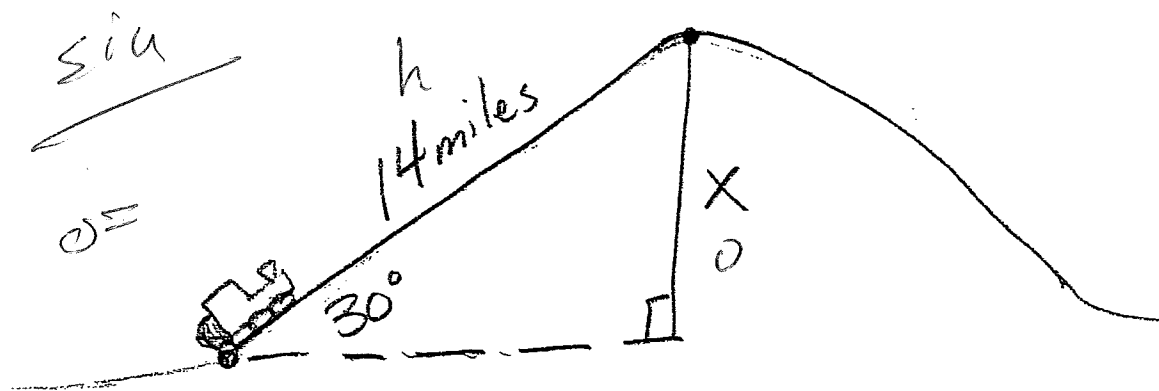
8) The entrance of the old town library is 2.5 feet above the ground level. A ramp from the ground level to the library entrance is scheduled to be built. The angle of elevation from the base of the ramp to its top is to be  $30^\circ$ . Find the length of the ramp.



9) A ladder 20 feet long leans against the side of a house. Find the height from the top of the ladder to the ground if the angle of elevation of the ladder is  $60^\circ$ .



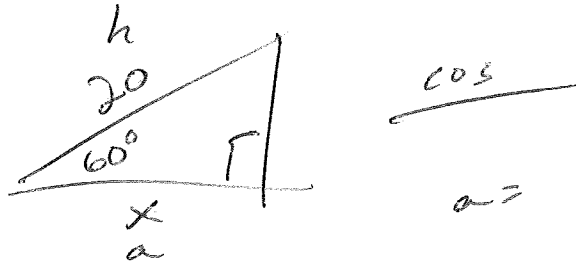
10) A train has a 14 mile steady incline hill, at an angle of elevation of  $30^\circ$ , that it must get over to continue on the tracks. How tall is the hill that the train must get over to continue on the tracks?



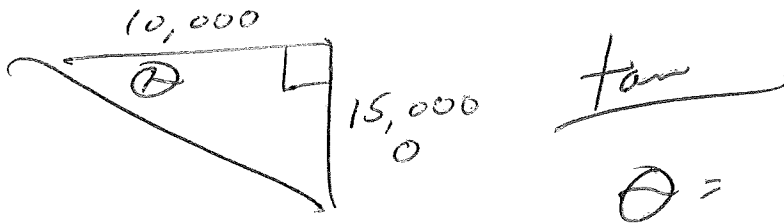


Trigonometry Word Problem Review

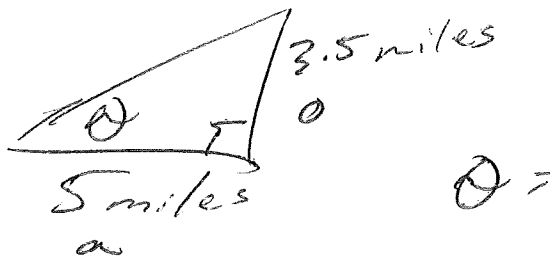
1. A construction worker leans his ladder against a building making a  $60^\circ$  angles with the ground. If his ladder is 20 feet long, how far away is the base of the ladder from the building?



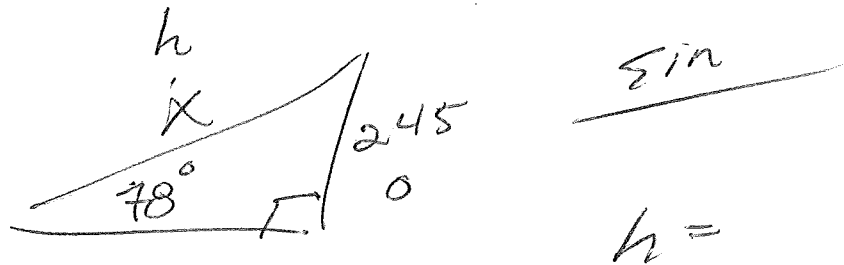
2. The computers on an airplane broke so the pilot has to land the plane by herself. If the plane's altitude is 15,000 feet and the plane is 10,000 feet from the beginning of the runway, what angle of depression must she take to get to the beginning of the runway (Horizontal Angle)?



3. A rocket is launched at an angle into outer space. After a minute, the rocket traveled 5 miles and had an altitude of 3.5 miles. What is the angle of elevation that the rocket was launched at?



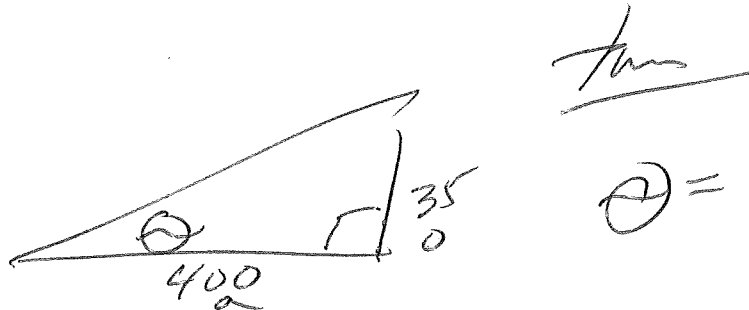
4. A cable is used to support a 245 meter TV tower. If the angle the cable makes with the ground is 78 degrees, how long is the cable?



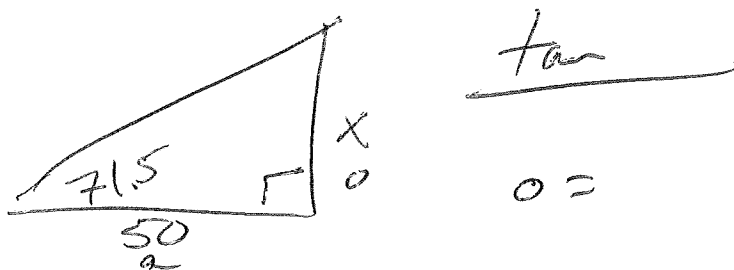




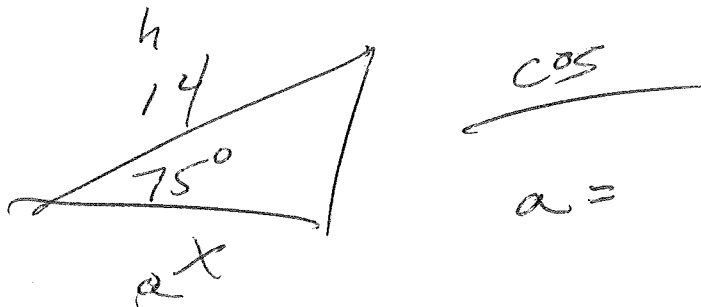
5. A road rises 35 feet for every 400 horizontal feet. What is the measurement of the angle the road forms with the horizontal?



6. A bird watcher is standing 50 feet from the base of a large tree. The surveyor measures the angle of elevation to a bird on top of the tree as  $71.5^\circ$ . How tall is the tree?



7. The directions for the use of a ladder recommend that for maximum safety the ladder should be placed against a wall at a  $75^\circ$  angle with the ground. If the ladder is 14 feet long, how far from the wall should the base of the ladder be placed?



8. A kite is held by a taut string pegged to the ground. The string is 40 feet long and makes a  $33^\circ$  angle with the ground. Supposing that the ground is level, find the vertical distance from the ground to the kite.

