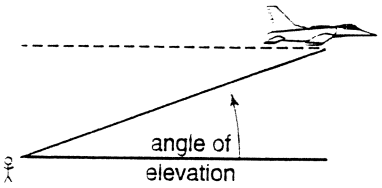
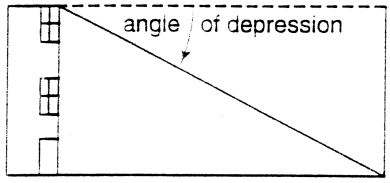
Study Guide 8-5

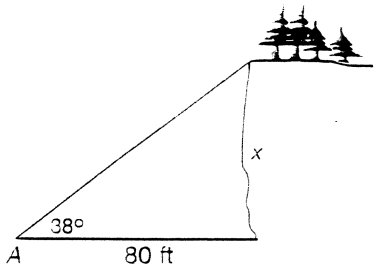
Angles of Elevation and Depression

Many problems in daily life can be solved by using trigonometry. Often such problems involve an **angle of elevation** or an **angle of depression.**





Example: The angle of elevation from point A to the top of a cliff is 38°. If point A is 80 feet from the base of the cliff, how high is the cliff?



Let x represent the height of the cliff.
Then $\tan 38° = \frac{x}{80}$.

$80 \tan 38° = x$

Use a calculator set for the degree mode to find x.

ENTER: 80 ⊠ 38 TAN = 62.502850

The cliff is about 63 feet high.

Solve each problem. Round measures of segments to the nearest hundredth and measures of angles to the nearest degree.

1. From the top of a tower, the angle of depression to a stake on the ground is 72°. The top of the tower is 80 feet above ground. How far is the stake from the foot of the tower?

2. A tree 40 feet high casts a shadow 58 feet long. Find the measure of the angle of elevation of the sun.

3. A ladder leaning against a house makes an angle of 60° with the ground. The foot of the ladder is 7 feet from the foundation of the house. How long is the ladder?

4. A balloon on a 40-foot string makes an angle of 50° with the ground. How high above the ground is the balloon if the hand of the person holding the balloon is 6 feet above the ground?

Practice 8-5

Angles of Elevation and Depression

Solve each problem. Round measures of segments to the nearest hundredth and measures of angles to the nearest degree.

1. A 20-foot ladder leans against a wall so that the base of the ladder is 8 feet from the base of the building. What angle does the ladder make with the ground?

2. A 50-meter vertical tower is braced with a cable secured at the top of the tower and tied 30 meters from the base. What angles does the cable form with the vertical tower?

3. At a point on the ground 50 feet from the foot of a tree, the angle of elevation to the top of the tree is 53°. Find the height of the tree.

4. From the top of a lighthouse 210 feet high, the angle of depression to a boat is 27°. Find the distance from the boat to the food of the lighthouse. The lighthouse was built at sea level.

5. Richard is flying a kite. The kite string makes an angle of 57° with the ground. If Richard is standing 100 feet from the point on the ground directly below the kite, find the length of the kite string.

6. An airplane rises vertically 1000 feet over a horizontal distance of 1 mile. What is the angle of elevation of the airplane's path? (Hint: 1 mile = 5280 feet)