**Geometry + LAB**        Name _____ Date _____ Section _____

**8-11R/8-13LAB Applications of Trig Ratios**

Directions: Draw and label a diagram for each problem, set up the trigonometric equations, and show all work. Round answers to the nearest tenth.

1. Mrs. O'Leary's cat is stuck in her backyard tree.  A fireman positions a ladder against the tree branch and rescues the cat.  The ladder was extended to 20 feet at the time and made an angle of 58° with the ground.  What was the cat's vertical height in the tree?
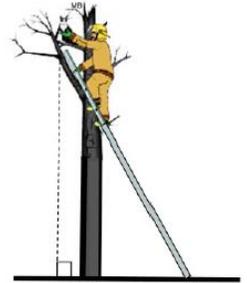
2. A plane takes off from LAX airport and ascends for a distance of 3000 feet.  If the plane traveled 2200 feet horizontally, find the plane's angle of elevation at takeoff.

3. A plane is flying into LAX airport at an angle of depression of 20°.  What is the slope of the line representing the path of the plane as it is coming in to land?

4. When attempting to stop at a stop sign on an icy road, Spencer slid through the intersection into a nearby 16-foot telephone pole.  The angle of depression from the top of the pole to the base of the stop sign is 32°.  How far did Spencer's car slide from the stop sign to the telephone pole?  (Don't worry, Spencer is okay).
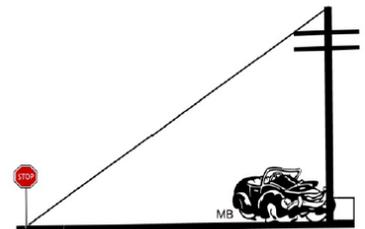
5. From the hay loft of a barn 18 feet high, an owl spots a bluejay on the top of a tree 15 feet away.  From the owl, the angle of elevation to the top of the tree is 20° and the angle of depression to the base of the tree is 40°.  Find the height of the tree.

6. A student lets out 100 feet of string on a kite from a hand height of 3 feet.  The angle of elevation from her hand is 25°.  Find the height of the kite above the ground.

7. On a windy day, a 90 foot rope tightly secures a hot air balloon to a stake in the ground.  The balloon is hovering 80 feet in the air.  What is the angle of depression from the balloon to the stake in the ground?

8. The distance from the base of a house to the base of a nearby tree is 78 feet.  Tomas stands at a distance of 45 feet from the base of the tree and observes the angle of elevation to the top of the tree to be be 59°.  If the tree were to fall towards the house, would the top of the tree hit the house?

9.

Roof Rafter

8'

A

32'
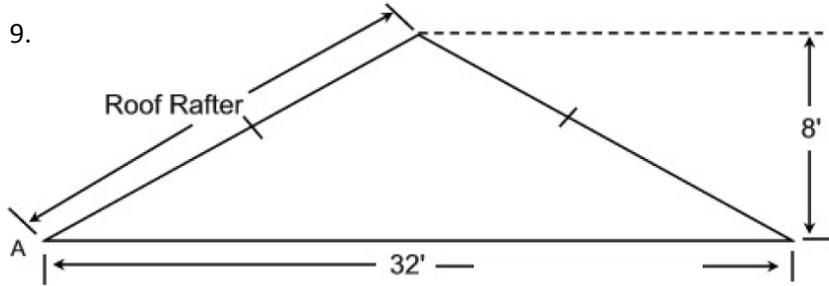
a) Find the length of the
roof rafter _____

b) Find $m\angle A$ _____

**10.** Simon bought a new shop and wants to order a new sign for the roof of the building. From point $P$, he finds the angle of elevation of the roof, from ground level, to be 31° and the angle of elevation of the top of the sign to be 42°. If point $P$ is 24 feet from the building, how tall is the sign to the *nearest tenth of a foot*?

LIL' SHOP

SALE

42°

31°

MathBits.com

P

24 feet
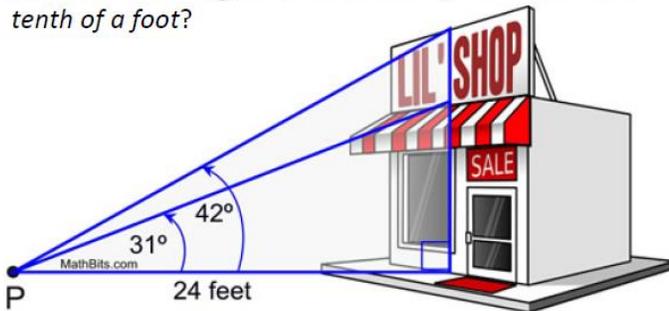
11. A firefighter on the ground sees the fire break through a window.  The angle of elevation to the windowsill is 32°.  The angle of elevation to the top of the building is 40°.  If the firefighter is 72 ft from the building, what is the distance from the roof to the window sill?
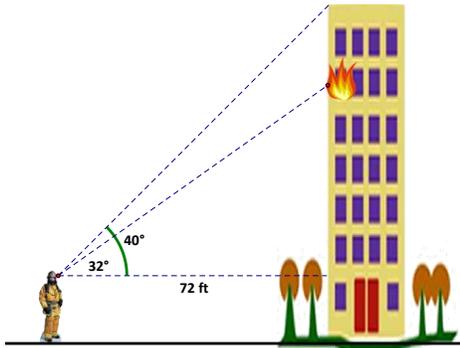


12. From a lighthouse 1000 ft above sea level, the angle of depression to a boat (A) is 29°.  A little bit later the boat has moved closer to the shore (B) and the angle of depression measures 44°.  How far (to the nearest foot) has the boat moved in that time?