13) Two workers are fixing a spark on a live wire.
One worker stands at the top of a 70-foot pole.
The other worker looks up at an angle of elevatation of 28 degrees toward his co-worker.
And, then he looks up at an angle of elevation of 34 degrees toward the spark.

How far is the spark from the worker above?

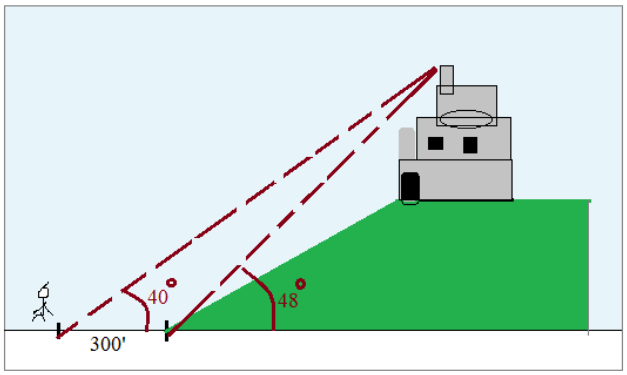
14) A balloon hovers 2000 feet over a lake...
If the angle of depression to one side of the lake is 40 degrees,
and the angle of depression to the other side of the lake is 28 degrees,
what is the length of the lake?

15) A plane takes off from a runway at a 20-degree angle of elevation.
If the lift-off occurs 600 feet from a 175-foot control tower, will the plane clear the tower?

If so, by how much?

16) A multi-story mansion is located on a hill. (see figure)
When the top of the mansion is viewed from the base of the hill, the angle of elevation is 50 degrees.
When it is viewed at a distance of 300 feet from the base of the hill, the angle of elevation is 40 degrees.
The hill rises at an angle of 33 degrees.

What is the height of the mansion?



17) A tree is standing on a hill inclined at an angle of 10 degrees.
When the angle of elevation from the tree to the sun is 20 degrees, the tree casts a shadow of 30 feet up the hill.
How tall is the tree?

16) A multi-story mansion is located on a hill. (see figure)
When the top of the mansion is viewed from the base of the hill, the angle of elevation is 50 degrees.
When it is viewed at a distance of 300 feet from the base of the hill, the angle of elevation is 40 degrees.
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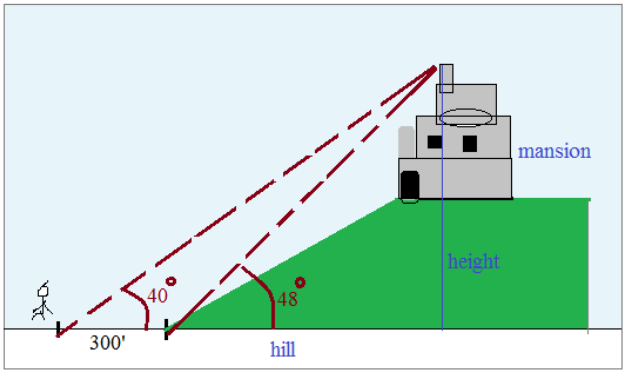
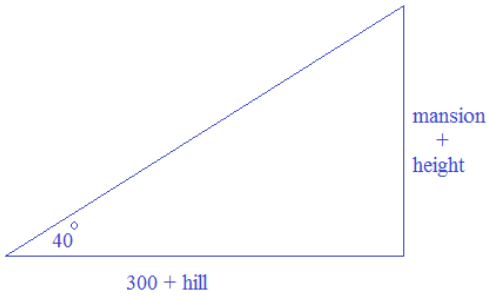
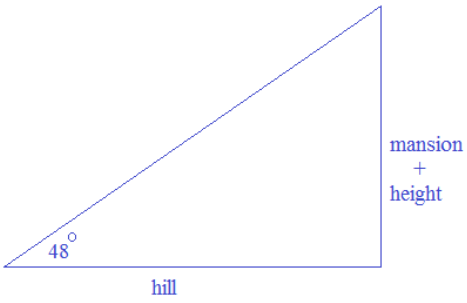






$$\tan(40) = \frac{(\text{mansion} + \text{height})}{300 + \text{hill}}$$

system of equations....

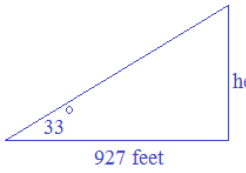
$$\tan(48) = \frac{(\text{mansion} + \text{height})}{\text{hill}}$$

$$\tan(40)(300 + \text{hill}) = \tan(48)(\text{hill})$$

$$251.7 + .84\text{hill} = 1{,}11\ \text{hill}$$

hill = 927 feet

and, (mansion + height) = 1030 feet



$$\tan(33) = \frac{\text{height}}{927}$$

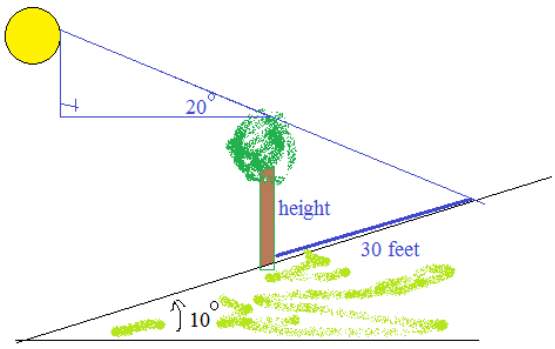
height = 602 feet

Next, we must find the mansion alone....

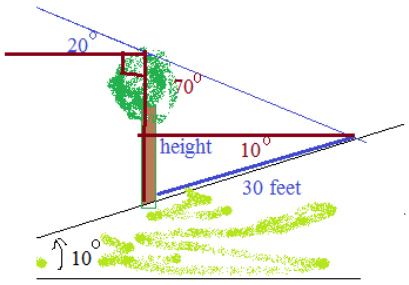
Therefore, the mansion is 428 feet high!

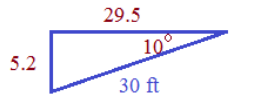
602 + 428 = 1030

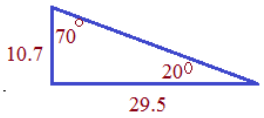
17) A tree is standing on a hill inclined at an angle of 10 degrees.
When the angle of elevation from the tree to the sun is 20 degrees, the tree casts a shadow of 30 feet up the hill.
How tall is the tree?



From the diagram, we can extract some right triangles....







The height of the tree is

5.2 + 10.7 = 15.9 feet