

Geometry

Chapter 8
Section 8-4 and 8-5

Vocabulary

Angle of
Elevation

Angle made between a horizontal line
and a ray above the horizontal line

Angle of
Depression

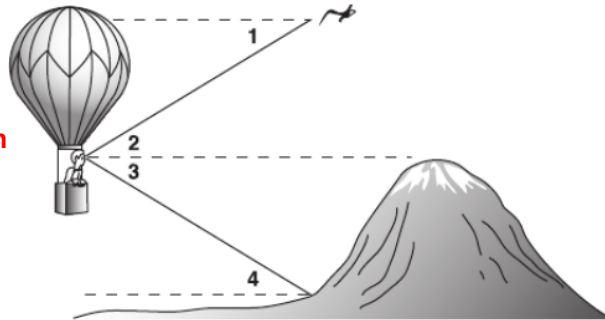
Angle made between a horizontal line
and a ray below the horizontal line

Angles of Elevation and Depression

Describe the following angles:

$\angle 2$ Angle of elevation from the person in the balloon to the bird

$\angle 3$ Angle of depression from the person in the balloon to the base of the hill



Using Angle of Elevation

What values could you measure to calculate the height of the tree?

*Hint: use the tangent

The person is 25 feet from the tree, with a line of sight 6 feet off of the ground and an angle of elevation at 55° . About how tall is the tree?



41.7 feet tall

Angle of Elevation from line of sight to tree top
Distance from the tree
Height of the line of sight

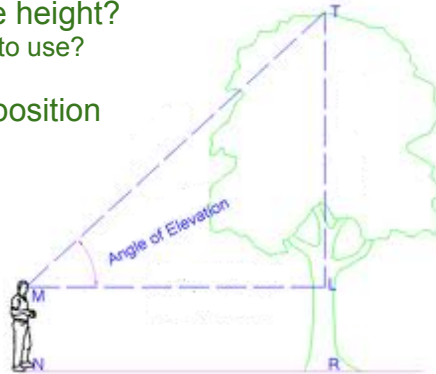
Using Angle of Elevation

How could the person position himself so it was easiest to calculate the height?

*Hint: What angle to use?

The person could adjust his position so the angle of elevation is:

30° , 45° , or 60°



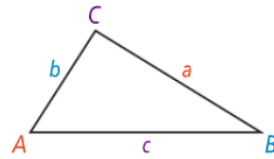
Angle of Elevation from line of sight to tree top
Distance from the tree
Height of the line of sight

Law of Sines

Key Concept Law of Sines

For any $\triangle ABC$, let the lengths of the sides opposite angles A , B , and C be a , b , and c . Then the **Law of Sines** relates the sine of each angle to the length of the opposite side.

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$



***Note: Not necessarily a right triangle.**

Using the Law of Sines

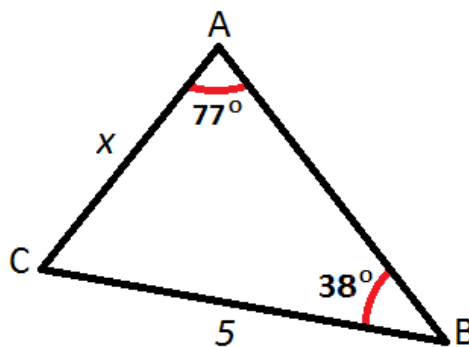
Solve for x.

$$\frac{\sin 77}{5} = \frac{\sin 38}{x}$$

$$x \sin 77 = 5 \sin 38$$

$$x = \frac{5 \sin 38}{\sin 77}$$

$$x = 3.16$$



Using the Law of Sines

Solve for $m\angle C$.

$$\frac{\sin 117}{8} = \frac{\sin C}{5}$$

$$8 \sin C = 5 \sin 117$$

$$\sin C = \frac{5 \sin 117}{8}$$

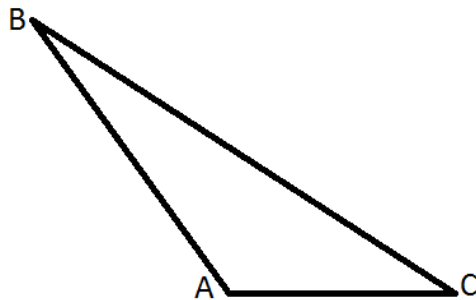
$$C = \sin^{-1}\left(\frac{5 \sin 117}{8}\right)$$

$$AB = 5$$

$$BC = 8$$

$$m\angle A = 117$$

$$m\angle C = 33.84$$



Application Problem

The Leaning Tower of Pisa in Italy makes an 85° angle with the ground and the short side of the tower measures 150.5 feet. The top of the tower and the farthest edge of its shadow are currently 191 feet apart. What is the approximate angle of elevation from the ground to the sun?

$$\frac{\sin 85}{191} = \frac{\sin x}{150.5}$$

$$x = 51.72^\circ$$

Homework

Pages 519 # 9 - 19 odd

Pages 525 - 526 # 6 - 18 even