

# Applications of Trigonometry: Angles of Elevation & Depression

## **Objectives:**

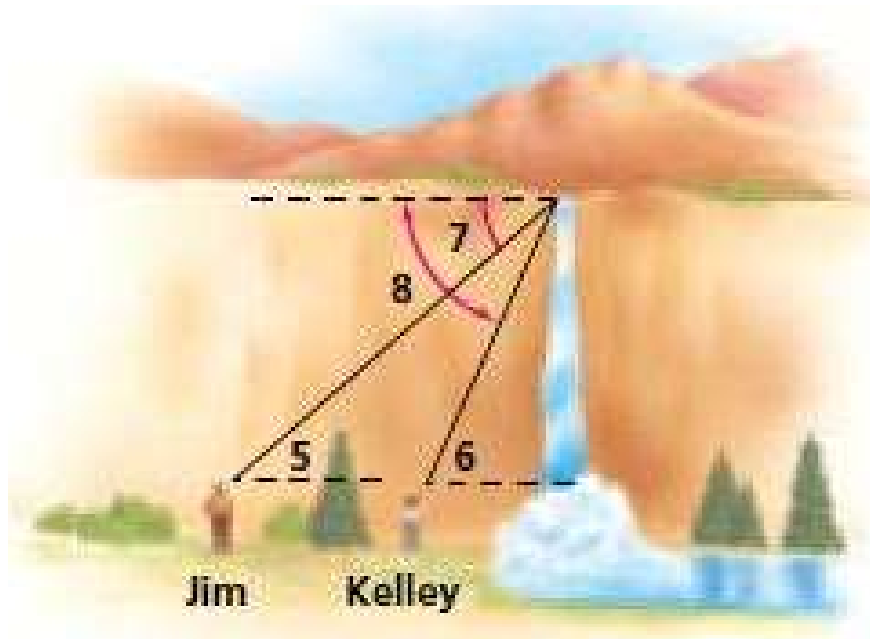
Understand, and correctly use, angles of elevation and depression  
Practice story problems

# Angles of Elevation & Depression

- Angles of elevation and depression are angles that are based off of a horizontal line
- Angle of Elevation: An angle that is **ABOVE** the horizontal line it touches
  
- Angle of Depression: An angle that is **BELOW** the horizontal line it touches

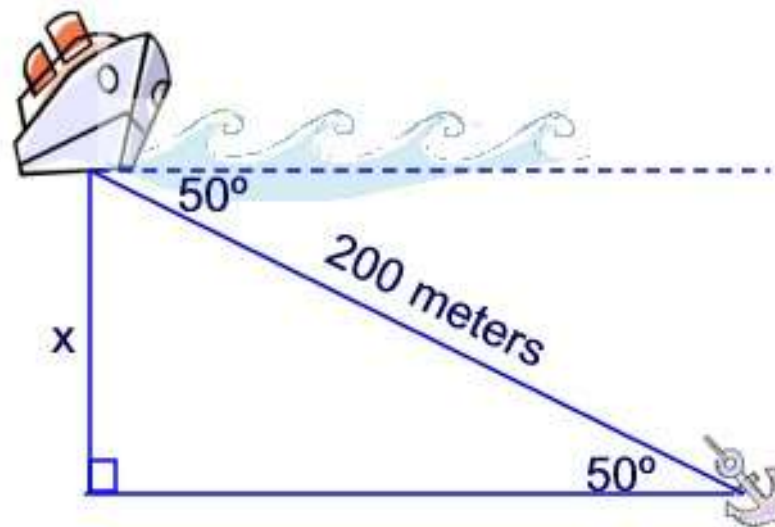
# Example

- Label each angle as either an angle of elevation or an angle of depression



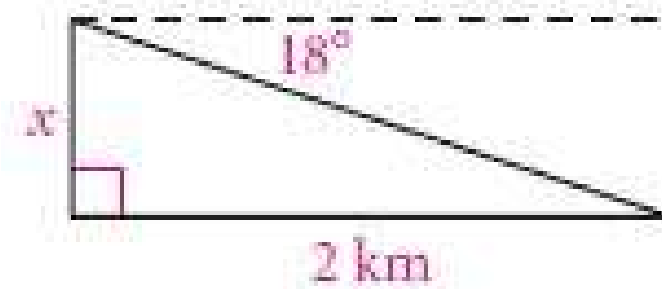
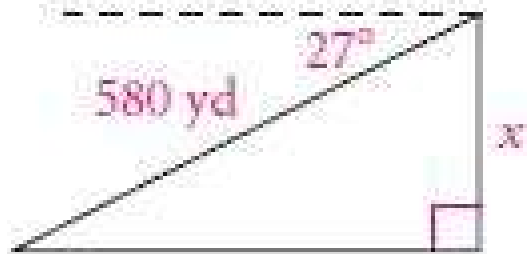
# Angles of Elevation & Depression and Alternate Interior Angles

- Sometimes angles of elevation or depression will be found **outside** of the right triangle. You can use the fact that alternate interior angles are congruent to label an angle inside of the triangle that is congruent to the angle of elevation or depression. Then you will be able to solve for the missing side length.



# Example

- Find the value of  $x$ . Round to the nearest tenth.



# Steps for Solving Trig Story Problems

1. Read the problem – Don't try to solve it yet!
2. Read the problem again and pick out key information (Angles and Distances)
3. Draw a picture (use a right triangle) and label it with the key information.
4. Set up a trig equation ( $\sin$ ,  $\cos$ ,  $\tan$ ,  $\sin^{-1}$ ,  $\cos^{-1}$ , or  $\tan^{-1}$ )
5. Solve the equation. Be sure to use appropriate units and rounding.

## Example

- You sight a rock climber on a cliff at a  $32^\circ$  angle of elevation. The horizontal ground distance to the cliff is 1000 ft. Find the line of sight distance to the rock climber.
  
- An airplane pilot sights a life raft at a  $26^\circ$  angle of depression. The airplane's altitude is 3 km. What is the airplane's surface distance from the raft?

- To approach runway 17 of the Ponca City Municipal Airport in Oklahoma, the pilot must begin a  $3^\circ$  descent starting from an altitude of 1707 feet above the airport. How many miles (Hint: 1 mile = 5280 ft) from the runway is the airplane at the start of this approach?
  
- To find the height of Delicate Arch in Arches National Park in Utah, a surveyor levels a measuring device with the bottom of the arch. She measures the angle of elevation to the top of the arch to be  $48^\circ$ . She measures the distance from where she stands to a point directly under the arch to be 36 ft. Find the height of the arch if the height of the measuring device is 5 ft.