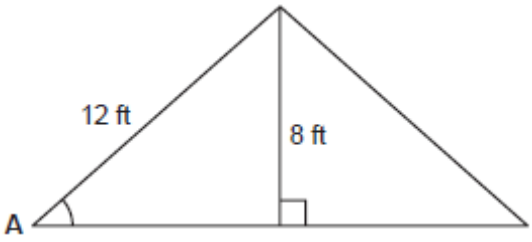
Name: _____ Date: _____

UNIT 6 **LESSON 6**

AIM: APPLICATIONS OF FINDING SIDES AND ANGLES USING SOHCAHTOA

Do Now: The center pole of a tent is 8 feet long, and a side of the tent is 12 feet long as shown in the diagram below. If a right angle is formed where the center pole meets the ground, what is the measure of angle *A* to the *nearest degree*?

1) 34
2) 42
3) 48
4) 56

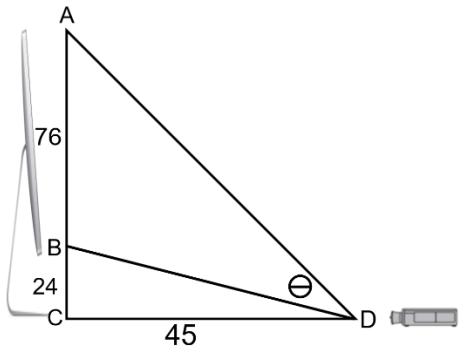


Using Trigonometry to Find Missing Angles in a Right Triangle
1. Choose sine, cosine, or tangent based on the information. 2. Set up equation. 3. Use inverse trig function (2nd sine/cosine/tangent & (Fraction)).

Example 1: As modeled below, a movie is projected onto a large outdoor screen. The bottom of the 76-foot-tall screen is 24 feet off the ground. The projector sits on the ground at a horizontal distance of 45 feet from the screen.

a) Determine and state, to the *nearest thousandth of a degree*, the measure of $\angle ADC$.

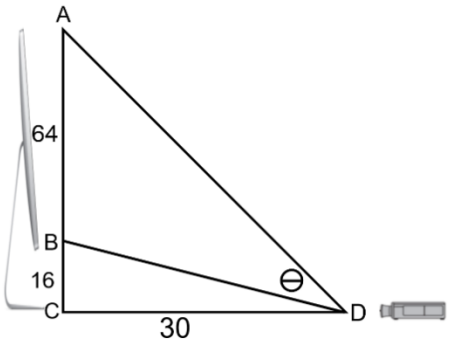
b) Determine and state, to the *nearest thousandth of a degree*, the measure of $\angle BDC$.



c) Determine and state, to the *nearest tenth of a degree*, the measure of θ, the projection angle.

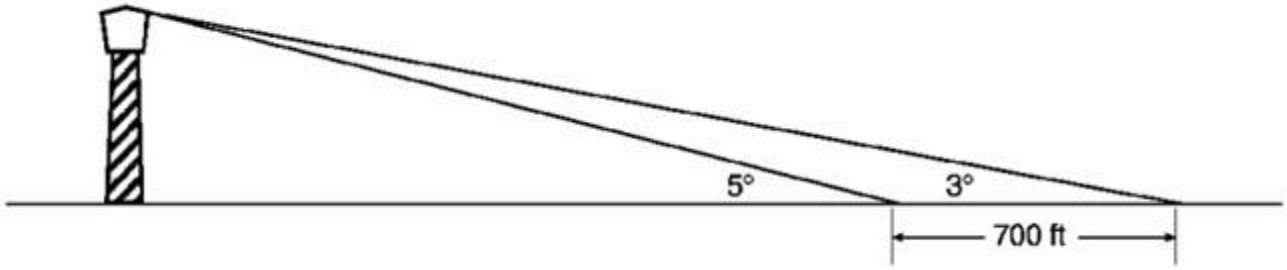
NOW YOU TRY ONE!

1. As modeled below, a movie is projected onto a large outdoor screen. The bottom of the 64-foot-tall screen is 14 feet off the ground. The projector sits on the ground at a horizontal distance of 30 feet from the screen. Determine and state, to the *nearest tenth of a degree*, the measure of θ, the projection angle.
(*Hint: Find the big angle of elevation, small angle of elevation and subtract!)*



WHAT IF WE SEE AN EXAMPLE LIKE THIS?

Example 2: While sailing a boat offshore, Donna see a lighthouse and calculates that the angle of elevation to the top of the lighthouse is $3°$, as shown in the accompanying diagram before. When she sails her boat 700 feet closer to the lighthouse, she finds that the angle of elevation is now $5°$. How tall, to the *nearest tenth of foot*, is the lighthouse?

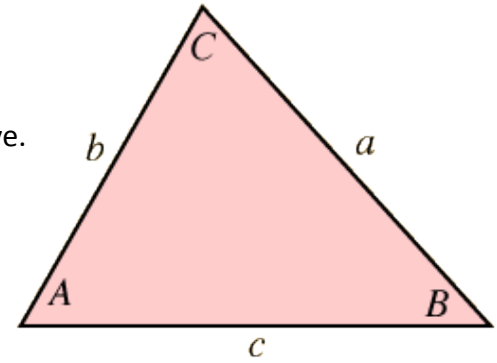


LAW OF SINES

- The **Law of Sines** states that the sine of an _____ is proportional to the side _____ the angle.

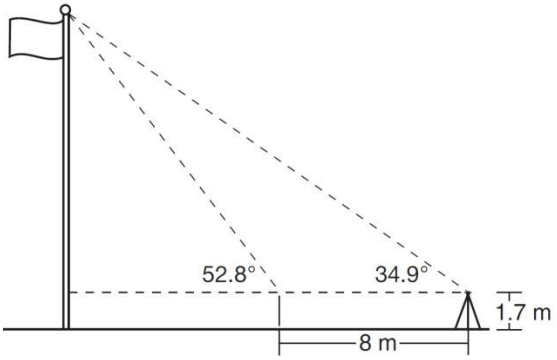
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

- We only use _____ of the possible ratios (depending on what is given to us), thus producing a proportion we can solve.
- Why use Law of Sines instead of SOHCAHTOA?
    - SOHCAHTOA is restricted to _____ triangles.
    - Law of Sines can be used in _____ triangle!



*Now, try solving the example above using Law of Sines! *FIND ALL ANGLE MEASURES FIRST!**

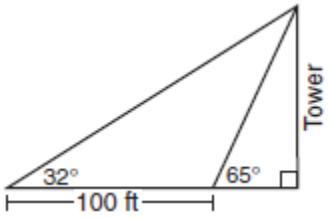
Example 3: Cathy wants to determine the height of the flagpole shown in the diagram below. She uses a survey instrument to measure the angle of elevation to the top of the flagpole, and determines it to be 34.9°. She walks 8 meters closer and determines the new measure of the angle of elevation to be 52.8°. At each measurement, the survey instrument is 1.7 meters above the ground.



Determine and state, to the nearest tenth of a meter, the height of the flagpole.

NOW YOU TRY ONE!

The accompanying diagram shows the plans for a cell-phone tower that is to be built near a busy highway. Find the height of the tower, to the nearest foot.

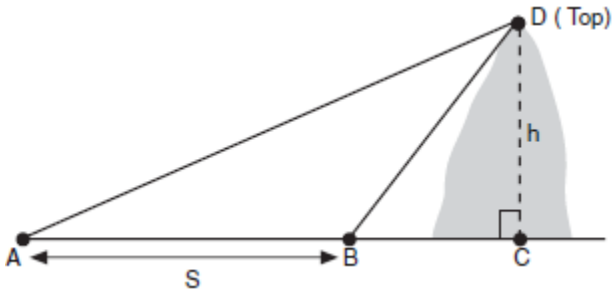


Name: _____ Date: _____

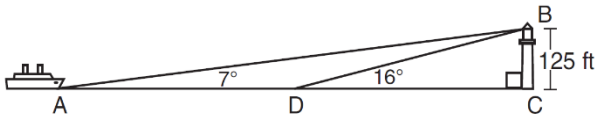
UNIT 6 **LESSON 6**

HOMEWORK

1. A ship at sea heads directly toward a cliff on the shoreline. The accompanying diagram shows the top of the cliff, *D,* sighted from two locations, *A* and *B*, separated by distance *S*. If $m\angle DAC = 30$, $m\angle DBC = 45$, and $S = 30$ feet, what is the height of the cliff, to the *nearest foot*?

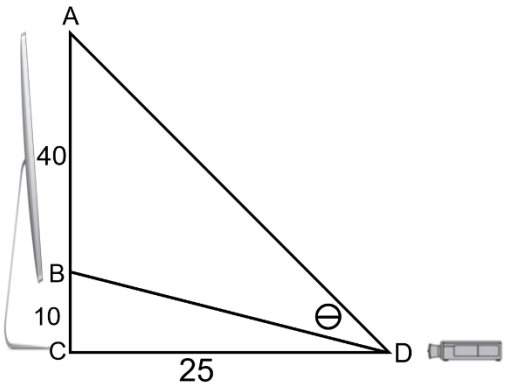


2. As shown in the diagram below, a ship is heading directly toward a lighthouse whose beacon is 125 feet above sea level. At the first sighting, point *A*, the angle of elevation from the ship to the light was 7°. A short time later, at point *D*, the angle of elevation was 16°.



To the *nearest foot*, determine and state how far the ship traveled from point *A* to point *D*.

3. As modeled below, a movie is projected onto a large outdoor screen. The bottom of the 40-foot-tall screen is 10 feet off the ground. The projector sits on the ground at a horizontal distance of 25 feet from the screen. Determine and state, to the *nearest tenth of a degree*, the measure of θ, the projection angle.
(*Hint: Find the big angle of elevation, small angle of elevation and subtract!)*



4. Triangle *ABC* is graphed on the set of axes below. Graph and label $\triangle A'B'C'$, the image of $\triangle ABC$ after a reflection over the line $x = 1$.