Name: _____ Date: _____
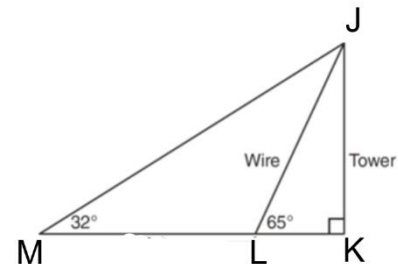
AIM: HOW DO WE FIND ANGLES USING SOHCAHTOA?

Do Now: The diagram below shows the plans for a cell phone tower. A guy wire attached to the top of the tower makes an angle of 65 degrees with the ground. From a different point on the ground, the angle of elevation to the top of the tower is 32 degrees. If the height of the tower is 88 feet:

a) To the nearest *hundredth of a foot*, determine the distance from point L to point K.

b) To the nearest *hundredth of a foot*, determine the distance from point M to point K.

c) To the nearest *foot*, determine and state the distance from point M to point L.

HOW DO WE FIND MISSING *ANGLES* USING SOHCAHTOA?

| STEPS	EXAMPLE
1. Use SOHCAHTOA to determine which trig function you are using. 2. Set up proportion (see below) $$\sin(Angle\ Measure) = \frac{opposite}{hypotenuse}$$ 3. Using the 2nd button in your calculator to get the inverse trig function, enter the ratio. ***DO NOT CROSS MULTIPLY!***	

Example 1: Using your calculator, evaluate each of the following. Round to the nearest whole number. What do you think the purpose of these inverse trig functions are?
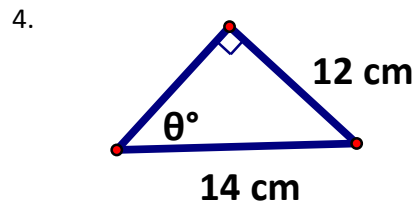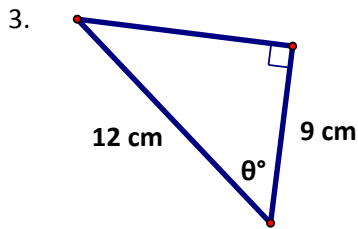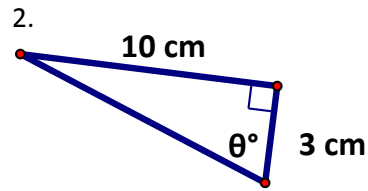
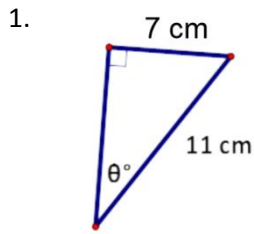$\sin^{-1}(.4384) =$ _____ $\cos^{-1}(.8290) =$ _____ $\tan^{-1}(.6009) =$ _____

Example 2: Given the right triangle below, determine the measure of $\angle E$ to the nearest degree by using your calculator and one of the inverse trig functions. Show your work and use proper notation.
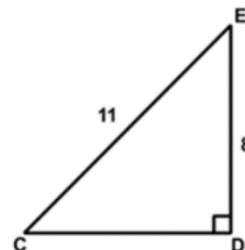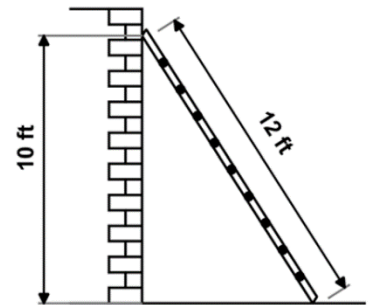
Example 3: Solve for the missing angle theta, θ, to *the nearest hundredth* of a degree.

1.
7 cm

11 cm

$\theta°$

2.
10 cm

$\theta°$ 3 cm

3.
12 cm

9 cm

$\theta°$

4.
12 cm

$\theta°$

14 cm

APPLICATIONS:

Example 4: A ladder will be unstable if the angle it makes with the ground is greater than 60°. If a 12 foot ladder is used to reach a window 10 feet above the ground, will it be unstable? Justify your answer.

10 ft

12 ft

Example 5: A 14 foot ladder leans against a wall, reaching 13 feet high on the wall. Determine the measure of the angle formed by the ladder and the ground, to the nearest degree.

Example 6: A boy who is 5 feet 6 inches tall casts a shadow that is 8 feet and 3 inches long. What is the measure of the angle of elevation of the sun, *A*, as show in the picture. Round to the nearest tenth. *Be careful with your units in this problem.*
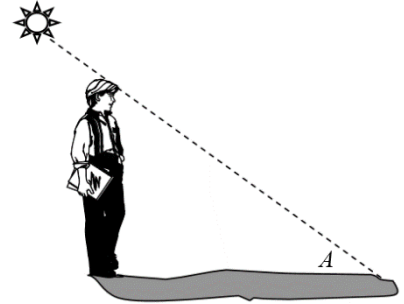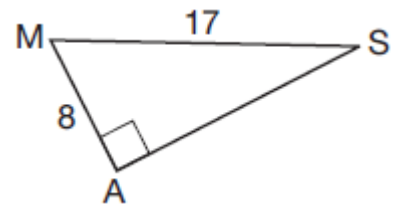

PRACTICE:

1. In right triangle *ABC* shown below, $AB = 18.3$ and $BC = 11.2$. What is the measure of $\angle A$, to the *nearest tenth of a degree?*

1) 31.5

2) 37.7

3) 52.3

4) 58.5
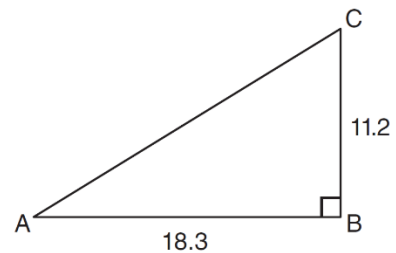
2. In the right triangle shown below, what is the measure of angle *S*, to the *nearest minute?*

3. A 12 foot ladder leans against a building. The foot of the ladder is 8 feet from the base of the building. Determine the measure of the angle formed by the ladder and the ground, to the nearest degree.

4. A support wire 20 meters long runs from the top of a utility pole to a point on the ground 17 meters from the base of the pole. What is the measure, to the *nearest degree*, of the angle formed by the pole and the wire?

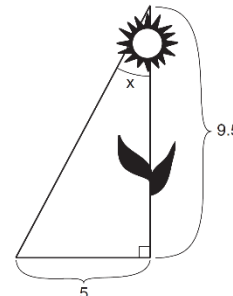### HOMEWORK

1. The diagram below shows the path a bird flies from the top of a 9.5-foot-tall sunflower to a point on the ground 5 feet from the base of the sunflower. To the *nearest tenth of a degree*, what is the measure of angle *x*?

1) 27.8

2) 31.8

3) 58.2

4) 62.2

2. A 16 feet ladder leans against a wall. The foot of the ladder is 7 feet from the wall. Determine the measure of the angle formed by the ladder and the ground, to the nearest degree.

3. In the diagram below of right triangle *KTW*, $KW = 6$, $KT = 5$, and $m\angle KTW = 90$. What is the measure of $\angle K$, to the *nearest tenth of a degree*?
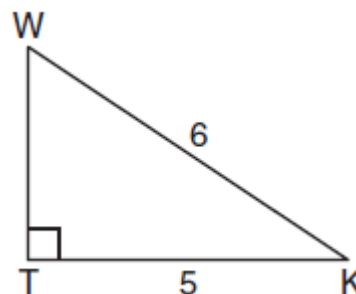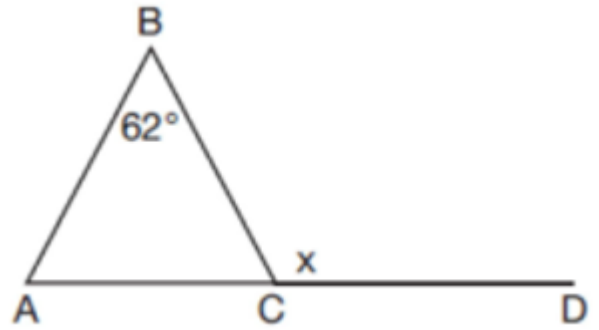
Review Question

4. As shown in the diagram below, a ladder 5 feet long leans against a wall and makes an angle of 65° with the ground. Find, to the *nearest tenth of a foot*, the distance from the wall to the base of the ladder.
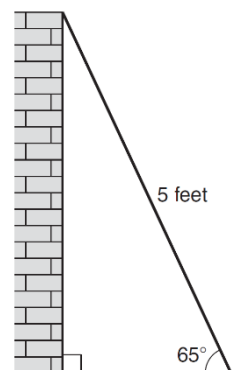
5. Given $\triangle ABC$ with $m\angle B = 62°$ and side $\overline{AC}$ extended to D, as shown below.

Which value of x makes $\overline{AB} \cong \overline{CB}$?

(1) 59°   (3) 118°
(2) 62°   (4) 121°

6. Which regular polygon has a minimum rotation of 45° to carry the polygon onto itself?

(1) octagon   (3) hexagon

(2) decagon   (4) pentagon

7. Describe a sequence of transformations that will map $\triangle ABC$ onto $\triangle DEF$ as shown below.