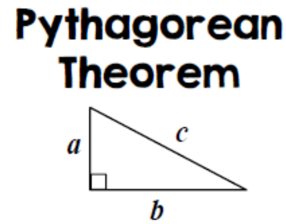
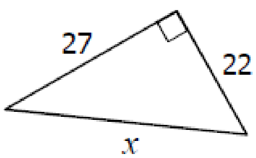
Unit 7 Lesson 1: Pythagorean Theorem & Intro to Trigonometry

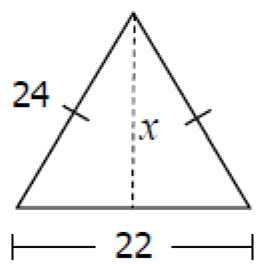


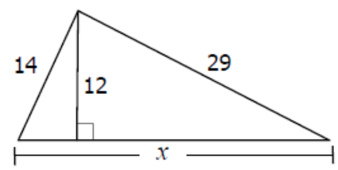
I. Pythagorean Theorem

- Used to find the missing ________________ of a _____________triangle.
- Sides *a* and *b* are called _________________________________.
- Side *c* is called the __________________.
- For any right triangle: ______________________________

Solve for x. Round to the nearest tenth.

1. 

2. 

3. 

4. A roofer leaned a 16 foot ladder against a house. If the base of the ladder is 5 feet from the house, how high up the house does the ladder reach?

II. Trigonometry

Trigonometry comes from the Greek words *trigonon* meaning _______________ and *metron* meaning __________________.

Officially it is the study of the ___________ and ________________ of a triangle.

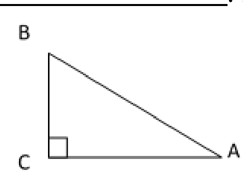
Developed from a need to compute ___________ and ______________________ in such fields as:

-
-
-

III. Labeling Sides of a Right Triangle

In a right triangle we usually refer to the sides of the triangle as ___________ and ______________________. When we study trigonometry we give these sides new names **(opposite, adjacent, and hypotenuse)**.

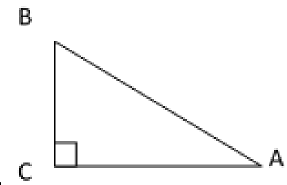
- The *longest* side of each right-angled triangle is called the ________________. It is easily found since it is *always* the side across from the ________________ angle.



The other two sides are called the opposite and adjacent sides. These sides are labeled in relation to an angle called the reference angle.

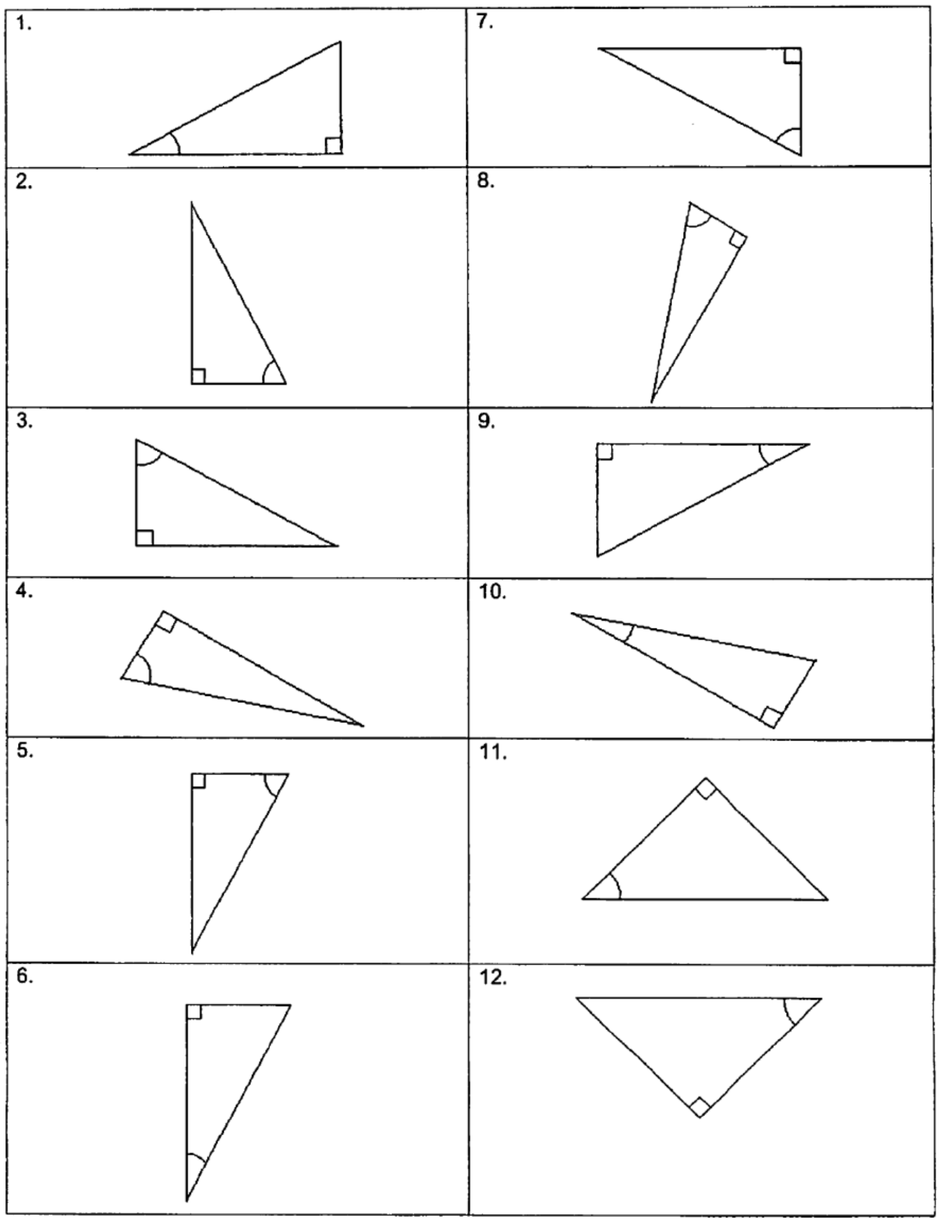
Reference Angle: ____

NEVER use the __________ angle as the reference angle!!!!!



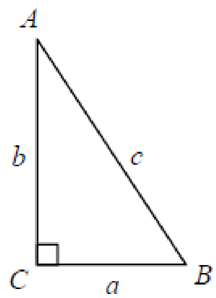
- The side *across* the triangle from the reference angle is called the ________________ side.
    - For angle A: ________ is opposite
    - For angle B: _________ is opposite
- The side that *helps form*, or *is next to*, the reference angle is called the ________________ side.
    - For angle A: _____ is adjacent to $\angle A$.
    - For angle B: _____ is adjacent to $\angle B$.

Label the sides of the triangles below with O for Opposite, A for Adjacent and H for Hypotenuse.



IV. Setting up Trig Ratios (fractions)

TRIGONOMETRIC RATIOS



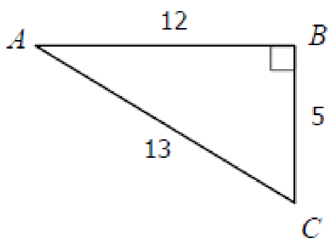
Each acute angle of a right triangle has the following trigonometric ratios:

SINE	The ratio of the leg **opposite** the angle to the **hypotenuse**.	• Sin A = _______ • Sin B = _______
COSINE	The ratio of the leg **adjacent** to the angle to the **hypotenuse**.	• Cos A = _______ • Cos B = _______
TANGENT	The ratio of the leg **opposite** the angle to the leg **adjacent** to the angle.	• Tan A = _______ • Tan B = _______

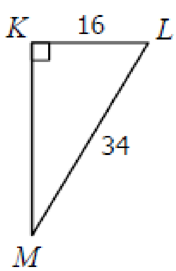
* REMEMBER!! *

______________ ______________ ______________

Sin = _________ *Cos* = _________ *Tan* = _________

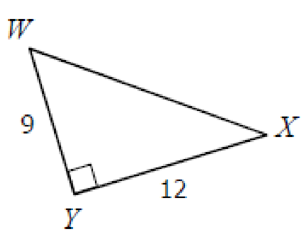
1. 

- Sin A = _______
- Cos A = _______
- Tan A = _______
- Sin C = _______
- Cos C = _______
- Tan C = _______

2. 

- Sin L = _______
- Cos L = _______
- Tan L = _______
- Sin M = _______
- Cos M = _______
- Tan M = _______

You Try!

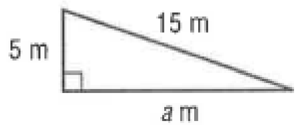
3. 

- Sin W = _______
- Cos W = _______
- Tan W = _______
- Sin X = _______
- Cos X = _______
- Tan X = _______

Unit 7 Lesson 1 HW Pythagorean Theorem & Intro to Trigonometry **Name: ______________________________**

I. Pythagorean Theorem

1. Find the missing side length



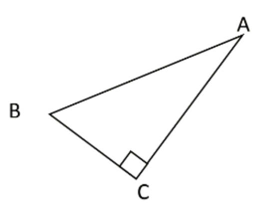
2. Find the missing side length in the right triangle ABC.
Let c represent the length of the hypotenuse.
$a = 7\ inches$ $b = 24\ inches$

3. Ashley jogged 3.4 miles east, then 5.7 miles south. How far is Ashley from her starting point?

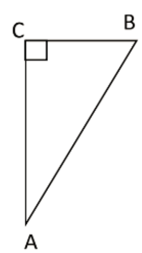
4. A 31 foot support wire is attached from the top of a 25 foot telephone pole to a point on the ground. How far from the base of the pole does the wire meet the ground?

II. Labeling Sides – Using the reference angle provided, label each side as O (opposite), A (adjacent), or H (hypotenuse).

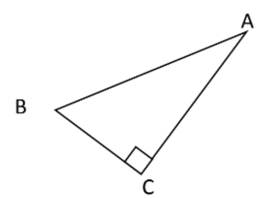
1. Reference Angle: A



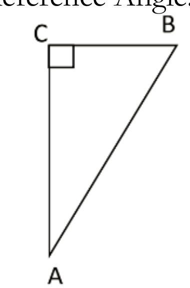
2. Reference Angle: A



3. Reference Angle: B

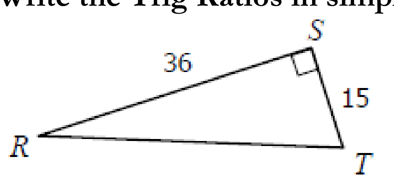


4. Reference Angle: B



III. Write the Trig Ratios in simplest form.

5.

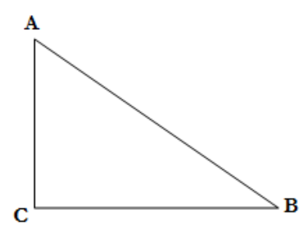


Sin R = ________ Sin T = ________

Cos R = ________ Cos T = ________

Tan R = ________ Tan T = ________

6. Find the missing trig ratios for angle A and B if $\sin A = \frac{20}{29}$



Unit 7 Lesson 2: Finding Missing Sides

I. Evaluating Trig Functions

Calculate each – fix settings on your calculator to do this (MODE-DEGREE). If rounding is necessary use three decimal places.

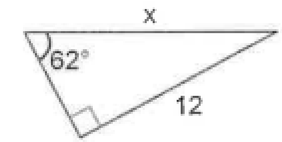
a. $\sin(53) = x$ b. $\cos(87) = x$ c. $\tan(32) = x$ d. $\cos(45) = x$ e. $\tan(10) = x$ f. $\sin(37) = x$

II. Using Trig to Solve

1. Identify the Reference Angle (should be marked – remember it cannot be the ______________________________)!
2. Label the sides of the triangle (opposite, adjacent, hypotenuse) with respect to your reference angle.
3. Identify the trig function you should use (sin, cos, tan) based on the sides that are labeled
4. Solve for x.

Find the missing side length using your knowledge of trig ratios.

1.



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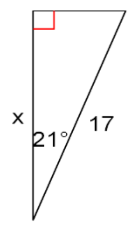

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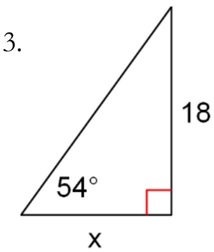

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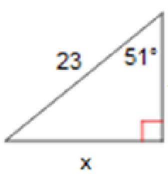

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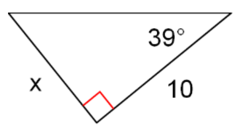

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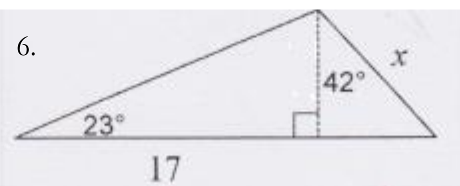

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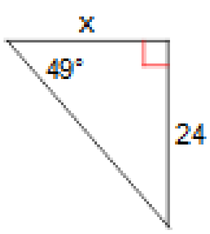

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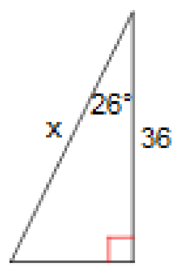

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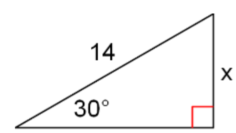
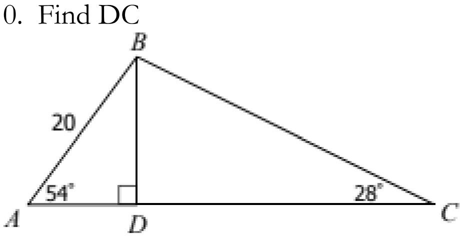
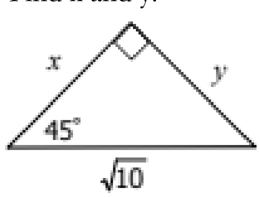


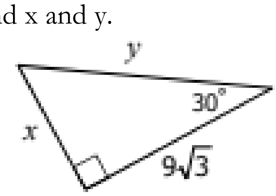
10. Find DC



11. Find x and y.



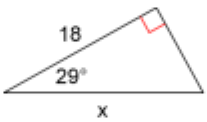
12. Find x and y.



13. Jake leaned a 12 foot ladder against his house. If the angle formed by the ladder and the ground is 68°, how far from the base of the house did he place the ladder?

Unit 7 Lesson 2 HW Name: ______________________

I. Solve for the missing side length. Round to the nearest tenth!

1.


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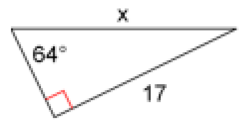

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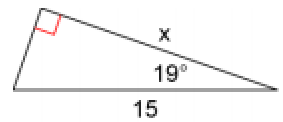

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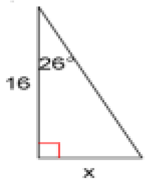

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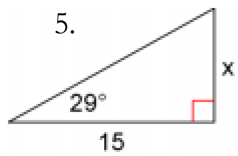

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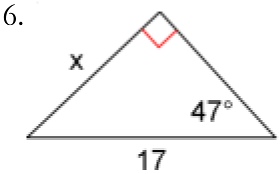

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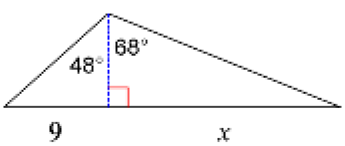
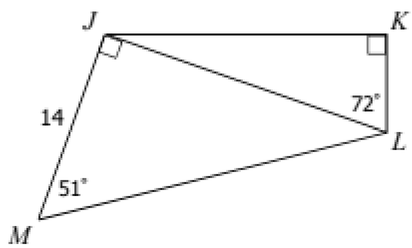
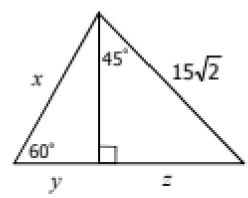


8. Find KL


9. Find x, y and z


10. A ramp is used to load suitcases on an airplane. If the cargo door is 7 feet from the ground and the angle formed by the end of the ramp and the ground is $25°$, how long is the ramp?

II. In ΔABC, which trigonometric ratio is represented for the given angle? Let angle C be a right angle.

12. $\frac{15}{8}$; $\angle A$

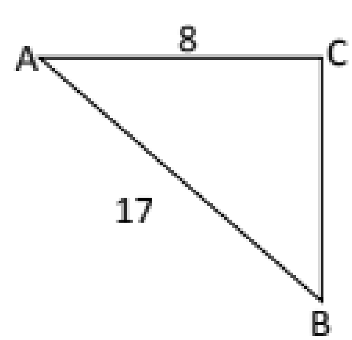
13. $\frac{8}{17}$; $\angle A$

14. $\frac{15}{17}$; $\angle A$

15. $\frac{8}{17}$; $\angle B$

16. $\frac{8}{15}$; $\angle B$

17. $\frac{15}{17}$; $\angle B$



Unit 7 Lesson 3 Notes Solve for Missing Angle **Name: ______________________________**

In previous lessons we learned how to use sine, cosine, and tangent to find the lengths of the _____________ of a right triangle. In each of those problems we were given the angle measure. What if we need to determine the angle measure given the side length? As with solving an algebraic equation, we need to be able to "___________" or find the inverse of a trig function in order to find the _____________ instead of the ________________.

$sin^{-1}(x)$ is read as the ________________. This "undoes" sin so that you are able to find x. What does the x represent?

$cos^{-1}(x)$ is read as the _______________. This "undoes" cos so that you are able to find x. What does the x represent?

$tan^{-1}(x)$ is read as the _______________. This "undoes" tan so that you are able to find x. What does the x represent?

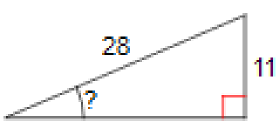
Examples: Solve for x. Round your answer to the nearest tenth.

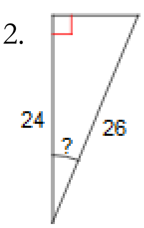
1. $\sin(x) = \frac{1}{2}$

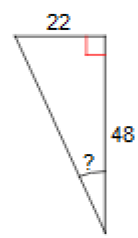
2. $\cos(x) = 1$

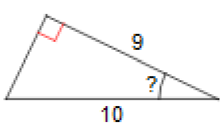
3. $\tan(x) = \frac{3}{2}$

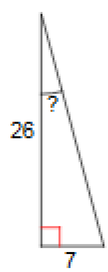
Solve for the missing angle. Round to the nearest tenth.

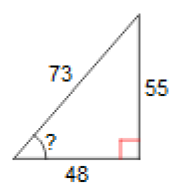
1. 

2. 

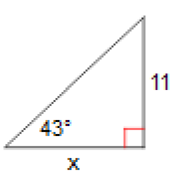
3. 

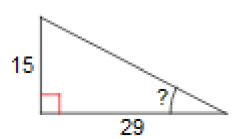
4. 

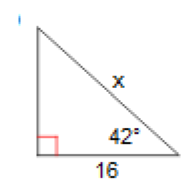
5. 

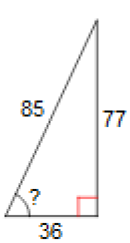
6. 

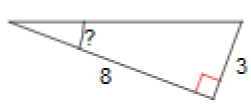
Solve for the missing side or angle.

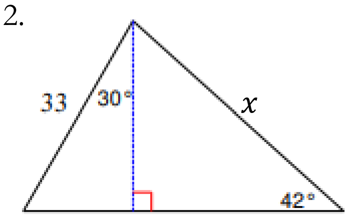
7. 

8. 

9. 

10. 

11. 

12. 

Right Triangle Trig Math Lib

Unit 7 Lesson 3 HW **Name: ____________________**

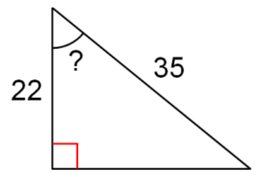
I. Solve for the missing angle measure. Round to the nearest tenth!

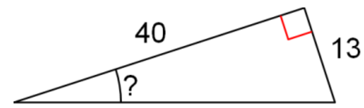
1. $\sin x = 0.6561$

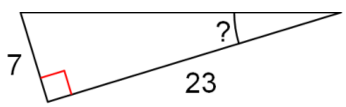
2. $\tan x = 0.7265$

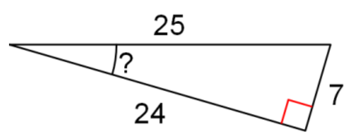
3. $-1 \cos x = -0.72$

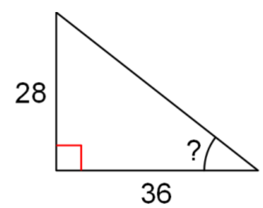
4. $4 \cos x - 6 = -5.2$

5. 

6. 

7. 

8. 

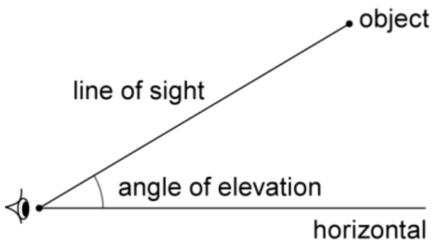
9. 

10. Your cat is trapped on a tree branch that is 6.5 meters above the ground. You have a ladder but it is only 6.7 meters long. If you place the ladder's tip on the branch, what angle will the ladder make with the ground?

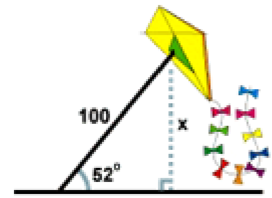
Unit 7 Lesson 4 Notes Angles of Elevation and Depression

Angle of Elevation: ____

____

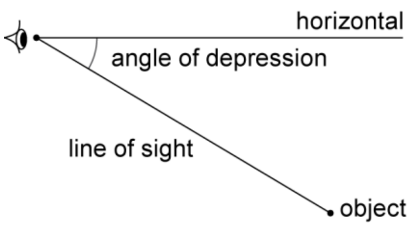


Example: A man flies a kite with a 100 foot string. The angle of elevation of the string is 52°. How high off the ground is the kite?

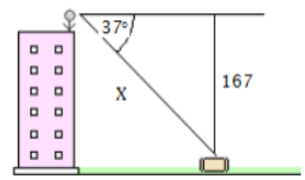


Angle of Depression: ____

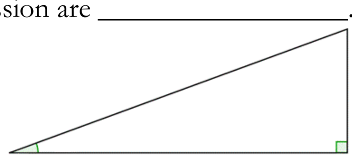
____



Example: A princess is on the top of a 167 foot tower looking down at a 37° angle of depression at a package attached to a rope on the ground. How long is the rope?



The angle of elevation and angle of depression are ________________. For this reason, you are able to draw each triangle the same.



1. From the top of a vertical cliff 40 meters high, you notice a rock that is level with the base of the cliff. The angle of depression to the rock is 34°. How far is the rock from the base of the cliff?

2. A submarine at the surface of the ocean makes and emergency dive, its path making an angle of 21° with the surface. If it travels 300 meters along its downward path, how deep will it go?

3. An engineer stands 50 feet away from a building and sights the top of the building with a surveying device mounted on a tripod. If the surveying device is 5 feet above the ground and the angle of elevation is 50°, how tall is the building?

4. A guy write is stretched from the top of a broadcasting tower to an anchor making an angle of 58° with the ground. The wire is anchored 200 feet from the base of the tower. How tall is the tower **and** how long is the guy wire?

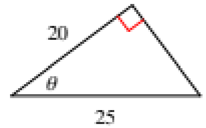
5. From an airplane at an altitude of 1200 meters, the angle of depression to a building on the ground measures 28°. Find the distance from the plane to the base of the building.

Angle of Elevation & Depression Math Lib and Stations Activity

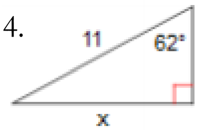
I. Trig Ratios

Write each trig ratio for θ in simplest form.

1. $\sin(\theta) =$ 2. $\cos(\theta) =$ 3. $\tan(\theta) =$



II. Solve for the missing variables or the ? using Trigonometry. Round to the nearest tenth.

4.


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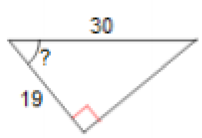

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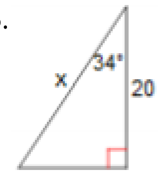

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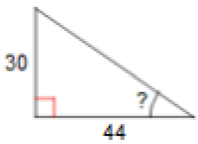

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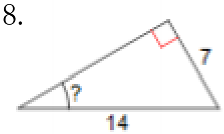

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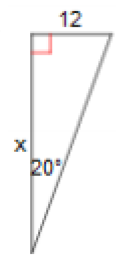
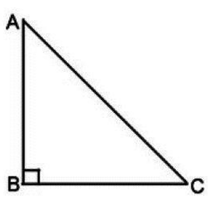
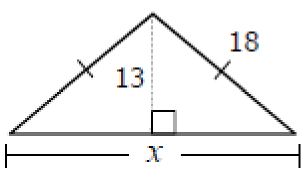


10. For the triangle below, if $\cos C = \frac{15}{17}$, what is $\cos A$?



11. $4\cos x - 1 = 2$

12.


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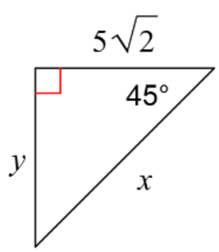

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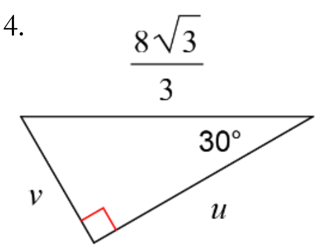
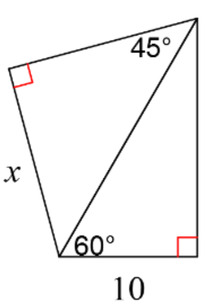


15.


III. Application Problems. Round to the nearest tenth.

16. The radar from a ship on the surface of the water detects a submarine 238 feet away at an angle of depression of $23°$. How deep underwater is the submarine?

17. A radio station tower was built in two sections. From a point 87 feet from the base of the tower, the angle of elevation to the top of the first section is $25°$ and the angle of elevation to the top of the second section is $40°$. To the nearest tenth of a foot, what is the height of the top section of the tower?

18. A tower, 28.4 feet high, must be secured with a guy wire anchored 5 feet from the base of the tower. What angle will the guy wire make with the ground?

19. An airplane takes off 200 yards in front of a 60-foot-tall building. To the nearest tenth, at what angle of elevation must the plane take off in order to avoid crashing into the building?

20. A person stands at the window of a building so that his eyes are 12.6 meters above the level ground. An object is on the ground 58.5 meters away from the base of the building. Compute the angle of depression of the person's line of sight to the object on the ground. Round to the nearest tenth.

21. An Olympic-size swimming pool is approximately 50 meters long by 25 meters wide. What distance will a swimmer travel if they swim from one corner to the opposite corner?