Geometry

UNIT 6 AGENDA - TRIG RATIOS

Name: _____

DATE	DAY	LESSON	Pages	HOMEWORK
THURS 1/5	6.1	WELCOME BACK!!! Intro to Trig	2 – 3	DeltaMath 6.1 due 1/13
FRI 1/6	6.2	Cofunctions	4 – 5	
MON 1/9	6.3	Trig Ratios (Side Lengths)	6 – 8	
TUES 1/10	6.4	Trig Ratios (Side Lengths) Math Libs & Practice	9 – 10	Finish Practice Pages 9 & 10
WED 1/11	6.5	Applications of Trig Ratios	11 – 13	
THURS 1/12	6.6	Review for Quiz	14 – 15	DM & Quiz Review due FRIDAY!
FRI 1/13	6.7	QUIZ TODAY	--------	
MON 1/16		NO SCHOOL - MLK DAY		

Agenda is subject to change!!!

Geometry – DAY 6.1
Trigonometric Ratios

Name: _____

Date: _____

Triangle Sides (based on θ)

_____   _____

_____
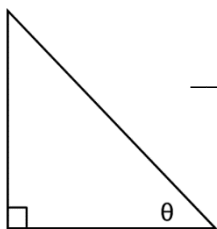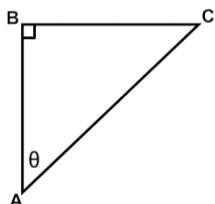
Which side is the hypotenuse? _____   Which side is the hypotenuse? _____
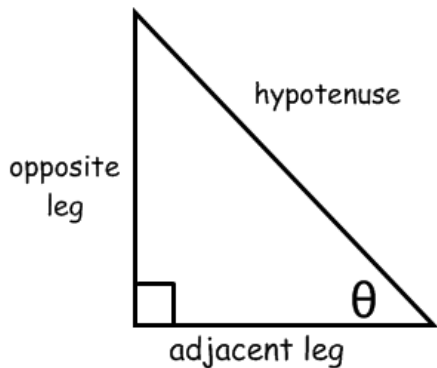
Which leg is opposite θ? _____   Which leg is opposite θ? _____

Which leg is adjacent to θ?_____   Which leg is adjacent to θ?_____
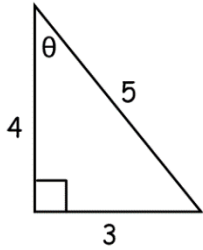
What are the Trigonometric Ratios?

SohCahToa

SOH _____ equals _____ over _____

CAH _____ equals _____ over _____

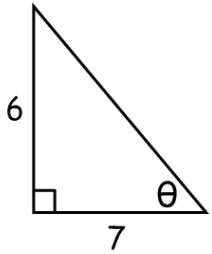TOA _____ equals _____ over _____

How do we use these ratios?

$$\sin \theta = \underline{\hspace{1.5cm}} = \underline{\hspace{1.5cm}}$$

$$\cos \theta = \underline{\hspace{1.5cm}} = \underline{\hspace{1.5cm}}$$

$$\tan \theta = \underline{\hspace{1.5cm}} = \underline{\hspace{1.5cm}}$$

Find the missing side and evaluate each for sin θ, cos θ, and tan θ.

$$\sin\theta = \frac{o}{h} = \underline{\hspace{2cm}}$$

$$\cos\theta = \frac{a}{h} = \underline{\hspace{2cm}}$$

$$\tan\theta = \frac{o}{a} = \underline{\hspace{2cm}}$$

How would you solve the following problem?

Suppose ∠J and ∠K are complementary angles in a right triangle. The value of $\tan J = \dfrac{12}{5}$. What is the value of sin J?

1. Draw and label a triangle for the problem.

2. Use the given trig ratio to label the lengths of two sides. Then use the Pythagorean Theorem to find the third side.

3. Using the measures of the sides of the triangle, find sin J.

Try this one...

Suppose ∠A and ∠B are complementary angles in a right triangle. The value of $\sin A = \dfrac{7}{14}$. What is the value of cos A?
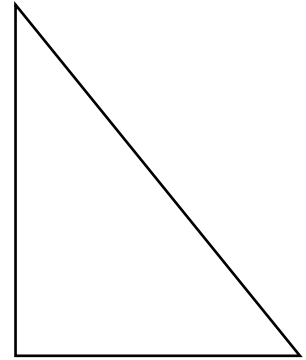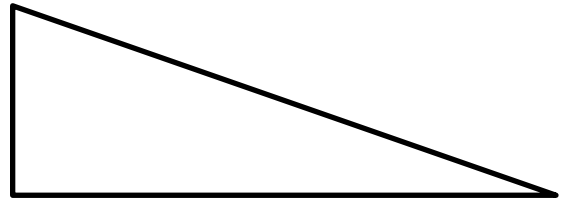
Let's look at the relationship between our trig ratios.

- Start with a right triangle $\triangle ABC$ where $\angle B = 90°$
- The acute angles will always be _____.
    - If $\angle A = 30°$, then $\angle C = $ _____
    - If $\angle A = 45°$, then $\angle C = $ _____
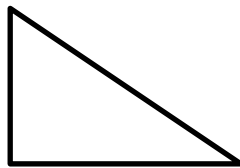   - If $\angle A = 22°$, then $\angle C = $ _____

- Let's summarize:
    - If $\angle A = \theta$, then $\angle C = $ _____
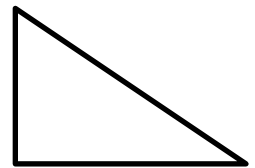
For each of the following find the trigonometric ratio.

$\sin\theta = $ _____

$\cos\theta = $ _____

$\tan\theta = $ _____

$\sin(90-\theta) = $ _____

$\cos(90-\theta) = $ _____

$\tan(90-\theta) = $ _____

Trigonometry Co-Functions

sin θ° =   **cos θ° =**   **tan θ° =**

Use co-functions to answer the following:

1. $\sin\theta = \dfrac{21}{29}$

   $\cos(90-\theta) = $ ——

2. $\cos\theta = \dfrac{8}{17}$

   $\sin(90-\theta) = $ ——

3. $\tan\theta = \dfrac{12}{37}$

   $\tan(90-\theta) = $ ——

4. $\sin 15 = \cos$ _____

5. $\sin$ _____ $= \cos 54$

6. $\sin 11 = \cos$ _____

7. Is it ever possible that sin(x) = cos(x). Explain your reasoning.

Draw $\triangle ABC$ where $\angle B = 90°$ and $\cos A = \dfrac{6}{10}$.

8. What is the length of AB? _____

9. What is cos C? _____

10. What is sin A? _____

11. In right $\triangle ABC$: $m\angle C = 90°$. If $\sin A = m$, then $\cos B =$ _____ .

    A. 90 – m   B. 45 – m   C. 90 + m   D. m

12. If $\cos 40 = \sin\theta$, then $\theta =$ _____ .

    A. 40°   B. 50°   C. 60°   D. 90°

13. If $\sin 71 = \cos\theta$, then $\theta =$ _____ .

    A. 71°   B. 35°   C. 29°   D. 19°

14. In $\triangle ABC$: $m\angle C = 90°$. If $\sin A = \dfrac{1}{4}$, then _____ $= \dfrac{1}{4}$. (There are 2 answers!)

    A. sin(B)   B. cos(B)   C. cos(90-A)   D. cos(90-B)

15. In $\triangle ABC$: $m\angle C = 90°$. If $\sin A = 3x - 0.6$ and $\cos B = 4x - 0.9$, then $x =$ _____ .

    A. 0.3   B. 0.4   C. 0.6   D. 1.5

WARM-UP – Numbers 1 – 11

1. $\dfrac{4}{\sqrt{6}}$

2. $\dfrac{\sqrt{5}}{2\sqrt{3}}$

3. Find the exact value of the three trig functions for the triangle below.

sin θ =   cos θ =   tan θ =
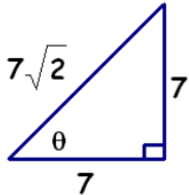
4. Sketch the triangle and find the other 2 trig functions of the <u>acute</u> angle.

   A. cos θ = $\dfrac{3}{4}$ B. tan θ = 6

5. Find the cosine and sine of the acute angles in the triangle shown.
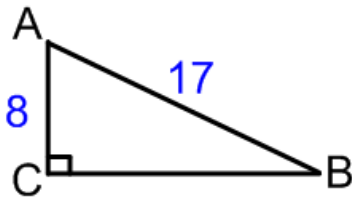
The trigonometric function of the complement of an angle is called a _____. Sine and cosine are cofunctions of each other.

Use co-functions to answer the following:

6. $\sin\theta = \dfrac{13}{30}$

$\cos(90-\theta) = $ ——

7. $\cos\theta = \dfrac{5}{19}$

$\sin(90-\theta) = $ ——

8. $\tan\theta = \dfrac{22}{17}$

$\tan(90-\theta) = $ ——

9. $\sin 62° = \cos$_____

10. $\sin$_____$= \cos 19°$

11. $\sin 28° = \cos$_____

Using the Calculator

**You must always remember to check your calculator. It needs to be in _____ mode in order to calculate the answers correctly.

Let's make sure you can use your calculator. Round your answers to two decimal places.

sin 48° [   ]   tan 22° [   ]   cos 52° [   ]

How would you solve these equations?

$$\sin 20° = \frac{a}{12}$$

$$\cos 80° = \frac{25}{b}$$

When given an acute angle measure and a side length, we can use trig to find another side length of the triangle.
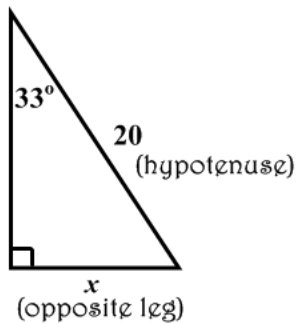
Which trig ratio contains "hypotenuse" and "opposite leg"?

Write an equation that would allow us to solve for x. Then, solve for x.

Let's try another one.
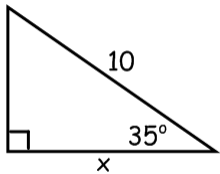
One More. . .
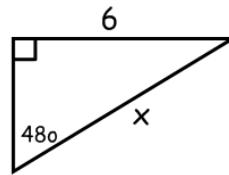
Work with your neighbor on these problems.
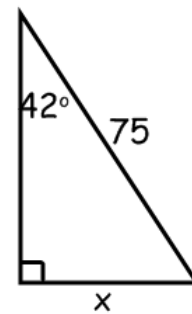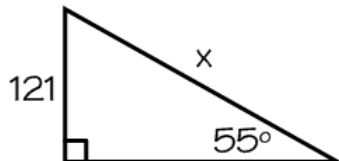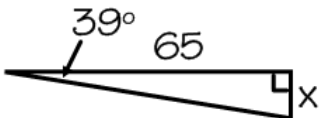
Find x and y.
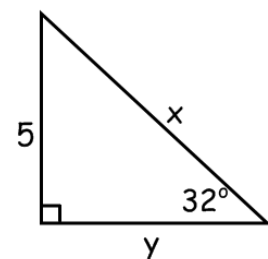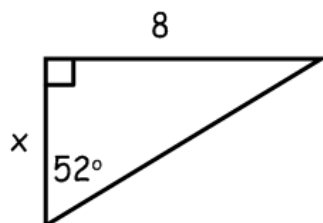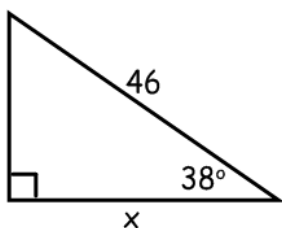
Geometry – DAY 6.3   Name_____

Classwork – Trigonometric Ratios (Day 2)   Date _____

Use the figure for Exercises 1–6. Write each trigonometric ratio as a simplified fraction.

1. sin A

_____

2. cos B

_____

3. tan B

_____

4. sin B

_____

5. cos A

_____
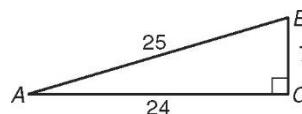
6. tan A

_____

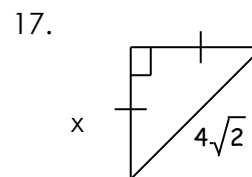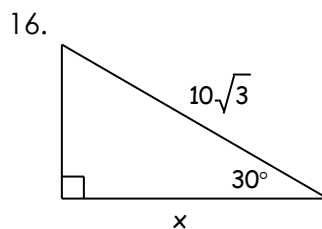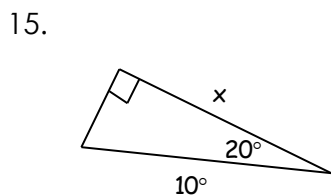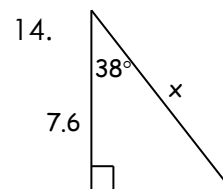**Sketch the triangle and find the other two trig functions of the acute angle.**

7. $\sin \theta = \dfrac{5}{7}$

8. $\tan \theta = 7$

Complete each statement.

9. The sin of 40° is equal to the _____ of 50°.

10. The sin of 25° divided by the cos of 25° is equal to the _____ of 25°.

11. The _____ of 10° is equal to the sin of 10° divided by the tan of 10°.

Find the measure of each side indicated. Round the answers to the nearest hundredth.
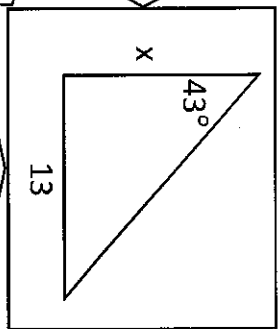
12.

13.

14.

15.

16.

17.
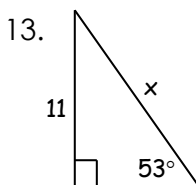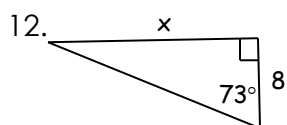
Trigonometric Ratios Maze

Name _____

Solve for x in each problem.

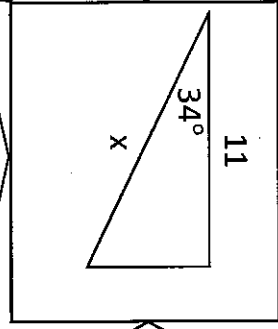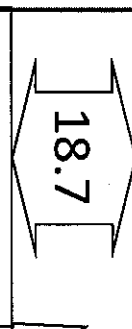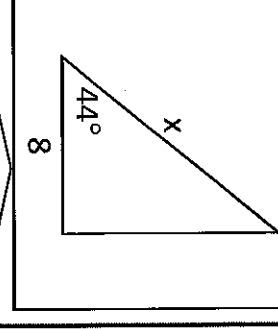Start at the "Start" box and work your way through the maze until you reach the "Finish" box.

Start

15, x, 38°

18.7

57°, 16, x

13.4

51°, x, 10

19.0

13.9

14.2

10.5

12.9

x, 43°, 13

12.6

x, 39°, 17

12.4

54°, x, 17

12.7

13.8

13.2

13.5

13.7

11, 34°, x

13.3

x, 61°, 27

12.9

4, x, 37°

12.9

12.3

13.1

13.3

12.5

44°, x, 8

12.5

10, x, 52°

12.7

Finish

Some boxes might not be used
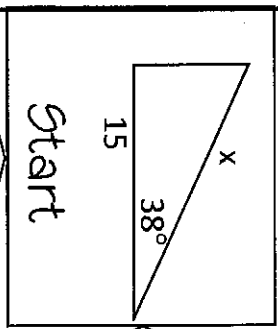
Geometry - DAY 6.3

Name_____

Classwork - Part 2

Date_____ Period_____
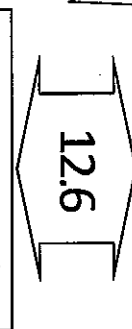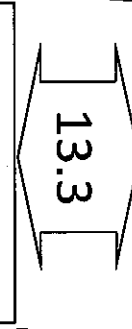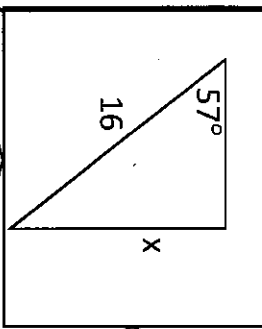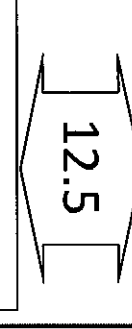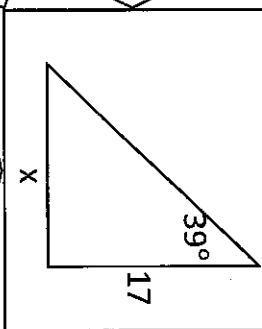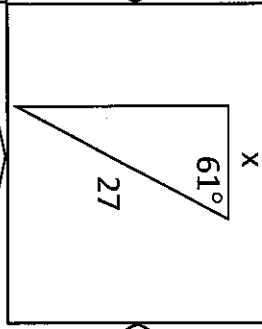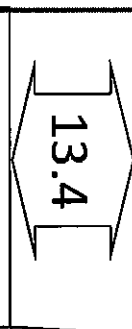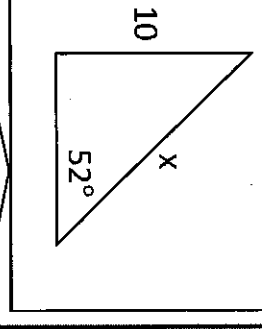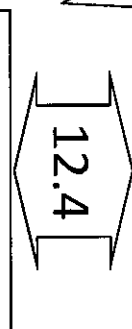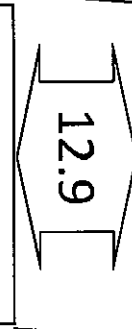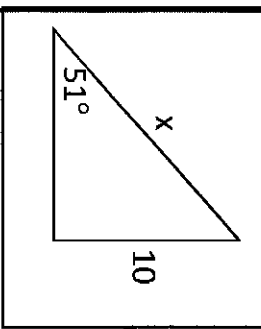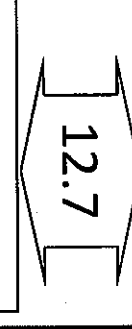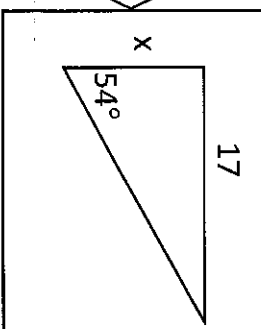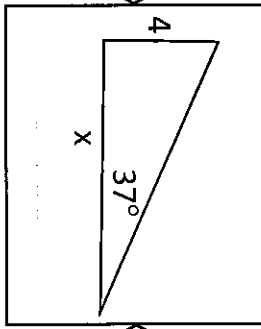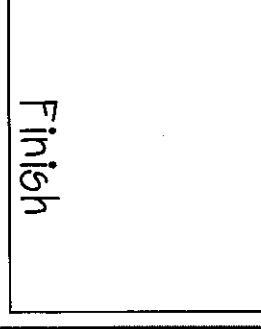
Find the value of each trigonometric ratio.

1) tan A
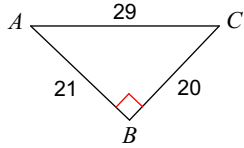
2) sin X

Find the missing side. Round to the nearest tenth.

3)

4)

5)

6)

7)

8)

9)

10)

Page 10
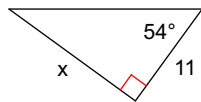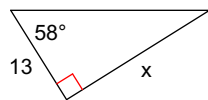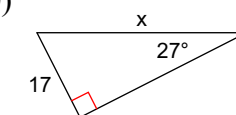
Geometry – DAY 6.5   **Name:** _____
Applications of Trig (Side Lengths)   **Date:** _____

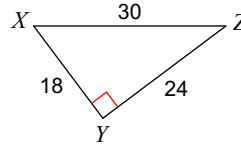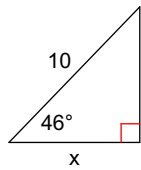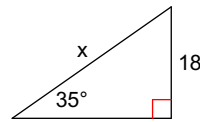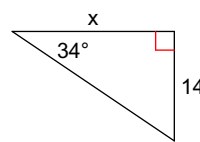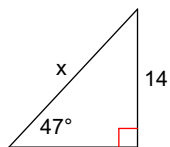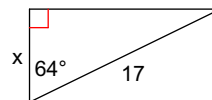## Warm-up: Find the missing side length.

1.

15 21°
x

2.

x 11 29°

3.

10 51°
x
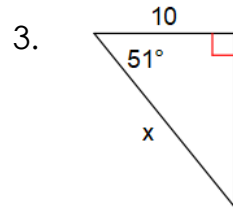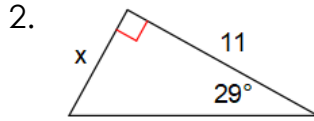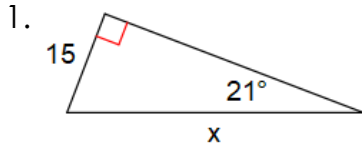
Elevation vs Depression

The _____ is the angle from the
horizontal <u>looking up</u> to some object.

angle of elevation
Line of Sight
horizontal
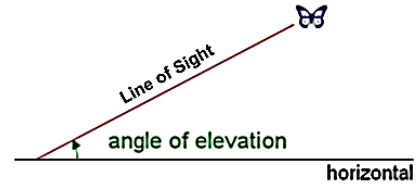
The _____ is the angle from the
horizontal <u>looking down</u> to some object.

horizontal
angle of depression
Line of Sight

B x C A
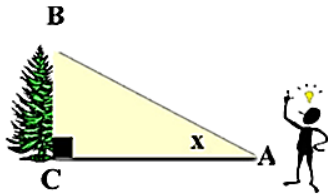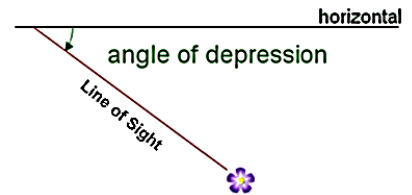
In the diagram at the left, x marks the angle of _____
of the top of the tree as seen from a point on the ground.

It is always _____ the triangle.

B x C A
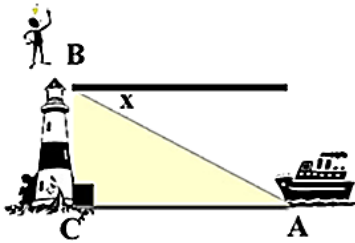
In the diagram at the left, x marks the angle of _____
of a boat at sea from the top of a lighthouse.

It is always _____ the triangle.

Horizontal Line
55°
Angle of depression
Angle of Elevation
Horizontal Line 55°
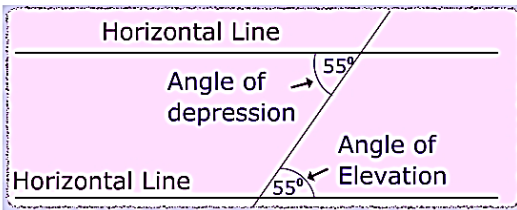
**Why does it appear that an angle of elevation
and an angle of depression are the SAME?**

- parallel lines cut by a _____

- _____ _____ _____ are congruent

Steps to Solving Trig Word Problems

1. _____

2. _____

3. _____

Examples.

1. A tree casts a shadow 21 m long. The angle of elevation of the sun is 51°. What is the height of the tree?

2. A ladder 5 m long leans against a vertical wall and makes a 65° angle with the ground. How far is the foot of the ladder from the wall?

3. A small airplane climbs at an angle of 18° with the ground. Find the horizontal distance it has flown when it has reached an altitude of 800 m.

4. You are looking at a painting on the wall at the High Museum in Atlanta. You are standing 10 feet from the wall. Your angle of elevation to view the painting is 20°. (Your eyes are about 5 feet above the floor). Find how high the top of the painting is from the floor.

5. A little boy is flying a kite. The string of the kite makes an angle of 30° with the ground. If the kite is 9 meters in the air, find the length (in meters) of the string the boy used.

6. An operator at the top of a lighthouse sights a sailboat. The point from which the sighting is made is 24 m above sea level. The angle of depression of the sighting is 10°. How far is the boat from the base of the lighthouse?

7. A guy wire reaches from the top of a 120 m television transmitter tower to the ground. The wire makes a 63° angle with the ground. Find the length of the guy wire.

Geometry – DAY 6.5
**Classwork –Applications of Trig (Side Lengths)**

Name: _____

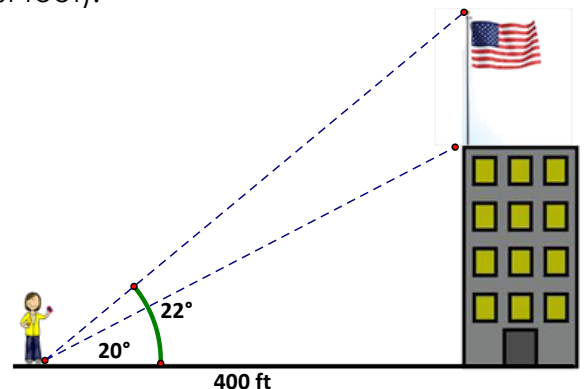Date: _____

Round all answers to the nearest hundredth.

1. At a point 20 meters from a flagpole, the angle of elevation of the top of the flagpole is 48°. How tall is the flagpole?

2. A woman looks out from the top of a cliff to the ocean below. In the distance is a boat. If the boat is 3200 feet from the base of the cliff and the angle of depression to the boat is 15°, what is the direct distance from the woman to the boat?

3. As it leans against a building, a 9-meter ladder makes an angle of 55° with the ground. How far up the building does the ladder reach?

4. An owl is located in a huge oak tree and sees a food bowl for dogs in the distance. If the base of the tree is 250 feet from the food bowl, and the angle of depression from the owl is 20°, then what is the direct distance from the owl to the food bowl?

5. A flagpole is at the top of a building. 400 ft from the base of the building, the angle of elevation of the top of the pole is 22° and the angle of elevation of the bottom of the pole is 20°. Determine the length of the flagpole (to the nearest foot).
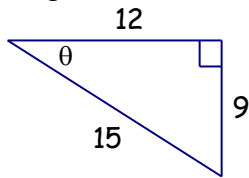

22°

20°

400 ft

Geometry – DAY 6.6   Name: _____
Review for Quiz – Trig Ratios   Date: _____

1. Find the following:

12         $\sin \theta =$ _____ $\cos \theta =$ _____ $\tan \theta =$ _____

θ

9

15

2. If $\sin \theta = \dfrac{23}{25}$, find $\cos \theta =$ _____   and $\tan \theta =$ _____
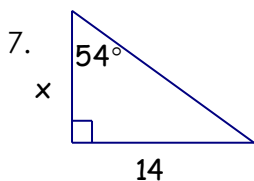
3. For any given right triangle, $\cos 81° =$ _____

Find the value of each. Round your answer to the nearest hundredth.

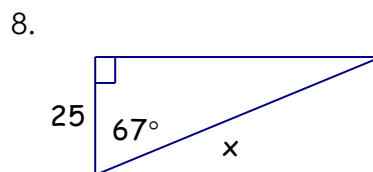4. $\sin 34° \approx$ _____   5. $\cos 85° \approx$ _____   6. $\tan 89° \approx$ _____
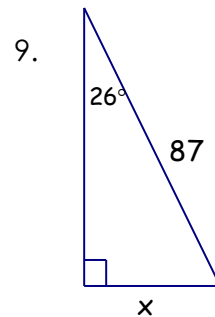
Write the trig equation and find the missing sides. Round answers to the nearest hundredth.

7.   54°   8.   9.   26°

x

14   25   67°   87

x   x

$x \approx$ _____ $x \approx$ _____ $x \approx$ _____

10.   The sequoia redwood trees in California are some of the tallest trees in the world. If a person were standing 180 feet from one of these trees with a 60° angle of elevation to the top of the tree, what would be the height of the tree?

11.   A passenger on a commercial flight from Augusta to Atlanta looks out his window and sees the city of Macon in the distance. If the angle of depression is 10° and the plane is flying at an altitude of 6 miles, what is the direct distance from the plane to the city of Macon?

12. A ladder leaning against a house makes an angle of 65° with the ground. The foot of the ladder is 7 feet from the foundation of the house. How long is the ladder?
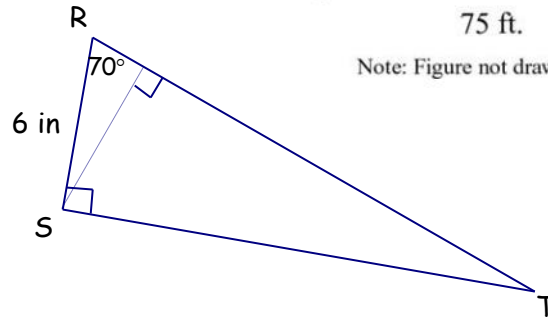
13. The top of a lighthouse is 120 meters above sea level. The angle of depression from the top of the lighthouse to the ship is 23°. How far is the ship from the foot of the lighthouse?

14. Ricardo is standing 75 feet away from the base of a building. The angle of elevation from the ground where Ricardo is standing to the top of the building is 32°. What is x, the height of the building, to the nearest tenth of a foot?
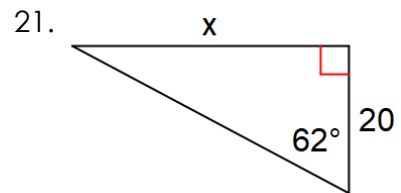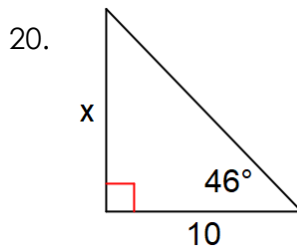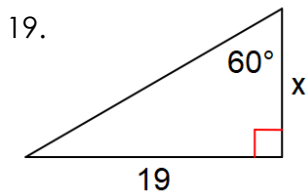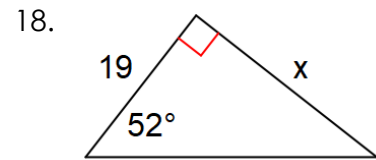
32°

75 ft.
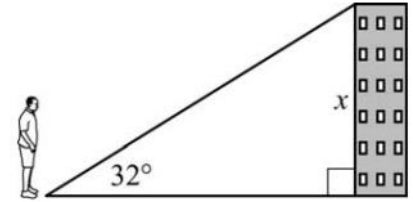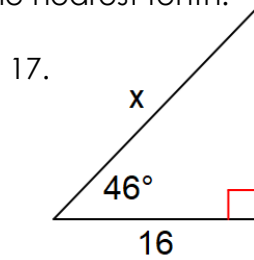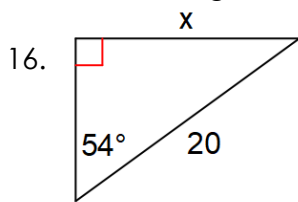
Note: Figure not drawn to scale.

15. What is the <u>area</u> of triangle RST? (A = ½ bh)

R

70°

6 in

S

T

Find the missing side. Round to the nearest tenth.

16.

x

54°   20

17.

x

46°

16

18.

19   52°   x

19.

60°

x

19

20.

x

46°

10

21.

x

62°   20

Use co-functions to answer the following:

22. $\sin\theta = \dfrac{3}{8}$

$\cos(90-\theta) = $ ———

23. $\cos\theta = \dfrac{31}{72}$

$\sin(90-\theta) = $ ———

24. $\tan\theta = \dfrac{51}{43}$

$\tan(90-\theta) = $ ———

25. $\sin 17° = \cos$ _____

26. $\sin$ _____ $= \cos 49°$

27. $\sin 67° = \cos$ _____

28. In $\triangle ABC : m\angle C = 90°$. If $\sin A = 8x - 6$ and $\cos B = 3x - 5$, then x = _____

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