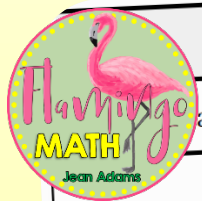


Precalculus Honors

Right Triangle Trigonometry



Trigonometric Functions

For an acute angle in the right triangle $\triangle ABC$ as shown, then

θ is the angle of interest:

Sine
 $\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}}$

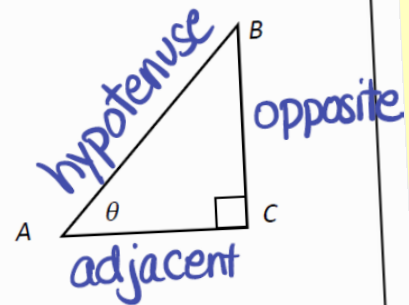
Cosecant
 $\csc \theta = \frac{\text{hypotenuse}}{\text{opposite}}$

Cosine
 $\cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}}$

Secant
 $\sec \theta = \frac{\text{hypotenuse}}{\text{adjacent}}$

Tangent
 $\tan \theta = \frac{\text{opposite}}{\text{adjacent}}$

Cotangent
 $\cot \theta = \frac{\text{adjacent}}{\text{opposite}}$



sides are:
lengths

Completely Editable 4.2

Lesson 2: Right Triangle Trigonometry

We are now ready to explore trigonometric functions from two famous right triangles and how these relate to the unit circle. Similar geometric figures have the same shape. *Specifically, their angle measures are equal, and their sides are proportional.*

Trigonometric Functions

Let θ be an acute angle in the right triangle $\triangle ABC$ as shown, then

Sine

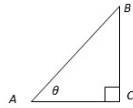
Cosecant

Cosine

Secant

Tangent

Cotangent



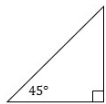
Two Famous Triangles

EX #1: The ratios for these two triangles will play an important role in our unit circle approach to trigonometry. Do you recall the ratios for each triangle from your geometry course?

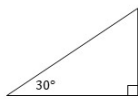
45°-45°-90° Triangle

30°-60°-90° Triangle

Ratio:



Ratio:



Ratio:



$$\sin 45^\circ =$$

$$\cos 45^\circ =$$

$$\tan 45^\circ =$$

$$\sin 30^\circ =$$

$$\cos 30^\circ =$$

$$\tan 30^\circ =$$

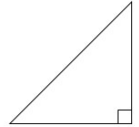
$$\sin 60^\circ =$$

$$\cos 60^\circ =$$

$$\tan 60^\circ =$$

Using One Trig Ratio to Find Others

EX #2: Let θ be an acute angle such that $\sin \theta = \frac{5}{6}$. Evaluate the other five trigonometric functions of θ .



A. $\sin \theta =$

B. $\cos \theta =$

C. $\tan \theta =$

D. $\csc \theta =$

E. $\sec \theta =$

F. $\cot \theta =$

Getting Answers with a Calculator

EX #3: Find the approximate values for each of the following:

A. $\cos 30^\circ$

B. $\sin 45^\circ$

C. $\tan 90^\circ$

D. $\sin 15^\circ$

E. $\csc 45^\circ$

F. $\cot 45^\circ$

EX #4: A right triangle with a hypotenuse of 8 includes a 36° angle. Find the lengths of the other two sides and the measures of the other two angles.

EX #5: The sides of a rectangle are 8 in and 25 in. What is the measure, to the nearest degree, of the angle formed by the short side and a diagonal of the rectangle?

EX #6: Sketch a right triangle corresponding to $\tan \theta = 3$. Use the Pythagorean Theorem to determine the third side and then find the other five trigonometric functions of θ .

Application: Finding the Height of a Building

EX #7: From a point 340-feet away from the base of the Peachtree Center Plaza in Atlanta, the angle of elevation to the top of the building is 65° . Find the height of the building.

NOTES

4.2

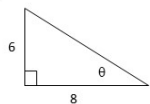
Right Triangle Trigonometry
Homework

Name _____

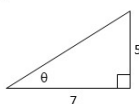
Date _____ Period _____

Problems 1 – 4, Find the values of $\sin \theta$, $\cos \theta$, and $\tan \theta$ of the angle.

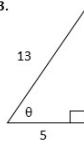
1.



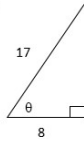
2.



3.



4.

**Problems 5–8,** Assume that θ is an acute angle in a right triangle satisfying the given conditions. Evaluate the remaining trigonometric functions.

5. $\sin \theta = \frac{5}{11}$

6. $\tan \theta = \frac{5}{12}$

7. $\cos \theta = \frac{5}{8}$

8. $\sec \theta = \frac{17}{15}$

Problems 9 – 14, Evaluate, if possible, using a calculator. Be sure the calculator is in the correct mode. Give answers correct to three decimal places.

9. $\sin 78^\circ$

10. $\tan 15^\circ 33'$

11. $\cos 112^\circ 23'$

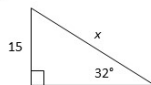
12. $\tan \left(\frac{\pi}{8} \right)$

13. $\sec (2.85)$

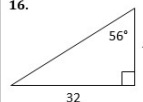
14. $\cot (1.85)$

Problems 15 – 18, Solve for the variable shown.

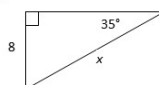
15.



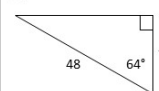
16.



17.



18.

**Problems 19 – 24,** Find the acute angle θ that satisfies the given equation. Give θ in both degrees and radians. You should do these without a calculator.

19. $\sin \theta = \frac{\sqrt{3}}{2}$

20. $\sec \theta = 2$

21. $\cos \theta = \frac{\sqrt{2}}{2}$

22. $\tan \theta = \sqrt{3}$

23. $\csc \theta = \sqrt{2}$

24. $\cot \theta = \frac{\sqrt{3}}{3}$

Problems 25-28, Solve.

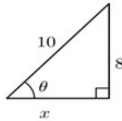
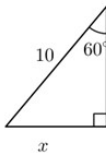
25. A kite is flying 120 ft above the ground. The length of the string to the kite is 200 feet, measured from the ground. Find the angle, to the nearest degree, that the string makes with the ground.

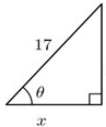
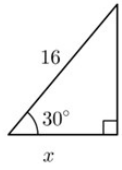
26. A cell phone tower is 75 meters high. A support wire is attached to the tower 20 meters from the top. If the support wire and the ground form an angle of 46 degrees, what is the length of the support wire to the nearest tenth?

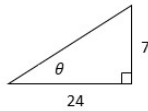
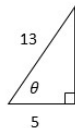
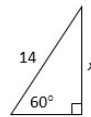
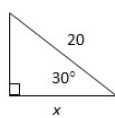
27. The angle of elevation to the top of a flagpole from a point on the ground 30 meters from the base of the flagpole is 18 degrees. What is the height of the flagpole, to the nearest meter?

Practice Sets

Lesson Warm-Ups

Name _____ Date _____ Period _____	
Lesson 4.2 - Right Triangle Trigonometry Warm-Up # I	
1. Find the missing side of the triangle. 	2. Find $\sin \theta$, $\cos \theta$, and $\tan \theta$ using the triangle in #1. $\sin \theta =$ $\cos \theta =$ $\tan \theta =$
3. Solve for x. 	4. Evaluate using a calculator: $\csc 2.4$

Name _____ Date _____	
Lesson 4.2 - Right Triangle Trigonometry	
1. Find the missing side of the triangle. 	2. Find $\sin \theta$, $\cos \theta$, and $\tan \theta$ using the triangle in #1.
3. Solve for x. 	4. Evaluate using a calculator:

4.2 Right Triangle Trigonometry Form A		4.2 Right Triangle Trigonometry Form B							
Name _____		Name _____							
Date _____ Period _____		Date _____ Period _____							
1. Use the Pythagorean Theorem to find the third side of the triangle. 		1. Use the Pythagorean Theorem to find the third side of the triangle. 							
2. Find the following trig functions for θ, using the triangle above <table border="1"> <tr> <td>$\sin \theta =$</td> <td>$\cos \theta =$</td> <td>$\tan \theta =$</td> </tr> </table>		$\sin \theta =$	$\cos \theta =$	$\tan \theta =$	2. Find the following trig functions for θ, using the triangle above <table border="1"> <tr> <td>$\sin \theta =$</td> <td>$\cos \theta =$</td> <td>$\tan \theta =$</td> </tr> </table>		$\sin \theta =$	$\cos \theta =$	$\tan \theta =$
$\sin \theta =$	$\cos \theta =$	$\tan \theta =$							
$\sin \theta =$	$\cos \theta =$	$\tan \theta =$							
3. Solve for x. 		3. Solve for x. 							
4. Evaluate using a calculator. Round to two decimal places.		4. Evaluate using a calculator. Round to two decimal places.							

Daily Lesson Quiz

Grade: _____	Grade: _____
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