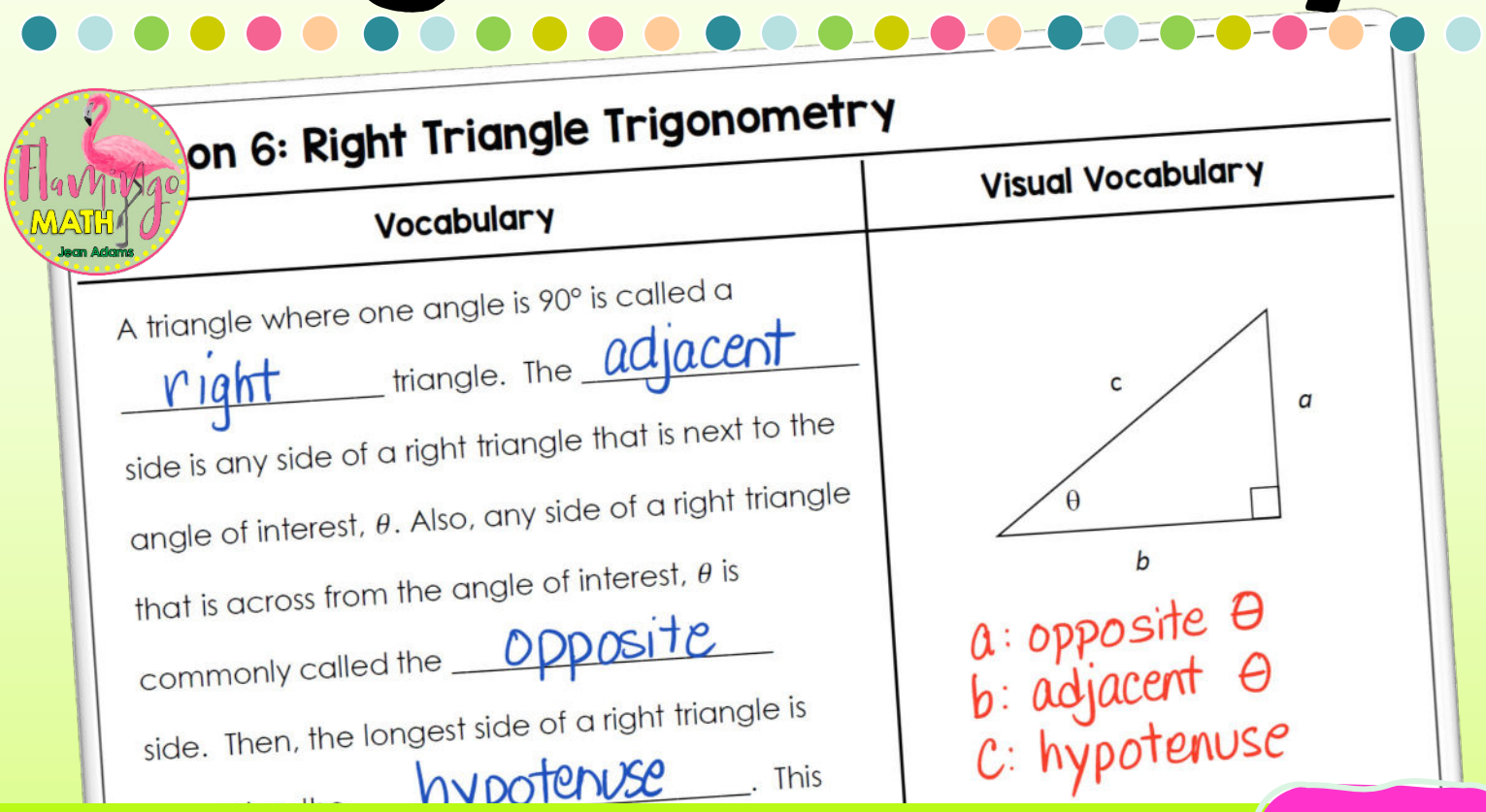
Algebra 2 Honors

Right Triangle Trigonometry



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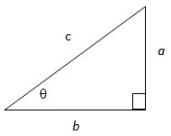
Lesson 6: Right Triangle Trigonometry

Vocabulary	Visual Vocabulary
A triangle where one angle is 90° is called a _____ triangle. The _____ side is any side of a right triangle that is next to the angle of interest, θ. Also, any side of a right triangle that is across from the angle of interest, θ is commonly called the _____ side. Then, the longest side of a right triangle is named as the _____. This side is located across from the 90-degree angle.	

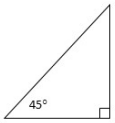
Let θ be an acute angle in the right ΔABC, as shown, then

Sine:	Cosecant:
Cosine:	Secant:
Tangent:	Cotangent:

Two Famous Triangles

45-45-90 Triangle:

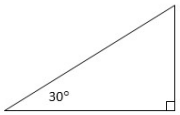
EX #1:
Find all six trigonometric functions of a 45° angle.



$\sin 45° = \frac{opp}{hyp}$	$\csc 45° = \frac{hyp}{opp}$
$\cos 45° = \frac{adj}{hyp}$	$\sec 45° = \frac{hyp}{adj}$
$\tan 45° = \frac{opp}{adj}$	$\cot 45° = \frac{adj}{opp}$

30-60-90 Triangle:

EX #2:
Find all six trigonometric functions of a 30° angle

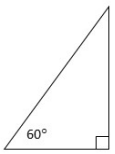


$\sin 30° = \frac{opp}{hyp}$	$\csc 30° = \frac{hyp}{opp}$
$\cos 30° = \frac{adj}{hyp}$	$\sec 30° = \frac{hyp}{adj}$
$\tan 30° = \frac{opp}{adj}$	$\cot 30° = \frac{adj}{opp}$

Special Angles

Trig Functions of 60°

EX #3:
Find the values of all six trigonometric functions for a 60° angle.

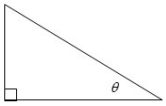


$\sin 60° = \frac{opp}{hyp}$	$\cot 60° = \frac{adj}{opp}$
$\cos 60° = \frac{adj}{hyp}$	$\sec 60° = \frac{hyp}{adj}$
$\tan 60° = \frac{opp}{adj}$	$\cot 60° = \frac{adj}{opp}$

Compare the six function values for 60° with the six function values for 30 °.
What do you notice?

Using One Trig Ratio to Find Others

EX #4:
Let θ be an acute angle such that $sin\theta = \frac{3}{5}$.
Evaluate the other five trigonometric functions of θ.



$\sin\theta° = \frac{opp}{hyp}$	$\csc\theta° = \frac{hyp}{opp}$
$\cos\theta° = \frac{adj}{hyp}$	$\sec\theta° = \frac{hyp}{adj}$
$\tan\theta° = \frac{opp}{adj}$	$\cot\theta° = \frac{adj}{opp}$

Evaluating Trigonometric Functions with a Calculator

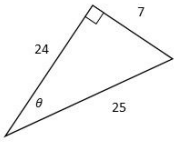
Common Errors:

1. Being in the **wrong mode** (Degrees/Radians)
2. Using the **inverse trig keys** to evaluate cot, sec, and csc. Instead of using the inverse trig keys, raise the function to the power of −1. Remember that the negative power has the effect of moving the term (*sin*, *cos*, *tan*) to the denominator.
3. Using **function shorthand** that the calculator does not recognize. Do not use $\sin^2(x)$. Instead use $(\sin x)^2$.

C. $csc\left(\frac{\pi}{3}\right)$	D. $\sec\left(\frac{5\pi}{6}\right)$

Getting an Approximate Answer

EX # 5: Find six trigonometric values. Give exact values and approximate values to the nearest tenth.



$\sin\theta$	$\csc\theta$
$\cos\theta$	$\sec\theta$
$\tan\theta$	$\cot\theta$

Application: Finding the Height of a Building

EX #6: An observer standing 18 feet from the side of a building, finds that the line of sight to the top of the building is 65°. Find the height of the building. Round your answer to the nearest foot.

Hint: Find a ratio that will relate an angle to its sides; usually the opposite and adjacent sides



NOTES

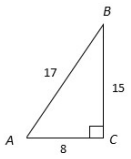
Name _____ Date_____

11.6

Right Triangle Trigonometry Practice

Problems 1 – 8, use the triangle at the right to find the exact values of the trigonometric ratios.

1. $\sin A$	**2.** $\tan A$
3. $\cos B$	**4.** $\cot B$
5. $\sec A$	**6.** $\cos A$
7. $\csc B$	**8.** $\sin B$



Problems 9 – 14, in $\Delta ABC, \angle C$ is a right angle and $\tan B = \frac{2}{5}$. Draw a diagram and find each value in fraction form and in decimal form.



9. $\sin A$	**10.** $\cos B$
11. $\tan B$	**12.** $\sec A$
13. $\csc B$	**14.** $\cot A$

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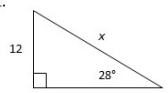
Problems 15 – 20, evaluate using a calculator. Be sure the calculator is in the correct mode. Give answers correct to three decimal places.

15. $\sin 85°$	**16.** $\tan 135°$
17. $\cos 120°$	**18.** $\sec (4.75)$
19. $\csc\left(\frac{\pi}{6}\right)$	**20.** $\cot\left(\frac{\pi}{2}\right)$

Problems 21 – 24, solve for the variable shown.

21.



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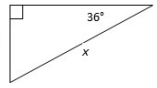

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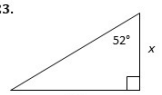
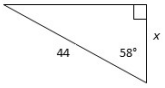


24.



Problems 25 – 26, sketch a right triangle with θ as the measure of one acute angle. Find the other five trigonometric ratios of θ.

25. $\tan\theta = \frac{24}{7}$	**26.** $\csc\theta = \frac{\sqrt{34}}{5}$

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Problems 27 – 30, solve.

27. A 20-foot-long ladder is leaning against a building. The ladder makes a 52° angle with the ground.

A. How far up the wall does the ladder reach?

B. How far from the wall is the base of the ladder?

28. You are standing at a point 30 feet from the base of a tree. The angle formed with the ground looking up to the top of the tree is 50°. Find the height of the tree to the nearest foot.

29. The vertex angle of an isosceles triangle is 62 degrees and each leg measures 12 inches. Find the length of the altitude to the base. Round your answer to the nearest tenth of an inch.

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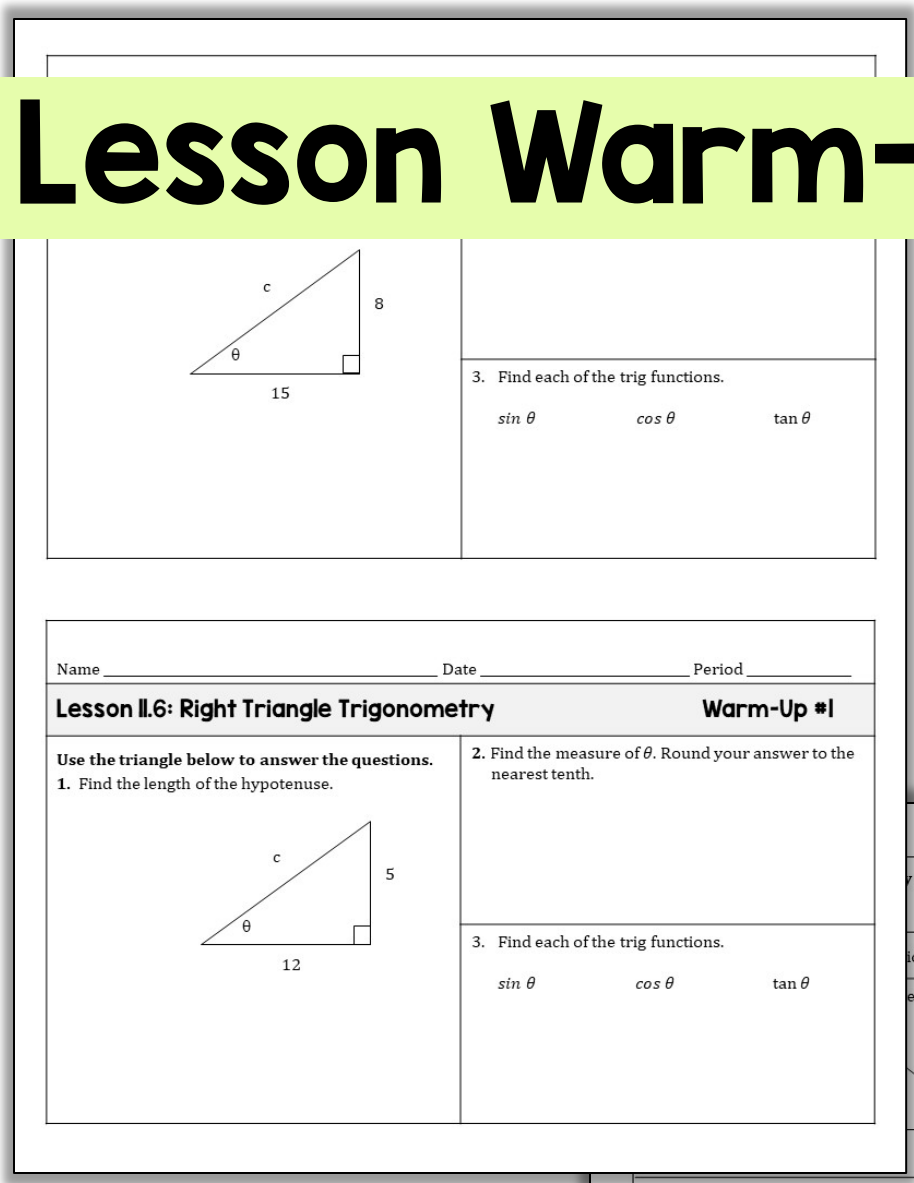
Practice Sets

Lesson Warm-Ups



3. Find each of the trig functions.

$\sin\theta$ $\cos\theta$ $\tan\theta$

Name _____ Date _____ Period _____

Lesson 11.6: Right Triangle Trigonometry **Warm-Up #1**

Use the triangle below to answer the questions.

1. Find the length of the hypotenuse.

2. Find the measure of θ. Round your answer to the nearest tenth.

3. Find each of the trig functions.

$\sin\theta$ $\cos\theta$ $\tan\theta$

Form A

iod _____

elow to

1. Find the hypotenuse of the triangle.

2. Find the $\sin\theta$

3. Find the $\cos\theta$

4. Find the value of $\cos\left(\frac{3\pi}{5}\right)$ to two decimal places.

Grade:

11.6 Right Triangle Trigonometry **Form B**

Name _____

Date _____ Period _____

Questions #1-3: Use the triangle below to answer the questions.

1. Find the hypotenuse of the triangle.

2. Find the $\sin\theta$

3. Find the $\cos\theta$

4. Find the value of $\sin\left(\frac{2\pi}{7}\right)$ to two decimal places.

Grade:

Daily Lesson Quiz