WAKE COUNTY PUBLIC SCHOOL SYSTEM

High School Programs

Math 2 UNIT 5 OVERVIEW: Trigonometry Parent Guide

Unit Outcomes At the end of this unit, your student should be able to:	**Key Vocabulary** Terms to deepen the student's understanding
Unit Skills **Define trigonometric ratios and solve problems involving right triangles** ✓ Identify the hypotenuse of a right triangle. ✓ Identify sides opposite and adjacent to a given acute angle in a right triangle. ✓ Write sine, cosine and tangent ratios when given a right triangle. ✓ Evaluate sine, cosine and tangent expressions. ✓ Explain the relationship between the sine and cosine of complementary angles. ✓ Find unknown sides and angles in right triangles using trigonometric ratios and the Pythagorean Theorem. ✓ Solve right triangles in applied problems. **Define special right triangle relationships and solve problems involving right triangles** ✓ Identify the hypotenuse of a right triangle. ✓ Identify sides opposite and adjacent to a given acute angle in a right triangle. ✓ Develop the relationship between the sides of a 30-60-90 right triangle. ✓ Develop the relationship between the sides of a 45-45-90 right triangle. ✓ Find unknown sides and angles in right triangles using special right triangles and the Pythagorean Theorem. ✓ Solve right triangles in applied problems.	✓ Sine ratio ✓ Cosine ratio ✓ Tangent ratio ✓ Pythagorean Theorem ✓ Right Triangle ✓ Angle of Elevation ✓ Angle of Depression ✓ 30-60-90 Special Right Triangle ✓ 45-45-90 Special Right Triangle
Key Standards Addressed Connections to Common Core/NC Essential Standards	**Where This Unit Fits** Connections to prior and future learning
• **NC.M2.A-SSE.1a** Identify and interpret parts of a quadratic, square root, inverse variation, or **right triangle trigonometric expression**, including terms, factors, coefficients, radicands, and exponents	**Coming into this unit, students should have a strong foundation in:** ✓ Finding the area of right triangles, other triangles, special quadrilaterals, and polygons by

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- **NC.M2.A-CED.1** Create **equations** and inequalities in one variable that represent quadratic, square root, inverse variation, and **right triangle trigonometric relationships** and use them to solve problems

- **NC.M2.G-SRT.6** Verify experimentally that the side ratios in similar right triangles are properties of the angle measures in the triangle, due to the preservation of angle measures in similarity. Use this discovery to develop definitions of the trigonometric ratios for the acute angles.

- **NC.M2.G-SRT.8** Use trigonometric ratios and the Pythagorean Theorem to solve problems involving right triangles in terms of a context.

- **NC.M2.G-SRT.12** Develop properties of special right triangles (45-45-90 and 30-60-90) and use them to solve problems

composing into rectangles or decomposing into triangles and other shapes.

✓ Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems.

✓ Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order

✓ Draw (freehand, with ruler and protractor, and with technology) triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle

✓ Represent proportional relationships by equations.

✓ Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.

✓ Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output

This unit builds to the following future skills and concepts:

✓ Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

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	✓ Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. ✓ Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle. ✓ Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. ✓ Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find sin(θ), cos(θ), or tan(θ) given sin(θ), cos(θ), or tan(θ) and the quadrant of the angle.

Additional Resources

Materials to support understanding and enrichment

✓ **Define trigonometric ratios and solve problems involving right triangles**

- Sine, cosine and Tangent – (Reference Notes and Tutorial) Basics of the three trigonometric ratios of sine, cosine, and tangent.
- Find sine value using side ratios – (Video) Learn how the ratios of certain sides of a right triangle determine the sine value of a particular angle by using properties of similar triangles; Enter the quick code ***LZ2518*** after clicking on the link.
- Find cosine value using side ratios – (Video) Learn how the ratios of certain sides of a right triangle determine the sine value of a particular angle by using properties of similar triangles; Enter the quick code ***LZ2462*** after clicking on the link.
- Find tangent value using side ratios – (Video) Learn how the ratios of certain sides of a right triangle determine the sine value of a particular angle by using properties of similar triangles; Enter the quick code ***LZ2464*** after clicking on the link.
- Solve Problems Using trigonometric ratios and the Pythagorean Theorem (Video) – Learn to apply angles of elevation and depression by doing a multistep modeling problem. Enter the quick code ***LZ3996*** after clicking on the link.

✓ **Define special right triangle relationships and solve problems involving right triangles**

- 30-60-90 triangles – (Video) Basics of the relationships between the sides of a 30-60-90 triangle and hold to solve for the missing sides of a right triangle using the relationship.
- 45-45-90 triangles – (Video) Basics of the relationships between the sides of a 45-45-90 triangle and hold to solve for the missing sides of a right triangle using the relationship.

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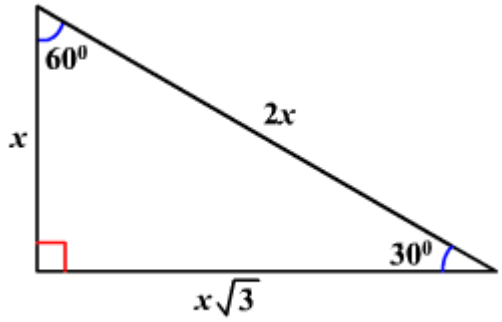
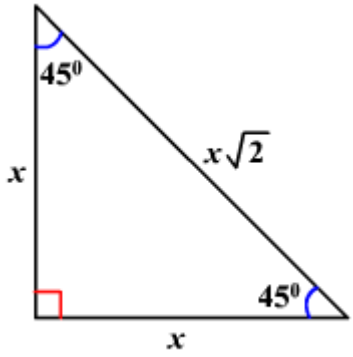
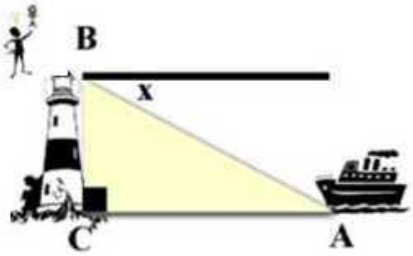
Glossary		
30-60-90 Special Right Triangle	A right triangle with acute angles that measure 30° and 60°. There is a relationship that exists between the length of the three sides. The hypotenuse is twice the length of the side opposite the 30° angle and the side opposite the 60° angle is $\sqrt{3}$ times the length of the side opposite the 30° angle. 	
45-45-90 Special Right Triangle	A right triangle with acute angles that both measure 45°. There is a relationship that exists between the length of the three sides. The hypotenuse is $\sqrt{2}$ times the length of the side opposite either of the the 45° angles. 	
Angle of Depression	The angle of depression is created in relation to the movement of your eyes. If you are standing in this case at the top of a lighthouse and look straight ahead you must lower or depress your eyes to see the boat down in the water. The angle x created is the angle of depression. It is always OUTSIDE the triangle. 	

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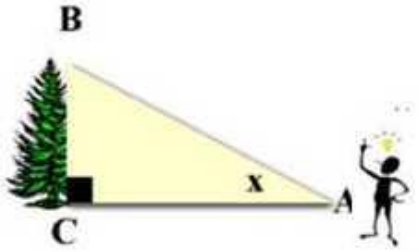
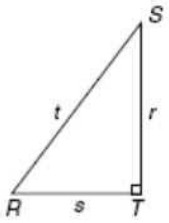
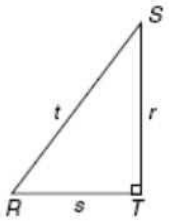
Angle of Elevation	The angle of elevation is created in relation to the movement of your eyes. If you are standing on the ground and look straight ahead you must raise or elevate your eyes to see something, as in this case, up in a tree. The angle x created is the angle of elevation. It is always INSIDE the triangle.  	
Cosine Ratio	The cosine ratio of an angle in a right triangle is $\frac{adjacent\ leg\ to\ the\ angle}{hypotenuse}$ **For example:**  $\cos R = \frac{leg\ adjacent\ <R}{hypotenuse} = \frac{s}{t}$	[Click to return to Key Vocabulary List]
Pythagorean Theorem	In a right angled triangle the square of the hypotenuse is equal to the sum of the squares of the other two sides. The formula is $a^2 + b^2 = c^2$ if c is the hypotenuse.	
Right Triangle	A triangle with one right angle. The other two angles are acute and complementary.	
Sine Ratio	The sine ratio of an angle in a right triangle is $\frac{opposite\ leg\ to\ the\ angle}{hypotenuse}$ **For example:**  $\sin R = \frac{leg\ opposite\ <R}{hypotenuse} = \frac{r}{t}$	[Click to return to Key Vocabulary List]

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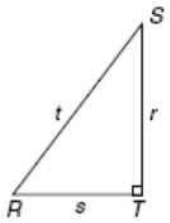
Tangent Ratio	The tangent ratio of an angle in a right triangle is $\frac{opposite\ leg\ to\ the\ angle}{adjacent\ leg\ to\ the\ angle}$ **For example:** $\tan R = \frac{leg\ opposite\ <R}{leg\ adjacent\ <R} = \frac{r}{s}$ 	

*** Please note**, the unit guides are a work in progress. If you have feedback or suggestions on improvement, please feel free to contact sdupree@wcpss.net.