

Unit 7 - Trigon

Overview

This is the first time that many students will see any trigonometry beyond SOHCAHTOA, for example, radian measure, law of sines and law of cosines, the reciprocal trig functions, trig graphs. We chose specifically to deemphasize Unit Circle, and to simply use “circle definitions” for problems like $\sin(240)$. Students should come away from this unit feeling like many trig topics can simply be done with x , y , and r (circle definitions). There are many variations of this type of problem, but students should feel the unity among them. Students need to know the basic side patterns for special right triangles along with how to draw angles in standard position.

21st Century Capacities: Analyzing, Collective Intelligence

Stage 1 - Desired Results

ESTABLISHED GOALS/ STANDARDS

- MP 1** Make sense of problems and persevere in solving them
- MP3** Construct viable arguments and critique the reasoning of others
- MP6** Attend to precision
- MP8** Look for and express regularity in repeated reasoning

Define trigonometric ratios and solve problems involving right triangles

CCSS.MATH.CONTENT.HSG.SRT.C.6 Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.

CCSS.MATH.CONTENT.HSG.SRT.C.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.*

Apply trigonometry to general triangles

Transfer:

Students will be able to independently use their learning in new situations to...

1. Demonstrate fluency with math facts, computation and concepts
2. Use properties to draw conclusions about graphs, shapes, equations, or objects. (Analyzing)
3. Make sense of a problem, initiate a plan, execute it, and evaluate the reasonableness of the solution (Collective Intelligence)

Meaning:

UNDERSTANDINGS: *Students will understand that:*

1. Mathematicians identify relevant tools, strategies, relationships, and/or information in order to draw conclusions.
2. Mathematicians examine relationships to discern a pattern, generalizations, or structure.
3. Mathematicians understand that

ESSENTIAL QUESTIONS: *Students will explore & address these recurring questions:*

- A. How do predictable patterns help us?
- B. How can I break a problem down into manageable parts?

PreCollege Algebra & Trigonometry Curriculum

<p>CCSS.MATH.CONTENT.HSG.SRT.D.10 (+) Prove the Laws of Sines and Cosines and use them to solve problems.</p> <p>CCSS.MATH.CONTENT.HSG.SRT.D.11 (+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).</p> <p>CCSS.MATH.CONTENT.HSF.IF.C.7.E Graph trigonometric functions, showing period, midline, and amplitude. Extend the domain of trigonometric functions using the unit circle.</p> <p>CCSS.MATH.CONTENT.HSF.TF.A.1 Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.</p> <p>CCSS.MATH.CONTENT.HSF.TF.A.2 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.</p> <p>CCSS.MATH.CONTENT.HSF.TF.A.3 (+) Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$, $\pi/4$ and $\pi/6$, and use the unit circle to express the values of sine, cosine, and tangent for x, $\pi + x$, and $2\pi - x$ in terms of their values for x, where x is any real number.</p> <p>Model periodic phenomena with trigonometric functions.</p> <p>CCSS.MATH.CONTENT.HSF.TF.B.5 Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.*</p> <p>Prove and apply trigonometric identities.</p> <p>CCSS.MATH.CONTENT.HSF.TF.C.8 Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle.</p>	<p>placing a problem in a category gives one a familiar approach to solving it.</p>	
Acquisition:		
	<p><i>Students will know...</i></p> <ol style="list-style-type: none"> 1. SOHCAHTOA and CHOSHACAO 2. The relationship between sides in a 30-60-90 and a 45-45-90 triangle 3. Circle definitions of trig functions 4. Radians are another unit for angle measure, based on arc length 5. Basic Trig Identities 6. Law of Sines and Law of Cosines 7. Basic graphs of sine and cosine 8. Vocabulary: sine, cosine, tangent, cosecant, secant, cotangent, coterminal, angle in standard position, radian, quadrantal, amplitude, period, sinusoidal axis, frequency, trigonometric identity 	<p><i>Students will be skilled at...</i></p> <ol style="list-style-type: none"> 1. Evaluating trig functions for special angles 2. Solving triangles, including the use of the law of sines and the law of cosines 3. Converting between radians and degrees 4. Sketching angles given in radians 5. Sketching reference angles 6. Using the circle definitions to find trig ratios 7. Applying the periodicity of trig functions when solving trig equations 8. Simplifying trig expressions using the identities 9. Solving trig equations 10. Solving application problems involving angles of depression and angles of elevation. 11. Graphing sine and cosine graphs given the function. 12. Creating sine and cosine functions given the graph