



Pre-College Algebra & Trigonometry - Unit 7 - Trigonometry

Unit Focus

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.

Stage 1: Desired Results - Key Understandings

Standard(s)	Transfer	
Common Core Mathematics: 9-12 - Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. (CCSS.MATH.CONTENT.HSF.IF.C.7.E) - Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. (CCSS.MATH.CONTENT.HSF.TF.A.1) - 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. (CCSS.MATH.CONTENT.HSF.TF.A.2) - 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. (CCSS.MATH.CONTENT.HSF.TF.A.3) - Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. (CCSS.MATH.CONTENT.HSF.TF.B.5) - 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. (CCSS.MATH.CONTENT.HSF.TF.C.8) - 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.6) - Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. (CCSS.MATH.CONTENT.HSG.SRT.C.8) - Prove the Laws of Sines and Cosines and use them to solve problems. (CCSS.MATH.CONTENT.HSG.SRT.D.10)	<i>Students will be able to independently use their learning to...</i> T1 demonstrate fluency with math facts, computation and concepts. T2 draw conclusions about graphs, shapes, equations, or objects. T3 make sense of a problem, initiate a plan, execute it, and evaluate the reasonableness of the solution.	
	Meaning	
	Understanding(s)	Essential Question(s)
	<i>Students will understand that...</i> U1 Mathematicians identify relevant tools, strategies, relationships, and/or information in order to draw conclusions. U2 Mathematicians examine relationships to discern a pattern, generalizations, or structure. U3 Mathematicians understand that placing a problem in a category gives one a familiar approach to solving it.	<i>Students will keep considering...</i> Q1 How do predictable patterns help us? Q2 How can I break a problem down into manageable parts?
	Acquisition of Knowledge and Skill	
	Knowledge	Skill(s)
	<i>Students will know...</i> K1 SOHCAHTOA and CHOSHACAO K2 the relationship between sides in a 30-60-90 and a 45-45-90 triangle K3 circle definitions of trig functions	<i>Students will be skilled at...</i> S1 evaluating trig functions for special angles S2 solving triangles, including the use of the law of sines and the law of cosines S3 Converting between radians and degrees

Stage 1: Desired Results - Key Understandings

- 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). (CCSS.MATH.CONTENT.HSG.SRT.D.11)
- Make sense of problems and persevere in solving them. (CCSS.MATH.MP.1)
- Construct viable arguments and critique the reasoning of others. (CCSS.MATH.MP.3)
- Attend to precision. (CCSS.MATH.MP.6)
- Look for and express regularity in repeated reasoning. (CCSS.MATH.MP.8)

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- Analyzing: Examining information/data/ evidence from multiple sources to identify possible underlying assumptions, patterns, and relationships in order to make inferences. (POG.1.2)
- Collective Intelligence: Working respectfully and responsibly with others, exchanging and evaluating ideas to achieve a common objective. (POG.3.1)

K4 radians are another unit for angle measure, based on arc length
K5 basic Trig Identities
K6 Law of Sines and Law of Cosines
K7 basic graphs of sine and cosine
K8 Vocabulary: sine, cosine, tangent, cosecant, secant, cotangent, coterminal, angle in standard position, radian, quadrantal, amplitude, period, sinusoidal axis, frequency, trigonometric identity

S4 Sketching angles given in radians
S5 Sketching reference angles
S6 Using the circle definitions to find trig ratios
S7 applying the periodicity of trig functions when solving trig equations
S8 simplifying trig expressions using the identities
S9 solving trig equations
S10 Solving application problems involving angles of depression and angles of elevation.
S11 Graphing sine and cosine graphs given the function.
S12 Creating sine and cosine functions given the graph