*Unit 6 Inverses and Solving Basic Trigonometric Equations

Content Area: **Mathematics**
Course(s): **Trigonometry and Analytical Geometry**
Time Period: **April**
Length: **10 Blocks**
Status: **Published**

Transfer Skills

Special properties of right triangles allow us to indirectly measure angles and lengths.

Enduring Understandings

The methods learned for solving algebraic equations directly relate to solving trigonometric equations.

The unit circle is a gateway between geometry and algebra.

Context is critical when using estimation.

Equivalent expressions can be written in a variety of formats.

Essential Questions

How can you use inverse trigonometry to solve real-world application problems?

How does solving algebraic equations compare to trigonometric equations?

What does it mean when we solve a trigonometric equation?

How do we represent multiple solutions on a given domain?

Content

Vocabulary:

Angle of depression

Angle of elevation

Reference Angles

Inverse

Radian

Degree

Right Triangle

Skills

Evaluate inverse trigonometric expressions in radians and degrees without using a calculator

Evaluate inverse trigonometric expressions using a calculator

Use inverse trigonometric functions to solve real life problems.

Evaluate inverse trigonometric expressions in radians and degrees without using a calculator. Use the correct intervals for inverses.

Evaluate inverse trigonometric expression using a calculator. Use the correct intervals for inverses.

Solve simple trigonometric equations by finding the zeros of the function only from [0, 360] or [0, 2pi]

Resources

Content Vocabulary

Practices quizzes

Teacher website

www.KhanAcademy.org

www.Desmos.com

Standards

Trigonometric Functions F-TF

A. Extend the domain of trigonometric functions using the unit circle

1. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.

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.

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, cosines, and tangent for πx, $\pi+x$, and $2\pi-x$ in terms of their values for x, where x is any real number.

MP1 Make sense of problems and persevere in solving them.

Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

MP6 Attend to precision.

Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in

discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

MP8 Look for and express regularity in repeated reasoning.

Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y – 2)/(x – 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x – 1)(x + 1)$, $(x – 1)(x2 + x + 1)$, and $(x – 1)(x3 + x2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

MA.F-TF	Trigonometric Functions
MA.F-TF.A	Extend the domain of trigonometric functions using the unit circle
MA.F-TF.A.1	Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
MA.F-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.
MA.F-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, cosines, and tangent for $\pi - \theta$, $\pi + \theta$, and $2\pi - \theta$ in terms of their values for θ, where θ is any real number.