



Math Weekly Lesson Preparation Guide

Teacher Name: Kimberly West	Grade: 11 th /12 th Precalculus
Week of: January 6 th thru 10 th	Unit: 4 Lesson Numbers: 4.1 AND 4.2

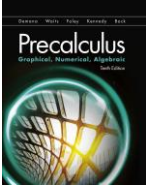
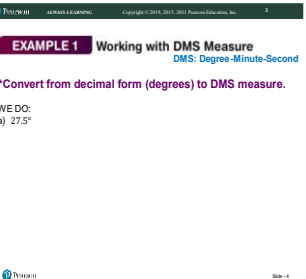
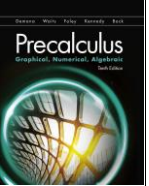
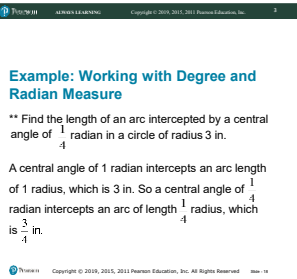
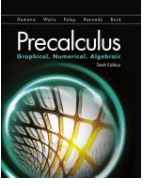
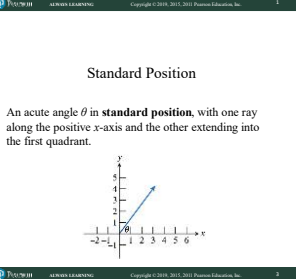
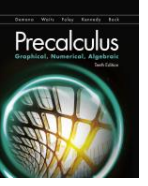
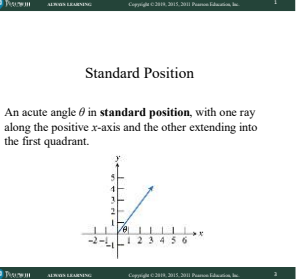
Purpose: The Weekly Lesson Preparation Guide is to provide a structure that encourages teachers to think through and internalize the daily/weekly instructional expectations.

Planning Questions	Monday Lesson 4.1	Tuesday Lesson 4.1	Wednesday Lesson 4.2	Thursday Lesson 4.2	Assessment OR Remediation
1. Which specific Tennessee standard(s) are being addressed in this lesson? What is the focus of this lesson? What will the lesson objective be for each day?	<p>P.F.TF.A.2 Convert from radians to degrees and from degrees to radians.</p> <p>Objective: I can convert between degree and DMS measure AND between degree and radian measure</p>	<p>P.F.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>Objective: I can calculate the arclength of an arc of a circle</p>	<p>P.G.AT.A.1 Use the definitions of the six trigonometric ratios as ratios of the sides in a right triangle to solve problems about lengths of sides and measures of angles.</p> <p>Objective: I can define the six trigonometric functions</p> <p>Objective: I can evaluate trigonometric functions for 30° 45° 60°</p>	<p>P.G.AT.A.1 Use the definitions of the six trigonometric ratios as ratios of the sides in a right triangle to solve problems about lengths of sides and measures of angles.</p> <p>Objective: I can determine the lengths of other sides of a right triangle given one side of an acute angle</p>	<p>P.F.TF.A.2 Convert from radians to degrees and from degrees to radians</p> <p>P.F.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>P.G.AT.A.1 Use the definitions of the six trigonometric ratios as ratios of the sides in a right triangle to solve problems about</p>

Adapted from TDOE Unit and Lesson Preparation Guides

Click [here](https://bestforall.tnedu.gov/) to access 2023 Revised Math Standards Resources: <https://bestforall.tnedu.gov/>

September 2024

					<p>lengths of sides and measures of angles.</p> <p>P.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 explain how to use the unit circle to express the values of sine, cosine, and tangent for $\pi-x$, $\pi+x$, and $2\pi-x$ in terms of their values for x, where x is any real number.</p>
<p>Modeling:</p> <p>2. Complete all tasks included in the lesson and review the sample/anticipated student responses. For each task consider:</p> <ul style="list-style-type: none"> What are the multiple solution paths students might take to solve this problem? 	<p>Chapter 4 Trigonometric Functions</p> <p>Section 4.1 Angles and Their Measures</p>  <p>EXAMPLE 1 Working with DMS Measure DMS: Degree-Minute-Second</p> <p>*Convert from decimal form (degrees) to DMS measure.</p> <p>WEDQ: a) 27.5°</p> 	<p>Chapter 4 Trigonometric Functions</p> <p>Section 4.1 Angles and Their Measures</p>  <p>Example: Working with Degree and Radian Measure</p> <p>** Find the length of an arc intercepted by a central angle of $\frac{1}{4}$ radian in a circle of radius 3 in.</p> <p>A central angle of 1 radian intercepts an arc length of 1 radius, which is 3 in. So a central angle of $\frac{1}{4}$ radian intercepts an arc of length $\frac{3}{4}$ in.</p> 	<p>Chapter 4 Trigonometric Functions</p> <p>Section 4.2 Trigonometric Functions of Acute Angles</p>  <p>Standard Position</p> <p>An acute angle θ in standard position, with one ray along the positive x-axis and the other extending into the first quadrant.</p> 	<p>Chapter 4 Trigonometric Functions</p> <p>Section 4.2 Trigonometric Functions of Acute Angles</p>  <p>Standard Position</p> <p>An acute angle θ in standard position, with one ray along the positive x-axis and the other extending into the first quadrant.</p> 	

Adapted from TDOE Unit and Lesson Preparation Guides

Click [here](https://bestforall.tnedu.gov/) to access 2023 Revised Math Standards Resources: <https://bestforall.tnedu.gov/>

September 2024

- What is the purpose of this task? Specifically, which aspect(s) of rigor are being addressed (conceptual understanding, procedural fluency, and/or application)? How does this differ based on the solution path
- Given this purpose, what key concepts and vocabulary might students need to understand to access the task?

EXAMPLE 1 Working with DMS Measure
DMS: Degree-Minute-Second

*Convert from decimal form(degrees) to DMS measure.

YOU DO:
a) 33.125°
b) 33.125°

EXAMPLE 1 Working with DMS Measure
DMS: Degree-Minute-Second

*Convert from DMS measure to degrees (decimal form).

WE DO:
a) 12° 20' 35"

EXAMPLE 1 Working with DMS Measure
DMS: Degree-Minute-Second

*Convert from DMS measure to degrees (decimal form).

YOU DO:
a) 10° 30' 45"

EXAMPLE 2 Working with Radian Measure

WE DO:

a) How many radians are in 75°
b) How many degrees are in $2\pi/5$

Arc Length Formula (Radian Measure)

If θ is a central angle in a circle of radius r , and if θ is measured in radians, then the length s of the intercepted arc is given by

$$s = r\theta.$$

Arc Length Formula (Degree Measure)

If θ is a central angle in a circle of radius r , and if θ is measured in degrees, then the length s of the intercepted arc is given by

$$s = \frac{\pi r \theta}{180}.$$

Example: Perimeter of a Pizza Slice

*Find the perimeter of a 30° slice of a large 8 in. radius pizza.

Let s equal the arc length of the pizza's curved edge.

$$s = \frac{\pi(8)(30)}{180} = \frac{240\pi}{180} \approx 4.2 \text{ in.}$$

$$P = 8 \text{ in.} + 8 \text{ in.} + s \text{ in.}$$

$$P = 20.2 \text{ in.}$$

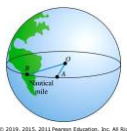
Angular and Linear Motion

Angular speed is measured in units like revolutions per minute.

Linear speed is measured in units like miles per hour.

Nautical Mile

A **nautical mile** (naut mi) is the length of 1 minute of arc along Earth's equator.




Trigonometric Functions

Let θ be an acute angle in the right $\triangle ABC$. Then


$$\sin(\theta) = \sin \theta = \frac{\text{opp}}{\text{hyp}} \quad \text{cosecant}(\theta) = \csc \theta = \frac{\text{hyp}}{\text{opp}}$$

$$\cos(\theta) = \cos \theta = \frac{\text{adj}}{\text{hyp}} \quad \text{secant}(\theta) = \sec \theta = \frac{\text{hyp}}{\text{adj}}$$

$$\tan(\theta) = \tan \theta = \frac{\text{opp}}{\text{adj}} \quad \text{cotangent}(\theta) = \cot \theta = \frac{\text{adj}}{\text{opp}}$$


Example 1: Evaluating Trigonometric Functions of 45°

Find the values of all six trigonometric functions for an angle of 45°.




$$\sin 45^\circ = \frac{\text{opp}}{\text{hyp}} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2} \quad \csc 45^\circ = \frac{\text{hyp}}{\text{opp}} = \frac{\sqrt{2}}{1} = \sqrt{2}$$

$$\cos 45^\circ = \frac{\text{adj}}{\text{hyp}} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2} \quad \sec 45^\circ = \frac{\text{hyp}}{\text{adj}} = \frac{\sqrt{2}}{1} = \sqrt{2}$$

$$\tan 45^\circ = \frac{\text{opp}}{\text{adj}} = \frac{1}{1} = 1 \quad \cot 45^\circ = \frac{\text{adj}}{\text{opp}} = \frac{1}{1} = 1$$

Example 2: Evaluating Trigonometric Functions of 60°

Find the values of all six trigonometric functions for an angle of 60°.



$$\sin 60^\circ = \frac{\text{opp}}{\text{hyp}} = \frac{\sqrt{3}}{2} \quad \csc 60^\circ = \frac{\text{hyp}}{\text{opp}} = \frac{2}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$$

$$\cos 60^\circ = \frac{\text{adj}}{\text{hyp}} = \frac{1}{2} \quad \sec 60^\circ = \frac{\text{hyp}}{\text{adj}} = \frac{2}{1} = 2$$

$$\tan 60^\circ = \frac{\text{opp}}{\text{adj}} = \frac{\sqrt{3}}{1} = \sqrt{3} \quad \cot 60^\circ = \frac{\text{adj}}{\text{opp}} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$

Common Calculator Errors When Evaluating Trig Functions

Using the calculator in the wrong angle mode (degree/radians)

Using the inverse trig keys to evaluate cot, sec, and csc

Using function shorthand that the calculator does not recognize

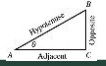
Not closing parentheses

Trigonometric Functions

Let θ be an acute angle in the right $\triangle ABC$. Then

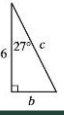
$$\sin(\theta) = \sin \theta = \frac{\text{opp}}{\text{hyp}} \quad \text{cosecant}(\theta) = \csc \theta = \frac{\text{hyp}}{\text{opp}}$$

$$\cos(\theta) = \cos \theta = \frac{\text{adj}}{\text{hyp}} \quad \text{secant}(\theta) = \sec \theta = \frac{\text{hyp}}{\text{adj}}$$

$$\tan(\theta) = \tan \theta = \frac{\text{opp}}{\text{adj}} \quad \text{cotangent}(\theta) = \cot \theta = \frac{\text{adj}}{\text{opp}}$$


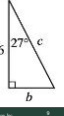
Example 5: Solving a Right Triangle (1 of 2)

A right triangle with a side length 6 includes a 27° angle adjacent to the side of length 6. Find the measures of the other two angles and the lengths of the other two sides.



Example 5: Solving a Right Triangle (2 of 2)

Since it is a right triangle, one of the other angles is 90°. That leaves $180^\circ - 90^\circ - 27^\circ = 63^\circ$ for the third angle. Use the labels on the figure to set up equations to find a and b .



$$\cos 27^\circ = \frac{6}{c} \quad \tan 27^\circ = \frac{b}{6}$$

$$c = \frac{6}{\cos 27^\circ} \quad b = 6 \tan 27^\circ$$

$$c \approx 6.73 \quad b \approx 3.06$$

	<p>EXAMPLE 2 Working with Radian Measure</p> <p>YOU DO:</p> <p>a) How many radians are in 53°</p> <p>b) How many degrees are in $\pi/7$</p> <p><small>© Thomson Page 8</small></p> <p>Independent/Guided Practice</p> <p>**Page. 318, SECTION 4.1 Exercises</p> <p>Work problems: 2, 4, 6, 8, 10, 12, 18, 20</p> <p><small>© Thomson Page 11</small></p> <hr/> <p><u>Vocabulary</u></p> <ul style="list-style-type: none"> • Central Angle • Degree • Minutes • Seconds • Course • Bearing • Line of Travel • Radian • Nautical Mile • Statute Mile 	<p>Distance Conversions</p> <p>1 statute mile \approx 0.87 nautical mile 1 nautical mile \approx 1.15 statute mile</p> <p><small>© Thomson Copyright © 2019, 2015, 2011 Pearson Education, Inc. All Rights Reserved Page 14</small></p> <hr/> <p><u>Vocabulary</u></p> <ul style="list-style-type: none"> • Central Angle • Degree • Minutes • Seconds • Course • Bearing • Line of Travel • Radian • Nautical Mile • Statute Mile 	<hr/> <p><u>Vocabulary</u></p> <ul style="list-style-type: none"> • Similar • Right Triangle Trigonometry • Standard Position • Solving a Triangle 	<hr/> <p><u>Vocabulary</u></p> <ul style="list-style-type: none"> • Similar • Right Triangle Trigonometry • Standard Position • Solving a Triangle 	
--	--	---	---	---	--

<p>3. What specific tasks/problems will you use to reveal understanding of the grade-level standard(s)? (refer to the Instructional Focus Document Evidence of Learning Statements)</p>	<p>*Selective Practice Problems from pages *Look and listen for proper steps and vocabulary used to explain each step in the problem solving process</p>	<p>*Selective Practice Problems from pages *Look and listen for proper steps and vocabulary used to explain each step in the problem solving process</p>	<p>*Selective Practice Problems from pages *Look and listen for proper steps and vocabulary used to explain each step in the problem solving process</p>	<p>*Selective Practice Problems from pages *Look and listen for proper steps and vocabulary used to explain each step in the problem solving process</p>	
<p>Additional Considerations</p>					
<p>If your lesson contains homework, how will you utilize the work? Will you need to send scaffolding notes home? Is there a strategy you can use to maximize homework?</p>	<p>Homework will be utilized by: Align with Learning Objectives: Ensure that homework directly relates to the concepts taught in class, allowing students to apply their learning. Variety of Tasks: Include different types of problems (e.g., practice, application, extension) to cater to various levels of understanding and to reinforce the concept from multiple angles. Scaffolded Problems: Start with easier problems and gradually increase difficulty. This helps build confidence and understanding before tackling more complex tasks. Extension Challenges: Include a few challenging problems that encourage critical thinking and exploration beyond the basic concepts.</p>	<p>Homework will be utilized by: Align with Learning Objectives: Ensure that homework directly relates to the concepts taught in class, allowing students to apply their learning. Variety of Tasks: Include different types of problems (e.g., practice, application, extension) to cater to various levels of understanding and to reinforce the concept from multiple angles. Scaffolded Problems: Start with easier problems and gradually increase difficulty. This helps build confidence and understanding before tackling more complex tasks. Extension Challenges: Include a few challenging problems that encourage critical thinking and exploration beyond the basic concepts.</p>	<p>Homework will be utilized by: Align with Learning Objectives: Ensure that homework directly relates to the concepts taught in class, allowing students to apply their learning. Variety of Tasks: Include different types of problems (e.g., practice, application, extension) to cater to various levels of understanding and to reinforce the concept from multiple angles. Scaffolded Problems: Start with easier problems and gradually increase difficulty. This helps build confidence and understanding before tackling more complex tasks. Extension Challenges: Include a few challenging problems that encourage critical thinking and exploration beyond the basic concepts.</p>	<p>Homework will be utilized by: Align with Learning Objectives: Ensure that homework directly relates to the concepts taught in class, allowing students to apply their learning. Variety of Tasks: Include different types of problems (e.g., practice, application, extension) to cater to various levels of understanding and to reinforce the concept from multiple angles. Scaffolded Problems: Start with easier problems and gradually increase difficulty. This helps build confidence and understanding before tackling more complex tasks. Extension Challenges: Include a few challenging problems that encourage critical thinking and exploration beyond the basic concepts.</p>	

Adapted from TDOE Unit and Lesson Preparation Guides

Click [here](https://bestforall.tnedu.gov/) to access 2023 Revised Math Standards Resources: <https://bestforall.tnedu.gov/>

September 2024