



Curriculum and Instruction – Mathematics

Quarter 4

Algebra II

Algebra II: Year at a Glance

Quarter 1		Quarter 2			Quarter 3		Quarter 4	
Expressions, Equations, Inequalities Various Functions, Equations & Their Graphs, Linear Systems, Quadratic Functions & Equations		Polynomials, Radicals, Inverses, Logarithms, Exponential Functions			Rational Expressions and Equations, Arithmetic and Geometric Sequences and Series, Probability		Trigonometric Functions, Pythagorean Identities, Unit Circle <i>TNReady April 13- May 8</i>	
August 12, 2019 – October 11, 2019		October 21, 2019 – December 20, 2019			January 6, 2020 – March 13, 2020		March 23, 2020 – May 22, 2020	
A2.A.REI. D.6	A2.A.REI. B.3	A2.A.APR. A.1	A2. F.IF. A.1	A2. F.IF. B.5	A2.A.REI. A.1	A2. S.CP. A.2	A2. F.TF.A.1	
A2.F.BF. A.1	A2.A.REI. B.3a	A2.A.APR. A.2	A2. F.IF. A.2	A2. F.LE. A.1	A2.A.REI. A.2	A2. S.CP.A.3	A2. F.TF.A.1a	
A2.F.BF. A.1a	A2. S.ID. B.2	A2.A.REI. A.1	A2. A. CED.A.1	A2. F.LE. A.2	A2.A.REI. D.6	A2. S.CP.A.4	A2. F.TF.A.1b	
A2.F.BF. A.1b	A2. A.N.Q.A.1	A2.A.REI. A.2	A2. A. CED.A.2	A2. S.ID. B.2	A2.A.SSE. B.3	A2. S.CP.B.5	A2. F.TF.A.2	
A2. A. CED.A.1	A2. F.IF.B.3a	A2.A.REI. D.6	A2.N.RN. A.1	A2. A.N.Q.A.1	A2.F.BF. A.1a	A2. S.CP.B.6	A2. F.TF.B.3	
A2. A. CED.A.2		A2.A.SSE. A.1	A2.N.RN. A.2	A2. F.BF.B.3	A2.F.BF. A.1b	A2. S.ID. A.1	A2. F.TF.B.3a	
A2.A.REI. C.4		A2.A.SSE. B.2/2a	A2.A.APR. B.3	A2. F.BF.B.4	A2.F.BF. A.2	A2. A. APR.C.4	A2. F.TF.B.3b	
A2.REI. C.5		A2.A.SSE. B.3	A2. F.IF. B.3a	A2. F.LE. B.3	A2. S.IC.A.1	A2. F.BF.B.4	A2. A.N.Q.A.1	
A2. N.C.N. A.1		A2.F.BF. A.1/1a	A2. F.IF. B.3b		A2. S.IC.A.2	A2. A.N.Q.A.1		
A2. N.C.N. A.2		A2.F.BF. A.1b	A2. F.IF. B.3c		A2. F. IF.A.1	A2. F. IF.B.3		
A2. N.C.N. B. 3		A2.A.APR. C.4	A2. F.IF.B.4		A2. S.CP. A.1	A2.F.LE. A.1		

■ Major Content

➤ Supporting Content

★(star) Modeling Standard/Domain



Introduction

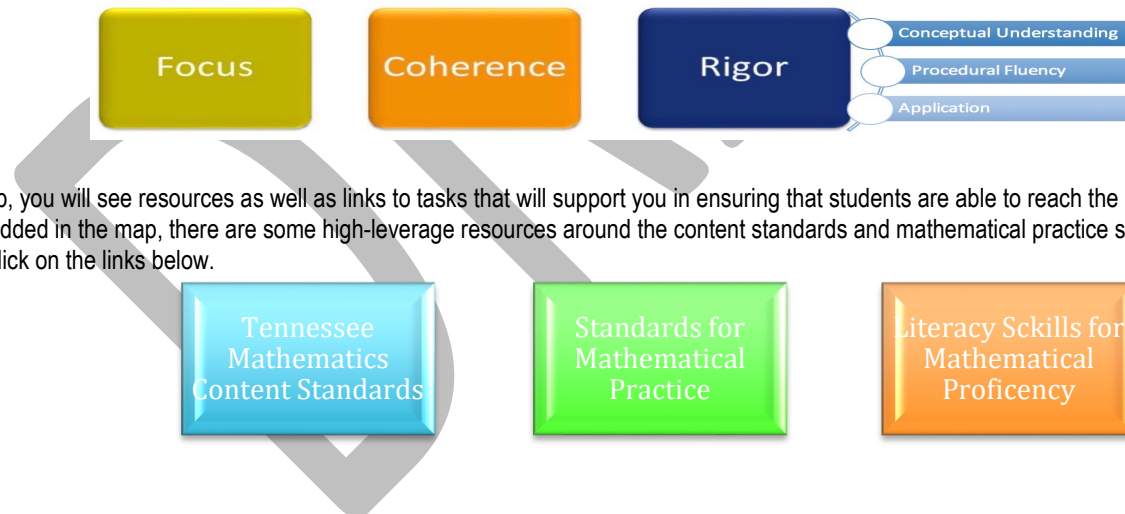
Destination 2025, Shelby County Schools’ 10-year strategic plan, is designed not only to improve the quality of public education, but also to create a more knowledgeable, productive workforce and ultimately benefit our entire community.

What will success look like?



In order to achieve these ambitious goals, we must collectively work to provide our students with high quality, college and career ready aligned instruction. The Tennessee State Standards provide a common set of expectations for what students will know and be able to do at the end of a grade. The State of Tennessee provides two sets of standards, which include the Standards for Mathematical Content and The Standards for Mathematical Practice. The Content Standards set high expectations for all students to ensure that Tennessee graduates are prepared to meet the rigorous demands of mathematical understanding for college and career. The eight Standards for Mathematical Practice describe the varieties of expertise, habits of mind, and productive dispositions that educators seek to develop in all students. The Tennessee State Standards also represent three fundamental shifts in mathematics instruction: **focus, coherence and rigor**.

Instructional Shifts for Mathematics



Throughout this curriculum map, you will see resources as well as links to tasks that will support you in ensuring that students are able to reach the demands of the standards in your classroom. In addition to the resources embedded in the map, there are some high-leverage resources around the content standards and mathematical practice standards that teachers should consistently access. For a full description of each, click on the links below.

■ Major Content

➤ Supporting Content

★(star) Modeling Standard/Domain



How to Use the Maps

Overview

An overview is provided for each quarter and includes the topics, focus standards, intended rigor of the standards and foundational skills needed for success of those standards.

Your curriculum map contains four columns that each highlight specific instructional components. Use the details below as a guide for information included in each column.

Tennessee State Standards

TN State Standards are located in the left column. Each content standard is identified as Major Content or Supporting Content (for Algebra I, Algebra II & Geometry only). A key can be found at the bottom of the map.

Content

This section contains learning objectives based upon the TN State Standards. Best practices tell us that clearly communicating measurable objectives lead to greater student understanding. Additionally, essential questions are provided to guide student exploration and inquiry.

Instructional Support & Resources

District and web-based resources have been provided in the Instructional Support & Resources columns. You will find a variety of instructional resources that align with the content standards. The additional resources provided should be used as needed for content support and scaffolding. The inclusion of vocabulary serves as a resource for teacher planning and for building a common language across K-12 mathematics. One of the goals for Tennessee State Standards is to create a common language, and the expectation is that teachers will embed this language throughout their daily lessons.

Instructional Calendar

As a support to teachers and leaders, an instructional calendar is provided **as a guide**. Teachers should use this calendar for effective planning and pacing, and leaders should use this calendar to provide *support* for teachers. Due to variances in class schedules and differentiated support that may be needed for students, adjustment to the calendar may be required.




Topics Addressed in Quarter

- Trigonometric Functions
- Pythagorean Identities
- Unit Circle

Overview

During quarter four students will extend their understanding of functions and the real numbers, and increase their toolset for modeling in the real world. Students extend their notion of number to include trigonometric functions and identities. Students explore trigonometric functions through graphing, solving, technology, and learning their properties. Building on their work with linear, quadratic, exponential, radical, and rational functions, in Algebra II students extend their repertoire of functions to include trigonometric functions. After the TNReady assessment, students work closely with reviewing functions and continue to expand and hone their abilities to model and analyze situations that involve quadratic, exponential, radical, rational and trigonometric functions.

Content Standard	Type of Rigor
A2. F.TF.A.1, 1a, 1b	Procedural Fluency, Conceptual Understanding
A2. F.TF.A.2	Procedural Fluency, Conceptual Understanding
A2. A.N.Q.A.1	Procedural Fluency, Application, Conceptual Understanding
A2. F.TF.A.2	Procedural Fluency, Conceptual Understanding
A2. F.TF.A.3, 3a, 3b	Procedural Fluency, Application, Conceptual Understanding
 indicates a Power Standard based on the 2017-18 TN Ready Assessment	
Instructional Focus Document (Algebra II)	

[TN Department of Education Assessment Live Binder](#)



TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES	
Trigonometric Functions and the Unit Circle <i>(Allow approximately 2-3 weeks for instruction, review, and assessment.)</i>			
<p>Domain Trigonometric Functions Cluster: Extend the domain of trigonometric functions using the unit circle.</p> <p>➤ A2. F.TF.A.1 Understand and use radian measure of an angle.</p> <p>a. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. (formerly F-TF.A.1)</p> <p>b. Use the unit circle to find $\sin \theta$, $\cos \theta$, and $\tan \theta$ when θ is a commonly recognized angle between 0 and 2π. <i>Commonly recognized angles include all multiples $n\pi/6$ and $n\pi/4$, where n is an integer.</i></p> <p>➤ A2. 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.</p> <p>Domain Quantities Cluster: Reason quantitatively and use units to solve problems.</p> <p>➤ A2. N.Q.A.1 Identify, interpret, and justify appropriate quantities for the purpose of descriptive modeling.</p>	<p>Essential Question(s):</p> <ul style="list-style-type: none"> • What is meant by the radian measure of an angle? • What is the connection between the radian measure of an angle and the length of the arc on the unit circle the angle intercepts? • What does the unit circle have to do with trigonometric functions? How can this help solve real-world problems? <p>Objective(s):</p> <ul style="list-style-type: none"> • Students will work with angles in standard position. (A2. F.TF.A.1b) • Students will find coordinates of points in the unit circle. (A2. F.TF.A.1b) • Students will define and evaluate sine, cosine and tangent. (A2. F.TF.A.1b) • Students will solve problems that model trigonometric functions. (A2. N.Q.A.1) 	<p><i>Use the textbook resources to address procedural fluency.</i></p> <p>Pearson 13-2 Angles and the Unit Circle</p> <p>Glencoe 13.2 Angles and Angle Measure 13.3 Trigonometric Functions of General Angles 13.6 Circular Functions</p> <p><i>Use the following resources to ensure that the intended outcome and level of rigor of the standards are met.</i></p> <p>Eureka Algebra II Module 2, Topic A (engageny.com), Lessons 1-3, 9</p> <p>Additional Resources</p> <p>e Math instruction: Unit 11 Paper Plate Unit Circle Blank and Filled out Unit Circle Handout GSE Introduction to Trigonometric Functions Figuring Out All the Angles Real Numbers and the Unit Circle Trigonometric Functions on the Unit Circle Un Wrapping the Unit Circle The Trig Hand Trick Converting between radians and degrees</p>	<p>Vocabulary</p> <p>Standard position, initial side, terminal side, coterminal angles, unit circle, cosine of θ, sine of θ, Tangent of θ, tangent function, central angle, intercepted arc, radian</p> <p>Writing in Math/Discussion</p> <p>Two angles are measured in radians. Explain how to tell whether the angles are coterminal without rewriting their measures in degrees</p> <p>Summarize how the quadrant in which the terminal side of an angle lies affects the sign of the sine and cosine of that angle.</p> <p>Explain how you can write a tangent function that has the same period as $y = \sin 4\theta$.</p> <p>Resources in the Pearson textbook:</p> <p>"Solve it," Think About a Plan, Find the Errors, Multiple word problems, Reasoning question, Compare/contrast question, Open-ended questions, and Connections to other real world topics and/or other subjects</p>



Curriculum and Instruction – Mathematics

Quarter 4

Algebra II

TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES	
		<p>(video) Finding cosine and sine of radian measures (video) Finding the length of an arc (video) HS Flip Book with Examples of each Standard</p> <p>ACT Practice Tests ACT Academy</p>	
<p>Domain Trigonometric Functions Cluster: Extend the domain of trigonometric functions using the unit circle.</p> <p>➤ A2. F.TF.A.1 Understand and use radian measure of an angle. a. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. (formerly F-TF.A.1) b. Use the unit circle to find $\sin \theta$, $\cos \theta$, and $\tan \theta$ when θ is a commonly recognized angle between 0 and 2π. <i>Commonly recognized angles include all multiples $n\pi/6$ and $n\pi/4$, where n is an integer.</i></p> <p>➤ A2. 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.</p> <p>Domain: Quantities Cluster: Reason quantitatively and use</p>	<p>Essential Question(s):</p> <ul style="list-style-type: none"> When do you want a measurement in degrees? In radians? What similarities do the sine and cosine graph have? Differences? Why does the tangent graph have asymptotes? <p>Objective(s):</p> <ul style="list-style-type: none"> Students will use radian measure for angles. (A2. F.TF.A.1a) Students will find the length of the arc of the circle. (A2. F.TF.A.1a) Students convert between degrees and radians. (A2. F.TF.A.2) 	<p><i>Use the textbook resources to address procedural fluency.</i></p> <p>Pearson 13-3 Radian Measure 13-4 The Sine Function 13-5 The Cosine Function 13-6 The Tangent Function</p> <p>Glencoe 13.7 Graphing Trigonometric Functions</p> <p><i>Use the following resources to ensure that the intended outcome and level of rigor of the standards are met.</i></p> <p>Eureka Algebra II Module 2, Topic A, Lessons 4-7</p> <p>Additional Resources Math Vision Project Task: More “Sine” Language Math Vision Project Task: Diggin’ It Math Vision Project Task: Stalking It Math Vision Project Task: “Sine”ing and “Cosine”ing It</p>	<p>Vocabulary Central angle, intercepted arc, radian, sine function, cosine function, sine curve</p> <p>Writing in Math/Discussion Two angles are measured in radians. Explain how to tell whether the angles are coterminal without rewriting their measures in degrees.</p> <p>What does a sine function remind you of in the real world? What does a cosine function remind you of in the real world?</p>



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TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES	
units to solve problems. ➤ A2. N.Q.A.1 (formerly N-Q.B.2) Identify, interpret, and justify appropriate quantities for the purpose of descriptive modeling.		Property Rules HS Flip Book with Examples of each Standard	
Trigonometric Identities <i>(Allow approximately 2 weeks for instruction, review, and assessment)</i>			
Domain Trigonometric Functions Cluster: Prove and apply trigonometric identities. ➤ A2. F.TF.B.3 Know and use trigonometric identities to find values of trig functions. a. Given a point on a circle centered at the origin, recognize and use the right triangle ratio definitions of $\sin \theta$, $\cos \theta$, and $\tan \theta$ to evaluate the trigonometric functions. b. Given the quadrant of the angle, use the identity $\sin^2 \theta + \cos^2 \theta = 1$ to find $\sin \theta$ given $\cos \theta$, or vice versa. <i>Commonly recognized angles include all multiples $n\pi/6$ and $n\pi/4$, where n is an integer.</i>	Essential Question(s): What are the six formulas needed to verify trigonometric identities? Objective(s): <ul style="list-style-type: none"> Students prove and use the Pythagorean identity $\sin^2(x) + \cos^2(x) = 1$. (A2. F.TF.B.3) Students will verify and apply trigonometric identities. (A2. F.TF.B.3) 	<i>Use the textbook resources to address procedural skill and fluency.</i> Pearson 14-1 Trigonometric Identities Glencoe 14.1 Trigonometric Identities <i>Use the following resources to ensure that the intended outcome and level of rigor of the standards are met.</i> Eureka Algebra II Module 2, Topic B, Lessons 15-17 Additional Resources Illustrative Math: Trig Ratios and the Pythagorean Theorem NYC Culminating Task: Ferris Wheel Task Math Bits Trigonometric Concepts (Lessons & Resources) HS Flip Book with Examples of each Standard End of the Course Review	Vocabulary Trigonometric Identity, Pythagorean identities Journaling/Prompt Develop your own trigonometric identity. Hint: Start with a simple trigonometric expression and work backwards. Have students to write an identity and exchange with a peer to solve it. Resources in the Pearson textbook: "Solve it," Think About a Plan, Find the Errors, Multiple word problems, Reasoning question, Compare/contrast question, Open-ended questions, and Connections to other real world topics and/or other subjects



Curriculum and Instruction – Mathematics

Quarter 4

Algebra II

TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES	
Review of Major Content/Additional Topics (Allow approximately 4-5 weeks for instruction, review, and assessment)			
<p>See previous quarters for the major work review. Review those standards to ensure that students are prepared for their final exam, their 4th year course, and/or the ACT.</p> <p>TN Department of Education Mathematics Standards</p> <p>ACT College & Career Readiness Mathematics Standards</p> <p>ACT Academy</p>		<p><i>Use previous lessons and tasks not assigned/completed.</i></p> <p><i>Additional topics may be addressed/included based upon student needs. These include:</i></p> <ul style="list-style-type: none"> ➤ Matrices Pearson-Ch. 12; Glencoe- Ch. 4 ➤ Introduction to Conics Pearson-Ch. 10; Glencoe- Ch. 10 <p>Additional Lessons & Resources <i>(Make sure that the intended outcome and rigor of the standard is addressed, based upon TN State Algebra 2 Standards or standards from a 4th year course.)</i></p> <ul style="list-style-type: none"> ➤ TN ACT Information & Resources (see ACT Educator Resources) ➤ Math Bits Notebook Lessons and Resources ➤ e Math instruction ➤ Edutoolbox.com (Assessment & Instructional Resources) ➤ HS Flip Book with Examples of each Standard 	

■ Major Content

➤ Supporting Content

★(star) Modeling Standard/Domain



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Quarter 4

Algebra II

RESOURCE TOOLKIT

<p>Textbook Resources</p> <p>Pearson: http://www.pearsonsuccessnet.com</p> <p>Online Tools</p> <p>Homework Video Tutors Lesson Quizzes</p>	<p>Glencoe: https://connected.mcgraw-hill.com/connected/login.do</p> <p>Online Tools</p> <p>Chapter Animation Chapter Quizzes & Tests Editable Worksheets Anticipation Guides Personal Tutors Lesson PowerPoints Enrichment Masters Graphing Calculator Activities</p>	<p>Standards</p> <p>Common Core Standards - Mathematics Common Core Standards - Mathematics Appendix A Edutoolbox (formerly TNCore) The Mathematics Common Core Toolbox PARCC Blueprints and Test Specifications FAQ CCSS Toolbox PARCC High School Math Tasks TICommonCore.com TN Department of Education Math Standards PARCC Practice Test HS Flip Book with Examples of each Standard JMAP Instructional Focus Document (Algebra II) TN Department of Education Assessment Live Binder</p>	<p>Videos</p> <p>Brightstorm Teacher Tube The Futures Channel Khan Academy Math TV Lamar University Tutorial e Math instruction</p>
<p>Additional Sites</p> <p>TN Dept. of Education Assessment Live Binder UT Dana Center Mars/Math Shell Tasks* (Not accessible via SCS server) Inside Math Tasks Math Vision Project Tasks Better Lesson Dana Center Algebra 2 Assessments University of Idaho Literacy Strategies</p>	<p>Interactive Manipulatives</p> <p>Illuminations (NCTM) National Math Resources NASA Space Math Math Vision Project Purple Math</p> <p>ACT & SAT</p> <p>TN ACT Information & Resources ACT College & Career Readiness Mathematics Standards ACT Academy SAT Connections SAT Practice from Khan Academy</p>	<p>Calculator</p> <p>Math Nspired Texas Instrument Activities Casio Activities</p>	



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Algebra II

March 2020

Suggested Lessons for the Week	Monday	Tuesday	Wednesday	Thursday	Friday	Notes:
	2	3	4	5	6	
	9	10	11	12	13	<i>End of 3rd Quarter</i>
	16	17	18	19	20	
Spring Break						
Pearson 13.2; eMathInstruction- Unit 11, Lesson 3; Selected tasks from the map; EOC Review	23 <i>4th Quarter Begins</i>	24	25	26	27	
Pearson 13.3, 13.4, 13.5 & 13.6 Selected tasks from the map; EOC Review	30	31	1	2	3	



Curriculum and Instruction – Mathematics

Quarter 4

Algebra II

April 2020

Suggested Lessons for the Week	Monday	Tuesday	Wednesday	Thursday	Friday	Notes:
Pearson 13.3, 13.4, 13.5 & 13.6 Selected tasks from the map; EOC Review			1	2	3	
Selected tasks from the map; EOC Review	6	7	8	9	10 <i>Spring Holiday/Good Friday (Out)</i>	
Pearson 14.1; Eureka Algebra II Module 2, Topic B, Lessons 15-17 EOC Review	13	14	15	16	17	
Math Bits Trigonometric Concepts (Lessons & Resources); EOC Review	20	21	22	23	24	
Review of Major Content/Additional Topics (see map)	27	28	29	30	1	

■ Major Content

➤ Supporting Content

★(star) Modeling Standard/Domain



Curriculum and Instruction – Mathematics

Quarter 4

Algebra II

May 2020

Suggested Lessons for the Week	Monday	Tuesday	Wednesday	Thursday	Friday	Notes:
					1	
Review of Major Content/Additional Topics (see map)	4	5	6	7	8	
Review of Major Content/Additional Topics (see map); Exam Review	11	12	13	14	15	
Exam Review Final Exams	18	19	20 Semester Exams	21 Semester Exams	22 Semester Exams <i>1/2 day students 4th Quarter ends</i>	
	25 <i>Memorial Day</i>	26	27	28	29	

■ Major Content

➤ Supporting Content

★(star) Modeling Standard/Domain