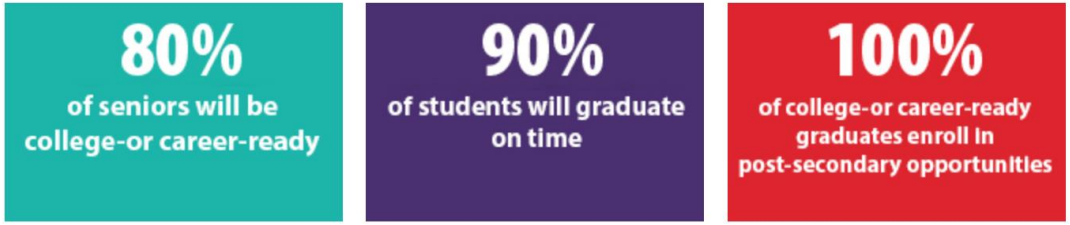
Mathematics
Grade 8: Year at a Glance
2019-2020

Q1			Q2	Q3			Q4	
Module 1 Aug. 12-Sept. 6	Module 2 Sept. 9 -Sept. 23	Module 3 Sept. 23-Oct. 10	Module 4 Oct. 21-Dec. 20 (Includes Semester Exam Days)	Module 5 Jan. 6 – Feb. 5	Module 6 Feb. 6 –Feb. 28	Gr. 7 Module 5 Lessons 6-7 Feb. 27- Feb. 28	Module 7 Mar. 9 -April 24 Review after TNReady April 27-May 22	
Integer Exponents & Scientific Notation	The Concept of Congruence	Similarity	Linear Equations	Examples of Functions from Geometry	Linear Functions		Introduction to Irrational Numbers Using Geometry	
8.EE.A.1	8.G.A.1	8.G.A.2	8.EE.B.5	8.F.A.1	8.F.B.4	8.SP.B.4	8.NS.A.1	
8.EE.A.3	8.G.A.3	8.G.A.3	8.EE.B.6	8.F.A.2	8.F.B.5		8.NS.A.2	
8.EE.A.4	8.G.B.4	8.G.B.4	8.EE.C.7	8.F.A.3	8.SP.A.1		8.EE.A.2	
	8.G.B.5	8.G.B.5	8.EE.C.8	8.G.C.7	8.SP.A.2		8.G.B.4	
					8.SP.A.3		8.G.B.5	
							8.G.B.6	
							8.G.C.7	
							After TNReady	
							8.EE 1, 3-6, 8	
							8.F 1-3	
							8.G 2, 5, 7	

■ Major Content ➢ Supporting Content

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**.

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.

Tennessee Mathematics Content Standards

Standards for Mathematical Practice

Literacy Sckills for Mathematical Proficency

How to Use the Curriculum Map

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. 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
District and web-based resources have been provided in the Instructional Support column. 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.

Vocabulary and Fluency
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. In order to aid your planning, we have also included a list of fluency activities for each lesson. It is expected that fluency practice will be a part of your daily instruction. (Note: Fluency practice is not intended to be speed drills, but rather an intentional sequence to support student automaticity. Conceptual understanding must underpin the work of fluency.

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.

Module 7: Intro to Irrational Numbers Using Geometry

The chart below includes the standards that will be addressed in this quarter, the type of rigor the standards address, and foundational skills needed for mastery of these standards. Consider using these foundational standards to address student gaps during intervention time as appropriate for students

Grade Level Standard	Type of Rigor	Foundational Standards
8.NS.A.1	Conceptual Understanding & Procedural Fluency	7.NS.A.2
8.NS.A.2	Conceptual Understanding	
8.EE.A.2	Conceptual Understanding & Procedural Fluency	6.EE.B.5, 6.EE.B.7, 6.EE.B.8
8.G.B.4	Conceptual Understanding & Procedural Fluency	7.G.B.5
8.G.B.5	Application	
8.G.B.6	Procedural Fluency	6.G.A.3
8.G.C.7	Conceptual Understanding & Application	
Indicates the Power Standard based on the 2017-18 TN Ready Assessment.		
	Instructional Focus Document – Grade 8	

Module 7 Intro to Irrational Numbers Using Geometry

Grade 8 Pacing and Preparation Guide

(Allow approximately 4 weeks for instruction, review and assessment)

TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT	VOCABULARY
Domain: Number System **Cluster:** Know that there are numbers that are not rational and approximate them by rational numbers. ➢ **8.NS.A.1**: Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually or terminates, and convert a decimal expansion which repeats eventually or terminates into a rational number. ➢ **8.NS.A.2**: Use rational approximations of irrational numbers to compare the size of irrational numbers locating them approximately on a number line diagram. Estimate the value of irrational expressions such as π^2. For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations. **Domain**: Expressions and Equations **Cluster:** Work with radicals and integer exponents. ■ **8.EE.A.2:** Use square root and cube root symbols to represent solutions to equations of the form x^2 = p and x^3 = p, where p is a positive rational number. Evaluate square	**Essential Questions:** • In what ways can rational numbers be useful? • Why is it important to be able to compare and approximate rational and irrational numbers? **Topic B Objectives:** **Lesson 6** • Students prove that those real numbers with a finite decimal expansion are precisely the fractions that can be written with a denominator that is a power of 10. • Students realize that any fraction with a denominator that is a product of 2's and/or 5's can be written in an equivalent form with a denominator that is a power of 10. **Lesson 7** • Students develop an intuitive understanding of the placement of infinite decimals on the number line. Students develop an argument for believing that 0.9999… should equal 1. **Lesson 8** • Students explore a variation of the long division algorithm. • Students discover that every rational number has a repeating decimal expansion. **Lesson 9** • Students identify the size in error when truncating an infinite decimal to a finite number of decimal places.	**Topic B: Decimal Expansion of Numbers** **Topic B Teacher Toolbox alignment:** **Lesson 3: *Understand Rational and Irrational Numbers*** Integrating Teacher Toolbox **Lesson 6** **Lesson 7 Optional, if time permits** **Lesson 8** **Lesson 9** **Lesson 10** **Lessons 11 & 12, Combine** Suggestions for combining • Focus on the examples from both lessons • Complete Exit Ticket for both lessons • Khan Academy: Approximate Square Roots • Decimal Expansion of Irrational Numbers **Lesson 13** **Lesson 14 Omit** **Optional Quiz for M7 Topic B** **Mid-Module 7 Assessment & Review of Assessment (#2-5, 6a-c are most similar to TNTeady-style questions that may appear on state assessment.)** ***(Complete by 4/1/20)*** **Optional Mid-Module 7 Assessment**	**Vocabulary for Module 7** Cube Root Decimal Expansion Decimal Expansion of a Negative Number Decimal Expansion of a Positive Real Number Decimal System Irrational Number The n^{th} Decimal Digit of a Decimal Expansion The n^{th} Finite Decimal of a Decimal Expansion Perfect Square Rational Approximation Real Number Square Root of a Number The Square Root of a Number Truncated Cone **Familiar Terms and Symbols for Module 7** Decimal Expansion Finite Decimals Number Line Rate of Change Rational Number Volume

TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT	VOCABULARY
roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational.	**Lesson 10** • Students develop a convincing argument establishing that every real number with a repeating decimal is a rational number. **Lesson 11** • Students approximate the decimal expansions of roots of integers. **Lesson 12** • Students develop an alternative method for computing the decimal expansion of a rational number. **Lesson 13** • Students use finite decimal approximations of irrational numbers to compare the size of irrational numbers. • Students place irrational numbers in their approximate locations on a number line.	**Additional Resources:** *These optional resources may be used for extension, enrichment and/or additional practice, as needed.* Khan Academy: Repeating Decimals Khan Academy: Square and Cube Roots Khan Academy: Classifying Rational & Irrational Numbers Illustrative Math: Converting Repeating Decimals to Fractions Illustrative Math: Converting Decimal Representations of Rational Numbers to Fraction Representations Illustrative math: Repeating or Terminating? Illustrative Math: Approximating Pi	
Domain: Geometry **Cluster:** Understand and apply the Pythagorean Theorem ■ **8.G.B.4:** (formerly 8.G.C.6) Explain a proof of the Pythagorean Theorem and its converse. ■ **8.G.B.5**: (formerly 8.G.B.7) Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. ■ **8.G.B.6:** (formerly 8.G.B.8) Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	**Essential Questions:** • What is the relationship between the lengths of the sides of a right triangle and how this relationship be used to find the distance between two points? **Topic C Objectives:** **Lesson 15**: • Students use similar triangles to develop another proof of the Pythagorean theorem and explore a geometric consequence of this proof. • Students explain a proof of the Pythagorean theorem. **Lesson 16:** • Students explain a proof of the converse of the Pythagorean theorem.	**Topic C: The Pythagorean Theorem** **Topic C Teacher Toolbox Alignment:** **Lesson 25: *Distance in the Coordinate Plane*** Integrating Teacher Toolbox **Lesson 15 Omit or review with students as needed; this was covered in Module 3** **Lesson 16** **Lesson 17** **Lesson 18** **Optional Quiz for M7 Topic C** **Additional Resources:** *These optional resources may be used for extension, enrichment and/or additional practice, as needed.* Online Math Learning: The Converse of The Pythagorean Theorem	

TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT	VOCABULARY
	• Students apply the theorem and its converse to solve problems. **Lesson 17** • Students determine the distance between two points on a coordinate plane using the Pythagorean theorem. **Lesson 18** • Students apply the Pythagorean theorem to real-world and mathematical problems in two dimensions.	Illustrative Math Tasks: Pythagorean Theorem Inside Mathematics Patterns in Prague Inside Mathematics Pugs 8.G.B.5 and 8.NS.A.2 Math Shell: The Shortest Route	
Domain: Geometry **Cluster:** Solve real-world and mathematical problems involving volume of cylinders, cones and spheres. ■ **8.G.B.5**: (formerly 8.G.B.7) Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. ➢ **8.G.C.7** (formerly 8.G.C.9) Know and understand the formulas for the volumes of cones, cylinders, and spheres, and use them to solve real-world and mathematical problems.	**Essential Question(s):** • What is the relationship between the volume of a sphere, cone, and cylinder? **Topic D Objectives** **Lesson 19** • Students use the Pythagorean theorem to determine an unknown dimension of a cone or a sphere. • Students know that a pyramid is a special type of cone with triangular faces and a polygonal base. • Students know how to use the lateral length of a cone and the length of a chord of a sphere to solve problems related to volume. **Lesson 21** • Students find the volumes of figures composed of combinations of cylinders, cones, and spheres. **Lesson 22** • Students compute the average rate of change in the height of water level when water is poured into a conical container at a constant rate.	**Topic D: Applications of Radicals and Roots** **Topic D Teacher Toolbox Alignment:** **Lesson 27: Solve Problems with Cylinders, Cones, and Spheres** Integrating Teacher Toolbox **Lesson 19** **Lesson 20 Omit** **Lesson 21** / **Lesson 22** — **Complete these lessons after TNReady** **Lesson 23 Optional, if time permits** Optional Quiz for M7 Topic D **End of Module 7 Assessment & Review of Assessment** ***(Complete by 4/9/20)*** Optional End-of-Module 7 Assessment **Additional Resources:** *These optional resources may be used for extension, enrichment and/or additional practice, as needed.* Illustrative Math: Comparing Snow Cones Illustrative Math: Flower Vases	

TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT	VOCABULARY
	Lesson 23 • Using square roots, students determine the position of the bottom of a ladder as its top slides down a wall at a constant rate.	Illustrative Math: Glasses Illustrative Math: Shipping Rolled Oats	

After TNReady Assessment

This section lists standards that are recommended to be reviewed after The State assessment. The Teacher Toolbox (Ready TN) is a great resource to use to cover the standards and you may also use the web resources that are provided below and in each of the instructional maps.

Module 7: Introduction to Irrational Numbers Using Geometry	
■ **8.G.B.5**: (formerly 8.G.B.7) ➢ **8.G.C.7** (formerly 8.G.C.9)	**Lesson 7 Infinite Decimals** **Lesson 15 Pythagorean Theorem Revisited** **Lesson 21 Volume of Composite Solids** **Lesson 22 Average Rate of Change** 3 ACTS: Guessing Gumballs 8.G.5 Better Lesson: Broken Telephone Pole 8.G.5 3 Acts: Mix, Then Spray 8.G.7
Module 1: Integer Exponents and Scientific Notation	
■ **8.EE.A.1**	**Lesson 6 Proofs of Laws of Exponents** **Lesson 12 Choice of Unit** Illustrative Math: Extending the Definitions of Exponents

Module 2: The Concept of Congruence	
➢ 8.G.A.2	**Lesson 7 Sequencing Translations** cpalms: Sequence of Transformations
Module 4: Linear Equations	
■ 8.EE.5 ■ 8.EE.6 ■ 8.EE.7 ■ 8.EE.8	**Lesson 22 Constant Rates Revisited** **Lesson 28 Another Computational Method of Solving Linear System** Performance Task: Machinist's Wages 8.EE.5, 8.EE.6 TN Task Arc for 8.EE.8 (A Set of 8 Tasks)
Module 5: Examples of Functions from Geometry	
■ 8.F.1 ■ 8.F.2 ■ 8.F.3	**Lesson 4 More Examples of Functions** Performance Task: Workers and Wages 8.EE.5, 8.F.1 Performance Task: Downloading Songs 8.F.1, 8.F.2, 8.EE.5 Task: Growth Patterns 8.F.3

RESOURCE TOOLKIT The Resource Toolkit provides additional support for comprehension and mastery of grade-level skills and concepts. While some of these resources are imbedded in the map, the use of these categorized materials can assist educators with maximizing their instructional practices to meet the needs of all students.		
Textbook Resources www.greatminds.org **Eureka Math Grade 8 Remediation Guides** Remediation Tools	**Standards Support** TNReady Math Standards Grade 8 Instructional Focus Document Achieve the Core Edutoolbox	**Videos** Khan Academy Learn Zillion
Calculator Activities TI-73 Activities CASIO Activities TI-Inspire for Middle Grades	**Interactive Manipulatives** **Glencoe Virtual Manipulatives** National Library of Interactive Manipulatives **SEL Resources** **SEL Connections with Math Practices** **SEL Core Competencies** The Collaborative for Academic, Social, and Emotional Learning (CASEL)	**Additional Sites** **Embarc Online** PBS: Grades 6-8 Lesson Plans Grade 8 Flip Book (This book contains valuable resources that help develop the intent, the understanding and the implementation of the state standards.) https://academy.act.org/ https://opened.com

Curriculum and Instruction – Mathematics

Quarter 4 **2019-2020** **Grade 8**

March 2020

Module/Topic	Monday	Tuesday	Wednesday	Thursday	Friday	Notes:
	2	**3**	**4**	**5**	**6**	**Flex Day Options Include:** ***Standard***- Suggested standard(s) to review for the day (*-denotes a Power Standard) ***Pacing*** – Use this time to adjust instruction to stay on pace. ***Other***- This includes assessments, review, re-teaching, etc.
	9	**10**	**11**	**12**	**13** *End of Quarter 3*	
	16	**17**	**18**	**19**	**20**	
	Spring Break					
Module 7 Topic B	**23** *Quarter 4 begins* Module 7 Lesson 6	**24** Module 7 Lesson 8	**25** Module 7 Lesson 9	**26** Module 7 Lesson 10	**27** Flex Day Options **8.NS.A.1*** **8.NS.A.2** **8.EE.A.2*** **Pacing** **Other**	
Module 7 Topic B	**30** Module 7 Lessons 11-12, Combined	**31** Module 7 Lesson 13	1	2	3	

■Major Content ➢ Supporting Content ■Major Content ➢ Supporting Content

Curriculum and Instruction – Mathematics

Quarter 4 **2019-2020** **Grade 8**

April 2020

Module/Topic	Monday	Tuesday	Wednesday	Thursday	Friday	Notes:
			1 **Mid-Module Assessment**	**2** Module 7 Lesson 16	**3** Flex Day Options **8.G.B.4** **8.G.B.5*** **8.G.B.6** **Pacing** **Other**	**Flex Day Options Include:** ***Standard-*** Suggested standard(s) to review for the day (*-denotes a Power Standard) ***Pacing*** – Use this time to adjust instruction to stay on pace. ***Other***- This includes assessments, review, re-teaching, etc.
Module 7 Topic C	**6** Module 7 Lesson 17	**7** Module 7 Lesson 18	**8** Module 7 Lesson 19	**9** **End of Module Assessment**	**10** ***Spring Break II/Good Friday***	
	13	**14**	**15**	**16**	**17**	
	TN Ready Testing Window					
	20	**21**	**22**	**23**	**24**	
	TN Ready Testing Window					
	27	**28**	**29**	**30**	1	
	Module 7 Lessons					

Note: Please use this suggested pacing as a guide. It is understood that teachers may be up to 1 week ahead or 1 week behind depending on their individual class needs.

Curriculum and Instruction – Mathematics

Quarter 4 **2019-2020** **Grade 8**

May 2020

Module/Topic	Monday	Tuesday	Wednesday	Thursday	Friday	Notes:
					1	**Flex Day Options Include:** ***Standard***- Suggested standard(s) to review for the day (*-denotes a Power Standard) ***Pacing*** – Use this time to adjust instruction to stay on pace. ***Other***- This includes assessments, review, re-teaching, etc.
	4	**5**	**6**	**7**	**8**	
	Modules 1 & 2 Review					
	11	**12**	**13**	**14**	**15**	
	Module 4 Review					
	18	**19**	**20**	**21**	**22** *1/2 day students* *End of Quarter 4*	
	Module 5 Review					
	25 ***Memorial Day***	**26**	**27**	**28**	**29**	
		PD FLEX DAY				

Note: Please use this suggested pacing as a guide. It is understood that teachers may be up to 1 week ahead or 1 week behind depending on their individual class needs.