



Curriculum and Instruction – Mathematics

Quarter 4

Grade 8



Mathematics Grade 8: Year at a Glance 2018-2019

Q1			Q2		Q3		Q4	
Module 1 Aug.6-Aug. 28	Module 2 Aug.29- Sept. 18	Module 3 Sept.19-Oct. 5	Module 4 Oct.15-Dec.14 (Includes Semester Exam Days)	Module 5 Jan 14-Feb. 6	Module 6 Feb. 7-Mar.1	Gr. 7 Module 5 Lessons 6-7 Feb. 27-Feb 28	Module 7 Mar. 4 -April 12 After TNReady April 29-May 24	
Integer Exponents and Scientific Notation	The Concept of Congruence	Similarity	Linear Equations	Examples of Functions from Geometry	Linear Functions		Introduction to Irrational Numbers Using Geometry	
8.EE.1	8.G.1	8.G.2	8.EE.5	8.F.1	8.F.4	8.SP.4	8.NS.1	
8.EE.3	8.G.3	8.G.3	8.EE.6	8.F.2	8.F.5		8.NS.2	
8.EE.4	8.G.4	8.G.4	8.EE.7	8.F.3	8.SP.1		8.EE.2	
	8.G.5	8.G.5	8.EE.8	8.G.7	8.SP.2		8.G.4	
					8.SP.3		8.G.5	
							8.G.6	
							8.G.7	
							After TNReady	
							8.EE	1, 3-6, 8
							8.F	1-3
							8.G	2, 5, 7

Note: Please use the suggested pacing as a guide. It is understood that teachers may be up to one week ahead or one week behind depending on the needs of their students.

Use this guide as you prepare to teach a module for additional guidance in planning, pacing, and suggestions for omissions. [Pacing and Preparation Guide \(Omissions\)](#)

Major Content

Supporting Content

Camilla Horton, Ed.D.
6/6/18

■ 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**.

Instructional Shifts for Mathematics



■ Major Content

➤ Supporting Content



Curriculum and Instruction – Mathematics

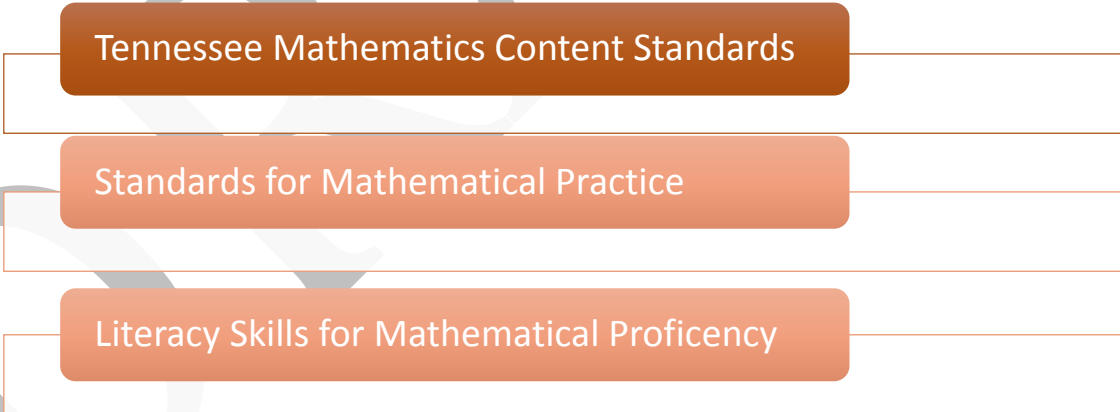
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The **Standards for Mathematical Practice** describe varieties of expertise, habits of minds and productive dispositions that mathematics educators at all levels should seek to develop in their students. These practices rest on important National Council of Teachers of Mathematics (NCTM) “processes and proficiencies” with longstanding importance in mathematics education. Throughout the year, students should continue to develop proficiency with the eight Standards for Mathematical Practice. The following are the eight Standards for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of them.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

This curriculum map is designed to help teachers make effective decisions about what mathematical content to teach so that ultimately our students can reach Destination 2025. 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.





Structure of the Standards

Structure of the TN State Standards include:

- **Content Standards** - Statements of what a student should know, understand, and be able to do.
- **Clusters** - Groups of related standards. Cluster headings may be considered as the big idea(s) that the group of standards they represent are addressing. They are therefore useful as a quick summary of the progression of ideas that the standards in a domain are covering and can help teachers to determine the focus of the standards they are teaching.
- **Domains** - A large category of mathematics that the clusters and their respective content standards delineate and address. For example, Number and Operations – Fractions is a domain under which there are a number of clusters (the big ideas that will be addressed) along with their respective content standards, which give the specifics of what the student should know, understand, and be able to do when working with fractions.
- **Conceptual Categories** – The content standards, clusters, and domains in the 9th-12th grades are further organized under conceptual categories. These are very broad categories of mathematical thought and lend themselves to the organization of high school course work. For example, Algebra is a conceptual category in the high school standards under which are domains such as Seeing Structure in Expressions, Creating Equations, Arithmetic with Polynomials and Rational Expressions, etc.



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. 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.



Grade 8 Quarter 4 Overview

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	



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TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT	VOCABULARY
Module 7 Intro to Irrational Numbers Using Geometry <u>Grade 8 Pacing and Preparation Guide</u> (Allow approximately 4 weeks for instruction, review and assessment)			
<p>Domain: Number System Cluster: Know that there are numbers that are not rational and approximate them by rational numbers.</p> <p>➤ 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.</p> <p>➤ 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.</p> <p>Domain: Expressions and Equations Cluster: Work with radicals and integer exponents.</p> <p>■ 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</p>	<p>Essential Questions:</p> <ul style="list-style-type: none"> In what ways can rational numbers be useful? Why is it important to be able to compare and approximate rational and irrational numbers? <p>Topic B Objectives:</p> <p>Lesson 6</p> <ul style="list-style-type: none"> 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. <p>Lesson 7</p> <ul style="list-style-type: none"> 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. <p>Lesson 8</p> <ul style="list-style-type: none"> Students explore a variation of the long division algorithm. Students discover that every rational number has a repeating decimal expansion. <p>Lesson 9</p> <ul style="list-style-type: none"> Students identify the size in error when truncating an infinite decimal to a finite 	<p>Topic B: Decimal Expansion of Numbers</p> <p>Lesson 6 Lesson 7 Lesson 8 Lesson 9 Lesson 10 Lessons 11 & 12, Combine Suggestions for combining</p> <ul style="list-style-type: none"> Focus on the examples from both lessons Complete Exit Ticket for both lessons Khan Academy: Approximate Square Roots Decimal Expansion of Irrational Numbers <p>Lesson 13 Lesson 14 Omit</p> <p>For Topic B, you may choose to use resources from the following Teacher Toolbox lesson for review, remediation and/or assessment to meet the needs of your students.</p> <ul style="list-style-type: none"> Lesson 3: Understand Rational and Irrational Numbers <p>Mid-Module 7 Assessment & Review of Assessment (Complete by 4/5/19)</p>	<p>Vocabulary for Module 7</p> <p>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</p> <p>Familiar Terms and Symbols for Module 7</p> <p>Decimal Expansion Finite Decimals Number Line Rate of Change Rational Number Volume</p>



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TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT	VOCABULARY
<p>positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.</p>	<p>number of decimal places.</p> <p>Lesson 10</p> <ul style="list-style-type: none"> Students develop a convincing argument establishing that every real number with a repeating decimal is a rational number. <p>Lesson 11</p> <ul style="list-style-type: none"> Students approximate the decimal expansions of roots of integers. <p>Lesson 12</p> <ul style="list-style-type: none"> Students develop an alternative method for computing the decimal expansion of a rational number. <p>Lesson 13</p> <ul style="list-style-type: none"> 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. 	<p>Additional Resources: <i>These optional resources may be used for extension, enrichment and/or additional practice, as needed.</i></p> <p>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</p>	
<p>Domain: Geometry Cluster: Understand and apply the Pythagorean Theorem</p> <p>■ 8.G.B.4: (formerly 8.G.C.6) Explain a proof of the Pythagorean Theorem and its converse.</p> <p>■ 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.</p> <p>■ 8.G.B.6: (formerly 8.G.B.8) Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.</p>	<p>Essential Questions:</p> <ul style="list-style-type: none"> 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? <p>Topic C Objectives:</p> <p>Lesson 15:</p> <ul style="list-style-type: none"> 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. <p>Lesson 16:</p> <ul style="list-style-type: none"> Students explain a proof of the converse of 	<p>Topic C: The Pythagorean Theorem</p> <p>Lesson 15 Omit or if time permits, review with students Lesson 16 Lesson 17 Lesson 18</p> <p>For Topic C, you may choose to use resources from the following Teacher Toolbox lesson for review, remediation and/or assessment to meet the needs of your students.</p> <ul style="list-style-type: none"> Lesson 25: Distance in the Coordinate Plane <p>Additional Resources: <i>These optional resources may be used for extension,</i></p>	



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	<p>the Pythagorean theorem.</p> <ul style="list-style-type: none"> Students apply the theorem and its converse to solve problems. <p>Lesson 17</p> <ul style="list-style-type: none"> Students determine the distance between two points on a coordinate plane using the Pythagorean theorem. <p>Lesson 18</p> <ul style="list-style-type: none"> Students apply the Pythagorean theorem to real-world and mathematical problems in two dimensions. 	<p>enrichment and/or additional practice, as needed.</p> <p>Online Math Learning: The Converse of The Pythagorean Theorem</p> <p>Illustrative Math Tasks: Pythagorean Theorem</p> <p>Inside Mathematics Patterns in Prague</p> <p>Inside Mathematics Pugs 8.G.B.5 and 8.NS.A.2</p> <p>Math Shell: The Shortest Route</p>				
<p>Domain: Geometry</p> <p>Cluster: Solve real-world and mathematical problems involving volume of cylinders, cones and spheres.</p> <p>■ 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.</p> <p>➤ 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.</p>	<p>Essential Question(s):</p> <ul style="list-style-type: none"> What is the relationship between the volume of a sphere, cone, and cylinder? <p>Topic D Objectives</p> <p>Lesson 19</p> <ul style="list-style-type: none"> 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. <p>Lesson 21</p> <ul style="list-style-type: none"> Students find the volumes of figures composed of combinations of cylinders, cones, and spheres. <p>Lesson 22</p> <ul style="list-style-type: none"> Students compute the average rate of change in the height of water level when 	<p>Topic D: Applications of Radicals and Roots</p> <p>Lesson 19</p> <p>Lesson 20 Omit</p> <table border="1" data-bbox="1056 836 1514 928"> <tr> <td>Lesson 21</td> <td rowspan="2">Complete these lessons after TNReady</td> </tr> <tr> <td>Lesson 22</td> </tr> </table> <p>Lesson 23 Optional</p> <p>For Topic D, you may choose to use resources from the following Teacher Toolbox lesson for review, remediation and/or assessment to meet the needs of your students.</p> <ul style="list-style-type: none"> Lesson 27: Solve Problems with Cylinders, Cones, and Spheres <p>End of Module 7 Assessment & Review of Assessment <i>(Complete by 4/12/19)</i></p> <p>Additional Resources: <i>These optional resources may be used for extension,</i></p>	Lesson 21	Complete these lessons after TNReady	Lesson 22	
Lesson 21	Complete these lessons after TNReady					
Lesson 22						

■ Major Content

➤ Supporting Content



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TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT	VOCABULARY
	<p>water is poured into a conical container at a constant rate.</p> <p>Lesson 23</p> <ul style="list-style-type: none">Using square roots, students determine the position of the bottom of a ladder as its top slides down a wall at a constant rate.	<p><i>enrichment and/or additional practice, as needed.</i></p> <p>Illustrative Math: Comparing Snow Cones</p> <p>Illustrative Math: Flower Vases</p> <p>Illustrative Math: Glasses</p> <p>Illustrative Math: Shipping Rolled Oats</p>	

DRAFT



After TNReady Assessment

This section lists standards that are recommended to be reviewed after The State assessment. The Teacher Toolbox 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

<ul style="list-style-type: none"> ■ 8.G.B.5: (formerly 8.G.B.7) ➤ 8.G.C.7 (formerly 8.G.C.9) 		<p>Lesson 21 Volume of Composite Solids Lesson 22 Average Rate of Change</p> <p>3 ACTS: Guessing Gumballs 8.G.5 Better Lesson: Broken Telephone Pole 8.G.5 3 Acts: Mix, Then Spray 8.G.7</p>	
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Module 1: Integer Exponents and Scientific Notation

<ul style="list-style-type: none"> ■ 8.EE.A.1 		<p>Lesson 6 Proofs of Laws of Exponents Lesson 12 Choice of Unit</p> <p>Illustrative Math: Extending the Definitions of Exponents</p>	
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Module 2: The Concept of Congruence

➤ 8.G.A.2		Lesson 7 Sequencing Translations cpalms: Sequence of Transformations	
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Module 4: Linear Equations

<ul style="list-style-type: none"> ■ 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)	
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Module 5: Examples of Functions from Geometry

<ul style="list-style-type: none"> ■ 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	
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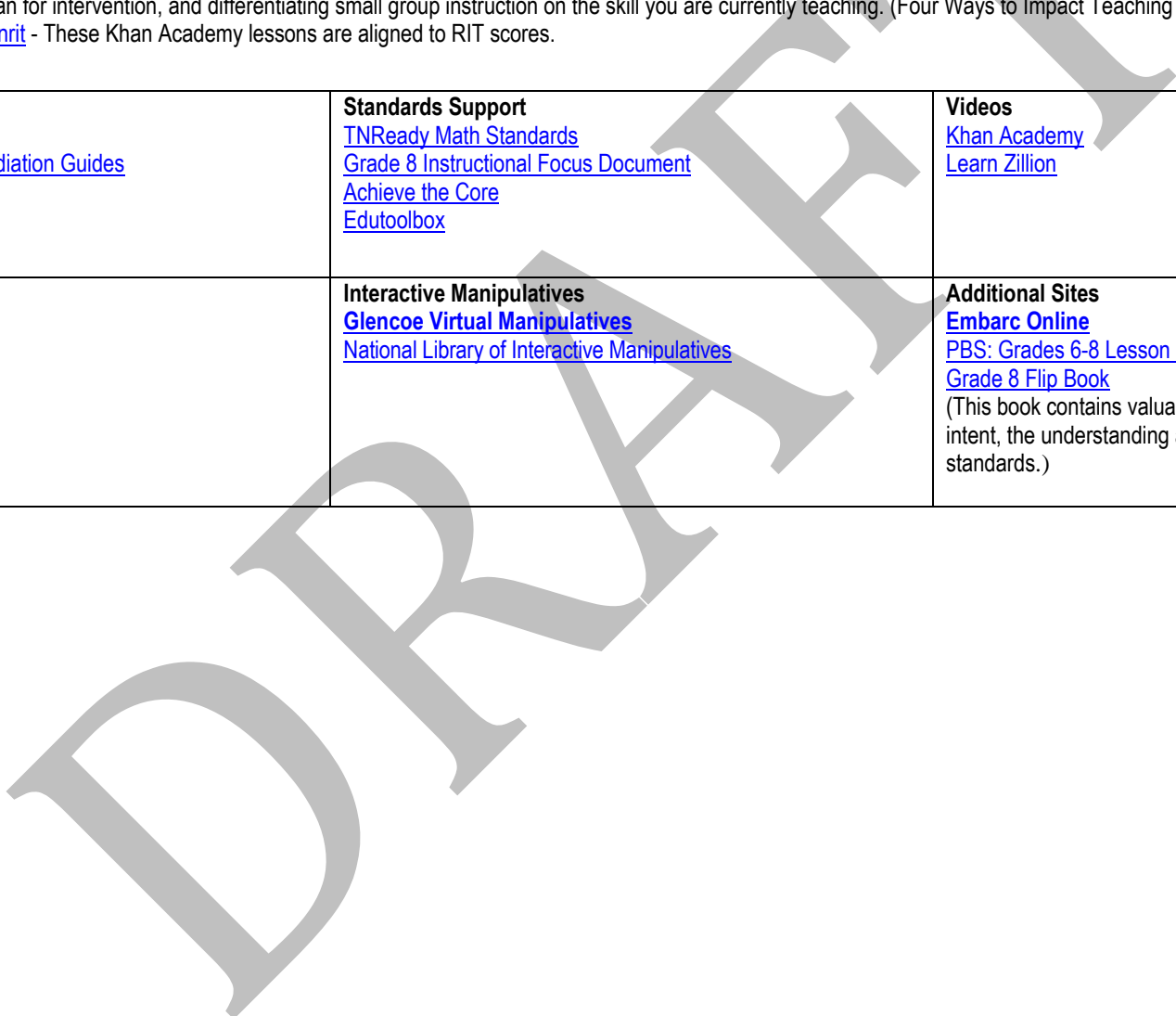
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RESOURCE TOOLBOX

The Resource Toolbox 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.

NWEA MAP Resources: https://teach.mapnwea.org/assist/help_map/ApplicationHelp.htm#UsingTestResults/MAPReportsFinder.htm - Sign in and Click the Learning Continuum Tab – this resources will help as you plan for intervention, and differentiating small group instruction on the skill you are currently teaching. (Four Ways to Impact Teaching with the Learning Continuum)
<https://support.nwea.org/khanrit> - These Khan Academy lessons are aligned to RIT scores.

<p>Textbook Resources www.greatminds.org Eureka Math Grade 8 Remediation Guides</p>	<p>Standards Support TNReady Math Standards Grade 8 Instructional Focus Document Achieve the Core Edutoolbox</p>	<p>Videos Khan Academy Learn Zillion</p>
<p>Calculator Activities TI-73 Activities CASIO Activities TI-Inspire for Middle Grades</p>	<p>Interactive Manipulatives Glencoe Virtual Manipulatives National Library of Interactive Manipulatives</p>	<p>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.)</p>





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Shelby County Schools – Grade 8 – March 2019

Mon	Tue	Wed	Thu	Fri	
				1	
4	5	6	7	8	
11 Spring Break	12 Spring Break	13 Spring Break	14 Spring Break	15 Spring Break	
18 Q4 Begins Module 7 Lesson 6	19	20	21	22	
25	26	27	28	29	

■ Major Content

➤ Supporting Content



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Shelby County Schools – Grade 8 – April 2019					
Mon	Tue	Wed	Thu	Fri	
1	2	3	4 Mid-Module 7 Assessment & Review of Assessment	5 Mid-Module 7 Assessment & Review of Assessment	
8	9	10	11 End-of Module 7 Assessment & Review of Assessment	12 End-of Module 7 Assessment & Review of Assessment	
15 State Assessment Week	16	17	18	19 <u>Good Friday</u> (no school)	
22 State Assessment Week	23	24	25	26	
29 Begin After Assessment Review of Modules 1, 3, & 7	30				

■ Major Content

➤ Supporting Content



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Shelby County Schools – Grade 8 – May 2019

Mon	Tue	Wed	Thu	Fri	
		1	2	3	
6 Begin After Assessment Review of Modules 4 & 5	7	8	9	10	
13	14	15	16	17	
20	21 Semester Exams	22 Semester Exams	23 Semester Exams	24 Last Day of School	
27 Memorial Day	28	29	30	31	