Curriculum and Instruction – Mathematics

Quarter 1 Grade 6

Introduction

In 2014, the Shelby County Schools Board of Education adopted a set of ambitious, yet attainable goals for school and student performance. The District is committed to these goals, as further described in our strategic plan, Destination2025. **By 2025,**

- **80% of our students will graduate from high school college or career ready**
- **90% of students will graduate on time**
- **100% of our students who graduate college or career ready will enroll in a post-secondary opportunity**

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. College and career readiness is rooted in the knowledge and skills students need to succeed in post-secondary study or careers. The TN State Standards represent three fundamental shifts in mathematics instruction: **focus, coherence and rigor**.

Focus

- The Standards call for a greater focus in mathematics. Rather than racing to cover topics in a mile-wide, inch-deep curriculum, the Standards require us to significantly narrow and deepen the way time and energy is spent in the math classroom. We focus deeply on the **major work** of each grade so that students can gain strong foundations: solid conceptual understanding, a high degree of procedural skill and fluency, and the ability to apply the math they know to solve problems inside and outside the math classroom.
- **For grades K–8**, each grade's time spent in instruction must meet **or exceed** the following percentages for the **major work** of the grade.
  - For grade 6, more than 65% of instructional time is spent on the major focus standards.
- **Supporting Content** - informaiont that supports the understanding and implementation of the major work of the grade.
- **Additional Content -** content that does not explicitly connect to the major work of the grade yet it is required for proficiency.

Coherence

- **Thinking across grades:**
  - The Standards are designed around coherent progressions from grade to grade. Learning is carefully connected across grades so that students can build new understanding on to foundations built in previous years. Each standard is not a new event, but an extension of previous learning.
- **Linking to major topics:**
  - Instead of allowing additional or supporting topics to detract from the focus of the grade, these concepts serve the grade level focus. For example, instead of data displays as an end in themselves, they are an opportunity to do grade-level word problems.

Rigor

- **Conceptual understanding:**
  - The Standards call for conceptual understanding of key concepts, such as place value and ratios. Students must be able to access concepts from a number of perspectives so that they are able to see math as more than a set of mnemonics or discrete procedures.
- **Procedural skill and fluency:**
  - The Standards call for speed and accuracy in calculation. Students are given opportunities to practice core functions such as single-digit multiplication so that they have access to more complex concepts and procedures.
- **Application:**
  - The Standards call for students to use math flexibly for applications in problem-solving contexts. In content areas outside of math, particularly science, students are given the opportunity to use math to make meaning of and access content.

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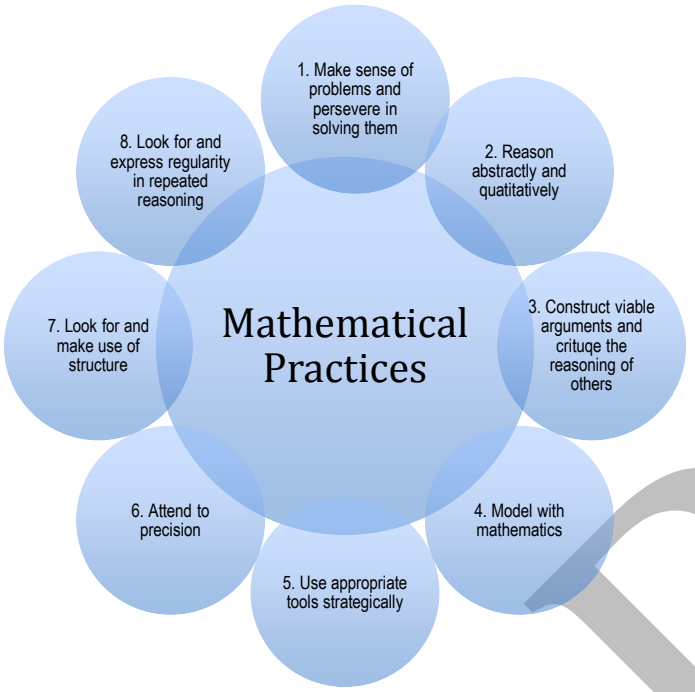
■ Major Content ➢ Supporting Content ❖ Additional Content



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.

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. To reach our collective student achievement goals, we know that teachers must change their practice so that it is in alignment with the three mathematics instructional shifts.

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:

The TN Mathematics Standards	
The Tennessee Mathematics Standards: https://www.tn.gov/education/article/mathematics-standards	**Teachers can access the Tennessee State standards, which are featured throughout this curriculum map and represent college and career ready learning at reach respective grade level.**
Standards for Mathematical Practice	
Mathematical Practice Standards https://drive.google.com/file/d/0B926oAMrdzI4RUpMd1pGdEJTYkE/view	**Teachers can access the Mathematical Practice Standards, which are featured throughout this curriculum map. This link contains more a more detailed explanation of each practice along with implications for instructions.**

■ Major Content ➢ Supporting Content ❖ Additional Content

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Purpose of the Mathematics Curriculum Maps

This curriculum framework or map is meant to help teachers and their support providers (e.g., coaches, leaders) on their path to effective, college and career ready (CCR) aligned instruction and our pursuit of Destination 2025. It is a resource for organizing instruction around the TN State Standards, which define what to teach and what students need to learn at each grade level. The framework is designed to reinforce the grade/course-specific standards and content—the major work of the grade (scope)—and provides a *suggested* sequencing and pacing and time frames, aligned resources—including sample questions, tasks and other planning tools. Our hope is that by curating and organizing a variety of standards-aligned resources, teachers will be able to spend less time wondering what to teach and searching for quality materials (though they may both select from and/or supplement those included here) and have more time to plan, teach, assess, and reflect with colleagues to continuously improve practice and best meet the needs of their students.

The map is meant to support effective planning and instruction to rigorous standards; it is *not* meant to replace teacher planning or prescribe pacing or instructional practice. In fact, our goal is not to merely "cover the curriculum," but rather to "uncover" it by developing students' deep understanding of the content and mastery of the standards. Teachers who are knowledgeable about and intentionally align the learning target (standards and objectives), topic, task, and needs (and assessment) of the learners are best-positioned to make decisions about how to support student learning toward such mastery. Teachers are therefore expected--with the support of their colleagues, coaches, leaders, and other support providers--to exercise their professional judgement aligned to our shared vision of effective instruction, the Teacher Effectiveness Measure (TEM) and related best practices. However, while the framework allows for flexibility and encourages each teacher/teacher team to make it their own, our expectations for student learning are non-negotiable. We must ensure all of our children have access to rigor—high-quality teaching and learning to grade-level specific standards, including purposeful support of literacy and language learning across the content areas.

Additional Instructional Support

Shelby County Schools adopted our current math textbooks for grades 6-8 in 2010-2011. The textbook adoption process at that time followed the requirements set forth by the Tennessee Department of Education and took into consideration all texts approved by the TDOE as appropriate. We now have new standards; therefore, the textbook(s) have been vetted using the Instructional Materials Evaluation Tool (IMET). This tool was developed in partnership with Achieve, the Council of Chief State Officers (CCSSO) and the Council of Great City Schools. The review revealed some gaps in the content, scope, sequencing, and rigor (including the balance of conceptual knowledge development and application of these concepts), of our current materials.

The additional materials purposefully address the identified gaps in alignment to meet the expectations of the CCR standards and related instructional shifts while still incorporating the current materials to which schools have access. Materials selected for inclusion in the Curriculum Maps, both those from the textbooks and external/supplemental resources (e.g., Engage^{NY}), have been evaluated by district staff to ensure that they meet the IMET criteria.

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How to Use the Mathematics Curriculum Maps

Overview
An overview is provided for each quarter. The information given is intended to aid teachers, coaches and administrators develop an understanding of the content the students will learn in the quarter, how the content addresses prior knowledge and future learning, and may provide some non-summative assessment items.

Tennessee State Standards
The TN State Standards are located in the left column. Each content standard is identified as the following: Major Work, Supporting Content or Additional Content.; a key can be found at the bottom of the map. The major work of the grade should comprise 65-85% of your instructional time. Supporting Content are standards that supports student's learning of the major work. Therefore, you will see supporting and additional standards taught in conjunction with major work. It is the teacher's responsibility to examine the standards and skills needed in order to ensure student mastery of the indicated standard.

Content
Teachers are expected to carefully craft weekly and daily learning objectives/ based on their knowledge of TEM Teach 1. In addition, teachers should include related best practices based upon the TN State Standards, related shifts, and knowledge of students from a variety of sources (e.g., student work samples, MAP, etc.). Support for the development of these lesson objectives can be found under the column titled 'Content'. The enduring understandings will help clarify the "big picture" of the standard. The essential questions break that picture down into smaller questions and the objectives provide specific outcomes for that standard(s). Best practices tell us that clearly communicating and making objectives measureable leads to greater student mastery.

Instructional Support and Resources
District and web-based resources have been provided in the Instructional Resources column. Throughout the map you will find instructional/performance tasks, i-Ready lessons and additional resources that align with the standards in that module. The additional resources provided are supplementary and should be used as needed for content support and differentiation.

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■ Major Content ➢ Supporting Content ❖ Additional Content

Topics Addressed in Quarter

Multi-digit Division
Operations on multi-digit decimals
Greatest Common Factor
Least Common Multiple
Dividing Fractions
Ratios & Unit Rates
Finding Percent of a number
Ratios and Measurement Conversions

Overview

During the first quarter, students will extend their previous understanding of multiplication and division to divide fractions by fractions. They construct division stories and solve word problems involving division of fractions (**6.NS.1**). Students will connect estimation to place value and determine that the standard algorithm is simply a tally system arranged in place value columns (**6.NS.2**). Students understand that when they "bring down" the next digit in the algorithm, they are essentially distributing, recording, and shifting to the next place value. They understand that the steps in the algorithm continually provide better approximations to the answer. Students further their understanding of division as they develop fluency in the use of the standard algorithm to divide multi-digit decimals (**6.NS.3**). Students apply odd and even number properties and divisibility rules to find factors and multiples. They extend this application to consider common factors and multiples and find greatest common factors and least common multiples. Lastly, student will investigate the concepts of ratio and rate. They use multiple forms of ratio language and ratio notation, and formalize understanding of equivalent ratios. Students apply reasoning when solving collections of ratio problems in real world contexts using various tools (e.g., tape diagrams, double number line diagrams, tables, equations and graphs). Students bridge their understanding of ratios to the value of a ratio, and then to rate and unit rate, discovering that a percent of a quantity is a rate per 100.

Grade Level Standard	Type of Rigor	Foundational Standards	Sample Assessment Items
6.NS.1	Conceptual Understanding	5.NF.7	Learnzillion 6.NS.1
6.NS.2	Procedural Skill & Fluency	5.NBT.6	Learnzillion 6.NS.2, 6.NS.3 & 6.NS.4 TNCore Assessment Tasks: Fluency I, II, & III
6.NS.3	Procedural Skill & Fluency	5.NBT.5, 5.NBT.6, 5.NBT.7, 6.NS.2	
6.NS.4	Procedural Skill & Fluency	4.OA.4, 5.NF.5	
6.RP.1	Conceptual Understanding	4.MD.1, 4.OA.2, 5.NF.5, 5.OA.3	TNCore: Are These Ratios the Same 6.RP.1-3 TNCore Assessment Task: Lunchroom Tiles 6.RP.1 & 3 TNCore: Mall 6.RP.1 & 3
6.RP.2	Conceptual Understanding	4.OA.2, 5.NF.3, 5.NF.7, 6.RP.1	
6.RP.3	Procedural Skill & Fluency & Application		

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■ Major Content ➢ Supporting Content ❖ Additional Content

Fluency

NCTM Position
Procedural fluency is a critical component of mathematical proficiency. Procedural fluency is the ability to apply procedures accurately, efficiently, and flexibly; to transfer procedures to different problems and contexts; to build or modify procedures from other procedures; and to recognize when one strategy or procedure is more appropriate to apply than another. To develop procedural fluency, students need experience in integrating concepts and procedures and building on familiar procedures as they create their own informal strategies and procedures. Students need opportunities to justify both informal strategies and commonly used procedures mathematically, to support and justify their choices of appropriate procedures, and to strengthen their understanding and skill through distributed practice.

The fluency standards for 6th grade listed below should be incorporated throughout your instruction over the course of the school year. Click Engage NY Fluency Support to access exercises that can be used as a supplement in conjunction with building conceptual understanding. Also you may click TNCore Assessment Tasks: Fluency, Fluency II and Fluency III for TNCore fluency assessment tasks.

- 6.NS.2 Fluently divide multi-digit numbers using standard algorithms
- 6.NS.3 Fluently add, subtract, multiply and divide multi-digit decimals

References:

- *https://www.engageny.org/*
- *http://www.corestandards.org/*
- *http://www.nctm.org/*
- http://achievethecore.org/

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TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES	
Multiply and Divide Fractions **(Allow approximately 3 weeks for instruction, review and assessment)**			
Domain: The Number System **Cluster:** Compute fluently with multi-digit numbers and find common factors and multiples. ❖ 6.NS.B.2: Fluently divide multi-digit numbers using the standard algorithm.	**Enduring Understanding(s):** • Rational numbers are a set of numbers that includes whole numbers and integers as well as numbers that can be written as the quotient of two integers, *a* divided by *b*, where *b* is not zero. • The interpretation of the operations on rational numbers is essentially the same as those on whole numbers, but some interpretations require adaptation, and the algorithms are different. **Essential Question(s):** • How do you divide a multi-digit number using the standard division algorithm? **Objective(s):** • Students will divide rational numbers by a whole number using long division. • Students will divide multi-digit rational number by other rational numbers using long division. **Additional Information:** In the elementary grades, students were introduced to division through concrete models and various strategies to develop an understanding of this mathematical operation (limited to 4-digit numbers divided by 2-digit numbers). In 6th grade, students become fluent in the use of the standard division algorithm, continuing to use their understanding of place value to describe what	**Glencoe** http://my.hrw.com/nsmedia/osp/2010/ma/msm1/temp/Tennessee/index.htm (This link can be used for those teachers who use Glencoe and need a resource for Dividing Whole Numbers. Click on 'Additional Common Core Lessons' to access.) **Holt** Curriculum Companion 1-1 A Dividing Multi-Digit Whole Numbers **Choose from the following resources and use them to ensure that the intended outcome and level of rigor of the standards are met.** **Additional Lessons:** Engage NY: Lesson 12 Estimating Digits in a Quotient 6.NS.2 Engage NY: Lesson 13 Dividing Multi-Digit Numbers 6.NS.2 Math Shell Concept Development Lesson: Algorithms for Number Operations Math Shell Lesson: Finding Factors and Multiples Learn Zillion Video Lesson: Dividing 4-digit number by 2-digit number **Tasks:** Illustrative Math: Interpreting a Division Computation Illustrative Math: How Many Staples?	**Vocabulary:** Rational number, multi-digit number, whole numbers, decimals, fractions, long division, fraction bar **Writing in Math:** General Information about using math journals. Background Information on Using Math Journals Everything You Need to Know About Math Journals

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TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES	
	they are doing. Place value has been a major emphasis in the elementary standards. This standard is the end of this progression to address students' understanding of place value.	Illustrative Math: Batting Average **Additional Resource(s):** Double Division Tool Virtual Nerd: How do you do long division? Learn Alberta: Division of Whole Numbers **Correlated iReady Lessons:** • Four-Digit Dividends	
Domain: The Number System **Cluster:** Compute fluently with multi-digit numbers and find common factors and multiples. ❖ 6.NS.B.3: Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.	**Enduring Understanding(s):** • The interpretation of the operations on rational numbers is essentially the same as those on whole numbers, but some interpretations require adaptation, and the algorithms are different. **Essential Question(s):** • How do you perform the four basic arithmetic operations on decimals using standard algorithms? **Objective(s):** • Students will add and subtract decimals. • Students will multiply and divide decimals. **Additional Information:** Students build fluency toward adding, subtracting, multiplying, and dividing multi-digit decimals using the standard algorithm for each operation.	**Glencoe** Start Smart 2 – Adding and Subtract Decimals (page 7-9) 1-1B Explore Multiply Decimal by Whole Number (page 30-31) 1-1C Multiply Decimals by Whole Number (page 32-35) 1-1D Multiply Decimal by Decimals (page 36-37) 1-1E Multiply Decimals by Decimals (page 38-41) 1-2B Explore Divide Decimals By Whole Numbers (page 47-48) 1-2C Divide Decimals by Whole Numbers (page 49-53) 1-2D Explore Divide By Decimals (page 54-55) 1-2E Divide Decimals by Decimals (page 56-60) **Holt** 3-3 Adding and Subtracting Decimals (page 110-113) 3-5 Multiplying Decimals (page 122-125) 3-6 Dividing Decimals by Whole Numbers (page 126-128) 3-7 Dividing Decimals by Decimals (page 129-132)	**Vocabulary:** Decimals, multi-digit, long division **Writing in Math:** Describe two methods for determining where to place the decimal point in the product of two decimals. **Graphic Organizer:** Have students to create a foldable for the four operations where they summarize the four operations, and create and write real-world problems for each operation. Students can glue the foldable in a composition book, five-star tablet, or binder and use it all year as an interactive math journal. Foldable Example Have students create a multiplying and a dividing decimal by decimals flow map to include in their interactive math journals. This flow map helps students to use estimation to help them understand if their decimal placement in their solution is reasonable. Multiplying Decimals Flow Map Example Dividing Decimals Flow Map Example

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TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES	
		Use the following resources to ensure that the intended outcome and level of rigor of the standards are met. **Additional Lessons:** Engage NY: Lesson 10 Distributive Property and Products of Decimals Engage NY: Lesson 11 Fraction Multiplication Engage NY: Lesson 14 The Division Algorithm - Fractions Engage NY: Lesson 15 The Division Algorithm - Mental Math CMP Lesson: Bits and Pieces 3 Investigations 1-3 **Tasks:** Illustrative Math: Movie Ticket Task Illustrative Math: Gifts from Grandma Task Math Shell Conceptual Development Lesson: 6.NS.3 School Store Task (Scroll to task) TNCore Assessment Tasks: Fluency, Fluency II and Fluency III **Additional Resources:** Math Activities: Sections 2-2 to 2-8 Virtual Nerd Adding/Subtracting Decimals Spy Guys Lesson Modeling Add, Subtract, Multiply and Divide Decimals Modeling Dividing Decimals **Correlated iReady Lesson(s):** • Fluently add and subtract decimals	Have students create a foldable for the decimal rules for each of the four operations where they write a brief synopsis of each rule. Afterwards, they will write real-world problems for each decimal rule. Decimal Foldable Study Guide Extra Decimal Foldable Examples

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TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES	
Domain: The Number System **Cluster:** Compute fluently with multi-digit numbers and find common factors and multiples. ❖ 6.NS.B.4: Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor.	**Enduring Understanding:** • A whole number can be decomposed into its factors. Some whole numbers have common factors. **Essential Question(s):** • What is the difference between factors and multiples? • How are common factors used in the distributive property? **Objectives:** • Students will find the factors of a given whole number. • Students will determine the greatest common factor of two whole numbers. • Students will determine the least common multiple of two whole numbers. **Additional Information:** Students will find factors of a given number and create a list of multiples for a given number.	**Glencoe** **Start Smart 3**- Greatest Common Factor and Least Common Multiple (pages 10-12) **Holt** 4-3 Greatest Common Factor (page 165-168) 5-1 Least Common Multiple (page 218-221) **Choose from the following resources and use them to ensure that the intended outcome and level of rigor of the standards are met.** **Additional Lessons:** Engage NY: Lesson 18 Least Common Multiples & Greatest Common Factors Math Shell Conceptual Development Lesson: 6.NS.4 **Tasks:** Illustrative Math: Greatest Common Factor 6.NS.4 Illustrative Math: Bake Sale Task Illustrative Math: Factors and Common Factors **Additional Resources:** Khan Academy Greatest Common Factor Video Virtual Nerd: Finding the GCF Video NLVM - Interactive Factor Tree Station Activities for 6.NS.4 **Correlated iReady Lesson(s):** • Prime Factors	**Vocabulary:** least common multiple, factor, greatest common factor, multiple **Writing in Math:** Discuss how the factor of a number is related to the GCF and LCM. Write the process of finding the GCF and LCM of a number. **Graphic Organizer:** Create a Venn diagram and use prime factorization to find the GCF of two given numbers. Students can write down their observations underneath this graphic organizer in their interactive math journals. GCF and LCM Venn Diagram Example GCF & LCM Birthday Candle/Venn Diagram Video Explanation

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Curriculum and Instruction – Mathematics

Quarter 1 Grade 6

TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES	
Domain: The Number System **Cluster:** Apply and extend previous understandings of multiplication and division to divide fractions by fractions. ■6.NS.A.1 Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.	**Enduring Understanding(s):** • Rational numbers allow us to solve problems that are not possible to solve with just whole numbers or integers. • The interpretation of the operations on rational numbers is essentially the same as those on whole numbers, but some interpretations require adaptation, and the algorithms are different. **Essential Question(s):** • How does division of fractions relate to multiplication of fractions? • How is division of fractions used in the real world? **Objective(s):** • Students will use grids to model division of fractions. • Students will solve real-world problems involving division of fractions by other fractions. **Additional Information:** Problems will involve fractions and mixed numbers but not decimals. Contexts and visual models can help students to understand quotients of fractions and begin to develop the relationship between multiplication and division. Model development can be facilitated by building from familiar scenarios with whole or friendly number dividends or divisors. Students make drawings, model situations with manipulatives, or manipulate computer generated models. **Example(s):**	**Focus attention on the Problem Solving and H.O.T. exercises from the following sections of Glencoe and Holt.** **Glencoe** 2-3C Explore Divide Fractions (page 124-125) 2-3D Divide Fractions (page 126-129) 2-3E Divide Mixed Numbers (page 130-133) **Holt** Lab 5-9a (page 258-259) 5-9 Dividing Fractions and Mixed Numbers (page 260-263) 5-10 Solving Fraction Equations (page 264-267) Only focus on exercises that deal with dividing fractions by fractions. Real-World Connections p. 269 **Choose from the following resources and use them to ensure that the intended outcome and level of rigor of the standards are met.** **Additional Lessons:** Engage NY: Lesson Interpreting and Computing Division of a Fraction by a Fraction-A Engage NY: Lesson Interpreting and Computing Division of a Fraction by a Fraction-B Engage NY: Lesson Creating Division Stories Math Shell Lesson: 6.NS.1 Connected Math Lesson: Investigation 4 Dividing w/Fractions Learn Zillion Dividing Fractions Models for Dividing Fractions Lesson Plan/Activities/Solutions	**Vocabulary:** quotient, reciprocal, multiplicative inverse **Writing in Math:** Students will annotate and solve word problems using the CUBES method. This process will help grow students' problem-solving and reasoning skills. Those students that struggle with organization, memory or attention may find the strategy especially powerful as they work to solve complex problems. • C- Circle key words • U- Underline the question • B-Box any action words • E- evaluate the problem • S- solve and check Students will analyze real-world problems involving division of fractions, and draw fraction models as well as write mathematical sentences to represent each situation. If you do not have access to the manipulatives, you can simply use construction paper or card stock to demonstrate division of fraction models. These observations and models should be recorded in their interactive math journals. Dividing Fractions Math Journal/Anchor Chart Example

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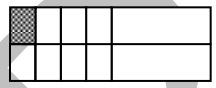
TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES	
	There is $\frac{1}{2}$ a cake left for 4 people to share equally. Choose the figure that has a shaded part with the amount of cake each person will eat. a.  b.  c.  d.  **Create a story problem for this equation** $9 \div \frac{1}{3} =$ ☐ Answers may vary. Possible scenarios include: Find the number of portions when 9 objects (must be something that can be divided into fractional parts) are divided into equal portions that are $\frac{1}{3}$ each. Manny has $\frac{1}{2}$ yard of fabric to make book covers. Each book is made from $\frac{1}{8}$ yard of fabric. How many book covers can Manny	**Tasks:** Illustrative Math: Cup of Rice Task Illustrative Math: Running to School Task Illustrative Math: Dan's Division Strategy Task TNCore Bike Ride Task **Additional Resources:** Math Station Activities p. 36 Modeling Dividing Fractions **Correlated iReady Lesson(s):** • Dividing Fractions • Division of Fractions	

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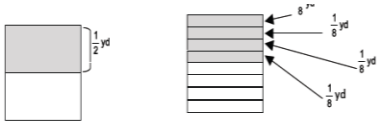
TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES	
	make? Solution: Manny can make 4 book covers. 		
Ratios and Proportions **(Allow approximately 3 weeks for instruction, review and assessment)**			
Domain: Ratios and Proportional Relationships **Cluster:** Understand ratio concepts and use ratio reasoning to solve problems. ■6.RP.A.1: Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. ■6.RP.A.2: Understand the concept of a unit rate *a*/*b* associated with a ratio *a*:*b* with *b* ≠ 0, and use rate language in the context of a ratio relationship.	**Enduring Understanding(s):** • Forming a ratio as a measure of a real-world attribute involves isolating that attribute from other attributes and understanding the effect of changing each quantity on the attribute of interest. • A ratio is a multiplicative comparison of two quantities. • A unit rate compares a quantity in terms of one unit of another quantity. **Essential Question(s):** • What is the relationship between a ratio and a fraction? • Why is it important to know how to solve for unit rates? **Objectives:** • Given a ratio, students precisely identify the associated rate and identify the unit rate and the rate unit. • Students will describe ratio relationships between two quantities. **Additional Information:** Expectations for ratios in this grade are limited to ratios of non-complex fractions. The initial numerator and denominator should be whole	**Glencoe** 3-1B Ratios (pages 150-155) 3-1C Unit Rates (p. 156-158) **Holt** 7-1 Ratios and Rates (pages 342-345) **Choose from the following resources and use them to ensure that the intended outcome and level of rigor of the standards are met.** **Additional Lessons:** Engage NY Lesson: Ratios 6.RP.A.1 Engage NY: Lesson 16 From Ratios to Rates-A 6.RP.2 Engage NY: Lesson 17 From Rates to Ratios-B 6.RP.2 Engage NY: Lesson 18 Finding a Rate by Dividing Two Quantities 6.RP.2 Ratio and Proportion CCSS Lessons (Which cup has the lighter color? Ratio Relationships Math Shell Concept Development Lesson: Using Proportional Reasoning **Tasks:** TNCore Task Arc: Reasoning with Ratios and Rates	**Vocabulary:** ratio, rate, and unit rate, equivalent ratios **Writing in Math:** Students will use mathematical vocabulary to explain the relationship between ratios and unit rates. Students use the precise academic vocabulary and notation of ratios (e.g., 3:2, 3 to 2). **Graphic Organizer:** Students will complete Frayer Model/ Vocabulary squares focusing on the academic vocabulary for the lesson. Video Showing Ratio Frayer Model Frayer Model Example

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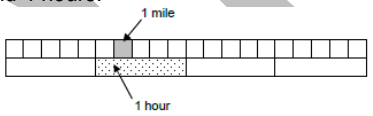
TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES	
	numbers. Students will often use unit rates to solve missing value problems. Cost per item or distance per time unit are common unit rates, however, students should be able to flexibly use unit rates to name the amount of either quantity in terms of the other quantity. Students will begin to notice that related unit rates are reciprocals as in the first example below. It is not intended that this be taught as an algorithm or rule because at this level, students should primarily use reasoning to find these unit rates. **Examples**: • On a bicycle you can travel 20 miles in 4 hours. What are the unit rates in this situation, (the distance you can travel in 1 hour and the amount of time required to travel 1 mile)? Solution: You can travel 5 miles in 1 hour written as $\frac{5\ mi}{1\ hr}$ and it takes $\frac{1}{5}$ of a hour to travel each mile written as $\frac{\frac{1}{5}hr}{1\ mi}$. Students can represent the relationship between 20 miles and 4 hours.  	Illustrative Math: Games at Recess Task(6.RP.A.1) Inside Math: Candies Task (6.RP.A.1) Illustrative Math: Escalator Unit Rate Task(6.RP.A.1&2) Illustrative Math: Mangos for Sale Task(6.RP.A.2) Illustrative Math: Beans for Sale Task(6.RP.A.2) **Additional Resources:** Math Station Activities: Refer to p. 1-14 Virtual Nerd Rates and Unit Rates Virtual Nerd Converting Unit Rates Dan Myer 3 Acts: Finals Week 6.RP.2 **Correlated iReady Lesson(s):** • Concept of Ratio • Ratio Concepts • Concept of Rate	
Domain: Ratios and Proportional Relationships **Cluster:** Understand ratio concepts and use ratio reasoning to solve problems. ■6.RP.A.3: Use ratio and rate reasoning to	**Enduring Understanding(s):** • Reasoning with ratios involves attending to and coordinating two quantities. **Essential Question(s):** • How and where are ratios and rates used in	**Glencoe** 3-1 Explore Ratios (p. 148-149) 3-1D Rates (pages 158-161) 3-2A Ratio Tables (p. 163-168) 3-2B Ratio Tables p. 169 3-3A Equivalent Ratios (p. 173-177)	**Vocabulary:** Tape diagram, equivalent ratios, part-to-part, part-to-whole, double number line **Writing in Math:** Students will demonstrate comprehension of

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TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES	
solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. ■6.RP.A.3a: Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios. ■6.RP.A.3b: Solve unit rate problems including those involving unit pricing and constant speed.	the real world? • How is a ratio or rate used to compare two quantities or values? **Objectives:** • Students will use a ratio table to solve for a given value by making equivalent ratios until they find an equivalent ratio pair. • Students will apply the concept of unit rate to solve real-world problems involving unit pricing. • Students will apply the concept of unit rate to solve real-world problems involving constant speed **Additional Information:** Students will represent real-world problems involving ratios and rates by creating graphs. Students graph the pairs of values displayed in ratio tables on coordinate axes. **Example(s):** Compare the number of black to white circles. If the ratio remains the same, how many black circles will you have if you have 60 white circles? ●●●●○○○ 	Black	4	40	20	60	?
---	---	---	---	---	---
White	3	30	15	45	60 | At Books Unlimited, 3 paperback books cost $18. What would 7 books cost? How many books could be purchased with $54.	3-3B Ratio & Rate Problems p. 180 3-3C Ratio and Rate Problems (p. 180-185) Additional Lessons-Lesson 1 Graph Ratio Tables (p. 777-782) **Holt** 7-2 Using Tables to Explore Equivalent Ratios and Rates (pages 346-349) Companion Guide 7-2A Extension Graphing Equivalent Ratios and Rates Additional Topics A9 **Choose from the following resources and use them to ensure that the intended outcome and level of rigor of the standards are met.** **Additional Lessons:** Engage NY Lesson: Ratios 6.RP.A.1 and 3a Engage NY Lesson:6.RP.A.3b CMP CC Investigation 1 Ratios and Rates Better Lessons: Graphing Ratios Lesson(6.RP.A.3a) Better Lessons: Better Deals Stations(6.RP.A.3b) **Tasks:** TNCore Task Arc: Reasoning with Ratios and Rates TNCore: Gears and Bike Ride Tasks 6.RP.A.1-3 Illustrative Math: Jim and Jesse's Money Task (6.RP.A.3) Illustrative Math: Mixing Concrete Task (6.RP.A.3) Illustrative Math: Walk-a-thon Task(6.RP.A.3a & b) Illustrative Math: Meeting on Bicycles	and explain how to use ratio and rate reasoning to solve real world and mathematical problems which include making tables of equivalent ratios, solving unit rate problems, finding percent of a quantity as a rate per 100 using word wall, whiteboards and small group. Students will solve ratio, rate and unit rate real-world problems by using either the UNRAVEL or ROPES literacy strategies. UNRAVEL for Math ROPES Strategy (p. 2) **Graphic Organizer:** Students can create a graphic organizer that will help them solve ratio problems. Ratio Graphic Organizer Example Ratio Graphic Organizer

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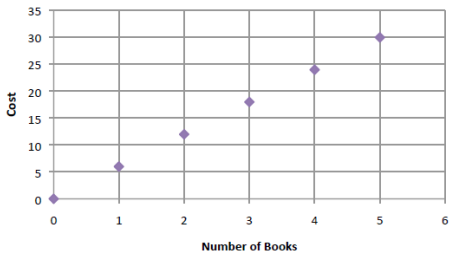
TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES	
	<table><tr><th>Number of Books (n)</th><th>Cost (C)</th></tr><tr><td>1</td><td>6</td></tr><tr><td>3</td><td>18</td></tr><tr><td></td><td></td></tr><tr><td>7</td><td>42</td></tr><tr><td>9</td><td>54</td></tr></table> The numbers in the table can be expressed as ordered pairs (number of books, cost) and plotted on a coordinate plane. **Books Unlimited**  Using the information in the table, find the number of yards in 24 feet. <table><tr><td>Feet</td><td>3</td><td>6</td><td>9</td><td>15</td><td>24</td></tr><tr><td>Yards</td><td>1</td><td>2</td><td>3</td><td>5</td><td>?</td></tr></table> There are several strategies that students could use to determine the solution. a.) Add quantities from the table to 24 feet (9 feet and 15 feet); therefore, the number of yards must be 8 yards (3 yd and 5 yd) b.) Use multiplication to find 24 feet. 1. 3 ft x 8 = 24 ft; therefore, 1 yd x 8 = 8 yards or 6 ft x 4 = 24 ft; therefore, 2 yd x 4 = 8 yd	Task(6.RP.A.3 & 3b) Illustrative Math: Running at a Constant Speed Task(6.RP.A.3 & 3b) TNCore Assessment Tasks: Are These Ratios the Same?, Triangles and Stars, Comparing Cars, Mall 6.RP.A.1-3 **Additional Resources:** Modeling Tape Diagrams (game) Ratio tables and proportions Examples & self-check questions Better Lessons: Understand Rates and Unit Rates Stations Activity Khan Academy- Ratio Tables **Correlated iReady Lesson(s):** • Concept of Ratio • Concept of Rate	

Ratio with Emphasis on Percent

(Allow approximately 2 weeks for instruction, review and assessment)

Domain: Ratios and Proportional Relationships **Cluster:** Understand ratio concepts and use	**Enduring Understanding(s):** • Ratios can be expressed as percent	**Glencoe** 4-2A Explore Model Percent	**Vocabulary:** percent, rate, part-to-whole, part-to part

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ratio reasoning to solve problems. ■6.RP.A.3c: Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.	**Essential Question(s):** • How can you express ratios as percent? **Objectives:** • Students will identify key information from a percent problem in context. • Students will calculate the whole when given a part and the percent • Students will write percent as ratios. • Students will apply ratio reasoning to solve percent problems, including finding the whole, the part, and/or the percent. **Additional Information:** This is the students' first introduction to percent. Models, such as percent bars or 10 x 10 grids should be used to model percent. Students will learn that a percent is a special type of ratio that compares a number to 100. Percent compares a part to a whole. **Example(s):** *Students use ratios to identify percent* What percent is 12 out of 25? *Solution:* One possible solution method is to set up a ratio table: Multiply 25 by 4 to get 100. Multiplying 12 by 4 will give 48, meaning that 12 out of 25 is equivalent to 48 out of 100 or 48%.	(pages 208-209) 4-4C Explore Find Percent of a Number 4-4D Percent of a Number 4-4E Problem-Solving Investigations Additional Lessons- Lesson 2 Solving Percent Problems Pg. 783 **Holt** Model Percent Lab (page 370) 7–7 Percent (page 371-374) 7–9 Percent Problems 7–10 Applying Percent **Choose from the following resources and use them to ensure that the intended outcome and level of rigor of the standards are met.** **Additional Lessons:** Engage NY Lessons: 6.RP.3c Lessons 24-29 Connected Math: Bits and Pieces I Investigation 4 Working with Percent Connected Math Investigations: Using Percent & More About Percent (Click on INV 4 & 5) **Tasks:** TNCore Task Arc: Reasoning with Ratios and Rates Illustrative Math: Ratio Reasoning Task Illustrative Math: Shirt Sale Task: 6.RP.3c Illustrative Math: Overlapping Squares Task **Other:** Math Station Activities: Refer to p. 1-14 Percent of a Number	**Writing in Math:** Students will create a definition and example chart for the word percent. A definition and example chart organize information about a concept. Students fill in the top rectangle with a term and its definition or description. Students fill in the rectangles that follow with examples to illustrate them. Each sample answer shows 3 examples. Definition and Example Chart Graphic Organizer

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TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES	
	<table><tr><th>Part</th><th>Whole</th></tr><tr><td></td><td></td></tr><tr><td>12</td><td>25</td></tr><tr><td>?</td><td>100</td></tr></table> *Students use percentages to find the part when given the percent, by recognizing that the whole is being divided into 100 parts and then taking a part of them (the percent).* What is 40% of 30? *Solution:* There are several methods to solve this problem. One possible solution using rates is to use a 10 x 10 grid to represent the whole amount (or 30). If the 30 is divided into 100 parts, the rate for one block is 0.3. Forty percent would be 40 of the blocks, or 40 x 0.3, which equals 12. *Students also determine the whole amount, given a part and the percent.* A credit card company charges 17% interest on any charges not paid at the end of the month. Make a ratio table to show how much the interest would be for several amounts. If your bill totals $450 for this month, how much interest would you have to pay if you let the balance carry to the next month? <table><tr><td>Charges</td><td>$1</td><td>$50</td><td>$100</td><td>$200</td><td>$450</td></tr><tr><td>Interest</td><td>$0.17</td><td>$8.50</td><td>$17</td><td>$34</td><td>?</td></tr></table> One possible solution is to multiply 1 by 450 to get 450 and then multiply 0.17 by 450 to get $76.50.	Math Goodies Percent Lessons **Correlated iReady Lesson(s):** • Estimating and Calculating Percents • Problem Solving with Ratio and Percent	

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Curriculum and Instruction – Mathematics

Quarter 1 Grade 6

TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES	
Ratio and Measurement Conversions **(Allow approximately 1 week for instruction, review and assessment)**			
Domain: Ratios and Proportional Relationships **Cluster:** Understand ratio concepts and use ratio reasoning to solve problems. ■6.RP.A.3d: Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.	**Enduring Understanding(s):** • A ratio can be used to compare measures of two different types. **Essential Question(s):** • How can a ratio be used to convert measurement units? • How and where are ratios and rates used in the real world? **Objectives:** • Students will apply ratio reasoning to convert measurement units in real-world and mathematical problems. • Students will apply ratio reasoning to convert measurement units by multiplying or dividing in real-world and mathematical problems **Additional Information:** **Examples:** The corn field on the Walters farm is made of 36 rows of the same length. Each row is 129 feet long. How many yards long is one row of corn? Students can set up the ratio 1yard = 3 feet and they can form an equivalent ratio to get the answer of 43 yards long using multiplication. How many centimeters are in 7 feet, given that 1 inch ≈ 2.54 cm. *Solution:*	**Glencoe** Additional Lesson 3: Use Ratios to Convert Measurements p. 787 Additional Lesson 12: Converting Units of Weight and Mass p. 828 Additional lesson 13: Converting Units of Capacity p. 831 Start Smart 5 Pg.16 **Holt** 9-3 Converting Customary Units p. 488 9-4 Converting Metric Units p. 492 9 – 5 Time and Temperature **Choose from the following resources and use them to ensure that the intended outcome and level of rigor of the standards are met.** **Additional Lessons:** CCSS Connected Math Investigation 1 **Tasks:** TNCore Task: Reading Rates Illustrative Math: Dana's House Task Illustrative Math: Converting Square Units Task **Additional Resources:** Better Lessons: Understand Rates and Unit Rates Stations Activity Khan Academy- Metric System Metric System Presentation and Practice Problems Metric Millionaire Game	**Vocabulary:** Unit ratio, conversion factor **Writing in Math:** Students will describe in writing the relationship between unit ratio and conversion factor.

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	7 feet x $\frac{12 \text{ inches}}{1 \text{ foot}}$ x $\frac{2.54 \text{ cm}}{1 \text{ inch}}$ = 7 ~~feet~~ x $\frac{12 \text{ ~~inches~~}}{1 \text{ ~~foot~~}}$ x $\frac{2.54 \text{ cm}}{1 \text{ ~~inch~~}}$ = 7 x 12 x 2.54 cm = 213.36 cm		

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RESOURCE TOOLBOX		
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.		
Textbook Resources www.myhrw.com www.connected.mcgraw-hill.com	**TN Core** TNReady Math Standards TNCore Resources Achieve the Core	**Videos** Khan Academy Watch Know Learn LearnZillion Virtual Nerd Math Playground Study Jams
Calculator Activities Greatest Common Factor Calculator TI-73 Activities CASIO Activities	**Interactive Manipulatives** National Library of Virtual Manipulatives - NLVM Area Models for Multiplication and Division GCF Game AAA Math GCF Game LCM Game	**Additional Sites** Helping With Math: Multiplying Decimals Virginia DOE: Fractions, Decimals & Percent **Other** http://community.ksde.org/LinkClick.aspx?fileticket=5-B58NkWJIs%3d&tabid=5646&mid=13290

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