Teacher Training
Revised ELA and Math Standards

Math 6–8

Tennessee Department of Education | 2017 Summer Teacher Training

TN Department of Education

Welcome, Teachers!

We are excited to welcome you to this summer's teacher training on the revised math standards. We appreciate your dedication to the students in your classroom and your growth as an educator. As you interact with the math standards over the next two days, we hope you are able to find ways to connect this new content to your own classroom. Teachers perform outstanding work every school year, and our hope is that the knowledge you gain this week will enhance the high-quality instruction you provide Tennessee's children every day.

We are honored that the content of this training was developed by and with Tennessee educators *for* Tennessee educators. We believe it is important for professional development to be informed by current educators, who work every day to cultivate every student's potential.

We'd like to thank the following educators for their contribution to the creation and review of this content:

Dr. Holly Anthony, Tennessee Technological University
Michael Bradburn, Alcoa City Schools
Dr. Jo Ann Cady, University of Tennessee
Sherry Cockerham, Johnson City Schools
Dr. Allison Clark, Arlington Community Schools
Kimberly Herring, Cumberland County Schools
Dr. Joseph Jones, Cheatham County Schools
Dr. Emily Medlock, Lipscomb University

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Part 1: The Standards

Module 1: Standards Review Process

Module 2: Tennessee Academic Standards

Module 3: Summary of Revisions

Part 2: Developing a Deeper Understanding

Module 4: Diving into the Standards (KUD)

Part 3: Instructional Shifts

Module 5: Revisiting the Shifts and SMP's

Module 6: Literacy Skills for Mathematical Proficiency

Part 4: Assessment and Materials

Module 7: Connecting Standards and Assessment

Module 8: Evaluating Instructional Materials

Part 5: Putting it All Together

Module 9: Instructional Planning

Notes

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Agenda: Day 1

Time	Content
8–11:15 (includes break)	**Part 1: The Standards** • M1: Standards Review Process • M2: TN Academic Standards • M3: Summary of Revisions
11:15–12:30	**Lunch (on your own)**
12:30–4 (includes break)	**Part 2: Developing a Deeper Understanding** • M4: Diving into the Standards (KUD) **Part 3: Instructional Shifts** • M5: Revisiting the Shifts and SMP's • M6: Literacy Skills for Mathematical Proficiency

Goals: Day 1

- Review the standards revision process.
- Highlight changes/revisions to standards.
- Use a KUD exercise to deepen our understanding of the expectations of the standards.
- Discuss the instructional shifts and the Standards for Mathematical Practice (SMPs).
- Explore the Literacy Skills for Mathematical Proficiency.

Agenda: Day 2

Time	Content
8–11:15 (includes break)	**Part 4: Aligned Materials and Assessments** • M7: Assessing Student Understanding
11:15–12:30	**Lunch (on your own)**
12:30–4 (includes break)	• M8: Evaluating Instructional Materials **Part 5: Putting it All Together** • M9: Instructional Planning

Goals: Day 2

- Examine best practices for assessing student learning.
- Develop a process for evaluating instructional materials.
- Connect standards and assessment through instructional planning.

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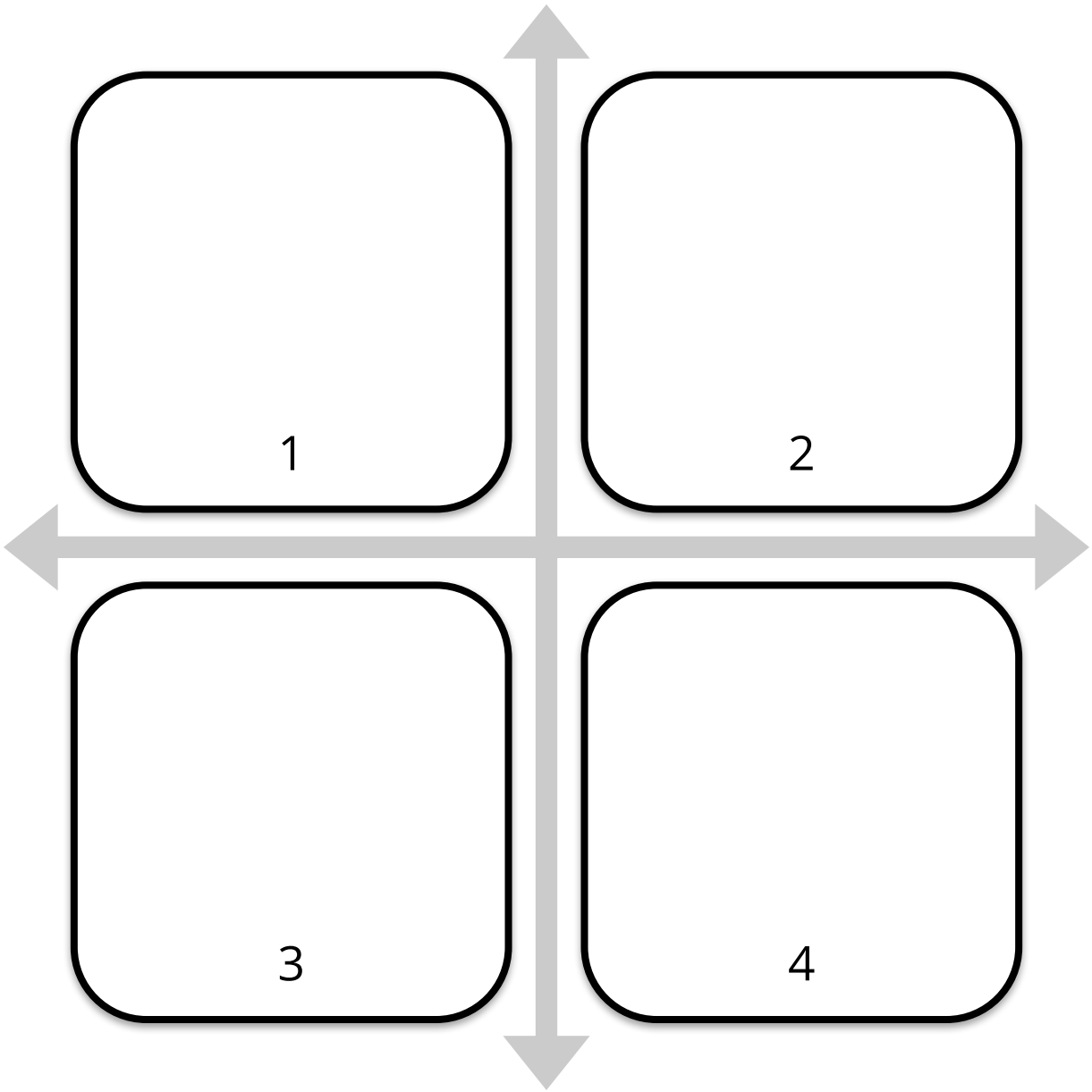
Appointment Time

Make four appointments to meet with fellow participants throughout the training to discuss the content. Record participants' names in the form below and bookmark this page for your reference.



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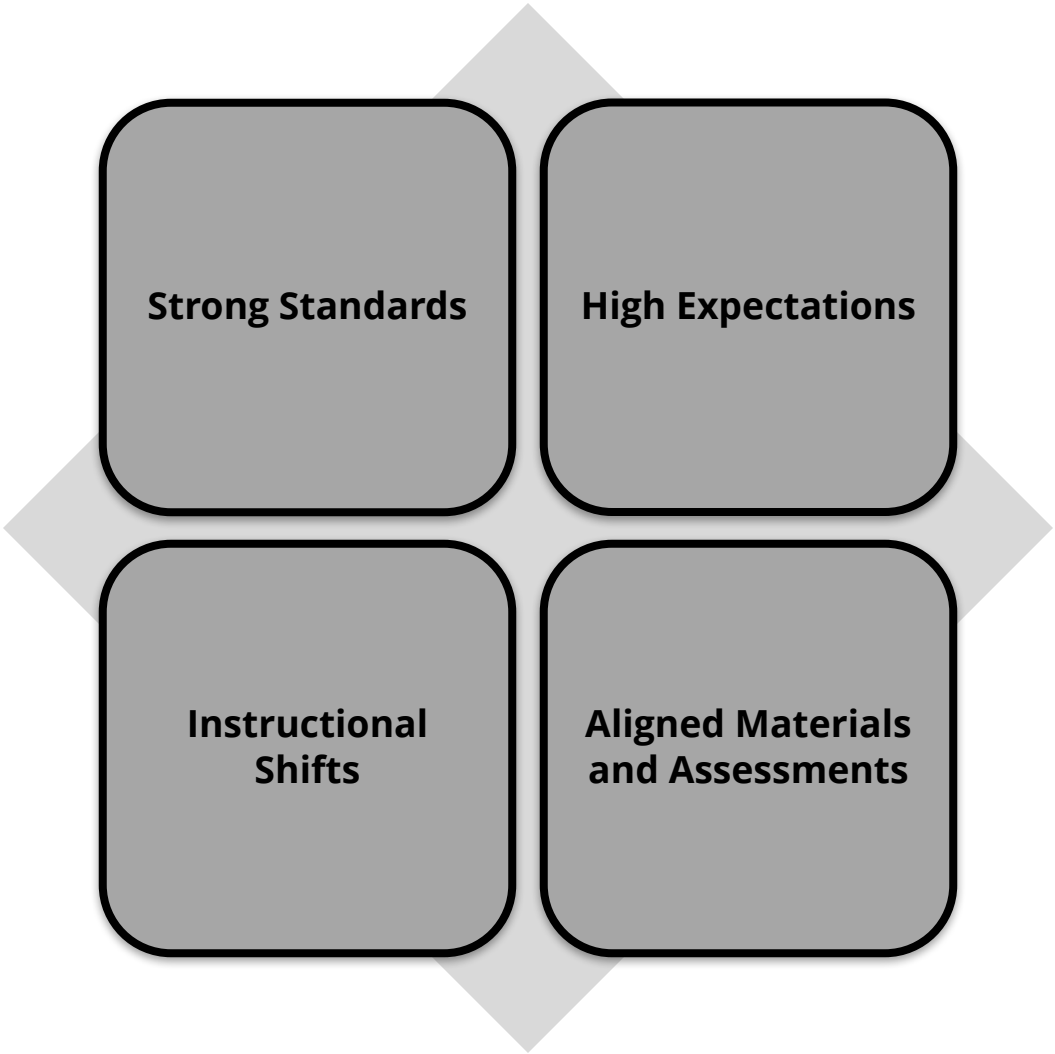
Key Ideas for Teacher Training



We know that Tennessee educators are working hard and striving to get better. This summer's teacher training is an exciting opportunity to learn about our state's newly adopted math and ELA standards and ways to develop a deeper understanding of the standards to improve classroom instructional practices. The content of this training is aligned to the standards and is designed to address the needs of educators across our state.

Throughout this training, you will find a series of key ideas that are designed to focus our work on what is truly important. These key ideas align to the training objectives and represent the most important concepts of this course.

Strong Standards

Standards are the bricks that should be masterfully laid through quality instruction to ensure that all students reach the expectation of the standards.

High Expectations

We have a continued goal to prepare students to be college and career ready.

Instructional Shifts

The instructional shifts are an essential component of the standards and provide guidance for how the standards should be taught and implemented.

Aligned Materials and Assessments

Educators play a key role in ensuring that our standards, classroom instructional materials, and assessments are aligned.

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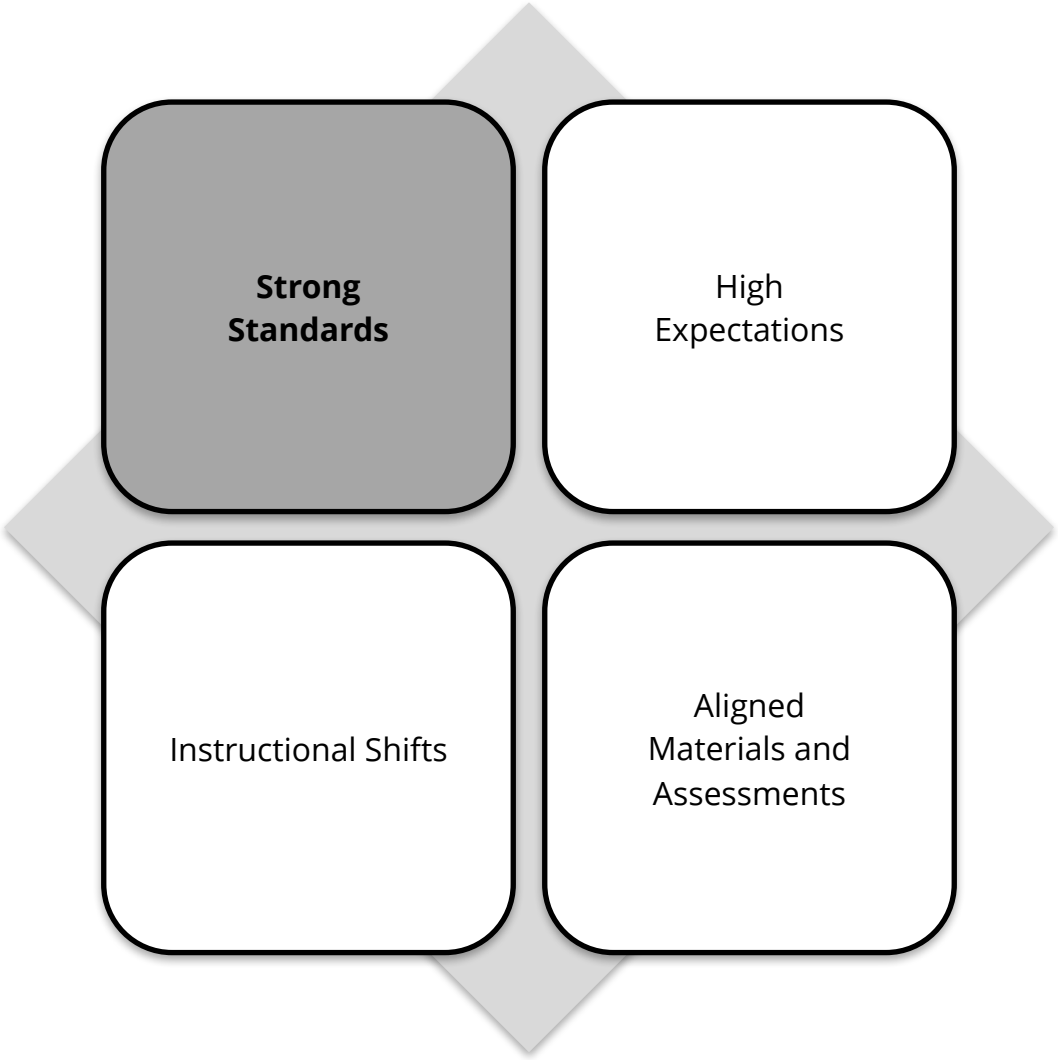
TAB PAGE

Part 1: The Standards

Module 1: The Standards Review Process



Standards Review Process

The graphic below illustrates Tennessee's standards review process. Here you can see the various stakeholders involved throughout the process.

- The process begins with a website for public feedback.
- Tennessee educators who are experts in their content area and grade band serve on the advisory panels. These educators review all the public feedback and the current standards, then use their content expertise and knowledge of Tennessee students to draft a revised set of standards.
- The revised standards are posted for a second feedback collection from Tennessee's stakeholders.
- The Standards Recommendation Committee (SRC) consists of 10 members appointed by legislators. This group looks at all the feedback from the website, the current standards, and revised drafts. Recommendations are then made for additional revisions if needed.
- The SRC recommends the final draft to the State Board of Education for approval.

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Educator Advisory Team Members

Every part of the state was represented with multiple voices.

Timeline of Standards Adoptions and Aligned Assessments Implementation

Subject	Standards Proposed to State Board for Final Read	LEAs: New Standards in Classrooms	Aligned Assessment
Math	April 2016	2017–18	2017–18
ELA	April 2016	2017–18	2017–18
Science	October 2016	2018–19	2018–19
Social Studies	July 2017	2019–20	2019–20

Standards Revision Key Points

- The instructional shifts remain the same and are still the focus of the standards.
- The revised standards represent a stronger foundation that will support the progression of rigorous standards throughout the grade levels.
- The revised standards **improve connections:**
    - within a single grade level, and
    - between multiple grade levels.

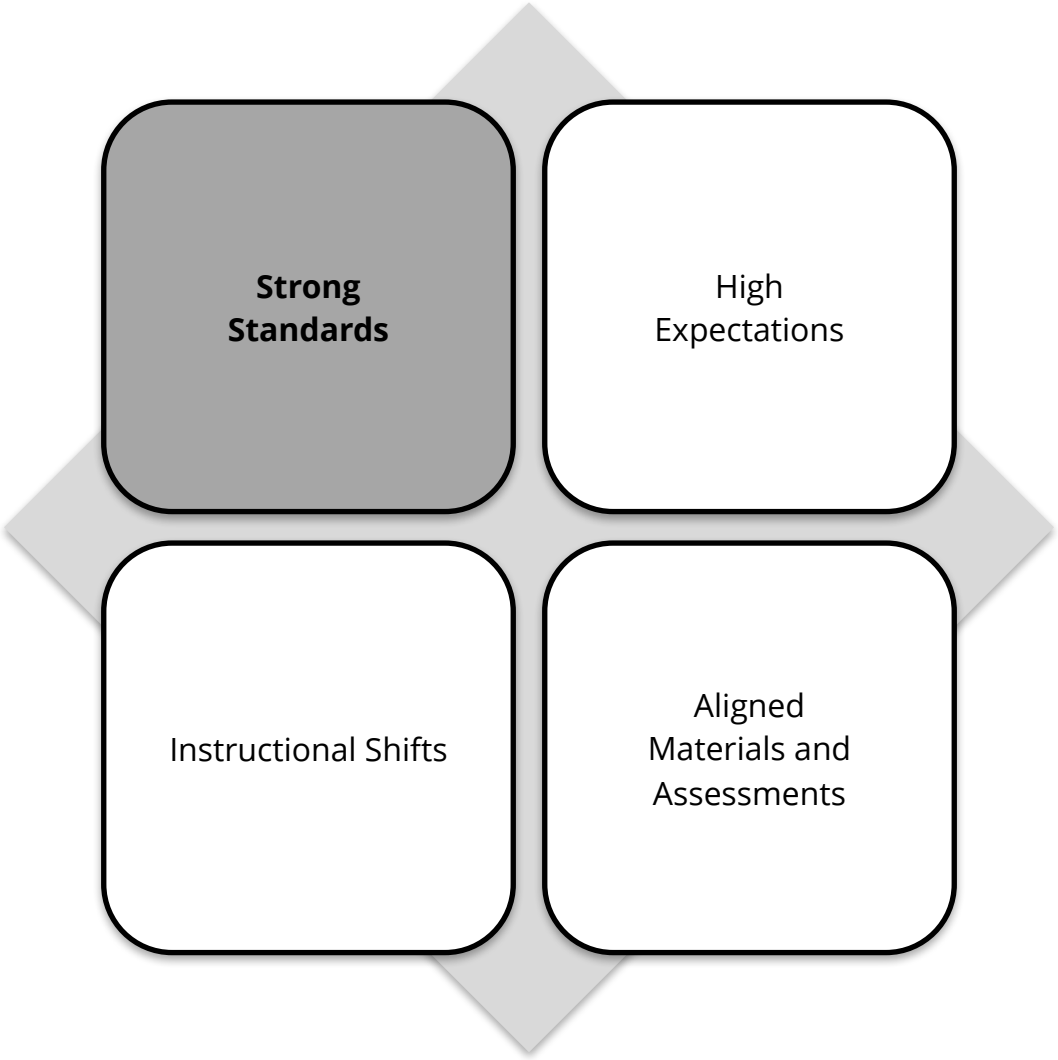
"Districts and schools in Tennessee will exemplify excellence and equity such that all students are equipped with the knowledge and skills to successfully embark upon their chosen path in life."

What is your role in ensuring that all students are college and career ready?

TAB PAGE

Part 1: The Standards

Module 2: The Tennessee Mathematics Academic Standards



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Goals

- Reinforce the continued expectations of the Tennessee Math Academic Standards.
- Revisit the three instructional shifts and their continued *and* connected role in the revised standards.
- Review the overarching changes of the revised Tennessee Math Academic Standards.

Strong Standards

Standards are the bricks that should be masterfully laid through quality instruction to ensure that all students reach the expectation of the standards.

High Expectations

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Instructional Shifts

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Aligned Materials and Assessments

Educators play a key role in ensuring that our standards, classroom instructional materials, and assessments are aligned.

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Setting the Stage

Directions:

1. Read and annotate the *General Introduction* to the TN Math Standards (pages 1–2) focusing on the "Mathematically Prepared" and "Conceptual Understanding, Procedural Fluency, and Application" sections.
2. After reading and annotating the two parts, write the sentence or phrase you felt was the most important in the box below and your rationale for choosing it.

Most Important Idea:
Rationale:
Key Ideas from Discussion:

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What Has NOT Changed

- Students **prepared** for college and career
- K–12 **Learning Progressions**
- Traditional and Integrated **pathways** (for high school)
- Standards for **Mathematical Practice**
- **Instructional Shifts**

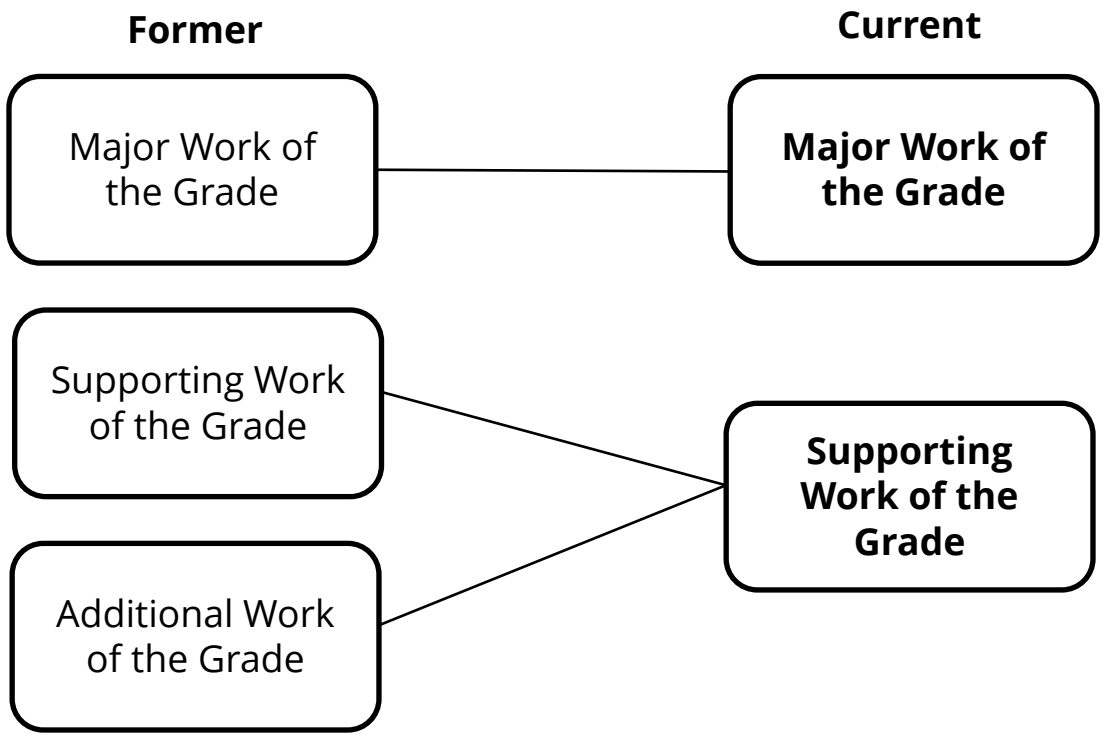
Notes:

What HAS Changed

- Category Change
- Revised Structured
- Coding & Nomenclature
- Literacy Skills for Mathematical Proficiency

What HAS Changed

Category Change



Notes:

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What HAS Changed

Revised Structure

Operations and Algebraic Thinking (OA)

Cluster Headings	Content Standards
A. Use the four operations with whole numbers to solve problems. (See Table 1 - Addition and Subtraction Situations and Table 2 - Multiplication and Division Situations)	**4.OA.A.1** Interpret a multiplication equation as a comparison (e.g., interpret 35 = 5 x 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5). Represent verbal statements of multiplicative comparisons as multiplication equations. **4.OA.A.2** Multiply or divide to solve contextual problems involving multiplicative comparison, and distinguish multiplicative comparison from additive comparison. *For example, school A has 300 students and school B has 600 students: to say that school B has two times as many students is an example of multiplicative comparison; to say that school B has 300 more students is an example of additive comparison.* **4.OA.A.3** Solve multi-step contextual problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
B. Gain familiarity with factors and multiples.	**4.OA.B.4** Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.
C. Generate and analyze patterns.	**4.OA.C.5** Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. *For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.*

Major Content | Supporting Content

Notes:

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What HAS Changed

Revised Structure

Cluster Headings	Content Standards	Scope & Clarifications
B. Solve equations and inequalities in one variable.	**A1.A.REI.B.3** Solve quadratic equations and inequalities in one variable. **a.** Use the method of completing the square to rewrite any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. **b.** Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, knowing and applying the quadratic formula, and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions	*For A1.A.REI.B.3b:* *Tasks do not require students to write solutions for quadratic equations that have roots with nonzero imaginary parts. However, tasks can require the student to recognize cases in which a quadratic equation has no real solutions.* *Note: solving a quadratic equation by factoring relies on the connection between zeros and factors of polynomials. This is formally assessed in Algebra II.*
C. Solve systems of equations.	**A1.A.REI.C.4** Write and solve a system of linear equations in context.	*Solve systems both algebraically and graphically.* *Systems are limited to at most two equations in two variables.*

	Major Content		Supporting Content

Notes:

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What HAS Changed

Coding and Nomenclature

6.EE.C.9

6	
EE	
C	
9	

8.F.B.4

8	
F	
B	
4	

Notes:

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What HAS Changed

Literacy Skills for Mathematical Proficiency

Communication in mathematics requires literacy skills in reading, vocabulary, speaking, listening, and writing. Students must be able to:

Literacy Skills for Mathematical Proficiency
1. Use multiple reading strategies.
2. Understand and use correct mathematical vocabulary.
3. Discuss and articulate mathematical ideas.
4. Write mathematical arguments.

Notes:

Module 2 Review

- Reinforce the continued expectations of the Tennessee Math Academic Standards.
- Revisit the three instructional shifts and their continued *and* connected role in the revised standards.
- Review the overarching changes of the revised Tennessee Math Academic Standards.

Strong Standards

Standards are the bricks that should be masterfully laid through quality instruction to ensure that all students reach the expectation of the standards.

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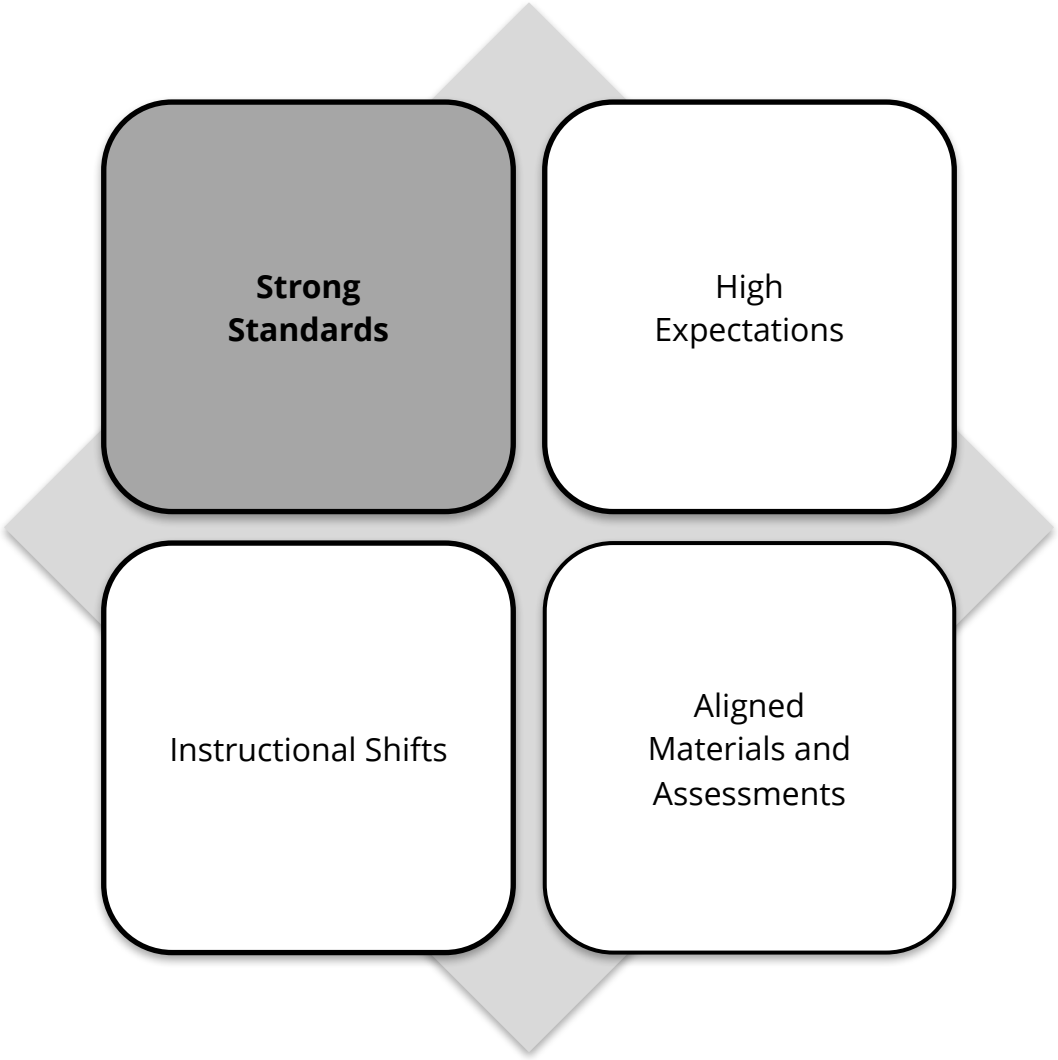
TAB PAGE

Part 1: The Standards

Module 3: Summary of Revisions



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Goals

- Review a summary of revisions to the math standards by grade band.
- Compare 2016–17 standards to 2017–18 standards.

Strong Standards

Standards are the bricks that should be masterfully laid through quality instruction to ensure that all students reach the expectation of the standards.

High Expectations

We have a continued goal to prepare students to be college and career ready.

Instructional Shifts

The instructional shifts are an essential component of the standards and provide guidance for how the standards should be taught and implemented.

Aligned Materials and Assessments

Educators play a key role in ensuring that our standards, classroom instructional materials, and assessments are aligned.

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Why Standards?

"To assess student achievement accurately, teachers and administrators must know and understand the content standards that their students are to master. Again, we cannot teach or assess achievement that we have not defined."

—S. Chappuis, Stiggins, Arter, and J. Chappuis, 2006

What about this quotation sticks out to you?

Notes:

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Revisions to the Math Standards

Specific to K–5

- Refined for clarity
- Increased fluency expectations
- Revised examples

Overarching Revisions

- Supporting and additional work of the grade is combined as supporting work of the grade
- Increased fluency expectations

	Increased Fluency Expectations	
	Former Standard	Current Standard
Kindergarten	K.OA.5 Fluently add and subtract within 5.	K.OA.A.5 Fluently add and subtract within 10 using mental strategies.
First Grade	1.OA.6. Add and subtract within 20, demonstrating fluency for addition and subtraction within 10.	1.OA.C.6 Fluently add and subtract within 20 using mental strategies. By the end of Grade 1, know from memory all sums up to 10.
Second Grade	2.OA.2 Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers.	2.OA.B.2 Fluently add and subtract within 30 using mental strategies. By the end of Grade 2, know from memory all sums of two one-digit numbers and related subtraction facts.

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Revisions to the Math Standards

Specific to K–5

- Refined for clarity
- Increased fluency expectations
- Revised examples

Overarching Revisions

- Added/shifted a small number of standards to strengthen coherence across grade levels

	Former Standard	Current Standard
Kindergarten	No Past Standard	K.MD.B.3 Identify the penny, nickel, dime, and quarter and recognize the value of each.
First Grade	No Past Standard	1.MD.B.4 Count the value of a set of like coins less than one dollar using the ¢ symbol only.
Second Grade	2.MD.8 Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately.	2.MD.C.8 Solve contextual problems involving dollar bills, quarters, dimes, nickels, and pennies using ¢ and $ symbols appropriately.

TN Department of Education

Revisions to the Math Standards

Specific to K–5

- Refined for clarity
- Increased fluency expectations
- Revised examples

Overarching Revisions

- Added/shifted a small number of standards to strengthen coherence across grade levels

	Former Standard	Current Standard
Fourth Grade	4.MD.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36),…	4.MD.A.1 Measure and estimate to determine relative sizes of measurement units within a single system of measurement involving length, liquid volume, and mass/weight of objects using customary and metric units.
Fifth Grade	5.MD.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.	5.MD.A.1 Convert customary and metric measurement units within a single system by expressing measurements of a larger unit in terms of a smaller unit. Use these conversions to solve multi-step real world problems involving distances, intervals of time, liquid volumes, masses of objects, and money (including problems involving simple fractions or decimals). For example, 3.6 liters and 4.1 liters can be combined as 7.7 liters or 7700 milliliters.

TN Department of Education

Revisions to the Math Standards

Specific to K–5

- Refined for clarity
- Increased fluency expectations
- Revised examples

Overarching Revisions

- Revised language to provide clarity and continuity
- Highlighted chart for–grade level mastery expectation for addition, subtraction, multiplication and division

Former Standard
2.NBT.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.

Current Standard
2.NBT.A.3 Read and write numbers to 1000 using **standard form**, **word form**, and expanded form.

Former Standard
4.NBT.3 Use place value understanding to round multi-digit whole numbers to any place.

Current Standard
4.NBT.A.3 Round multi-digit whole numbers to any place **(up to and including the hundred-thousand place)** using understanding of place value.

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Revisions to the Math Standards

Specific to 6–8

- Refined major work of the grade
- Revised supporting work of the grade, especially in statistics and probability

Overarching Revisions

- Slight revisions made to geometry in grade 8
- Supporting and additional work of the grade is combined as supporting work of the grade
- Revised language to provide clarity and continuity

Former Standard
6.SP.2 Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.

Current Standard
6.SP.A.2 Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center **(mean, median, mode)**, spread **(range)**, and overall shape.

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Revisions to the Math Standards

Specific to 6–8

- Refined major work of the grade
- Revised supporting work of the grade, especially in statistics and probability

Overarching Revisions

- Revised a small number of standards to strengthen coherence by condensing, expanding, and removing standards
- Revised a small number of statistics and probability standards

Former Standard

6.EE.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another. *For example, Susan is putting money in her savings account by depositing a set amount each week (50). Represent her savings account balance with respect to the number of weekly deposits (*s = 50w*, illustrating the relationship between balance amount* s *and number of weeks* w*).* Write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.

Current Standard

6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another. *For example, Susan is putting money in her savings account by depositing a set amount each week (50). Represent her savings account balance with respect to the number of weekly deposits (*s = 50w*, illustrating the relationship between balance amount* s *and number of weeks* w*).*

a. Write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable.

b. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.

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Revisions to the Math Standards

Specific to 6–8

- Refined major work of the grade
- Revised supporting work of the grade, especially in statistics and probability

Overarching Revisions

- Revised a small number of standards to strengthen coherence by condensing, expanding, and removing standards
- Revised a small number of statistics and probability standards

Removed Standard

7.G.3 Describe the two-dimensional figures that result from slicing three dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.

Former Standard

6.SP.5c Summarize numerical data sets in relation to their context, such as by: c. Giving quantitative measures of center (median and/or mean) and variability **(interquartile range and/or mean absolute deviation)**, as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.

Current Standard

6.SP.B.5c Summarize numerical data sets in relation to their context, such as by: c. Giving quantitative measures of center (median and/or mean) and variability **(range)**, as well as describing any overall pattern with reference to the context in which the data were gathered.

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Revisions to the Math Standards

Specific to 9–12

- Refined and revised scope and clarifications
- Revisions for Algebra II and Integrated Math III
- Restructured additional math courses to reflect college and career readiness

Overarching Revisions

- Supporting and additional work of the grade is combined as supporting work of the grade
- Removed or shifted a small number of standards to the major work of the grade to streamline vertical progression
- Revised language and examples to provide clarity and continuity
- Shifted a small number of supporting work of the grade standards to additional mathematics courses

Former Standard
G.SRT.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

Current Standard
G.SRT.C.8a ***Know and*** use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

Moved Standard
A2/M3.F.TF.5 to P.F.TF.A.4 Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.

This standard moved from Algebra II/Integrated III to Pre-Calculus.

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Revisions to the Math Standards

Specific to 9–12

- Refined and revised scope and clarifications
- Revisions for Algebra II and Integrated Math III
- Restructured additional courses to reflect college and career readiness

Overarching Revisions

- Restructured additional mathematics courses to reflect college and career readiness by removing three courses and adding “Applied Mathematical Concepts”

Rationale:

- High expectations
- Retention of rigorous standards
- Clearly defined and coherent pathways
- Equity and opportunity
- Aligned with student interest in postsecondary fields
- Shift to a discipline and career based pathway

Former:

- Advanced Algebra and Trigonometry
- Discrete Math
- Finite Math
- Bridge Math
- Pre-Calculus
- Statistics
- Calculus

Current:

- **Applied Mathematical Concepts**
- Bridge Math
- Pre-Calculus
- Statistics
- Calculus

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Revisions to the Math Standards

New Applied Mathematical Concepts Course

- For students interested in careers that use applied mathematics such as banking, industry, or human resources
- Rich problem solving experience
- Combines standards from Senior Finite Math and Discrete Mathematics
- Designed with industry needs in mind
- Alignment with first three math courses and ACT college and career readiness
- Possible dual credit exam

Problems in Applied Mathematical Concepts

AM.G.L.A.3: Solve a variety of logic puzzles

What's the easiest way to heat a pan of water for 9 minutes when you have only a 6-minute hour-glass timer and a 21-minute hour-glass timer?

AM.D.ID.A.2: Use a variety of counting methods to organize information, determine probabilities, and solve problems.

Given a group of students: G = {Allen, Brenda, Chad, Dorothy, Eric} list and count the different ways of choosing the following officers or representatives for student congress. Assume that no one can hold more than one office.

A president, a secretary, and a treasurer, if the president must be a woman and the other two must be men.

AM.N.NQ.B.6: Solve contextual problems involving financial decision-making.

The cash price of a fitness system is $659.99. The customer paid $115 as a down payment. The remainder will be paid in 36 monthly installments of $19.16 each. Find the amount of the finance charge.

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Revisions to the Math Standards

Standards Comparison Activity

Compare the former standards to the current standards

Directions:

1. Highlight any changes you notice between the former standards and the current standards in the column on the right.
2. Use the included chart to compare the former standards with the current standards.

Notes:

Coding	Former TN Standards	Revised TN Standards
6.RP.A.1	1. Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."	6.RP.A.1. Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, *The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak or For every vote candidate A received, candidate C received nearly three votes.*
6.RP.A.2	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. For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger." (Expectations for unit rates in this grade are limited to noncomplex fractions.)	6.RP.A.2. Understand the concept of a unit rate a/b associated with a ratio a:b with b≠ 0, Use rate language in the context of a ratio relationship. For example, *This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar or We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger.* (Expectations for unit rates in this grade are limited to noncomplex fractions.)
6.RP.A.3	3. Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. a. 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. b. Solve unit rate problems including those involving unit pricing and constant speed. For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed? c. 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. d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.	6.RP.A.3. Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. a. 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. b. Solve unit rate problems including those involving unit pricing and constant speed. For example, *If it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?* c. 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. d. Use ratio reasoning to convert customary and metric measurement units (within the same system); manipulate and transform units

		appropriately when multiplying or dividing quantities.
6.NS.A.1	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. For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. (In general, (a/b) ÷ (c/d) = ad/bc.) How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?	6.NS.A.1. Interpret and compute quotients of fractions, and solve contextual problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. For example, *Create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. (In general, (a/b) ÷ (c/d) = ad/bc.) How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?*
6.NS.B.2	2. Fluently divide multi-digit numbers using the standard algorithm.	6.NS.B.2. Fluently divide multi-digit numbers using a standard algorithm.
6.NS.B.3	3. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.	6.NS.B.3. Fluently add, subtract, multiply, and divide multi-digit decimals using a standard algorithm for each operation.
6.NS.B.4	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. For example, express 36 + 8 as 4 (9 + 2).	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. For example, *Express 36 + 8 as 4 (9 + 2).*
6.NS.C.5	5. Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.	6.NS.C.5. Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
6.NS.C.6	6. Understand a rational number as a point on the number line. Extend number line diagrams	6.NS.C.6. Understand a rational number as a point on the number line. Extend number line

	and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., –(–3) = 3, and that 0 is its own opposite. b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.	diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., –(–3) = 3, and that 0 is its own opposite. b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.
6.NS.C.7	7. Understand ordering and absolute value of rational numbers. a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. For example, interpret –3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right. b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. For example, write –3 o C > –7 o C to express the fact that –3 o C is warmer than –7 o C. c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. For example, for an account balance of -30 dollars, write |-30| = 30 to describe the size of the debt in dollars.	6.NS.C.7. Understand ordering and absolute value of rational numbers. a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. For example, *Interpret –3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right.* b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. For example, *Write –3 o C > –7 o C to express the fact that –3 o C is warmer than –7 o C.* c. Understand the absolute value of a rational number as its distance from 0 on the number line and distinguish comparisons of absolute value from statements about order in a real-world context. For example*, An account balance of -24 dollars represents a greater debt than an account balance of*

	d. Distinguish comparisons of absolute value from statements about order. For example, recognize that an account balance less than -30 dollars represent a debt greater than 30 dollars.	*-14 dollars because -24 is located to the left of -14 on the number line.*
6.NS.C.8	8. Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.	6.NS.C.8. Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.
6.EE.A.1	1. Write and evaluate numerical expressions involving whole-number exponents.	6.EE.A.1. Write and evaluate numerical expressions involving whole-number exponents.
6.EE.A.2	2. Write, read, and evaluate expressions in which letters stand for numbers. a. Write expressions that record operations with numbers and with letters standing for numbers. For example, express the calculation "Subtract y from 5" as 5 – y. b. Identify parts of an expression using mathematical terms(sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. For example, describe the expression 2 (8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms. c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas V = s 3 and A = 6 s 2 to find the volume and surface area of a cube with sides of length s = 1/2.	6.EE.A.2. Write, read, and evaluate expressions in which variables (letters) stand for numbers. a. Write expressions that record operations with numbers and with variables. For example, *Express the calculation "Subtract y from 5" as 5 – y.* b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. For example, *Describe the expression 2 (8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.* c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).

6.EE.A.3	3. Apply the properties of operations to generate equivalent expressions. For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y	6.EE.A.3. Apply the properties of operations (including, but not limited to, commutative, associative, and distributive properties) to generate equivalent expressions. The distributive property is prominent here. For example, *Apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.*
6.EE.A.4	4. Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.	6.EE.A.4. Identify when expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). For example, *The expression 5b + 3b = (5 + 3)b = 8b.*
6.EE.B.5	5. Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.	6.EE.B.5. Understand solving an equation or inequality using substitution to determine whether a given number in a specified set makes an equation or inequality true.
6.EE.B.6	6. Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.	6.EE.B.6. Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.
6.EE.B.7	7. Solve real-world and mathematical problems by writing and solving equations of the form x + p = q and px = q for cases in which p, q and x are all nonnegative rational numbers.	6.EE.B.7. Solve real-world and mathematical problems by writing and solving one-step equations of the form x + p = q and px = q for cases in which p, q and x are all nonnegative rational numbers.
6.EE.B.8	8. Write an inequality of the form x > c or x < c to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form x > c or x < c have infinitely many solutions; represent solutions of such inequalities on number line diagrams.	6.EE.B.8. Interpret and write an inequality of the form x > c or x < c to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form x > c or x < c have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

6.EE.C.9	9. Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.	6.EE.C.9. Use variables to represent two quantities in a real-world problem that change in relationship to one another. For example, *Susan has $1 in her savings account. She is going to save $4 each week. How much will she save weekly?* a. Write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. b. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.
6.G.A.1	1. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.	6.G.A.1. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.
6.G.A.2	2. Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas V = l w h and V = b h to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.	6.G.A.2. Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas V = l w h and V = B (area of base) h to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.
6.G.A.3	3. Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.	6.G.A.3. Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side that joins two vertices. Apply these techniques in the context of solving real-world and mathematical problems.
6.G.A.4	4. Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.	6.G.A.4. Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.

6.SP.A.1	1. Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.	6.SP.A.1. Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. For example, *"How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.*
6.SP.A.2	2. Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.	6.SP.A.2. Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center (mean, median, mode), spread (range), and overall shape.
6.SP.A.3	3. Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.	6.SP.A.3. Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.
6.SP.B.4	4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots.	6.SP.B.4. Display a single set of numerical data using dot plots (line plots), pie charts, and stem plots.
6.SP.B.5	5. Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.	6.SP.B.5. Summarize numerical data sets in relation to their context. a. Report the number of observations. b. Describe the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Give quantitative measures of center (median and/or mean) and variability (range) as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relate the choice of measures of center to the shape of the data distribution and the context in which the data were gathered.

7th Grade Standards Comparison

Coding	Former TN Standards	Revised TN Standards
7.RP.A.1	1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. *For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.*	7.RP.A.1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units. *For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.*
7.RP.A.2	2. Recognize and represent proportional relationships between quantities. a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. c. Represent proportional relationships by equations. *For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn*. d. Explain what a point *(x, y)* on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, *r)* where *r* is the unit rate.	7.RP.A.2. Recognize and represent proportional relationships between quantities. a. Decide whether two quantities are in a proportional relationship (e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin). b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. c. Represent proportional relationships by equations. *For example, if total cost* t *is proportional to the number* n *of items purchased at a constant price* p*, the relationship between the total cost and the number of items can be expressed as* t = pn. d. Explain what a point *(x, y)* on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, *r)* where *r* is the unit rate.
7.RP.A.3	3. Use proportional relationships to solve multistep ratio and percent problems. *Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.*	7.RP.A.3. Use proportional relationships to solve multi-step ratio and percent problems. *Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.*
7.NS.A.1	1. Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. a. Describe situations in which opposite quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.* b. Understand $p + q$ as the number located a distance $\|q\|$ from p, in the	7.NS.A.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. a. Describe situations in which opposite quantities combine to make 0. b. Understand $p + q$ as the number located a distance $\|q\|$ from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite

	positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. c. Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. d. Apply properties of operations as strategies to add and subtract rational numbers.	have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. c. Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. d. Apply properties of operations as strategies to add and subtract rational numbers.
7.NS.A.2	2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real world contexts. c. Apply properties of operations as strategies to multiply and divide rational numbers. d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.	7.NS.A.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts. c. Apply properties of operations as strategies to multiply and divide rational numbers. d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.
7.NS.A.3	3. Solve real-world and mathematical problems involving the four operations with rational numbers. (Computations with rational numbers	7.NS.A.3 Solve real-world and mathematical problems involving the four operations with rational numbers. (Computations with rational

	extend the rules for manipulating fractions to complex fractions.)	numbers extend the rules for manipulating fractions to complex fractions.)
7.EE.A.1	1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	7.EE.A.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
7.EE.A.2	2. Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."*	7.EE.A.2 Understand that rewriting an expression in different forms in a contextual problem can provide multiple ways of interpreting the problem and how the quantities in it are related. *For example, shoes are on sale at a 25% discount. How is the discounted price* P *related to the original cost* C *of the shoes?* C - .25C = P*. In other words,* P *is 75% of the original cost for* C - .25C *can be written as* .75C*.*
7.EE.B.3	3. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.*	7.EE.B.3 Solve multi-step real-world and mathematical problems posed with positive and negative rational numbers presented in any form (whole numbers, fractions, and decimals). a. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate. b. Assess the reasonableness of answers using mental computation and estimation strategies.
7.EE.B.4	4. Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. a. Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?*	7.EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. a. Solve contextual problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?*

	b. Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. *For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.*	b. Solve contextual problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality on a number line and interpret it in the context of the problem. *For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.* (Note that inequalities using >, <, ≤, ≥ are included in this standard).
7.G.A.1	1. Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.	7.G.A.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
7.G.A.2	2. Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.	7.G.A.2 Draw geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.
7.G.A.3	3. Describe the two-dimensional figures that result from slicing three dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.	
7.G.B.4	4. Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.	7.G.B.3 Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.
7.G.B.5	5. Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in the figure.	7.G.B.4 Know and use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.
7.G.B.6	6. Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	7.G.B.5 Solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

7th Grade Standards Comparison

7.SP.A.1	1. Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.	7.SP.A.1 Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.
7.SP.A.2	2. Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.*	7.SP.A.2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.*
7.SP.B.3	3. Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. *For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.*	7.SP.B.3 Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. *For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team; on a dot plot or box plot, the separation between the two distributions of heights is noticeable.*
7.SP.B.4	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. *For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.*	7.SP.B.4 Use measures of center and measures of variability for numerical data From random samples to draw informal comparative inferences about two populations. *For example, decide whether the words in a chapter of a 7th grade science book are generally longer than the words in a chapter of a 4th grade science book.*
7.SP.C.5	5. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.	7.SP.C.5 Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
7.SP.C.6	6. Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its	7.SP.C.6 Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its

	long-run relative frequency, and predict the approximate relative frequency given the probability. *For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.*	long-run relative frequency, and predict the approximate relative frequency given the probability. *For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.*
7.SP.C.7	7. Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected. b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?	7.SP.C.7 Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. *a.* Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. *For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.* *b.* Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. *For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?*
7.SP.C.8	8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. b. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event.	

	c. Design and use a simulation to generate frequencies for compound events. *For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood.*	
		7.SP.D.8 Summarize numerical data sets in relation to their context. **a.** Give quantitative measures of center (median and/or mean) and variability (range and/or interquartile range), as well as describe any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. **b.** Know and relate the choice of measures of center (median and/or mean) and variability (range and/or interquartile range) to the shape of the data distribution and the context in which the data were gathered.

Coding	Former TN Standards	Revised TN Standards
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, and convert a decimal expansion which repeats eventually into a rational number.	**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	2. Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., 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.*	**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.*
8.EE.A.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,* $3^2 \times 3^{-5} = 3^{-3} = \frac{1}{3^3} = \frac{1}{27}$.	**8.EE.A.1** Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,* $3^2 \times 3^{-5} = 3^{-3} = \frac{1}{3^3} = \frac{1}{27}$.
8.EE.A.2	Use square root and cube root symbols to represent solutions to equations of the form $x2 = p$ and $x3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.	**8.EE.A.2** Use square root and cube root symbols to represent solutions to equations of the form $x2 = p$ and $x3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.
8.EE.A.3	Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as 3×10^8 and the population of the world as 7×10^9, and determine that the world population is more than 20 times larger.*	**8.EE.A.3** Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as 3×10^8 and the population of the world as 7×10^9, and determine that the world population is more than 20 times larger.*
8.EE.A.4	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use	**8.EE.A.4** Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small

	millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.	quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.
8.EE.B.5	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.*	**8.EE.B.5** Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.*
8.EE.B.6	Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.	**8.EE.B.6** Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; know and derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.
8.EE.C.7	Solve linear equations in one variable.	**8.EE.C.7** Solve linear equations in one variable.
	a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.	**a.** Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). **b.** Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.
8.EE.C.8	8. Analyze and solve pairs of simultaneous linear equations. a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve	**8.EE.C.8** Analyze and solve systems of two linear equations. **a.** Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. **b.** Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations.

	simple cases by inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.* c. Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.*	Solve simple cases by inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.* **c.** Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.*
8.F.A.1	Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. (Function notation is not required in Grade 8.)	**8.F.A.1** Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. (Function notation is not required in 8th grade.)
8.F.A.2	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.*	**8.F.A.2** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and another linear function represented by an algebraic expression, determine which function has the greater rate of change.*
8.F.A.3	Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.*	**8.F.A.3** Know and interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function $A = \boldsymbol{s^2}$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.*
8.F.B.4	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.	**8.F.B.4** Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two *(x, y)* values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models and in terms of its graph or a table of values.

8.F.B.5	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	**8.F.B.5** Describe qualitatively the functional relationsh two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has described verbally.
8.G.A.1	Verify experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines.	**8.G.A.1** Verify experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines.
8.G.A.2	Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.	
8.G.A.3	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	**8.G.A.2** Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
8.G.A.4	4. Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two dimensional figures, describe a sequence that exhibits the similarity between them.	
8.G.A.5	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.*	**8.G.A.3** Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.*
8.G.B.6	Explain a proof of the Pythagorean Theorem and its converse.	**8.G.B.4** Explain a proof of the Pythagorean Theorem and its converse.

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.5** 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.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	**8.G.B.6** Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
8.G.C.9	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	**8.G.C.7** Know and understand the formulas for the v cones, cylinders, and spheres, and use them to solve and mathematical problems.
8.SP.A.1	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.	**8.SP.A.1** Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
8.SP.A.2	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.	**8.SP.A.2** Know that straight lines are widely used to relationships between two quantitative variables. Fo plots that suggest a linear association, informally fit straight line and informally assess the model fit by ju the closeness of the data points to the line.
8.SP.A.3	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.*	**8.SP.A.3** Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.*
8.SP.A.4	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there*	

	evidence that those who have a curfew also tend to have chores?	
		8.SP.B.4 Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. Represent sample spaces for compound events using methods such as organized lists, tables, and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event.

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Standards Comparison Chart

Standard Coding	Dropped from Course	Added to Course	Revised	No change

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Revisions to the Math Standards

Standards Comparison Activity

1. If you had to summarize the revisions to these selected standards in twenty words or less, what would you say?

Notes:
Small Group Consensus:
Whole Group Consensus:

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Appointment with Peers

Please meet with your first partner to discuss:

- How will these changes impact your classroom?
- What are your takeaways from modules 1–3?
- How does this align to your observation rubric?

Notes:

Module 3 Review

- The instructional expectations remain the same and are still the focus of the standards.
- The revised standards represent a stronger foundation that will support the progression of rigorous standards throughout the grade levels.
- The revised standards improve connections:
  - within a single grade level, and
  - between multiple grade levels.

Strong Standards

Standards are the bricks that should be masterfully laid through quality instruction to ensure that all students reach the expectation of the standards.

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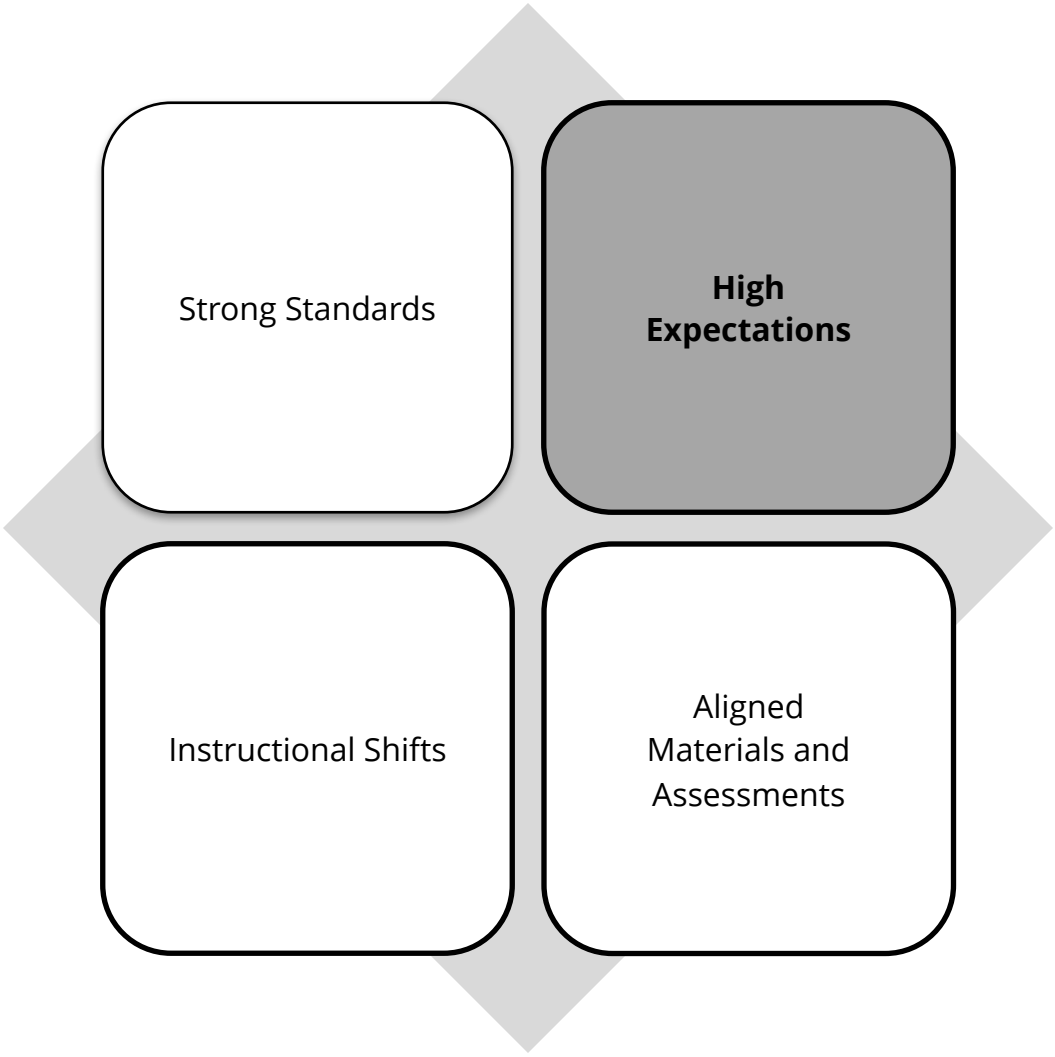
TAB PAGE

Part 2: Developing a Deeper Understanding

Module 4: Diving Into 6–8 Math



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Goals

- Concisely describe a course based on its introduction.
- Develop a means for deconstructing standards to determine the mathematical emphasis of the standard—its intent and purpose.
- Use the KUD approach to guide planning, instruction, and assessment.

Strong Standards

Standards are the bricks that should be masterfully laid through quality instruction to ensure that all students reach the expectation of the standards.

High Expectations

We have a continued goal to prepare students to be college and career ready.

Instructional Shifts

The instructional shifts are an essential component of the standards and provide guidance for how the standards should be taught and implemented.

Aligned Materials and Assessments

Educators play a key role in ensuring that our standards, classroom instructional materials, and assessments are aligned.

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Closer Look

Take a few minutes to read the overview page for your grade level and think about how this relates to the overarching revisions we have just seen.

Notes:

Now summarize your course in 140 characters. Write your tweet to inform others regarding what is included in your grade.

My Tweet:

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Intent and Purpose of the Standards

"With my ears to the ground, listening to my students, my eyes are focused on the mathematical horizon."

—Ball, 1993

Analyzing Standards

6.RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems (e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations).

a. 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.

b. Solve unit rate problems including those involving unit pricing and constant speed. For example, if a runner ran 10 miles in 90 minutes, running at that speed, how long will it take him to run 6 miles? How fast is he running in miles per hour?

Notes:

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We are going to look closely at 6.RP.A.3.

Know (facts, vocabulary)	Understand (concepts, generalizations)	Do (verbs, skills)
Essential Questions:		
Instruction & Assessment (What does the math look like?)		

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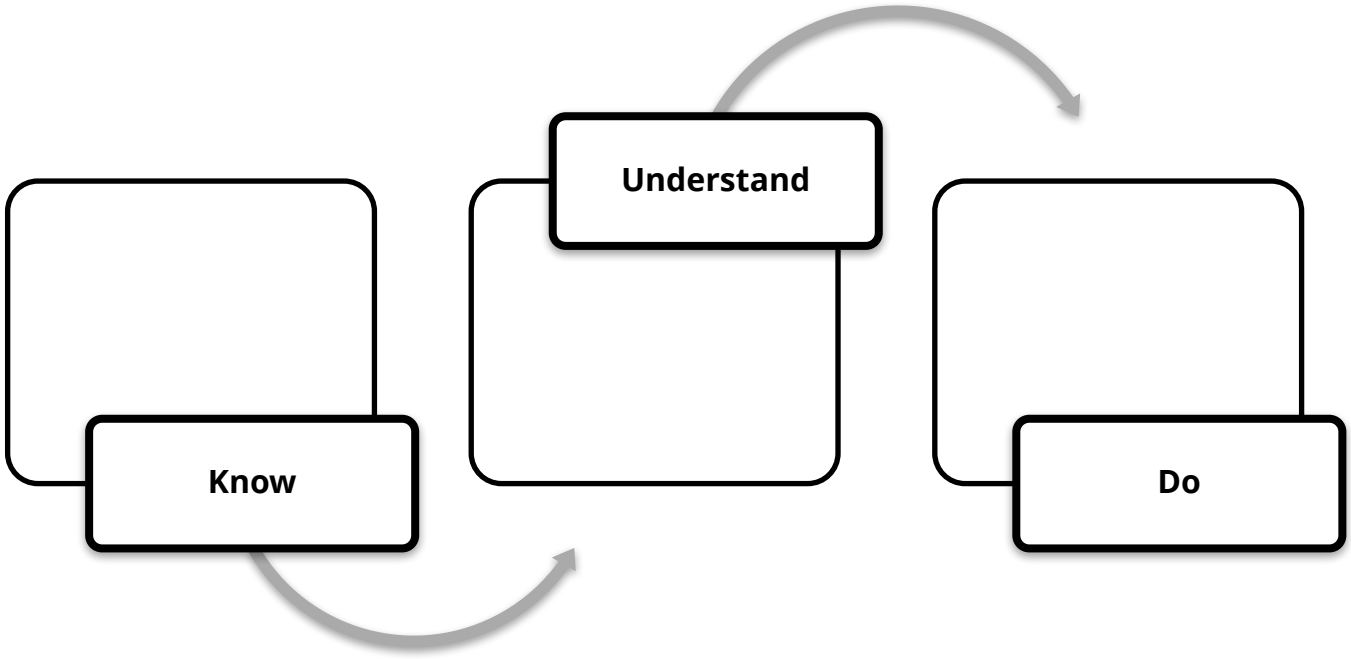
From Standard to Instruction: KUD

Know, Understand, and Do

- What is it that the standard wants the student to know, understand, and do?
- KUD – helps to maintain focus in differentiated instruction
  - **Know**: facts, vocabulary, properties, procedures, etc.
  - **Understand**: concepts, ideas, etc.
  - **Do**: tasks, approaches, assessment problems, etc.
- The two go together: What is the intent and purpose of the standard and how do I put this into instructional form?



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You Try One!

Know (facts, vocabulary)	Understand (concepts, generalizations)	Do (verbs, skills)
Essential Questions:		
Instruction & Assessment (What does the math look like?)		

Module 4 Review

- Concisely describe a course based on its introduction.
- Develop a means for deconstructing standards to determine the mathematical emphasis, intent, and purpose of the standard.
- Use the KUD approach to guide planning, instruction, and assessment.

High Expectations

We have a continued goal to prepare students to be college and career ready.

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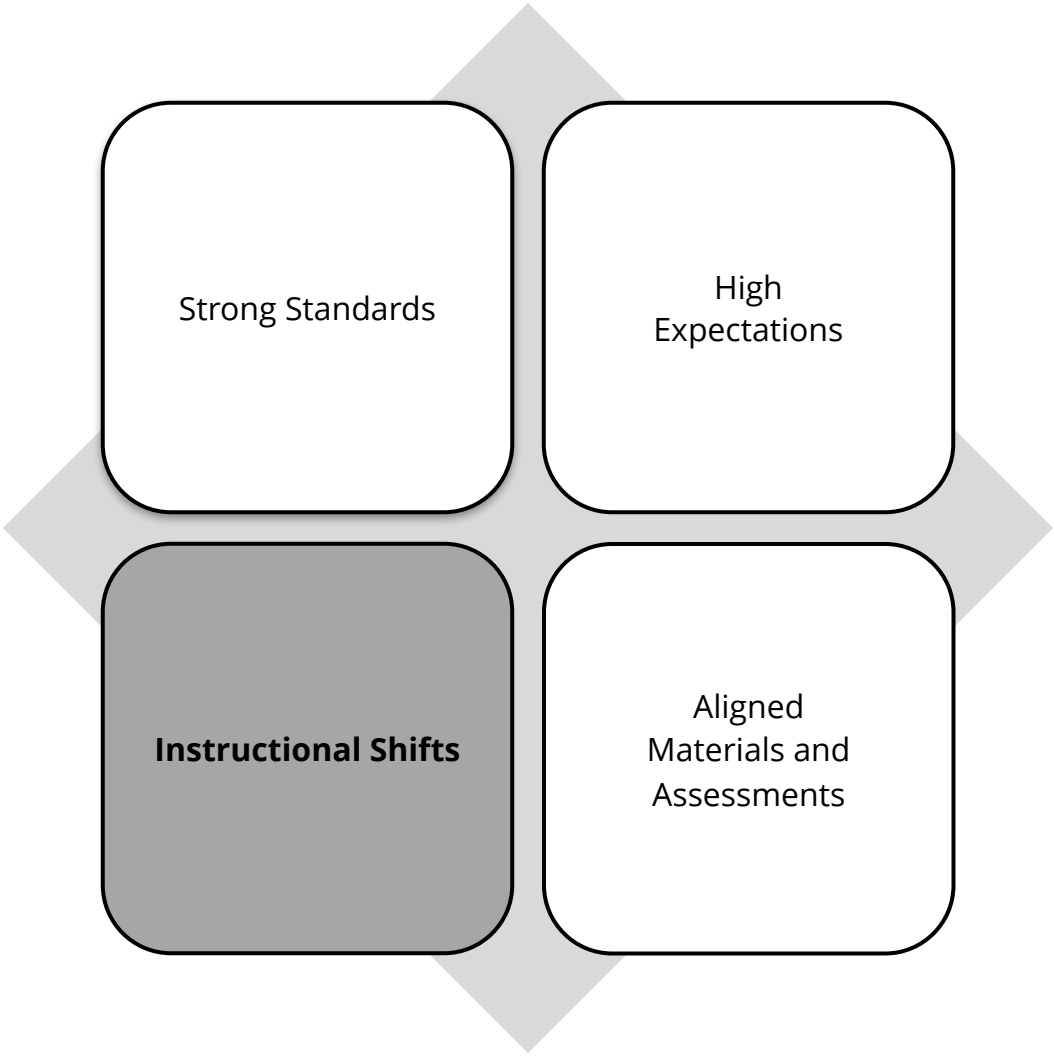
TAB PAGE

Part 3: Instructional Shifts

Module 5: Revisiting the SMP's and Instructional Expectations



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Goals

- Revisit the concepts of focus, coherence, and rigor and how they play out in instruction.
- Discuss the purpose and place of the content and practice standards.
- Explore students' mathematical mindsets.
- Share instructional strategies related to the Standards for Mathematical Practice.
- Discuss research on the influence of mindsets in the math classroom.

Strong Standards

Standards are the bricks that should be masterfully laid through quality instruction to ensure that all students reach the expectation of the standards.

High Expectations

We have a continued goal to prepare students to be college and career ready.

Instructional Shifts

The instructional shifts are an essential component of the standards and provide guidance for how the standards should be taught and implemented.

Aligned Materials and Assessments

Educators play a key role in ensuring that our standards, classroom instructional materials, and assessments are aligned.

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Why Standards for Mathematical Practice?

"Beginning to experiment with small changes to one's teaching practice and collaborating with colleagues can help move students toward the vision of mathematical proficiency described in the Standards for Mathematical Practice"

—Mateas, 2016

- Tell us what students should know and be able to do
- So, what should students know and do?
    - Content Standards
    - Standards for Mathematical Practice
    - Literacy Skills
- **Knowing that these are WHAT students need to learn, teachers determine *how* to teach these.**

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 others.
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.

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Mindset

- The TN Academic Standards for Mathematics may seem challenging for students whose mindsets have been fixed by their past experiences in mathematics classrooms.
- As teachers, we are best positioned to influence students' mathematical mindsets through our actions and practices in the mathematics classroom.

_____ -Intelligence is a fixed trait. You cannot change it.

_____ -You can grow your intelligence through effort.

Notes:

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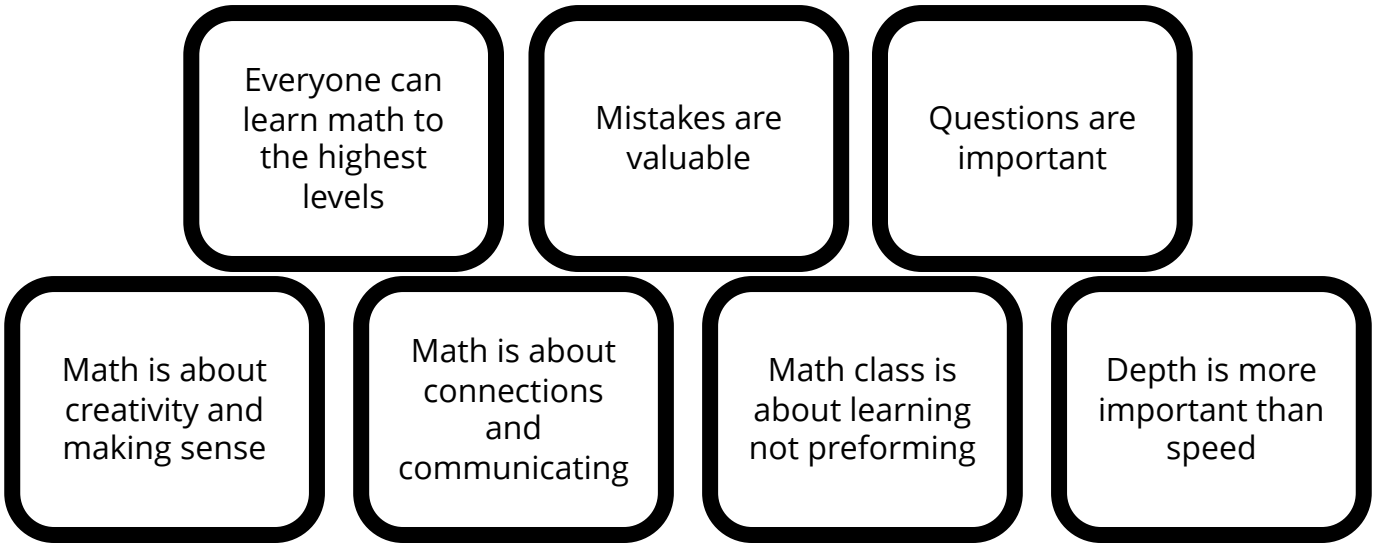
Why Address Mindsets?

"If there's a threat of being wrong every time I raise my hand, and being wrong is a bad thing, then very quickly I decide math isn't for me, I don't like this, I'm not a smart person."

—Noah Heller, Harvard Graduate School of Education, 2016



Notes:

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Instructional Expectations

Focus

1. In your grade level groups, discuss ways you could respond if someone asks you the following question, “Why focus? There’s so much math that students could be learning. Why limit them?”

2. Review the table below and answer the questions, “Which two of the following represent areas of major focus for the indicated grade?”

6	Understand ratio concepts and use ratio reasoning to solve problems	Identify and utilize rules of divisibility	Apply and extend previous understandings of arithmetic to algebraic expressions
7	Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers	Use properties of operations to generate equivalent expressions	Generate the prime factorization of numbers to solve
8	Standard form of a linear equation	Define, evaluate, and compare functions	Understand and apply the Pythagorean Theorem

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Instructional Shifts

Coherence

In the space below, copy all of the standards for your assigned domain and note how coherence is evident in the vertical progression of these standards.

Grade	Standard	Summary of the Standard (If the standard has sub-parts, summarize each sub-part.)

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Instructional Shifts

Rigor

1. Make a true statement: *Rigor* = _____ + _____ + _____

2. In your groups, discuss ways to respond to one of the following comments: “These standards are expecting that we just teach rote memorization. Seems like a step backwards to me.” Or “I’m not going to spend time on fluency—it should just be a natural outcome of conceptual understanding.”

3. The shift towards rigor is required by the standards. Find and copy in the space below standards which specifically set expectations for each component of rigor.

Standard	Evidence

What do the instructional shifts look like in the classroom?

Module 5 Review

- We connected the instructional shifts to the standards and our classroom practices.
- We explored students' mathematical mindsets.
- We shared instructional strategies related to the Standards for Mathematical Practice.

Instructional Shifts

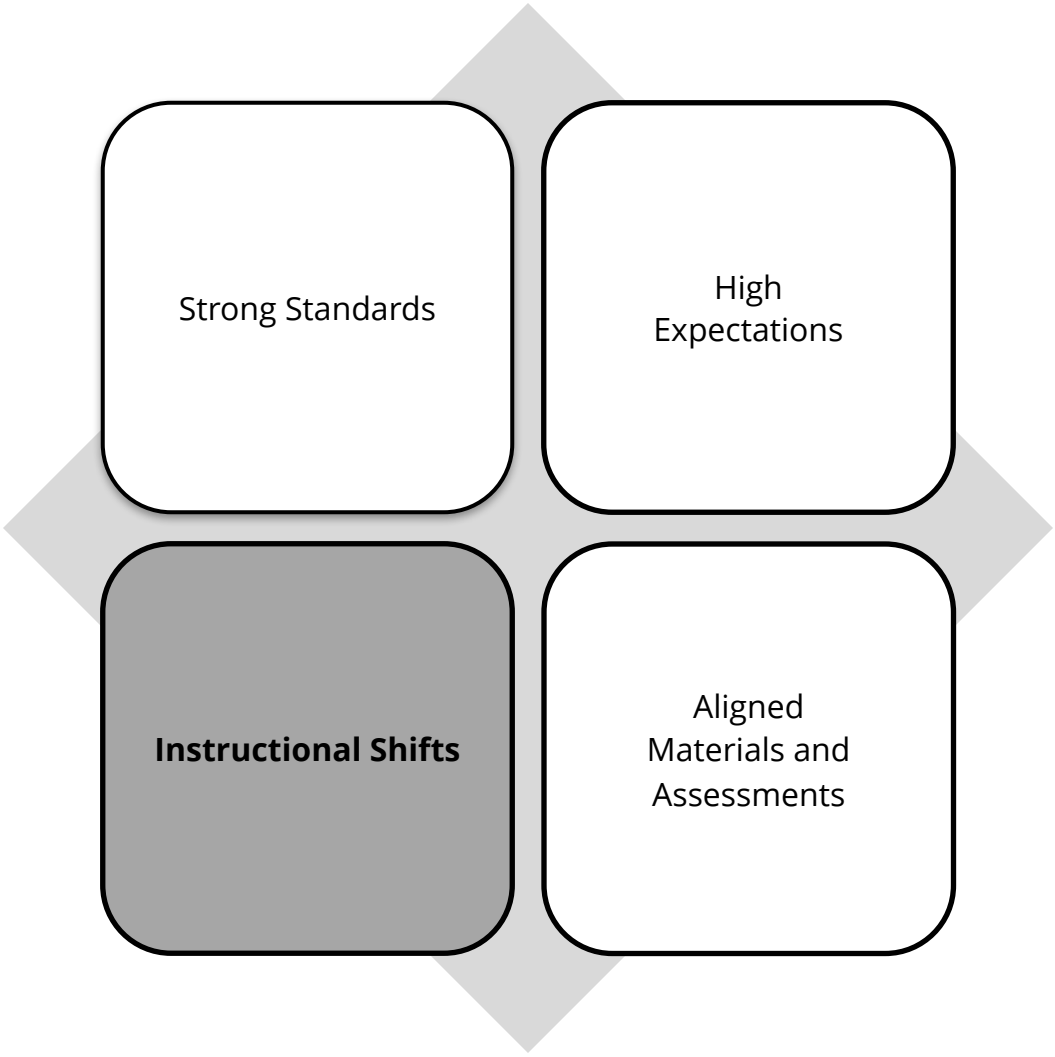
The instructional expectations are an essential component of the standards and provide guidance for how the standards should be taught and implemented.

TN Department of Education

TAB PAGE

Part 3: Instructional Shifts

Module 6: Literacy Skills for Mathematical Proficiency



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Goal

- Develop a better understanding of the Literacy Skills for Mathematical Proficiency.

Strong Standards

Standards are the bricks that should be masterfully laid through quality instruction to ensure that all students reach the expectation of the standards.

High Expectations

We have a continued goal to prepare students to be college and career ready.

Instructional Shifts

The instructional shifts are an essential component of the standards and provide guidance for how the standards should be taught and implemented.

Aligned Materials and Assessments

Educators play a key role in ensuring that our standards, classroom instructional materials, and assessments are aligned.

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Literacy in your Math Classroom

Reflect on ways literacy skills are already present in your mathematics classroom.

Literacy Skills for Math Proficiency

Communication in mathematics requires literacy skills in reading, vocabulary, speaking, listening, and writing.

Literacy Skills for Mathematical Proficiency
1. Use multiple reading strategies.
2. Understand and use correct mathematical vocabulary.
3. Discuss and articulate mathematical ideas.
4. Write mathematical arguments.

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Literacy Skills for Math Proficiency

Categorize the strategies you listed and discussed with your table partners in the chart below.

Reading	
Vocabulary	
Speaking & Listening	
Writing	

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Literacy Skills for Mathematical Proficiency

1. Read and annotate your assigned section from pages 13–14 of the TN Math Standards. Work with your group to present this information to your colleagues.
2. Use the chart below to take notes and highlight the main ideas of each section.

Reading	
Vocabulary	
Speaking & Listening	
Writing	

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Strategies for Incorporating Literacy

Text Features

Highlight key symbols

Color code steps or circle action steps

Place a box around key terms in vocabulary

Let's Try a Problem

Brandon and Allison participate in an annual community 5k. Brandon can run at a rate of 3 miles in 24 minutes. Allison can run at a rate of 1 mile in 9 minutes. Who has the faster rate? Who finished the race first?

Notes:

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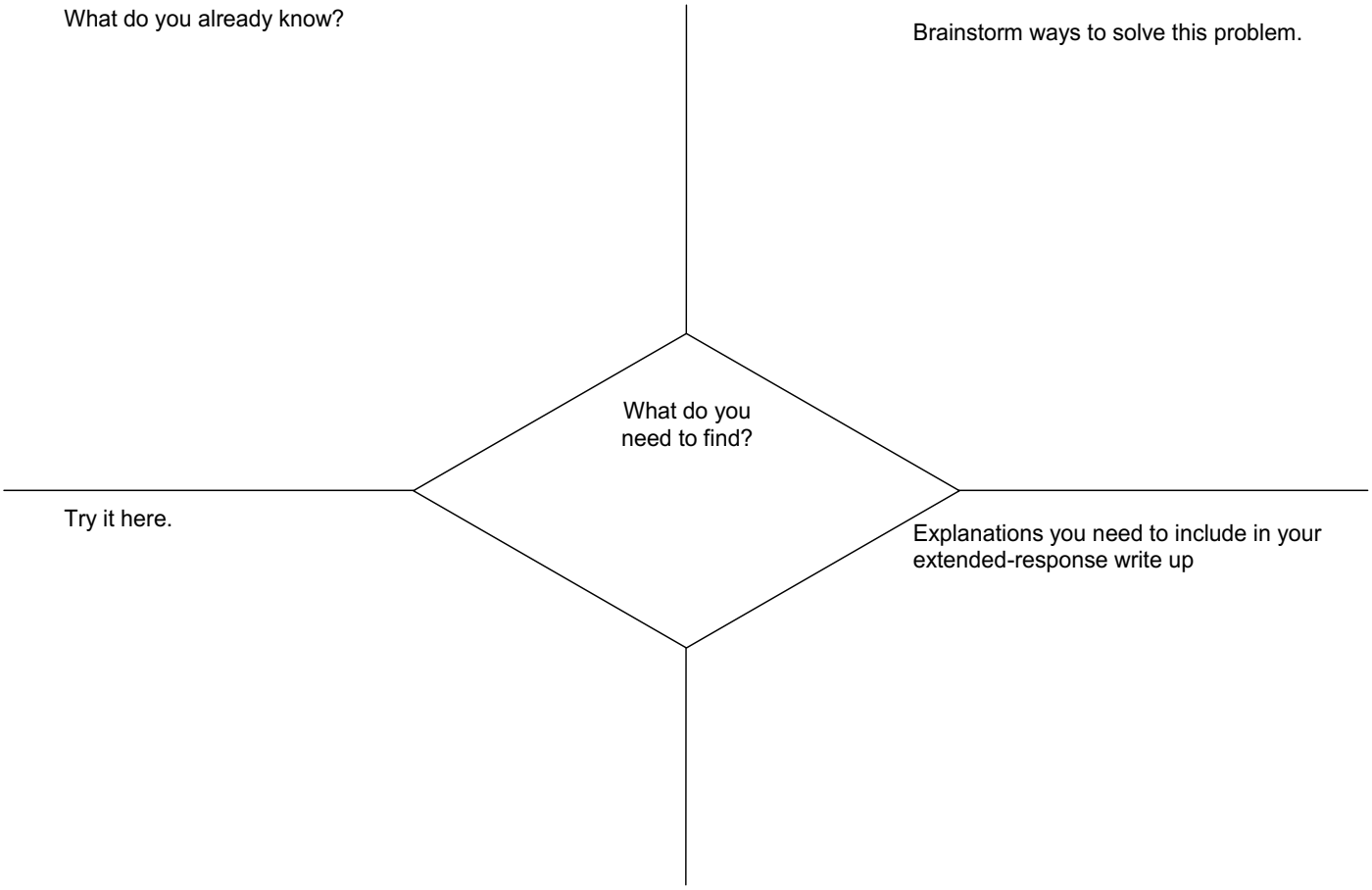
Strategies for Incorporating Literacy

Text Structures

- Graphs
- Tables
- Four Corner's and a Diamond
- Frayer's Model
- Four Square Graphic Organizer
- Semantic Grid Analysis

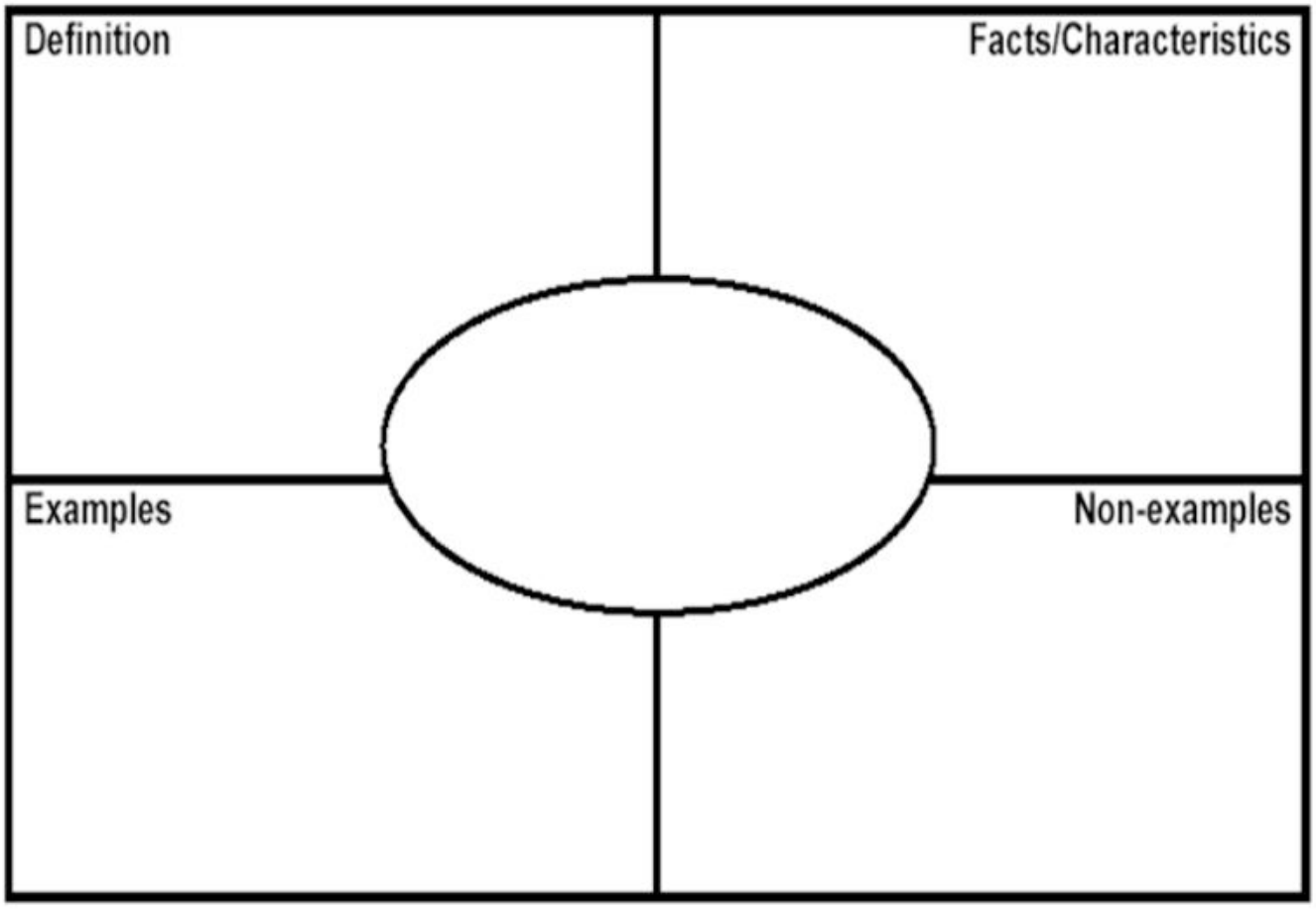
Four-Corners-and-a-Diamond Math Graphic Organizer



Mathematical Vocabulary

- Student achievement is dependent upon students' reading comprehension and content area learning.
- Math vocabulary is decontextualized because they are not in everyday conversations.
- Terms in math can have multiple meanings– i.e. table, origin, and leg.
- Mathematical terms can have specific meanings – i.e. average, reflection.
- Students need to develop a conceptual meaning and read use the words accurately.

Frayer's Model



Module 6 Review

- Literacy skills in the math classroom will support students' understanding of the content standards.
- When students can read, write, and speak about math ideas, connections are made between concepts.

Instructional Shifts

The instructional shifts are an essential component of the standards and provide guidance for how the standards should be taught and implemented.

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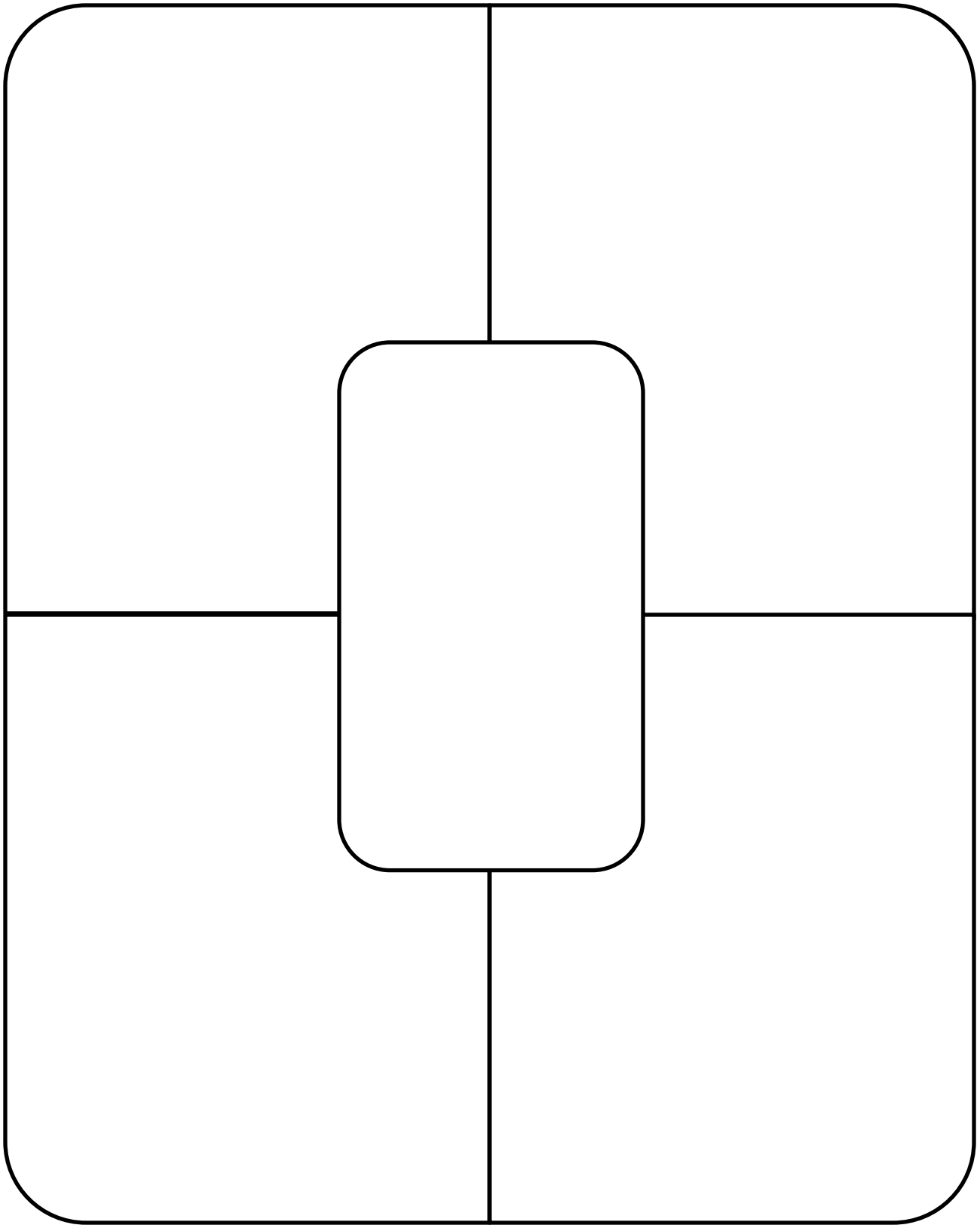
Making Connections



Appointment with Peers

Please meet with your second partner to discuss the following:

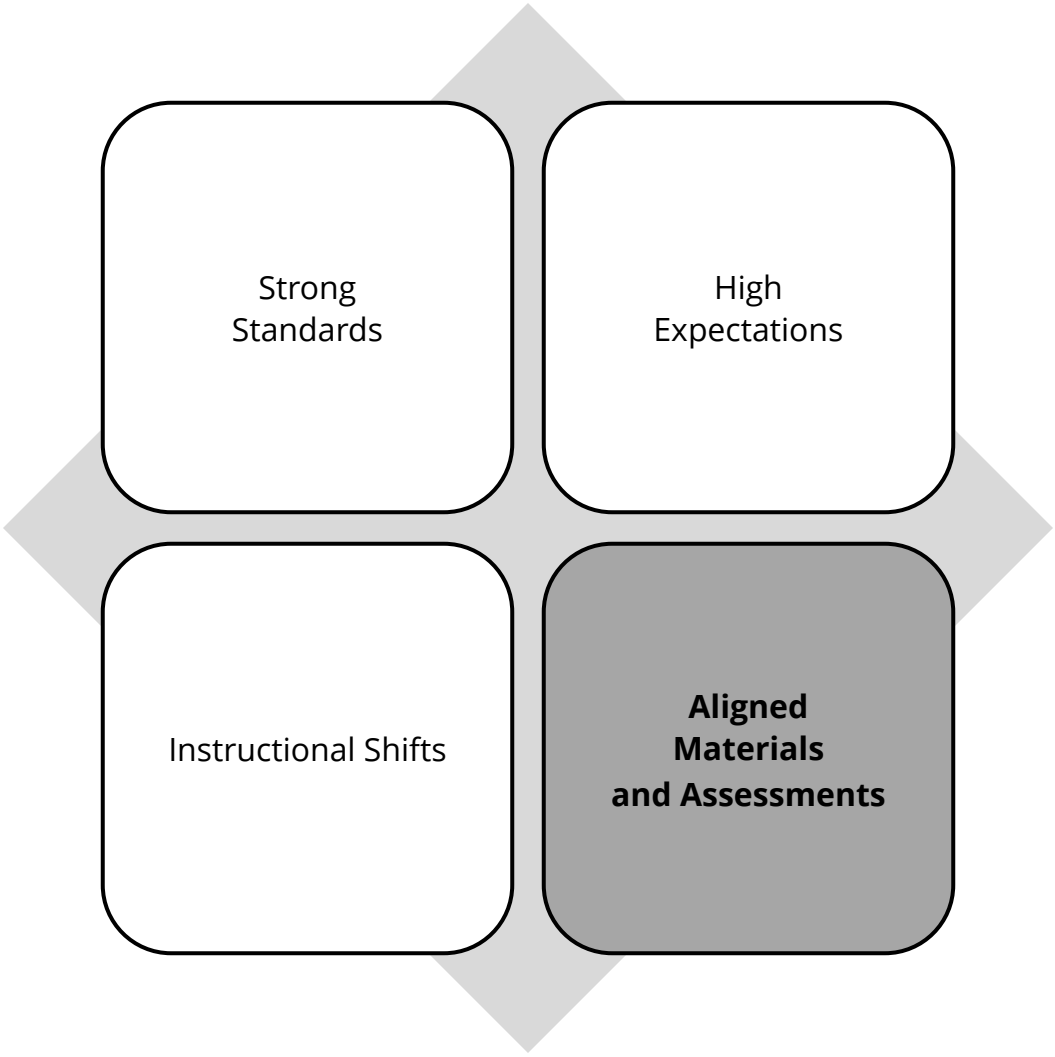
- What are your key takeaways from today?
- How does the align to your observation rubric?

Notes:

TAB PAGE

Part 4: Assessment and Materials

Module 7: Connecting Standards and Assessment



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Goals

- Discuss the role assessment plays in the integrated system of learning.
- Discuss the cycle of assessment.
- Discuss the areas of focus for standards-aligned assessments.
- Review and write mathematics assessment items.

Strong Standards

Standards are the bricks that should be masterfully laid through quality instruction to ensure that all students reach the expectation of the standards.

High Expectations

We have a continued goal to prepare students to be college and career ready.

Instructional Shifts

The instructional shifts are an essential component of the standards and provide guidance for how the standards should be taught and implemented.

Aligned Materials and Assessments

Educators play a key role in ensuring that our standards, classroom instructional materials, and assessments are aligned.

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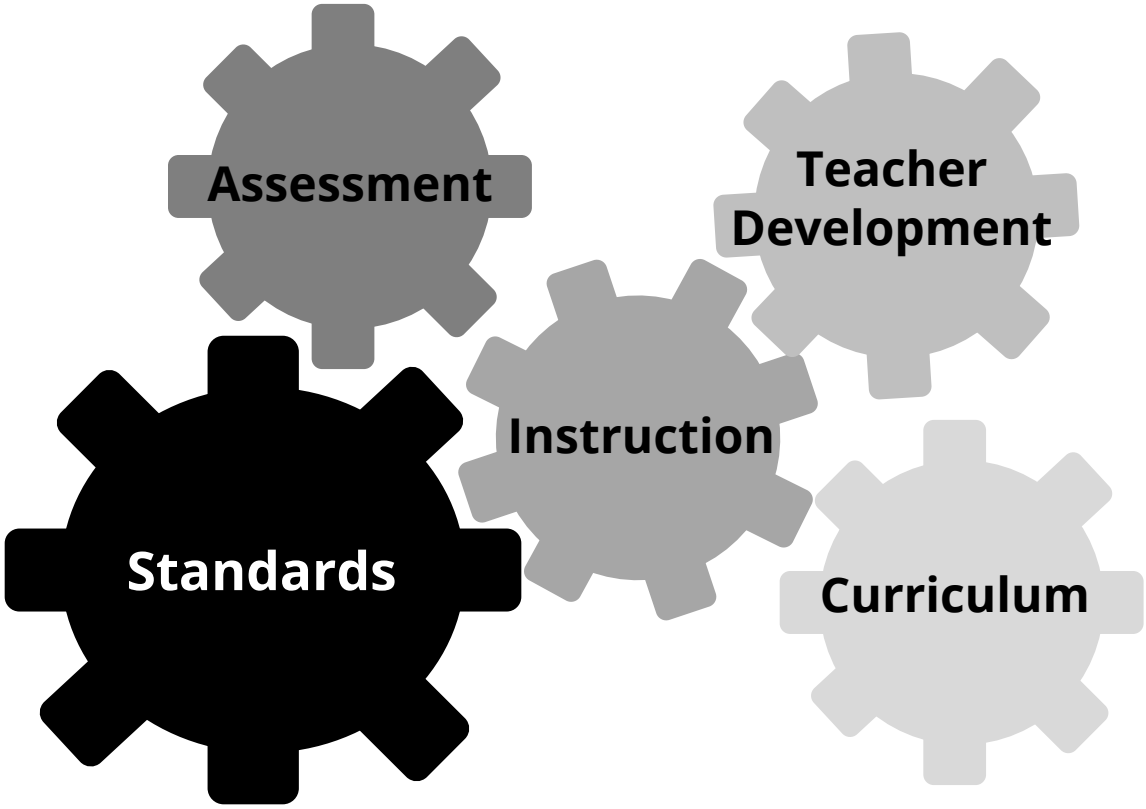
Connecting Standards and Assessment



Assessment is

_____.

Considering this definition of assessment, what are educators "making a judgement about" when assessing students?

Notes:

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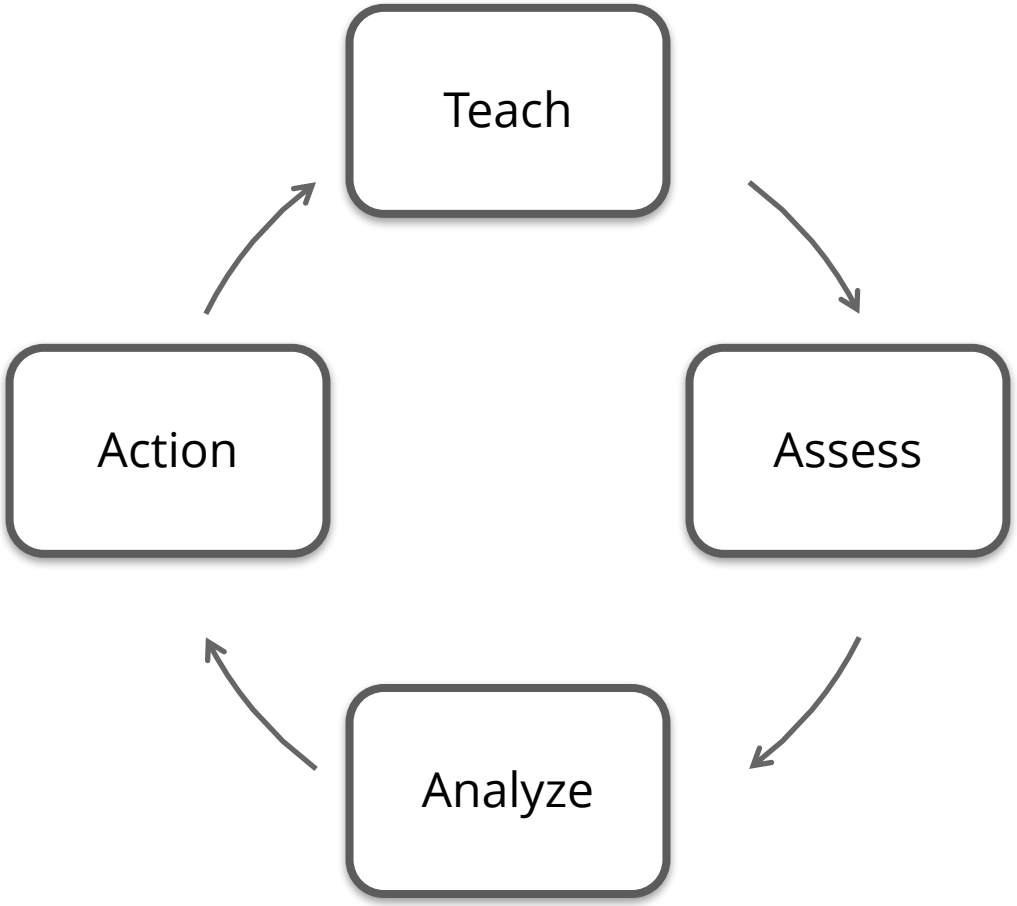
The Cycle of Assessment



"The good news is that research has shown for years that consistently applying principles of assessment for learning has yielded remarkable, if not unprecedented, gains in student achievement, especially for low achievers."

—Black & Wiliam, 1998

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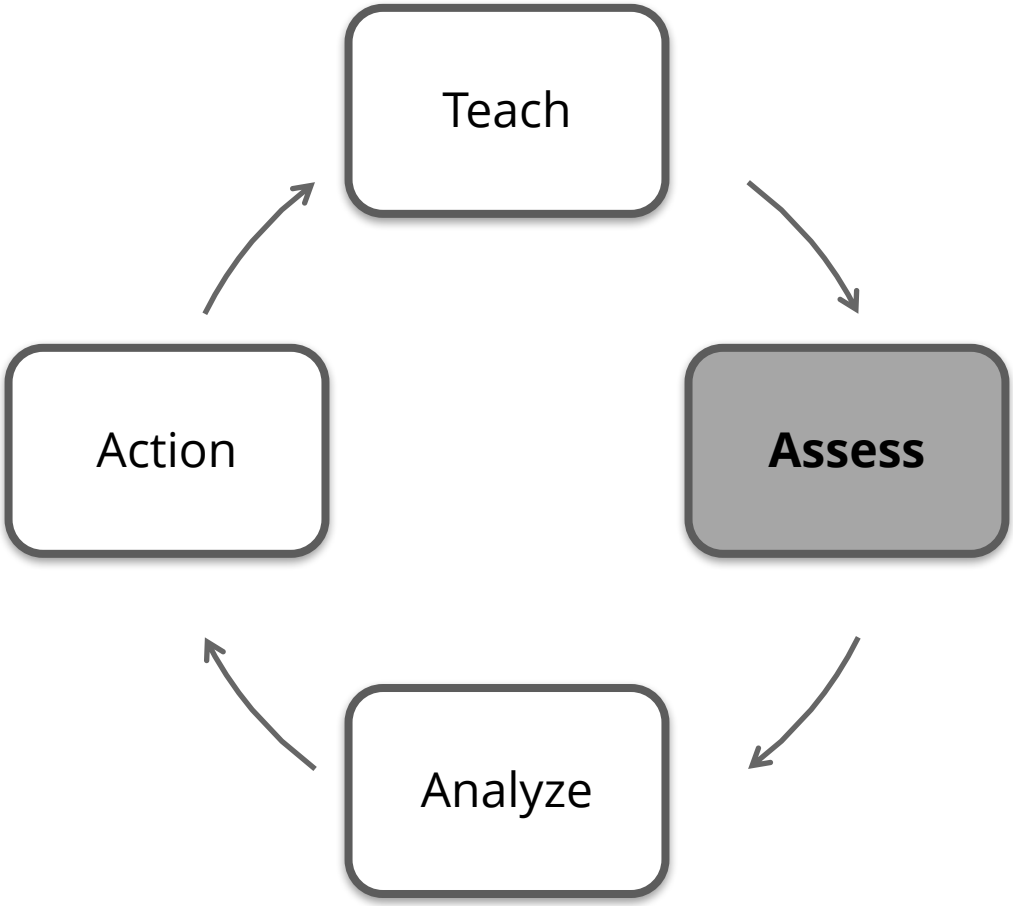
The Cycle of Assessment



Standards Aligned Assessment

Areas of Focus

1. Intent of the Assessment
    - Summative
    - Formative
2. Content and structure of Assessments
3. Analysis of Assessments

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Intent of Assessments

Areas of Focus

1. **Intent of the Assessment**
    - **Summative**
    - **Formative**
2. Content and Structure of Assessments
3. Analysis of Assessments

How are the results used?

Formative	Summative

"Benchmark assessments, either purchased by the district or from commercial vendors or developed locally, are generally meant to measure progress toward state or district content standards and to predict performance on large-scale summative tests. A common misconception is that this level of assessment is automatically formative."

—Stephen and Jan Chappuis 2012

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Intent of Assessments

Areas of Focus

1. Intent of the Assessment
    - Summative
    - Formative
2. **Content and Structure of Assessments**
3. Analysis of Assessments

Things to think about…

Universal Design Principles:

- No barriers
- Accessible for all students
- Upholds the expectations of our state standards

Notes:

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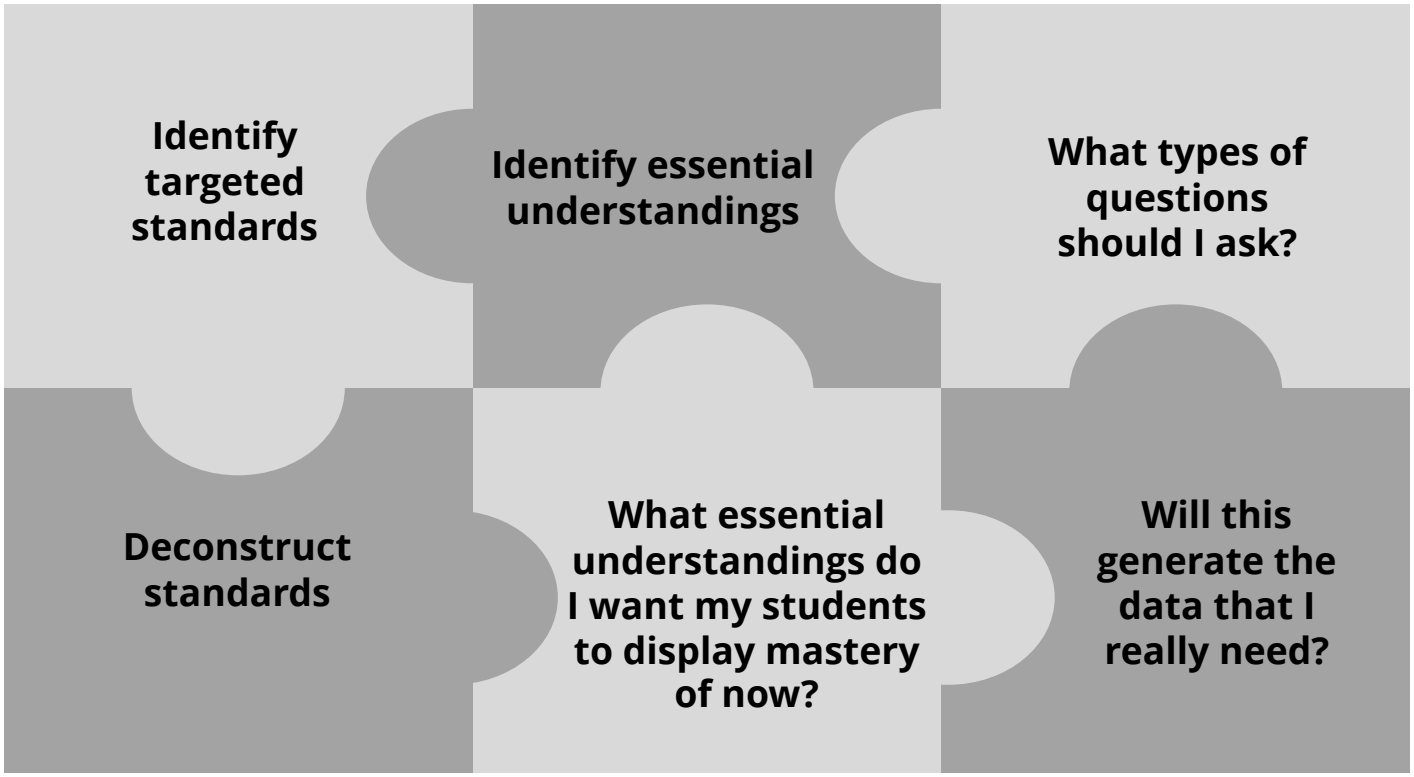
Developing a Classroom Assessment



Notes:

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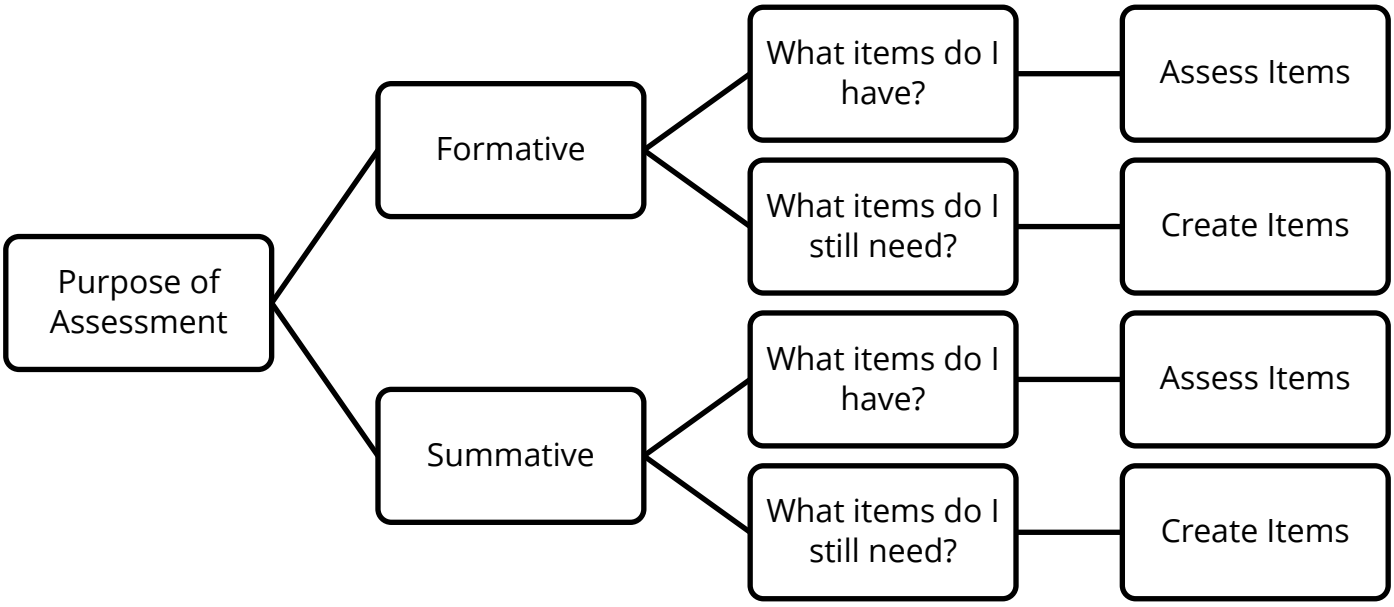
Inventory for a Classroom Assessment



Notes:

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Item Review

Standard:

4.OA.A.3: Solve multi-step contextual problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

Which item is better?

Item 1: Samantha bought stickers.

- She bought 6 packs of stickers.
- Each pack has 12 stickers.
- She got 8 more stickers from a friend.

How many stickers does Samantha have in all?

A. 76
B. 78
C. 80
D. 82

Item 2: Samantha bought stickers.

- She bought 6 packs of stickers.
- Each pack has 12 stickers.
- She got 8 more stickers from a friend.

How many stickers does Samantha have in all?

A. 26
B. 64
C. 72
D. 80

Notes:

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Item Review

Assessment Terminology

Item Type

Selected response	
Open response	
Verbal	
Extended writing	

Item Components

Stimulus	
Stem	
Key	
Distractor	
Rationale	

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Examining Items: Formative vs. Summative

- What is the question actually asking?
- Is the question aligned to the depth of the standard?
- Are the answers precise?
- Is the wording grade appropriate?
- Is the question aligned to the standard?
- Do the distractors give insight into student thinking?
- Is the entire standard assessed?
- Is the question precise?
- Is there a better way to assess the standard?

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Item Assessment Activity

For each of the provided formative assessment items, think about the things we just discussed. Would you include it on a formative assessment when paired with the provided standard?

You will be looking at five items. Decide if you would keep them, revise them in some way, or throw the item out all together. Look first at the items independently. Then you may work with a partner to complete the activity.

Item #1

6.SP.A.2

Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center (mean, median, mode), spread (range), and overall shape.

A student makes a 65, 75, 84, 92, and 74 on his math tests. Match the statistical description on the left with the correct calculation on the top.

	78	**75**	**None**	**27**
Mean				
Median				
Mode				
Range				

Item #2

8.F.A.3

Know and interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.

Which of the following is not a linear function?

A. $3x + 4y = 12$
B. $y = |x|$ for all values where $x > 0$
C. $y = 2x + 3$
D. $y^2 = x$

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Item Assessment Activity

Item #3

7.EE.B.4

Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

Mrs. Jones is buying paper for the copier. The paper costs $64 per box plus 6% sales tax.

Choose the two equations that could be used to represent the total cost C of b boxes of paper.

A. C = 64b + 0.06
B. C = 64b + 6
C. C = 64b(0.06) + 64b
D. C = 64b
E. C = [64 + 64(0.06)]b

Item #4

6.G.A.2

Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Know and apply the formulas *V* = lwh and *V* = *Bh where B is the area of the base* to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.

The bakery sells biscuits to a restaurant in a rectangular prism-shaped box. Each biscuit has a diameter of 1 ½ inches. One layer of the box is 8 biscuits by 12 biscuits. The box holds 4 layers of biscuits. Each biscuit is ¾ in tall. What is the volume, in inches, of the box?

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Item Assessment Activity

Item #5

8.G.B.6

Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

What is the distance between (3,6) and (-1,2) ?

A. $2\sqrt{5}$
B. $4\sqrt{2}$
C. 32
D. $2\sqrt{2}$

Share 1 or 2 “ah-ha” moments from this activity with your neighbor.

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Creating Formative Items

Before you actually start writing items:

- Think about the purpose of the assessment as a whole. Is it formative or summative?
- Read the standards carefully with the assessment purpose in mind. Ask yourself: "What skills/knowledge are the standards asking the student to display?"
- Revisit the "I can" statements or "Essential Questions" you wrote for the standard(s). They may provide guidance as you write items.
- Brainstorm

Revisiting Standard 6.RP.A.3

6.RP.A.3

Use ratio and rate reasoning to solve real-world and mathematical problems (e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations).

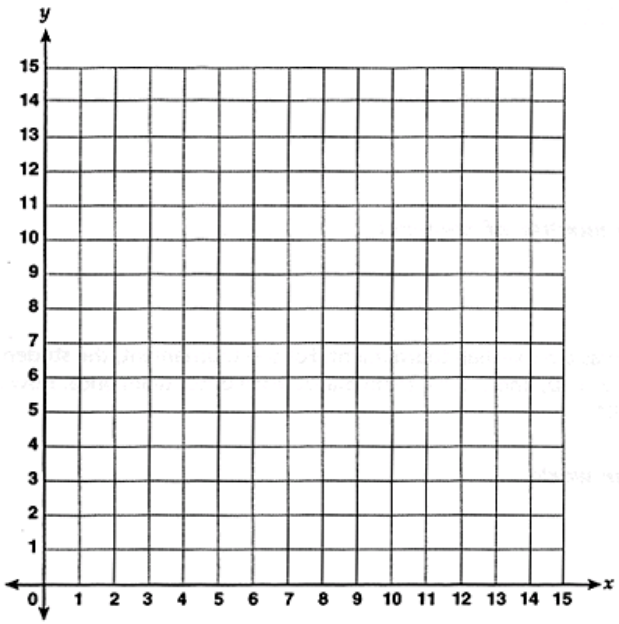
a. Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.

FORMATIVE Assessment

Item #1

Graph the following points in the provided coordinate plane:

A (2,5)
B (0,3)
C (4,0)
D (9,8)
E (0,0)



Revisiting Standard 6.RP.A.3

Item #2

Julie is making punch for a party. Her mom gives her the following table to show how much apple juice to mix with lemon lime soda.

Apple Juice (in gallons)	Lemon Lime Soda (in liters)
1	2
4	8

Select all of the ordered pairs that would have punch tasting the same as the recipe.

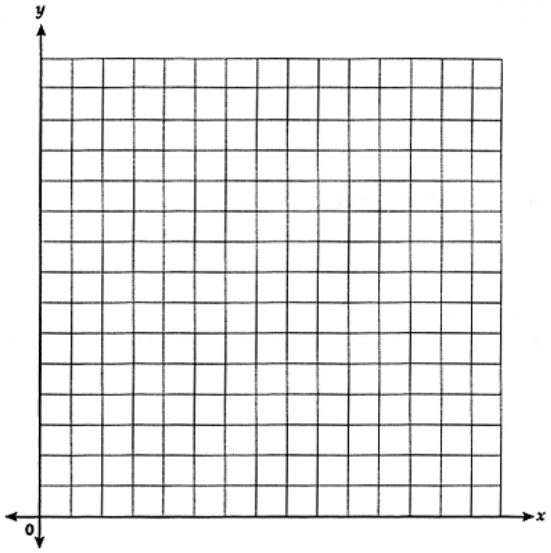
A . (2,4) C. (4,2) E. (3,9)

B. (2,3) D. (3,6) F. (7,14)

Item #3

The following table shows how long it took Timmy's Dad to drive different distances. Graph them as ordered pairs on the provided coordinate grid.

Distance (in miles)	Time (in hours)
30	1
60	2
120	?
?	6



Did we cover all aspects of the standard with these items?

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Review

- Formative Assessments *may* need items that scaffold in order for the teacher to diagnose what a student does/does not understand.
- Effectively writing "I can" or "essential questions" helps target assessment items specifically to standards.
- It is very difficult to formatively assess student understanding through a single item.
- Don't forget the principles of universal design.
- It's important to ask yourself the nine essential questions during item review or item writing.

Item Writing-Your Turn

- You will be provided a set of standards.
- You and a partner will be writing items to post for our gallery walk.
  - On selected response items you do not have to post the rationale for the distractors.
  - Please post the coding for the standard(s) to which your items are written.

Selected Response

Multiple Choice	Multiple Select

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Item Writing: Your Turn

Use this space to write out your standard(s) and assessment item(s).

Option 1	Option 2
1. Choose three of the standards. 2. Write an item to assess each standard that you would use on a formative assessment. 3. Try to write at least one multiple choice or multiple select item. Focus on writing distractors that provide instructional information.	1. Choose one standard. 2. Write three formative assessment items to the single standard that you selected. Make sure that each item requires students to demonstrate a different level of understanding of the standard. 3. Try to write at least one multiple choice or multiple select item. Focus on writing distractors that provide instructional information.

Gallery Walk

As you review your colleagues' items, look for similarities and differences in the items created.

Reflection

Reflect on your experience evaluating and creating assessment items and discuss:

- What was challenging about this experience?
- What did you learn from this experience?
- What supports do you need to better understand the relationship between standards and assessments in this way?

Notes:

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Analyzing Assessments

Areas of Focus

1. Intent of the Assessment
    - Summative
    - Formative
2. Content and Structure of Assessments
3. **Analysis of Assessments**

Analysis of Assessment

- Is the data _____ ?
- How is it analyzed?
- On which questions _____ ? Why?
- On which questions _____ ? Why?
- Were there issues with…

  _____

  _____

  _____ ?

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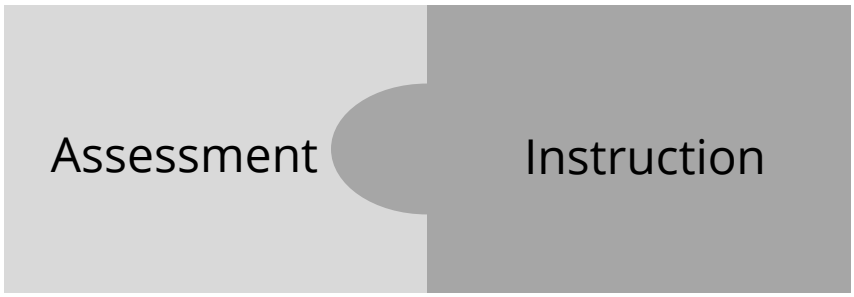
Taking Action



- How is instruction changing/adapting as a result of student data?
- Are results shared with all stakeholders (including students)?
- Are assessments adapted to address weaknesses found?

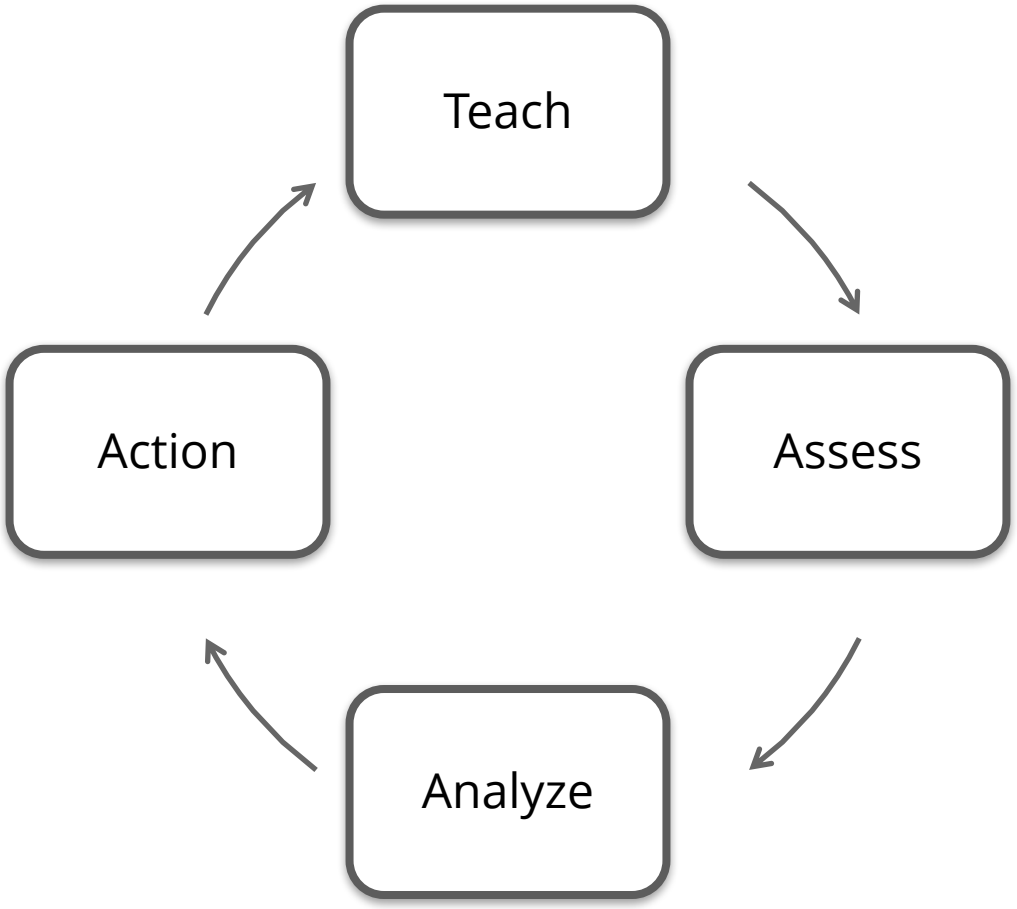
"The assessments will produce no formative benefit if teachers administer them, report the results, and then continue with instruction as previously planned."

—Stephen and Jan Chappuis, 2012

Notes:

Summary

The Cycle of Assessment



Aligned Materials and Assessments

Educators play a key role in ensuring that our standards, classroom instructional materials, and assessments are aligned.

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Appointment with Peers

Please meet with your third partner to discuss:

- What are your takeaways from module 7?
- How does this align to your evaluation rubric?

Notes:

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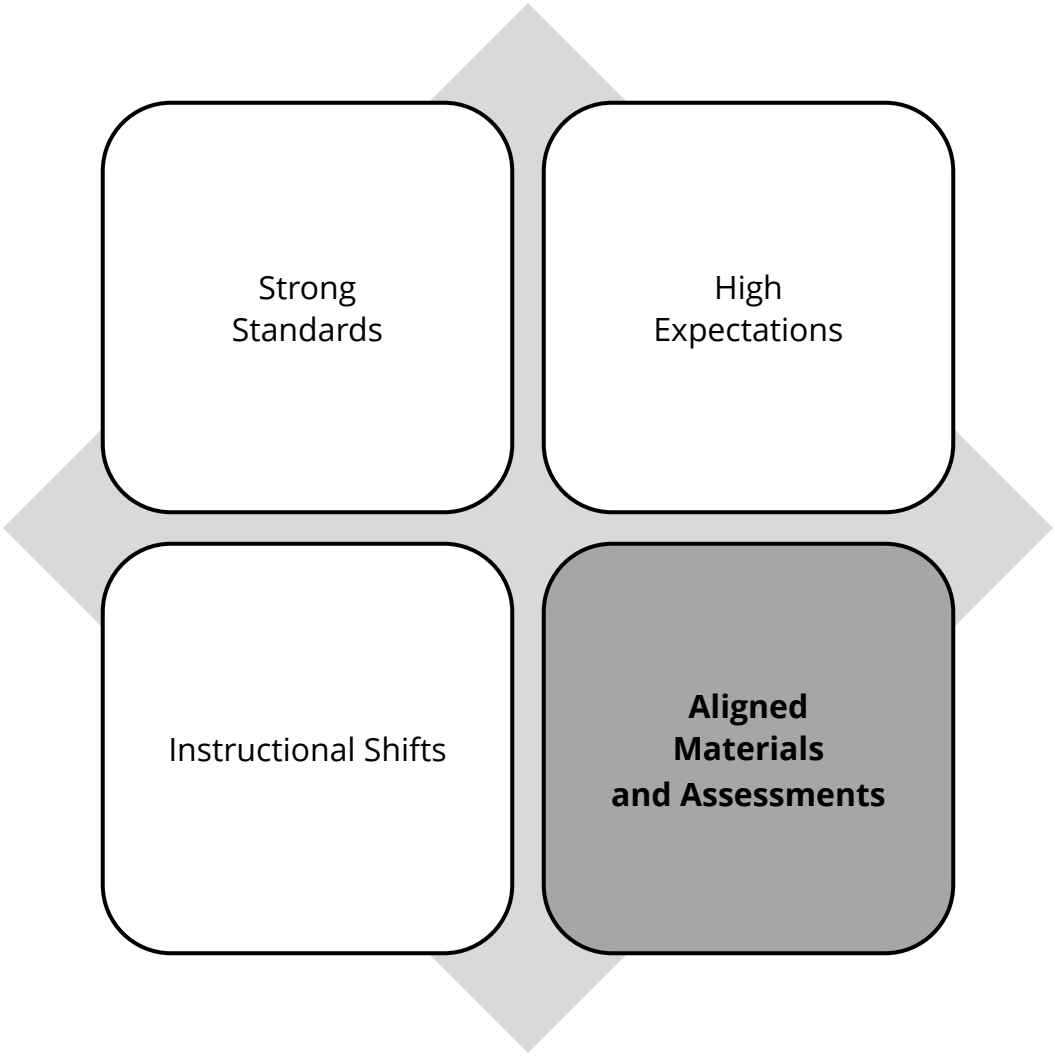
TAB PAGE

Part 4: Assessment and Materials

Module 8: Evaluating Instructional Materials



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Key Question

How do we know that our instructional materials address the depth of the content and the instructional shifts of focus, coherence, and rigor of the TN State Standards?

Goals

- Examine the TEAM rubric to define what is meant by standards based materials.
- Know which key criteria to use for reviewing materials, lessons, and/or units for alignment and quality.

Strong Standards

Standards are the bricks that should be masterfully laid through quality instruction to ensure that all students reach the expectation of the standards.

High Expectations

We have a continued goal to prepare students to be college and career ready.

Instructional Shifts

The instructional shifts are an essential component of the standards and provide guidance for how the standards should be taught and implemented.

Aligned Materials and Assessments

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Standards Based Materials and Practice

"...teachers have a responsibility to make day-to-day instructional choices that ensure that students work with problems that engage their interest and their intellect."

—Cathy L. Seeley, 2014

Reflect on Our Practice

When your students' work is on public display, in the hallway or shared with families, can anyone see the math?

Are the materials and the instructional practices you are using focused on the mathematics?

If anyone looked at your students' work, would they be able to see the math or would they be left asking "**where's the math?**"

Notes:

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Standards Based Materials and Practice

TEAM Connection
Activities & Materials

- Support the lesson objective
- Are challenging
- Sustain students' attention
- Elicit a variety of thinking
- Provide time for reflection
- Provide opportunities for student-to-student interaction
- Provide students with choices
- Incorporate technology
- Induce curiosity & suspense
- In addition sometimes activities are game-like, involve simulations, require creating products, and demand self-direction and self-monitoring.
- The preponderance of activities demand complex thinking and analysis
- Texts & task are appropriately complex

TEAM Connection
Problem Solving

- Abstraction
- Categorization
- Predicting Outcomes
- Improving Solutions
- Generating Ideas
- Creating & Designing
- Observing & Experimenting
- Drawing Conclusions/Justifying Solutions
- Identify Relevant/Irrelevant Information

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Standards Based Materials and Practice

Effective Mathematics Teaching Practices

1. Establish mathematics goals to focus learning.
2. Implement tasks that promote reasoning and problem solving.
3. Use and connect mathematical representations.
4. Facilitate meaningful mathematical discourse.
5. Pose purposeful questions.
6. Build procedural fluency from conceptual understanding.
7. Support productive struggle in learning mathematics.
8. Elicit and use evidence of student thinking.

Notes:

Missing Angle Activity

- What content standard do you think these activities address?
- Where is the evidence of student understanding of the mathematical content?

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Standards Based Materials and Practice

Missing Angle Activity

If a teacher was trying to address the depth of the **content standard 8.G.A.3 ,** does the Missing Angle Activity accomplish this goal?

8.G.A.3. Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.

Notes:

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Criteria for Alignment and Quality

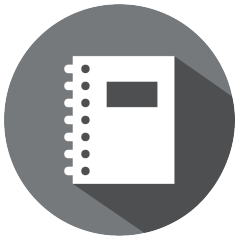
Research

"A curriculum is more than a collection of activities."

—from the Curriculum Principle in *Principles and Standards for School Mathematics*

A **well-articulated curriculum** will:

- Make clear the most important mathematics of the grade level.
- Specify when concepts and skills are introduced and when they should be mastered.
- Detail how student conceptual understanding of big ideas develops across units and across multiple grade levels.



When choosing instructional materials, what should a teacher consider?

Notes:

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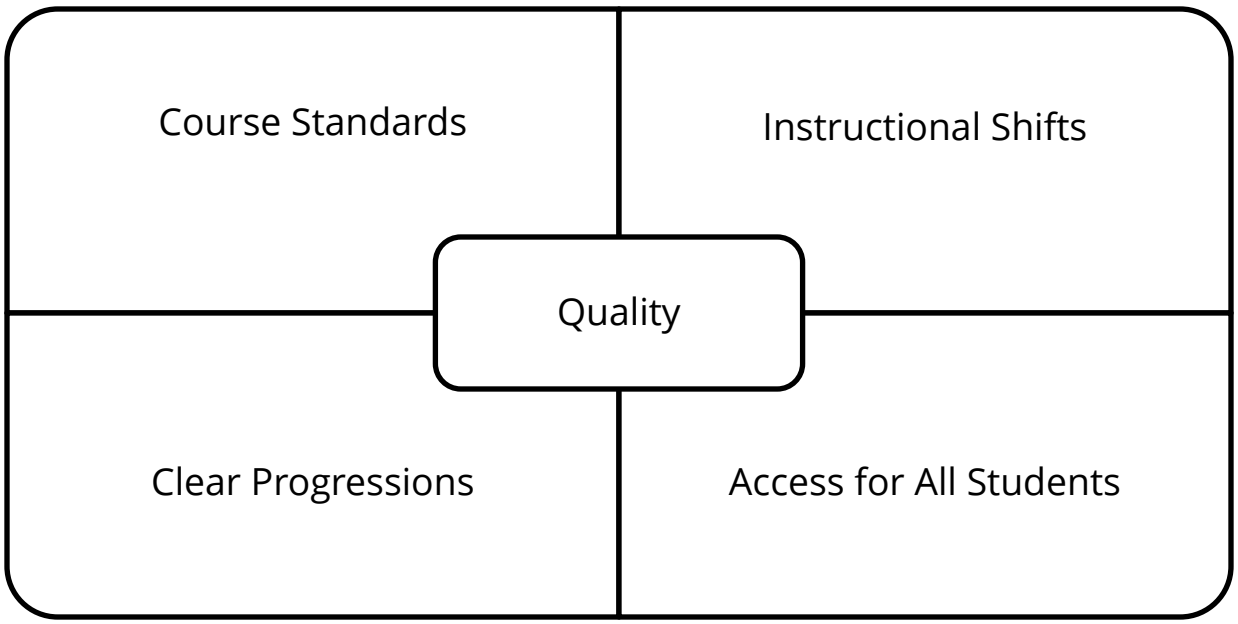
Criteria for Alignment and Quality



Materials Review Instrument

When reviewing materials, it is important to have a deep understanding of the standards and a deep understanding of the screening instrument before looking at the materials.

- Section I: Non-Negotiable Alignment Criteria
  - Part A: Standards
  - Part B: Shifts
    - Focus
    - Rigor
    - Coherence
- Section II: Additional Alignment Criteria and Indicators of Quality
  - Part A: Key areas of focus
  - Part B: Student engagement & instructional focus
  - Part C: Monitoring student progress

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Math Materials Review Instrument

SECTION I: NON-NEGOTIABLE ALIGNMENT CRITERIA		SECTION II: ADDITIONAL ALIGNMENT CRITERIA AND INDICATORS OF QUALITY		
Part A. Course Standards	Part B. Shifts in Instruction	Part A. Key Areas of Focus	Part B. Student Engagement and Instructional Supports	Part C. Monitoring Student Progress
Yes: Move to Part B No: Do not use or modify	Yes: Move to Section II No: Do not use or modify	Yes: Move to Section II:B No: Do not use or modify	Yes: Move to Section II:C No: Do not use or modify	Yes: Use materials No: Do not use or modify
The instructional materials represent 100 percent alignment with the Tennessee Math Standards and explicitly focus teaching and learning on the course standards at the rigor necessary for students to reach mastery.	1. Focus 2. Coherence 3. Rigor	Learning experiences provide opportunities for thought, discourse, and practice in an interconnected and social context. Units and instructional sequences are coherent and organized in a logical manner that builds upon knowledge and skills learned in prior grade levels or earlier in the grade. Materials support student communication within an ELA focus by providing consistent opportunities for students to utilize literacy skills for proficiency in reading, writing, vocabulary, speaking, and listening.	Material provides learning experiences that incorporate the course standards, Standards for Mathematical Practice, and Literacy Skills for Mathematical Proficiency. Material engages students through real-world, relevant, thought-provoking questions, problems, and tasks that stimulate interest and elicit critical thinking and problem solving. Material integrates appropriate supports for students who are ELL, have disabilities, or perform below grade level. Material includes differentiated materials that provide support for students approaching mastery as well as extensions for students already meeting mastery or with high interest.	Assessments provide data on the content standards. Material assesses student mastery using methods that are unbiased and accessible to all students. Material includes aligned rubrics or scoring guidelines that provide sufficient guidance for interpreting student performance. Material uses varied modes of curriculum embedded assessments that may include pre-, formative, summative, and self-assessment measures. Assessments are embedded throughout instructional materials as tools for students' learning and teachers' monitoring of instruction. Assessments provide teachers with a range of data to inform instruction.

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Evaluating Instructional Materials: Best Practices

- It's important to review instructional materials you use to determine where you have strong alignment to standards and where you may have gaps to fill.
- School leaders and teachers should engage in reviewing instructional materials on an ongoing basis to develop pedagogy and capacity.

Teachers need to review materials when:

- There is a new adoption.
- Current materials have gaps that may require supplemental materials.
- They are looking for supplemental instructional materials.

Notes:

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Supplemental Materials

Let's Discuss:

- What resources do you have on hand?
- Where do you find supplemental materials?
- How can you use this process to evaluate supplemental materials?

Reviewing Materials: A Recap

As you look for materials...

- Is it aligned to the standards?
- Does it reflect high leverage best practices?
- Is it accessible for ALL students?
- Does it lead to students being able to demonstrate mastery of the standard?

Notes:

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Potential Gaps in Materials

Grades 6-8:

- Shifted Compound Probability standard
    - Moved from seventh to eighth grade
- Revised Geometry standards
    - Removed from seventh grade: slice of 3-dimensional objects
    - Removed from eighth grade: congruency and similarity of 2-dimensional objects

Grades 9-12:

- Shifted a number of standards from Algebra II and Integrated Math III to the Additional Math Courses

Notes:

Module 8 Review

The review process of instructional materials will:

- Deepen understanding of the standards,
- Make use of review instruments to analyze materials to determine alignment or gaps, and
- Result in wise decisions about how best to use the materials already on-site to teach the new standards to mastery OR effectively fill any gaps uncovered in the review process.

Aligned Materials and Assessments

Educators play a key role in ensuring that our standards, classroom instructional materials, and assessments are aligned.

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Appointment with Peers

Please meet with your fourth partner to discuss:

- How can the materials review instrument lead to improved student outcomes in your classroom?

Notes:

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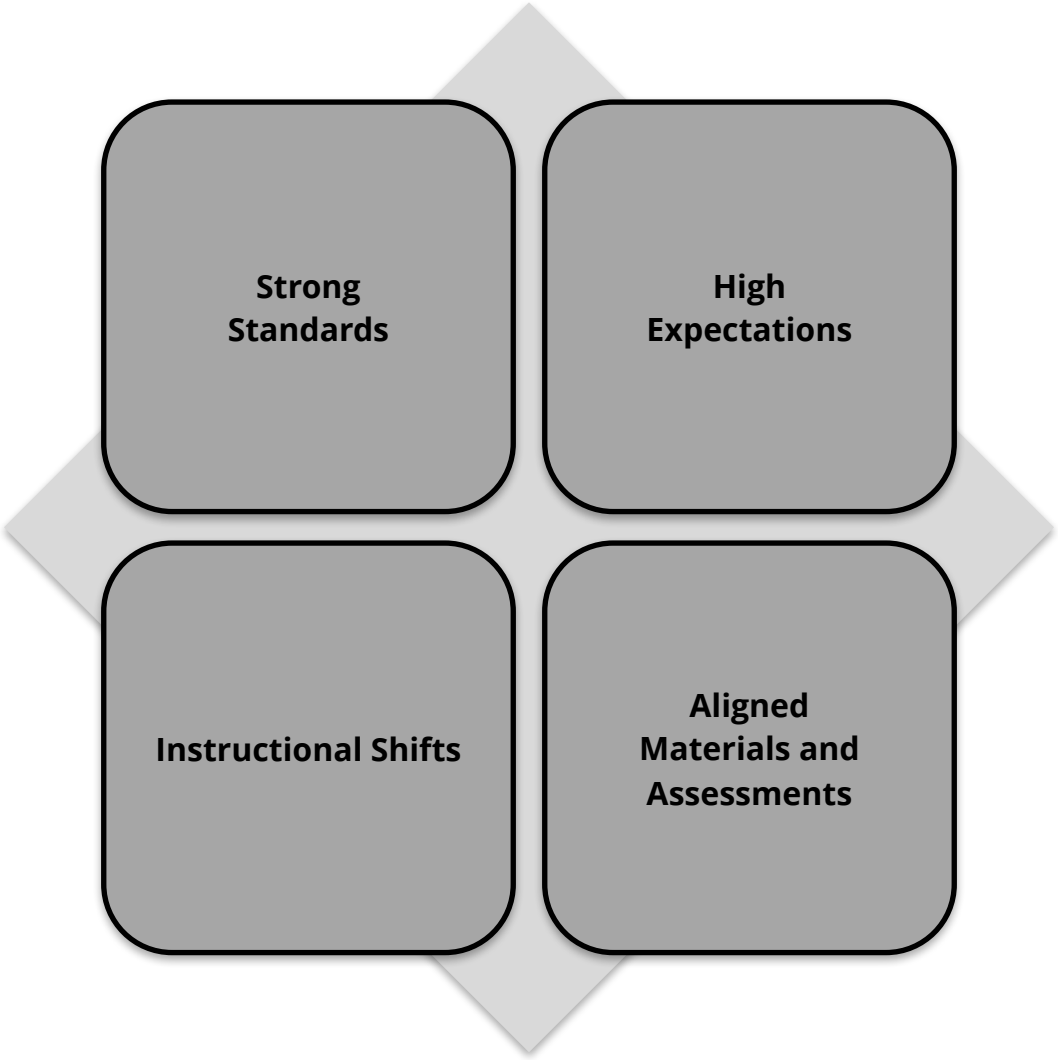
TAB PAGE

Part 5: Putting It All Together

Module 9: Instructional Planning



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Goals

- Understand intentional instruction as a bridge between strong standards and assessment.
- Develop lesson planning techniques to strengthen the understanding of the relationship between standards and practice.
- Create lessons based on the revised standards to be used for instruction.

Strong Standards

Standards are the bricks that should be masterfully laid through quality instruction to ensure that all students reach the expectation of the standards.

High Expectations

We have a continued goal to prepare students to be college and career ready.

Instructional Shifts

The instructional shifts are an essential component of the standards and provide guidance for how the standards should be taught and implemented.

Aligned Materials and Assessments

Educators play a key role in ensuring that our standards, classroom instructional materials, and assessments are aligned.

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Designing Effective Learning Experiences

"...teachers have a responsibility to make day-to-day instructional choices that ensure that students work with problems that engage their interest and their intellect."

—Cathy L. Seeley, 2014

Notes:

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What is Intentional Instruction?

What does “intentional” mean?

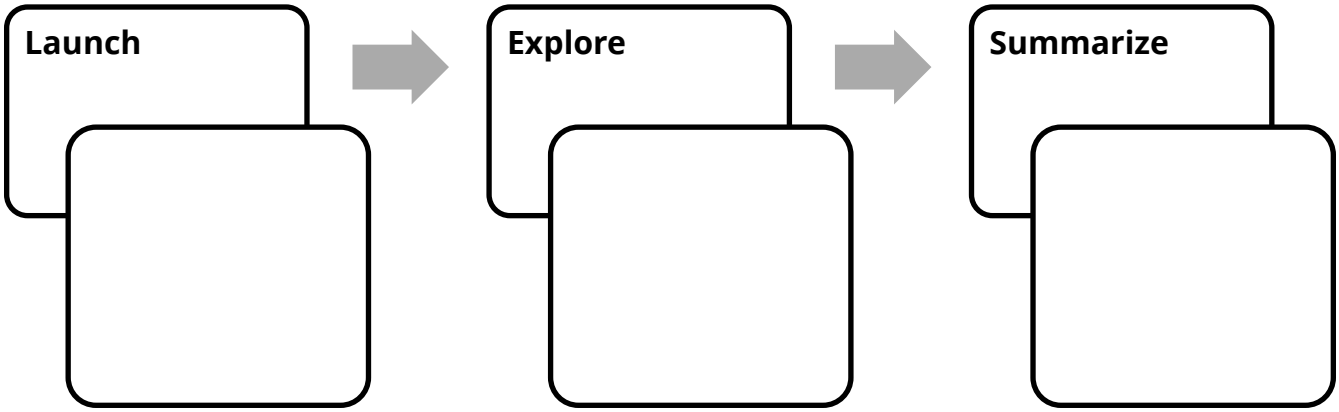
Keep standards in mind – what standards are driving your instruction?

Keep assessment in mind – what are your end goals? What do students need to…

Know,

Understand, and

Do to meet these standards?



Notes:

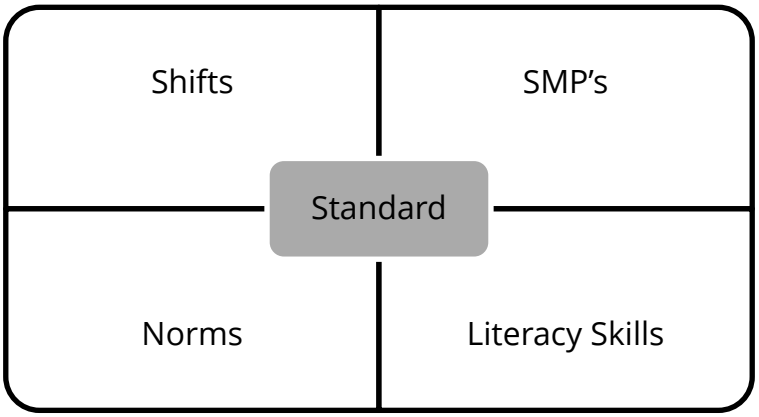
Putting it all Together

- Review standard, determine KUD
- Evaluate instructional materials
- Utilize Launch, Explore, and Summarize model
- Assess learning

Step 1: Review the Standards

Review the revision of standard

- Is the standard the same or has it been revised?
- Has the learning changed?
- How do the SMP's, literacy skills, and instructional shifts apply?
- What do students need to know, understand, and do?



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Step 2: Evaluate Instructional Materials

- Use the Materials Review Instrument.
- Evaluate textbook and supplemental materials for alignment.

Step 3: Create Learning Experiences

- Plan with the end in mind
- What will the teacher be doing?
- What will the students be doing?
- What will the classroom look and sound like?
- What literacy skills and mathematical practices will be incorporated?

Step 4: Assessment

- How will you know they have learned the concepts?
- Can you challenge their thinking during an assessment?
- How do you provide intervention for a specific student after instruction?

Graphic Organizers on Next Page

Notes:

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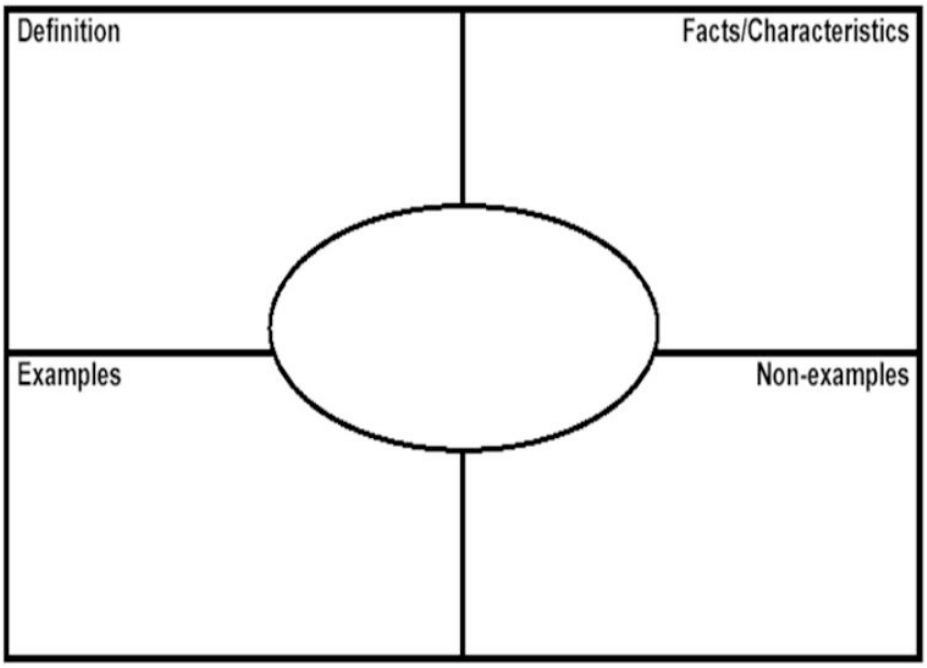
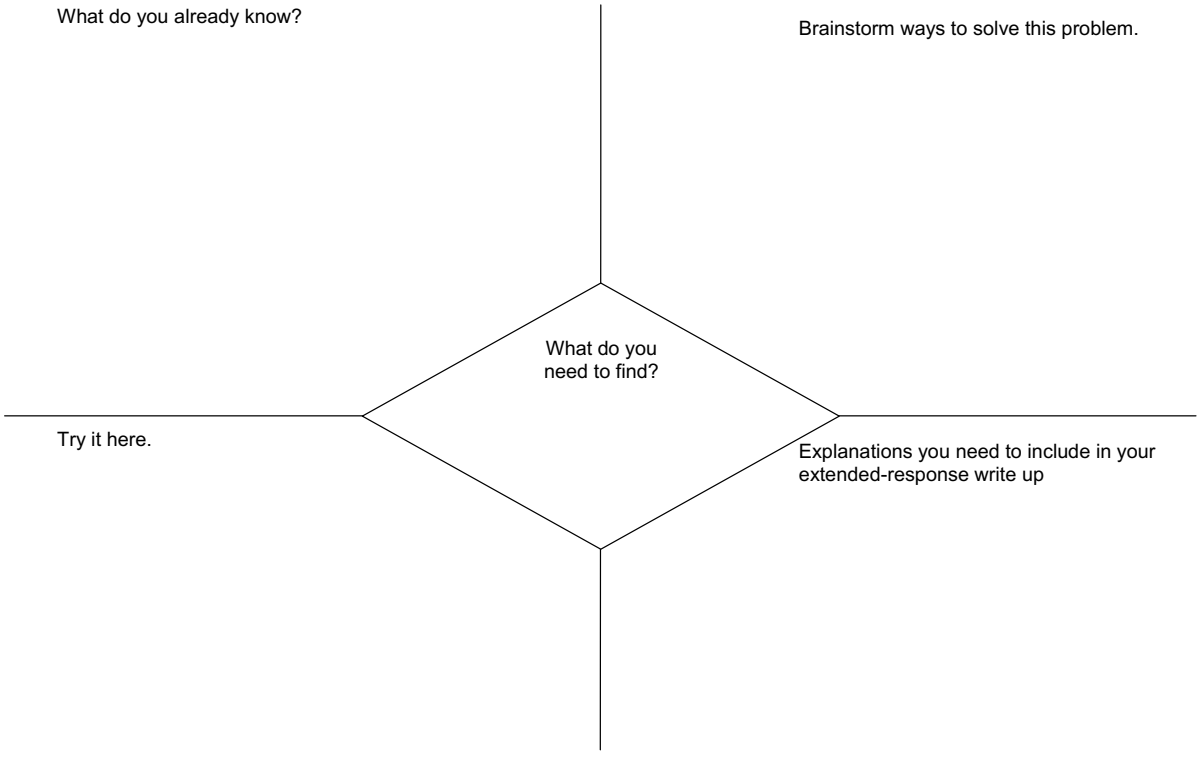
Frayer's Model



Four Corners

Four-Corners-and-a-Diamond Math Graphic Organizer



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Designing Effective Learning Experiences
Putting It All Together

Now it's your turn! Use this space for your small group planning.

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Designing Effective Learning Experiences
Putting It All Together

Now it's your turn! Use this space for your small group planning.

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Module 9 Review

- There are many ways to “do” intentional instruction.
- Intentional instruction is the bridge between standards and assessment.
- Start with the standard: determine what students need to know, understand, and do.
- Create learning experiences that connect to students’ experiences and give them a chance to explore the concept.
- Assessment plays a critical role in instruction, should be standards based, and should be used to determine student mastery of the standard(s).

Strong Standards

Standards are the bricks that should be masterfully laid through quality instruction to ensure that all students reach the expectation of the standards.

High Expectations

We have a continued goal to prepare students to be college and career ready.

Shifts in Instructional Practice

The instructional shifts are an essential component of the standards and provide guidance for how the standards should be taught and implemented.

Aligned Materials and Assessment

Educators play a key role in ensuring that our standards, classroom instructional materials, and assessments are aligned.

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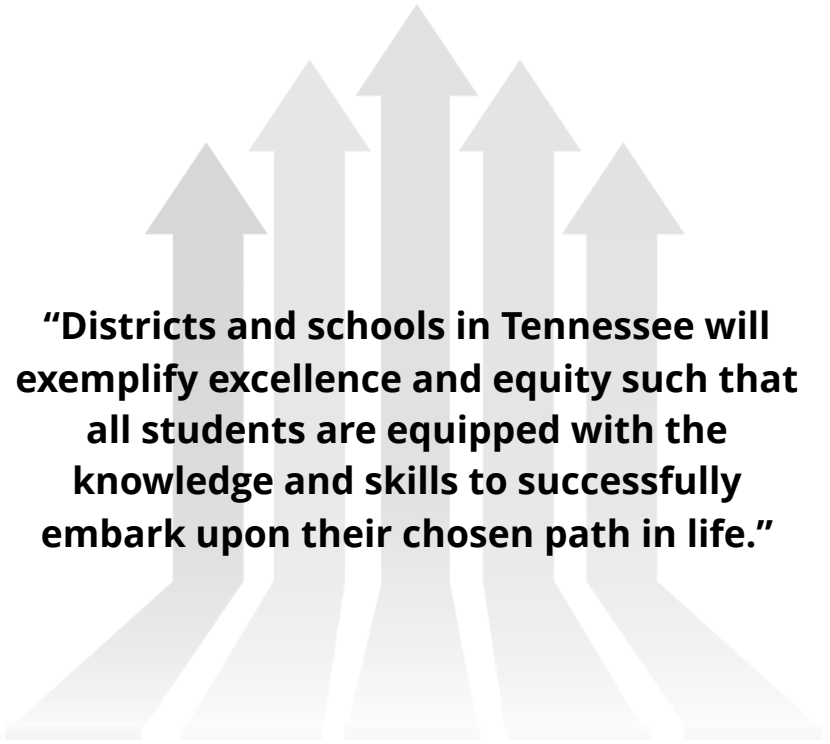

“Districts and schools in Tennessee will exemplify excellence and equity such that all students are equipped with the knowledge and skills to successfully embark upon their chosen path in life.”

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