Click-On TEKS

A simple approach to understanding the Texas Essential Knowledge and Skills

GRADE 7 MATH

REGION 13
EDUCATION SERVICE CENTER

These explanations of the new state math standards are designed to help you understand what the standards mean and how the models of teaching math help students understand mathematics more deeply. Others may interpret the standards differently and may have different ideas for how to teach them. It is the hope of the authors that this deconstruction of the Texas Essential Knowledge and Skills (TEKS) for mathematics makes teaching math more rigorous, more fun, and a little less confusing.

The goal of this document is to be responsive to the updated information about the new Mathematics TEKS. Specificity and/or activities may be adjusted over time as more information becomes available from the state.

To navigate this document, simply go to the Table of Contents and click on the TEKS you want to view.

Strand 1: Mathematical Process Standards	
7.1	Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:

To return to the Table of Contents at any time, click the **Back to TOC** button at the bottom of every page.

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Structure of the TEKS

The Texas Essential Knowledge and Skills (TEKS) consists of four parts.

Part 1: The Introduction

The state standards, or TEKS, for each grade level begin with an Introduction. The Introduction gives an overview of the focal areas for each grade and provides general information about numerical fluency and the processing skills. While the Introduction has not been reprinted in this product, information from the Introduction has been included in the explanations of the TEKS where appropriate.

Part 2: Strands

The standards are broken into groups or categories called Strands. The TEKS for secondary mathematics are divided into six strands:

1. Mathematical Process Standards: This strand contains the process standards for mathematics, which are the same from Kindergarten through Pre-Cal. The process standards are the ways that students acquire math content through the use of models and tools, communication, problem solving, reasoning and analysis, and making connections. These standards should be woven consistently throughout the content strands (2–6). The dual-coded questions on STAAR will be coded with a content standard and a process standard.
2. Number and Operations
3. Proportionality
4. Expressions, Equations, and Relationships
5. Measurement and Data
6. Personal Financial Literacy

Example

7.1 Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:

(A) apply mathematics to problems arising in everyday life, society, and the workplace.

Part 3: Knowledge and Skills Statements

Immediately following the strand is the **Knowledge and Skills** (K&S) statement. It provides the context for the student expectations that follow it.

Numbering: The first number is the grade level. The second number is the Knowledge and Skills number. The K&S statement shown is from seventh grade.

Part 4: Student Expectations

Immediately following each Knowledge and Skills statement is a list of **Student Expectations** (SE).

The letters, such as (A), refer to what students are expected to do with regard to a particular Knowledge and Skills statement. We often refer to this example as 7.1A. [Grade Level seventh grade, Knowledge and Skills statement (1), Student Expectation (A)]

Table of Contents

Click-On 7.2 - 7.3B for Examples

RC = Reporting Category

7.4D	solve problems involving ratios, rates, and percents, including multi-step problems involving percent increase and percent decrease, and financial literacy problems. **RC2, Readiness Standard**
7.4E	convert between measurement systems, including the use of proportions and the use of unit rates. **RC3, Supporting Standard**
7.5	Proportionality. The student applies mathematical process standards to use geometry to describe or solve problems involving proportional relationships. The student is expected to:
7.5A	generalize the critical attributes of similarity, including ratios within and between similar shapes. **RC3, Supporting Standard**
7.5B	describe π as the ratio of the circumference of a circle to its diameter. **RC3, Supporting Standard**
7.5C	solve mathematical and real-world problems involving similar shape and scale drawings. **RC3, Readiness Standard**
7.6	Proportionality. The student applies mathematical process standards to use probability and statistics to describe or solve problems involving proportional relationships. The student is expected to:
7.6A	represent sample spaces for simple and compound events using lists and tree diagrams. **RC1, Supporting Standard**
7.6B	select and use different simulations to represent simple and compound events with and without technology.
7.6C	make predictions and determine solutions using experimental data for simple and compound events. **RC1, Supporting Standard**
7.6D	make predictions and determine solutions using theoretical probability for simple and compound events. **RC1, Supporting Standard**
7.6E	find the probabilities of a simple event and its complement and describe the relationship between the two. **RC1, Supporting Standard**
7.6F	use data from a random sample to make inferences about a population.
7.6G	solve problems using data represented in bar graphs, dot plots, and circle graphs, including part-to-whole and part-to-part comparisons. **RC4, Readiness Standard**
7.6H	solve problems using qualitative and quantitative predictions and comparisons from simple experiments. **RC1, Readiness Standard**
7.6I	determine experimental and theoretical probabilities related to simple and compound events using data and sample spaces. **RC1, Readiness Standard**

Strand 4: Expressions, Equations, and Relationships	
7.7	Expressions, equations, and relationships. The student applies mathematical process standards to represent linear relationships using multiple representations. The student is expected to represent linear relationships using verbal descriptions, tables, graphs, and equations that simplify to the form y = mx + b. **RC2, Readiness Standard**
7.8	Expressions, equations, and relationships. The student applies mathematical process standards to develop geometric relationships with volume. The student is expected to:
7.8A	model the relationship between the volume of a rectangular prism and a rectangular pyramid having both congruent bases and heights and connect that relationship to the formulas.
7.8B	explain verbally and symbolically the relationship between the volume of a triangular prism and a triangular pyramid having both congruent bases and heights and connect that relationship to the formula.

RC = Reporting Category

7.8C	use models to determine the approximate formulas for the circumference and area of a circle and connect the models to the actual formulas.
7.9	Expressions, equations, and relationships. The student applies mathematical process standards to solve geometric problems. The student is expected to:
7.9A	solve problems involving the volume of rectangular prisms, triangular prisms, rectangular pyramids, and triangular prisms. **RC3, Readiness Standard**
7.9B	determine the circumference and area of circles. **RC3, Readiness Standard**
7.9C	determine the area of composite figures containing combinations of rectangles, squares, parallelograms, trapezoids, triangles, semicircles, and quarter circles. **RC3, Readiness Standard**
7.9D	solve problems involving the lateral and total surface area of a rectangular prism, rectangular pyramid, triangular prisms, and triangular pyramid by determining the area of the shape's net. **RC3, Supporting Standard**
7.10	Expressions, equations, and relationships. The student applies mathematical process standards to use one-variable equations and inequalities to represent situations. The student is expected to:
7.10A	write one-variable, two-step equations and inequalities to represent constraints or conditions within problems. **RC2, Supporting Standard**
7.10B	represent solutions for one-variable, two-step equations and inequalities on number lines. **RC2, Supporting Standard**
7.10C	write a corresponding real-world problem given a one-variable, two-step equation or inequality. **RC2, Supporting Standard**
7.11	expressions, equations, and relationships. The student applies mathematical process standards to solve one-variable equations and inequalities. The student is expected to:
7.11A	model and solve one-variable, two-step equations and inequalities. **RC2, Readiness Standard**
7.11B	determine if the given value(s) make(s) one-variable, two-step equations and inequalities true. **RC2, Supporting Standard**
7.11C	write and solve equations using geometry concepts, including the sum of the angles in a triangle, and angle relationships. **RC3, Supporting Standard**

Strand 5: Measurement and Data	
7.12	Measurement and data. The student applies mathematical process standards to use statistical representations to analyze data. The student is expected to:
7.12A	compare two groups of numerical data using comparative dot plots or box plots by comparing their shapes, centers, and spreads. **RC4, Readiness Standard**
7.12B	use data from a random sample to make inferences about a population. **RC4, Supporting Standard**
7.12C	compare two populations based on data in random samples from these populations, including informal comparative inferences about differences between the two populations. **RC4, Supporting Standard**

RC = Reporting Category

Strand 6: Personal Financial Literacy	
7.13	Personal financial literacy. The student applies mathematical process standards to develop an economic way of thinking and problem solving useful in one's life as a knowledgeable consumer and investor. The student is expected to:
7.13A	calculate the sales tax for a given purchase and calculate income tax for earned wages. **RC4, Supporting Standard**
7.13B	identify the components of a personal budget, including income, planned savings for college, retirement, and emergencies, taxes, and fixed and variable expenses, and calculate what percentage each category comprises of the total budget. **RC4, Supporting Standard**
7.13C	create and organize a financial assets and liabilities record and construct a net worth statement. **RC4, Supporting Standard**
7.13D	use a family budget estimator to determine the minimum household budget and average hourly wage needed for a family to meet its basic needs in the student's city or another large city nearby. **RC4, Supporting Standard**
7.13E	calculate and compare simple interest and compound interest earnings. **RC4, Supporting Standard**
7.13F	analyze and compare monetary incentives, including sales, rebates, and coupons. **RC4, Supporting Standard**

Strand 2: Numbers and Operations

7.2 Number and operations. The student applies mathematical process standards to represent and use rational numbers in a variety of forms. The student is expected to extend previous knowledge of sets and subsets using a visual representation to describe relationships between sets of rational numbers. (RC1, Supporting Standard)

Our number system consists of several different sets of numbers—natural numbers, whole numbers, integers, rational numbers, irrational numbers, real numbers, and imaginary numbers. Seventh graders work with 3 of these sets: whole numbers, integers, and rational numbers.

Whole numbers are the numbers starting with 0 and counting up.

0, 1, 2, 3, 4 …

Integers include the whole numbers, but they also include negative numbers.

…$^{-}$3, $^{-}$2, $^{-}$1, 0, 1, 2, 3 …

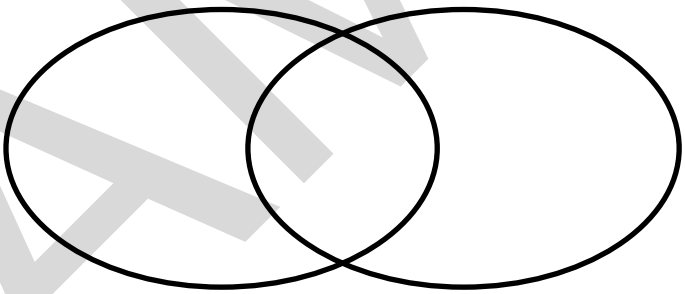
Rational numbers are numbers that can be written in the form of a fraction. Numbers are considered rational even when they are not in fraction form. This includes positive and negative fractions and some decimals. (Which decimals are not considered rational? Decimals that do not terminate (end) or that do not repeat a pattern. These types of decimals will be introduced in 8th grade.)
Examples of rational numbers:

$$^{-}16,\ 0,\ 245,\ 3.58,\ \frac{4}{6},\ 5.555\ldots,\ 7.3434343\ldots,\ \sqrt{9}$$

Some square roots are also rational. However, square roots are not taught until 8th grade.
Pi is not part of the set of rational numbers, as it neither terminates nor repeats a pattern.

Example/Activity

A Venn diagram can be used to help students understand the structure of the number system. Typical Venn diagrams look like this:

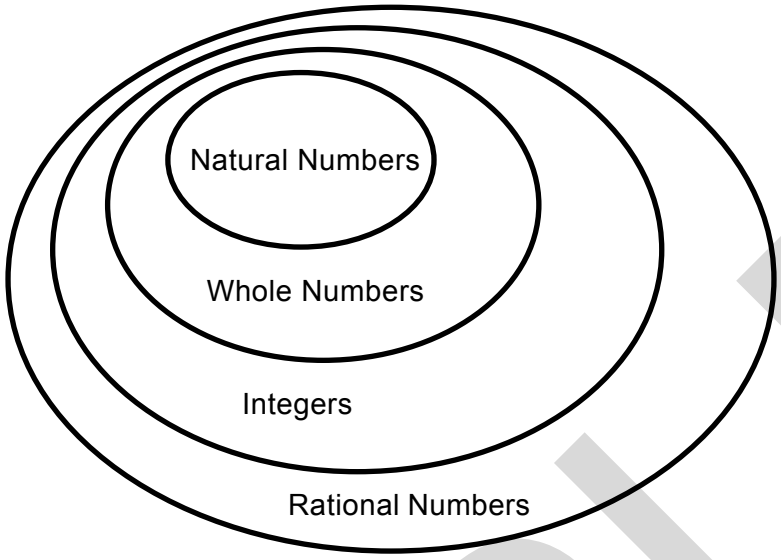


The overlapping part contains the elements of the set that are common to both sets.

Continued on next page

Back to TOC

The Venn diagram for the number system looks a bit different. The sets are nested inside each other. This is because each of the smaller sets of numbers is a complete subset of a larger set of numbers.



Students in 7th grade will understand counting and whole numbers because they have been working with them since kindergarten. Seventh-grade students encountered integers in 6th grade. Although rational numbers are included in 6th grade, the concept of a rational number will still be new to them. It also includes number types that they have rarely seen—decimals that repeat a pattern. These types of decimals typically appear when students are learning to divide decimals and are not part of the life of a typical 7th grader.

Vocabulary Note: The math definition of the word *rational* is very different from the word *rational* as it is commonly used. This needs to be explicitly addressed when introducing the concept of *rational numbers*.

7.3 Number and operations. The student applies mathematical process standards to add, subtract, multiply, and divide while solving problems and justifying solutions. The student is expected to:

7.3A add, subtract, multiply, and divide rational numbers fluently. (RC2, Supporting Standard)

Rational numbers are numbers that can be written in the form of a fraction. (See 7.2.) For the purposes of this Student Expectation (SE), rational numbers are positive and negative fractions and decimals including integers.

Fluency is defined in the introduction to the TEKS as skill in carrying out procedures flexibly, accurately, efficiently, and appropriately. Therefore, by the end of 7th grade, students need to be flexible with:

- adding positive and negative fractions and decimals
- subtracting positive and negative fractions and decimals
- multiplying positive and negative fractions and decimals
- dividing positive and negative fractions and decimals

Their calculations need to be accurate and relatively quick. Students need to apply the rules for these operations and these number sets accurately, not mixing them up.

Note that the Knowledge and Skills Statement says that students are to solve problems and justify the solutions. This means that students need to be able to justify the reasonableness of the solution. 7.3B can help students tell whether their answers are reasonable or not.

Continued on next page

Back to TOC

Example/Activity

Students in 7th grade are expected to be fluent with all operations for positive and negative fractions and decimals by the end of the school year. This means that prior to learning operations with rational numbers, students must be fluent with integer operations. Although with the revised TEKS students are supposed to be fluent with integer operations by the end of the year, it is likely that 7th grade students will still be shaky with the rules. Prior to learning this unit, students will probably need a short review of integer operations. This may be handled through short activities over the course of a couple of weeks or a very short, intense review.

7.3 Number and operations. The student applies mathematical process standards to add, subtract, multiply, and divide while solving problems and justifying solutions. The student is expected to:

7.3B apply and extend previous understanding of operations to solve problems using addition, subtraction, multiplication, and division of rational numbers. (RC2, Readiness Standard)

For this Student Expectation (SE), students apply the fluency from 7.3A to word problems. To show mastery, they must be able to choose the operation to use to solve a problem, solve the problem accurately, and justify their solution.

Problem sets should require students to choose an operation, rather than consist of all one operation. Problem sets should also have some multistep problems.

Example/Activity

When reading word problems that contain fractions or decimals, students often get confused about what operation to choose without resorting to key words, which often lead to choosing incorrect operations.

- Addition is putting two or more quantities together.
- Subtraction is breaking a quantity into parts. The parts may be equal or unequal. Often the whole is broken into two parts.
- Multiplication is combining several of the same size groups. The key is that the groups must be the same size.
- Division is breaking a quantity into groups that are the same size. They key is that the groups must be the same size.

If students read a problem and are stuck on which operation to choose, provide them with the definitions. Students should be able to tell which one their problem is most like.

If students are still stuck, ask them to substitute some “easy” numbers for the fractions or decimals and then identify the operation. Often it’s the scary fraction or decimal that causes the problem, not the words themselves.

Another tool to help students figure out the operation is to ask them to act out the problem. As they begin to act it out, they should think about their actions along with the informal definitions of the operations listed above. This should give them a clue about which operation to choose.

Continued on next page

Back to TOC

Finally, students should spend some time reading problems and choosing the operation without having to solve the problems. Here is an activity that helps students think through their choice of operation:

1. Post signs in the corners of the room. There should be one operation on each sign.
2. Show students a problem and have them choose the operation without working the problem itself.
3. When the teacher says, “Go,” each student stands up and walks to the corner that has the operation they chose.
4. In their groups, students discuss why the operation they chose is correct and choose a spokesperson. If the groups are large, then they should choose several spokespersons.
5. Have the spokespersons defend their choice of operation. It is likely that some students will realize that they made a wrong choice and want to change groups. Let them change and have them justify why they want to switch groups.

Back to TOC