Click-On TEKS

A simple approach to understanding the Texas Essential Knowledge and Skills

GRADE 3 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 updated information about the new Mathematics TEKS. Specificity and/or activities may be adjusted over time as more information becomes available from the state.

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

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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 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 elementary 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 the 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. Algebraic Reasoning
4. Geometry and Measurement
5. Data Analysis
6. Personal Financial Literacy

Example

3.1 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** statement (K&S). It provides the context for the student expectations which 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 third 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 3.1A. [Grade Level third grade, Knowledge and Skills statement (1), Student Expectation (A)]

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3.3F	represent equivalent fractions with denominators of 2, 3, 4, 6, and 8 using a variety of objects and pictorial models, including number lines.
3.3G	explain that two fractions are equivalent if and only if they are both represented by the same point on the number line or represent the same portion of a same size whole for an area model.
3.3H	compare two fractions having the same numerator or denominator in problems by reasoning about their sizes and justifying the conclusion using symbols, words, objects, and pictorial models.
3.4	Number and operations. The student applies mathematical process standards to develop and use strategies and methods for whole number computations in order to solve problems with efficiency and accuracy.
3.4A	solve with fluency one-step and two-step problems involving addition and subtraction within 1,000 using strategies based on place value, properties of operations, and the relationship between addition and subtraction.
3.4B	round to the nearest 10 or 100 or use compatible numbers to estimate solutions to addition and subtraction problems.
3.4C	determine the value of a collection of coins and bills.
3.4D	determine the total number of objects when equally-sized groups of objects are combined or arranged in arrays up to 10 by 10.
3.4E	represent multiplication facts by using a variety of approaches such as repeated addition, equal-sized groups, arrays, area models, equal jumps on a number line, and skip counting.
3.4F	recall facts to multiply up to 10 by 10 with automaticity and recall the corresponding division facts.
3.4G	use strategies and algorithms, including the standard algorithm, to multiply a two-digit number by a one-digit number. Strategies may include mental math, partial products, and the commutative, associative, and distributive properties.
3.4H	determine the number of objects in each group when a set of objects is partitioned into equal shares or a set of objects is shared equally.
3.4I	determine if a number is even or odd using divisibility rules.
3.4J	determine a quotient using the relationship between multiplication and division.
3.4K	solve one-step and two-step problems involving multiplication and division within 100 using strategies based on objects; pictorial models, including arrays, area models, and equal groups; properties of operations; or recall of facts.

Strand 3: Algebraic Reasoning	
3.5	Algebraic reasoning. The student applies mathematical process standards to analyze and create patterns and relationships. The student is expected to:
3.5A	represent one- and two-step problems involving addition and subtraction of whole numbers to 1,000 using pictorial models, number lines, and equations.
3.5B	represent and solve one- and two-step multiplication and division problems within 100 using arrays, strip diagrams, and equations.
3.5C	describe a multiplication expression as a comparison such as 3 x 24 represents 3 times as much as 24.
3.5D	determine the unknown whole number in a multiplication or division equation relating three whole numbers when the unknown is either a missing factor or product.
3.5E	represent real-world relationships using number pairs in a table and verbal descriptions.

Strand 4: Geometry and Measurement	
3.6	Geometry and measurement. The student applies mathematical process standards to analyze attributes of two-dimensional geometric figures to develop generalizations about their properties. The student is expected to:
3.6A	classify and sort two- and three-dimensional solids, including cones, cylinders, spheres, triangular and rectangular prisms, and cubes based on attributes using formal geometric language.
3.6B	use attributes to recognize rhombuses, parallelograms, trapezoids, rectangles, and squares as examples of quadrilaterals and draw examples of quadrilaterals that do not belong to any of these subcategories.
3.6C	determine the area of rectangles with whole number side lengths in problems using multiplication related to the number of rows times the numbers of unit squares in each row.
3.6D	decompose composite figures formed by rectangles into non-overlapping rectangles to determine the area of the original figure using the additive property of area.
3.6E	decompose two congruent two-dimensional figures into parts with equal areas and express the area of each part as a unit fraction of the whole and recognize that equal shares of identical wholes need not have the same shape.
3.7	Geometry and measurement. The student applies mathematical process standards to select appropriate units, strategies, and tools to solve problems involving customary and metric measurement. The student is expected to:
3.7A	represent fractions of halves, fourths, and eighths as distances from zero on a number line.
3.7B	determine the perimeter of a polygon or a missing length when given perimeter and remaining side lengths in problems.
3.7C	determine the solutions to problems involving addition and subtraction of time intervals in minutes using pictorial models or tools such as a 15-minute event plus a 30-minute event equals 45 minutes.
3.7D	determine when it is appropriate to use measurements of liquid volume (capacity) or weight.
3.7E	determine liquid volume (capacity) or weight using appropriate units and tools.

Strand 5: Data Analysis	
3.8	Data analysis. The student applies mathematical process standards to solve problems by collecting, organizing, displaying, and interpreting data. The student is expected to:
3.8A	summarize a data set with multiple categories using a frequency table, dot plot, pictograph, or bar graph with scaled intervals.
3.8B	solve one- and two-step problems using categorical data represented with a frequency table, dot plot, pictograph, or bar graph with scaled intervals.

Strand 6: Personal Financial Literacy	
3.9	Personal financial literacy. The student applies mathematical process standards to manage one's financial resources effectively for lifetime financial security. The student is expected to:
3.9A	explain the connection between human capital/labor and income.
3.9B	describe the relationship between the availability or scarcity of resources and how that impacts cost.
3.9C	identify the costs and benefits of planned and unplanned spending decisions.
3.9D	explain that credit is used when wants or needs exceed the ability to pay and that it is the borrower's responsibility to pay it back to the lender, usually with interest.
3.9E	list reasons to save and explain the benefit of a savings plan, including for college.
3.9F	identify decisions involving income, spending, saving, credit, and charitable giving.

Strand 2: Numbers and Operations

3.2 Number and operations. The student applies mathematical process standards to represent and compare whole numbers and understand relationships related to place value. The student is expected to:

3.2A compose and decompose numbers up to 100,000 as a sum of so many ten thousands, so may thousands, so many hundreds, so many tens, and so many ones using objects, pictorial models, and numbers, including expanded notation as appropriate.

Compose: Sets of objects may be joined together to make a larger group. The two sets are the parts and the whole is the larger set that is created.

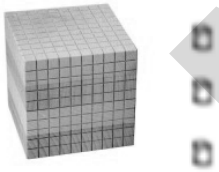
Decompose: Sets of objects can also be broken into smaller subsets and together still contain the total amount.

To show mastery of this standard, students must compose and decompose numbers using:

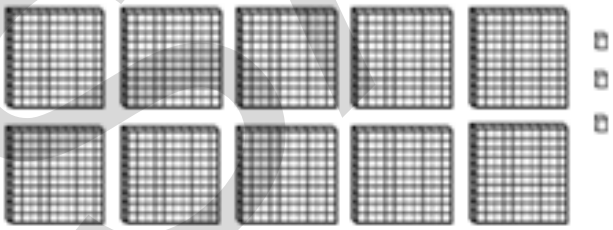
- objects
- pictorial models
- numbers, including writing the numbers in standard notation

Although place value is not specifically mentioned in the standard, when students are creating multiple ways to write a number according to the number of hundreds, tens, ones, etc., they are applying their understanding of place value.

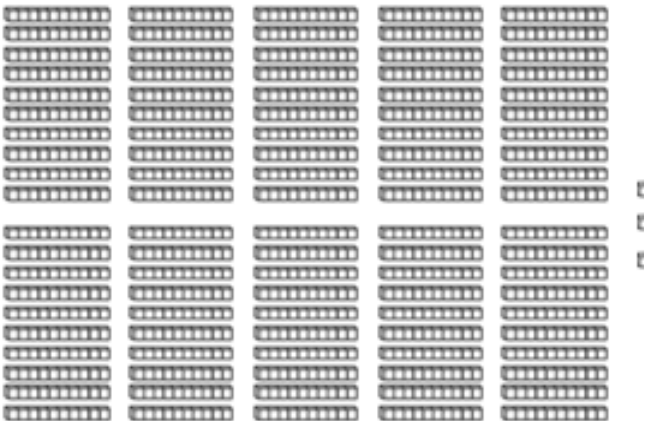
Example/Activity



1 group of 1,000 and 3 ones
or
One 1,000 cube and 3 units



10 groups of 100 and 3 ones
or
10 flats and 3 units



100 groups of 10 and 3 ones
or
100 longs and 3 ones

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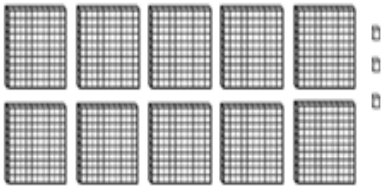
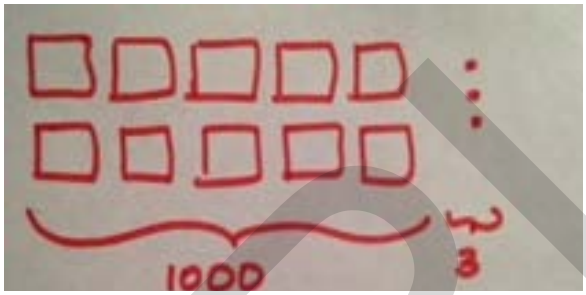
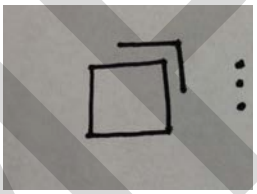
The more flexible students are with numbers, the easier they may be able to recall their math facts and perform operations.

The table below shows concrete and pictorial models along with expanded and standard notation for the number 1,003. As students are learning to write expanded notation, they should write the numbers below the pictorial model so that the more abstract expanded notation is merely an extension of the pictorial model that the student drew. Through student experiences of composing and decomposing numbers, making concrete models, and drawing pictorial models, students gain an in-depth understanding of how numbers work together to create other numbers, which paves the way for fluency with operations.

Concrete Model	Pictorial Model	Expanded Notation	Standard Notation
 or 	 or 	1000 + 3	1003

3.2 Number and operations. The student applies mathematical process standards to represent and compare whole numbers and understand relationships related to place value. The student is expected to:

3.2B describe the mathematical relationships found in the base-10 place value system through the hundred thousands place.

This standard, 3.2B, goes beyond knowing what place a digit is in. It requires students to understand the relationships between the places that make up a number, such as 10 tens make 1 hundred or 100 tens can be exchanged for 1,000.

Example/Activity

The digits in our base-10 place value system have a special mathematical relationship. As the digits move from ones to tens to hundreds, each place is 10 times the value of the place to its right. A 5 in the tens place has 10 times the value of a 5 in the ones place. A 5 in the hundreds place has 10 times the value of a 5 in the tens place. This Student Expectation asks students to understand these relationships to understand numbers more deeply.
For example, examine the number below.

890,471

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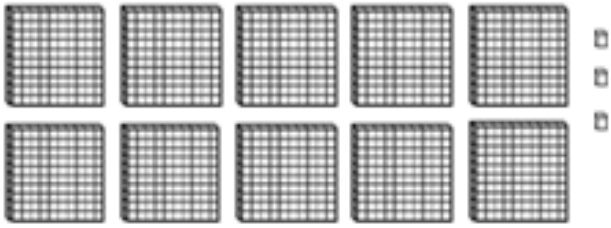
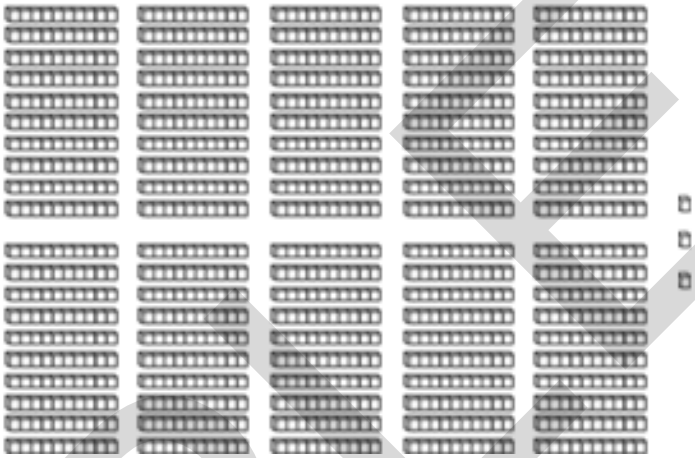
The 9 is in the ten thousands place. How many thousands does the 9 represent? It represents 9 ten-thousands. It also represents 90 thousands and 900 hundreds. It is these kinds of relationships that are the focus of this state standard.

Since a number that large is difficult to model, it helps to use smaller numbers first for understanding and then move to abstract understanding for larger numbers. Look at these two concrete models for the number 1,003.



10 groups of 100 and 3 ones



100 groups of 10 and 3 ones

The model on the left is a common view of the number using base-10 blocks. In the model on the right, the groups of 100 are broken up into 10 groups of ten. Thus, 10 tens make 100. 10 hundreds make 1,000.

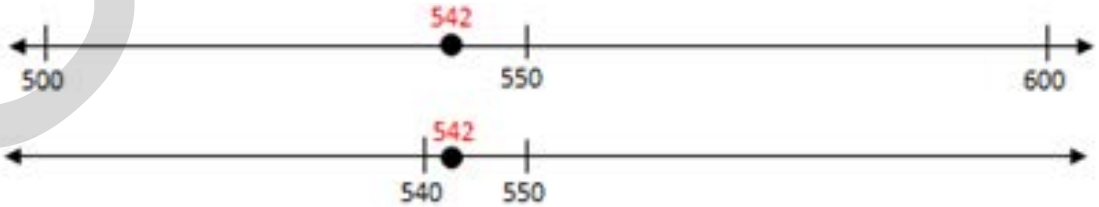
3.2 Number and operations. The student applies mathematical process standards to represent and compare whole numbers and understand relationships related to place value. The student is expected to:

3.2C represent a number on a number line as being between two consecutive multiples of 10; 100; 1,000; or 10,000 and use words to describe relative size of numbers in order to round whole numbers.

The goal of this standard is a conceptual view of rounding numbers. Students are asked to round numbers based on how close the number is to a multiple of 10, rather than relying on rules to round the numbers. They also use words to describe the relative size of numbers, e.g., 497 is about 500.

Example/Activity

The two open number lines below show the number 542. The top graph shows 542 graphed between 500 and 600. Because 542 is closer to the number 500 than it is to 600 on the number line, 542 rounds to 500, not 600. The bottom number line shows 542 graphed between 540 and 550. Since 542 is closer to 540 than it is to 550, 542 rounds to 540, not 550.



Students are also asked to describe the relative size of numbers using words. For the example above, we might say that 542 is “about 540” or “approximately 540.”

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3.2 Number and operations. The student applies mathematical process standards to represent and compare whole numbers and understand relationships related to place value. The student is expected to:

3.2D compare and order whole numbers up to 100,000 and represent comparisons using the symbols >, <, or =.

To show mastery of this state standard, students should be able to:

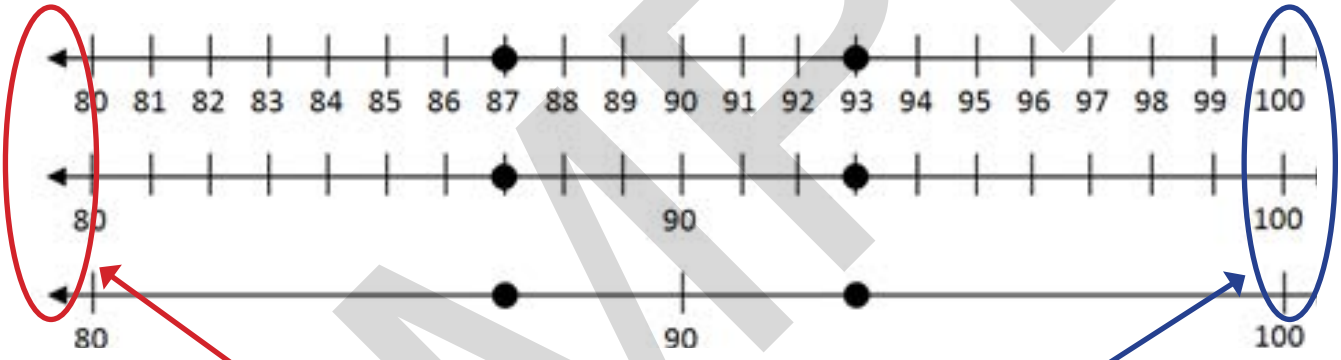
- place numbers in order from least to greatest and greatest to least
- use >, <, or = to tell whether numbers are greater than, less than, or equal to each other.

Students use the traditional greater than, less than, and equals symbols to tell the comparison that they have made.

Example/Activity

Although students often know which numbers are larger or smaller than others, many students struggle when asked to write the numbers from greatest to least or least to greatest. It may help students to graph the numbers on an open number line and then make the list of numbers.

Note: The symbols < and > should be taught without the use of “alligators." Think of the symbols as the ends of a number line.



These arrows indicate that the numbers are getting smaller. This is like the < symbol. Therefore, the point indicates the smaller number and the open side indicates the larger number.

These arrows indicate that the numbers are getting larger. This is like the > symbol. Therefore, the point indicates the smaller number and the open side indicates the larger number.

Sentence Stems

Sentence stems may be helpful in teaching children to verbalize their thoughts.

_____ is more than (less than) _____. I know this because _____ has _____hundreds and _____ tens and _____ ones and, _____ has _____hundreds and _____ tens and _____ ones.

These two sets are equal. I know this because…

The _____ set is smaller (or less than) the _____ set. I know this because…

There are less (fewer) _____ than _____. I know this because…

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3.3 Number and operations. The student applies mathematical process standards to represent and explain fractional units.

In 2nd grade, students worked with denominators of 2, 4, and 8. They did not write fractions using the fraction bar. In third grade, students continue to build understanding with these denominators, but denominators of 3 and 6 are also explored.

In 2nd grade, students counted fractional parts beyond 1. In third grade, though, the Students Expectations (SEs) have students working with fractions that are smaller than 1. Because students have counted fractional parts beyond 1, students may continue to count fractional parts beyond 1. Do not be tempted to stretch the new learning in the third grade SEs to fractions that are larger than 1. Counting beyond 1 is still okay.

3.3 Number and operations. The student applies mathematical process standards to represent and explain fractional units. The student is expected to:

3.3A represent fractions greater than zero and less than or equal to one with denominators of 2, 3, 4, 6, and 8 using concrete objects and pictorial models, including strip diagrams and number lines.

This standard bridges concrete and pictorial models of fractions. For this state standard, students will work with fractions that equal 1 or are smaller than 1, but not 0.

Students only work with models for this standard.
Students are introduced to set models in third grade.

Important notes about the concept of fractional parts:

- Students should understand clearly that a whole is being partitioned into equal-sized parts. It is critical that students know that the parts must be the same size. When students divide a whole into parts by drawing the parts, they may not be able to draw the parts exactly equal in size. However they should still understand that the parts are the same size.
- Students should understand clearly what the whole is and that the whole changes for each model. They should be taught to identify the whole in the problem first.
- Students should understand that the name of the fractional part comes from the number of equal parts in the whole. For example, if the whole is divided into 4 equal parts, the fractional parts are called fourths. If the whole is divided into 8 equal parts, the fractional parts are called eighths.
- Students should be exposed to three different kinds of models for fractions: area models, length models, and set models. They should also experience different types of each one of these models. Examples are shown below.
- Students should count the fractional parts out loud (one-fourth, two-fourths, three-fourths, four-fourths) and it should be clear that four-fourths represents the whole.

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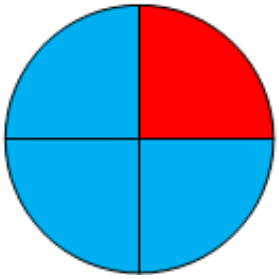
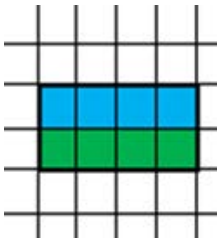
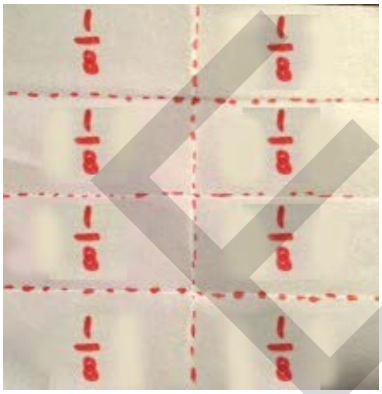
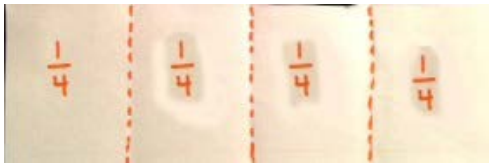
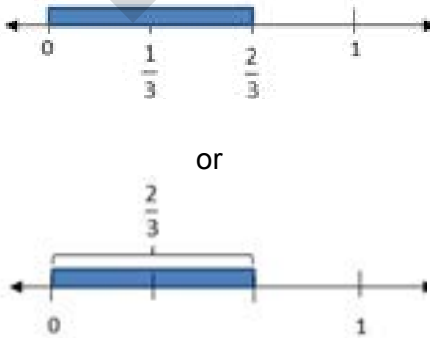
Example/Activity

Examples of Area Models

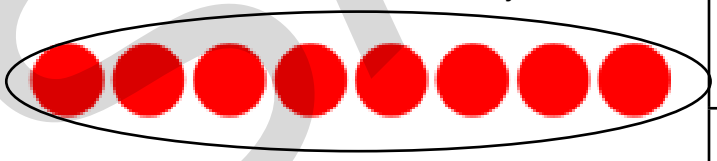
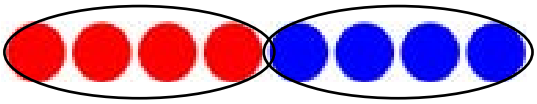
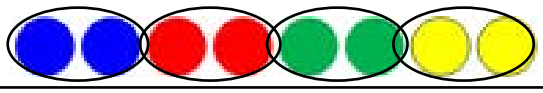
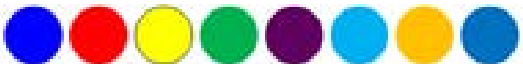
Circle Models	Grid Models	Paper Folding
	 This grid is a great model for fractions. Using the grid above, students can see four-eighths and one-half are the same amount. With practice, they will also see that two-fourths is the same as one-half or four-eighths.	

Examples of Linear Models

Strip Diagrams or Fraction Strips	Cuisenaire® Rods	Number Lines
 This is also an area model. However the emphasis here is on dividing the strip into four equal sections that line up.	 one whole or 1  $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$	 or

Examples of Set Models

Set models are different from length and area models in that a set model contains a set of objects, and the whole is the total number of objects in the set. Be sure to emphasize that the set of counters is 1 and not 8.

Counters-whole	Counters-fractional parts
The whole is made up of 8 red counters. Students should be taught to view these as a whole rather than as 8 individual objects. 	This set is divided into halves. There are 4 counters in each half. 
	This set is divided into fourths. There are two counters in each fourth. 
	This set is divided into eighths. There is one counter in each eighth. 

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3.3 Number and operations. The student applies mathematical process standards to represent and explain fractional units. The student is expected to:

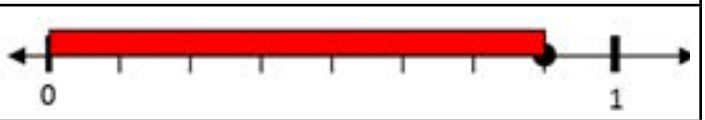
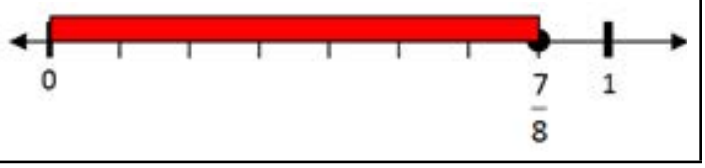
3.3B determine the corresponding fraction greater than zero and less than or equal to one with denominators of 2, 3, 4, 6, and 8 given a specified point on a number line.

For this state standard, students will work with fractions that equal 1 or are smaller than 1, but do not equal 0.
Finding fractions on a number line can be difficult for students because they focus on the wrong thing. They are graphing a point. But to find the point, they need to examine the spaces on the number line.

This Student Expectation introduces students to formal fraction notation. Students should also be introduced to the vocabulary words numerator and denominator. The numerator is the top number of a fraction and can be thought of as the "counting number", or the number of fractional parts under consideration.The denominator is the bottom number of the fraction and represents the type of part being counted or represented.

Example/Activity

Examining the Spaces to Determine the Fractional Points on a Number Line

1. The whole is the length between 0 and 1. The fractional parts are the spaces between 0 and 1. First, students have to identify how many fractional parts there are. Why do we count the spaces and not the hash marks? Think about walking and counting your steps. When you start, you're standing at 0. Then you put one foot out to take a step. The space between your feet is 1 step. The same thing is true on a number line. We count the spaces between the hash marks to see how many spaces 1 has been divided into. This number line has been divided into 8 spaces. So 8 is the denominator of the fraction.	
2. Now we determine the numerator. It is helpful here to use a marker or colored pencil to highlight the spaces.	
3. Count the spaces using fractions, not whole numbers. Why? If students count with whole numbers, they will hear whole numbers and they will think whole numbers. They will lose the meaning of fractions and lose the fact that the fractions are smaller than one. They will see the fractions as two numbers, a numerator and a denominator, not as a number itself.	Say, "one-eighth, two-eighths, three-eighths," Do not say, "1, 2, 3. . ."
4. Identify the fraction on the number line.	

An extension of this standard is for students to be given a fraction and told to find where it belongs on the number line.