2^{nd} Grade Texas Mathematics: Unpacked Content

What is the purpose of this document?
To increase student achievement by ensuring educators understand specifically what the new standards mean a student must know, understand and be able to do. This document may also be used to facilitate discussion among teachers and curriculum staff and to encourage coherence in the sequence, pacing, and units of study for grade-level curricula. This document, along with on-going professional development, is one of many resources used to understand and teach the new math standards.

What is in the document?
Descriptions of what each standard means a student will know, understand, and be able to do. The “unpacking” of the standards done in this document is an effort to answer a simple question “What does this standard mean that a student must know and be able to do?” and to ensure the description is helpful, specific and comprehensive for educators.

At A Glance:

New to 2nd Grade:

Numbers and Operations:

- Up to 1,200 :
  - Compose and decompose
  - Write in expanded and word form
  - Use pictorial models
  - Compare and order whole numbers
  - Use comparative language
- Generate a number greater or less than a given number up to 1,200
- Locate a specific point on an *open* number line (also a geometry and measurement TEKS)
- Fractions:
  - Partitioning of objects *including* halves, fourths and eighths using words
  - Understanding the meaning of the denominator
  - Concrete models to count beyond one whole
  - How many parts equal one whole (four-fourths equals one whole)
  - Identify examples and non-examples of halves, fourths and eighths
- Basic facts up to 20 with automaticity (automaticity means no manipulatives or fingers)
- Column addition up to four two-digit numbers using mental strategies and algorithms
- Subtract two-digit numbers using mental strategies and algorithms
- Addition and subtraction one step and multi-step word problems within 1000
- Generate and solve a problem for a given number sentence for sums and differences within 1000
- Use money symbols to name the value of a collection of coins
- Contextual multiplication situations
- Contextual division situations

Algebraic Reasoning:

- Determine whether a number up to 40 is even or odd using pairings of objects to represent the number (moved from 1st grade)
- Extend place value to 1,200 and determine the number that is 10 or 100 more or less than a given number
- Adding an unknown variable to solve addition and subtraction number sentences

Geometry and Measurement:

- Create a two-dimensional shape based on given attributes, including number of sides and vertices
- Classify and sort three-dimensional solids using formal geometric language (added three prism types)
- Classify and sort polygons with 12 or fewer sides according to attributes
- Compose and decompose 2D and 3D shapes and solids with given properties or attributes
- Students select and use measurement tools and determine a solution to a problem using length, including estimating lengths (such as, inch tiles and centimeter cubes)
- Describe the inverse relationship between the size of the unit and the number of units needed to equal the length of an object (moved from 1st)
- Represent whole numbers as distances from any given location on a number line
- Determine the length of an object to the nearest marked unit using rulers, yardsticks, meter sticks, or measuring tapes (new)
- Select a non-standard unit of measure such as square tiles to determine the area of a 2D surface
- Read and write time to the nearest one minute
- Determine a.m. and p.m.

Data Analysis:

- Organize data, create and explain the parts of a bar graph and pictograph (from picture graph to pictograph)
- Bar graphs and pictographs must include up to 4 categories with intervals of one or more
- Write and solve one-step addition and subtraction word problems using graph data
- Draw conclusions and make predictions from graphs

Personal Financial Literacy: (new strand)

- Calculate how money saved can accumulate into a larger amount over time
- Explain that saving is an alternative to spending
- Distinguish between a deposit and a withdrawal
- Identify examples of borrowing and distinguish between responsible and irresponsible borrowing
- Identify examples of lending and use concepts of benefits and costs to evaluate lending decisions
- Differentiate between producers and consumers and calculate the cost of to produce a simple item

Moved from 2nd Grade:

- ○ Benchmarking of fractions parts (3rd grade)
- ○ Use concrete models to represent and name fractional parts of a set of objects (gone)
- ○ Generate a list of paired numbers based on real life situation (gone)
- ○ Select a non-standard unit of measure to determine the capacity of a given container (gone)
- ○ Select a non-standard unit of measure to determine the weight/mass of a given object (gone)
- ○ Read a thermometer to gather data (moved to 2nd grade Science TEKS)
- ○ Use data to describe events as more likely or less likely (probability—gone)
- ○ Select or develop an appropriate problem-solving strategy including drawing a picture, looking for a pattern, systematic guessing and checking or acting it out in order to solve a problem (gone)

Instructional Implications for 2013-14:

- Identify the gaps that need to be addressed, such as: place value moved from 999 to 1,200;recall facts to 20 in addition and subtraction (moved from 18) with AUTOMATICITY
- Use formal geometry language to have students compose and decompose 2- and 3- D shapes (prisms)
- Teach students time to one minute increments - can our first grade teachers help prepare students with this?

Professional Learning Implications for 2013-14:

- Teachers will need time to identify the gaps that will need to be addressed in the 2013-14 school year.
- Embed the process standards into instruction and application
- PD and resources regarding Personal Financial Literacy
- Initial learning of the teachers' grade level TEKS (teachers unpacking the TEKS at their grade level)
- Vertical study of the strands to know how the TEKS align and progress from 1st through 3rd grade.
- Identify academic vocabulary

Grade 2^{nd} Primary Focal Areas:

The Primary Focal Areas are designed to bring focus to the standards at each grade by describing the big ideas that educators can use to build their curriculum and to guide instruction.

The primary focal areas in Grade 2 are making comparisons within the base-10 place value system, solving problems with addition and subtraction within 1,000, and building foundations for multiplication.

(A) Students develop an understanding of the base-10 place value system and place value concepts. The students' understanding of base-10 place value includes ideas of counting in units and multiples of thousands, hundreds, tens, and ones and a grasp of number relationships, which students demonstrate in a variety of ways.

(B) Students identify situations in which addition and subtraction are useful to solve problems. Students develop a variety of strategies to use efficient, accurate, and generalizable methods to add and subtract multi-digit whole numbers.

(C) Students use the relationship between skip counting and equal groups of objects to represent the addition or subtraction of equivalent sets, which builds a strong foundation for multiplication and division.

Mathematical process standards.

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;

(B) use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;

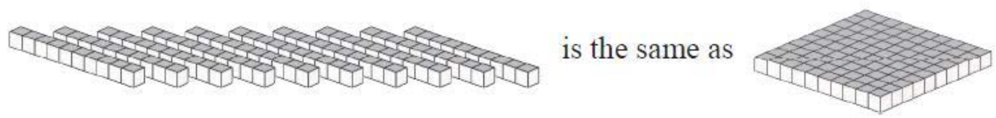
(C) select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;

(D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate;

(E) create and use representations to organize, record, and communicate mathematical ideas;

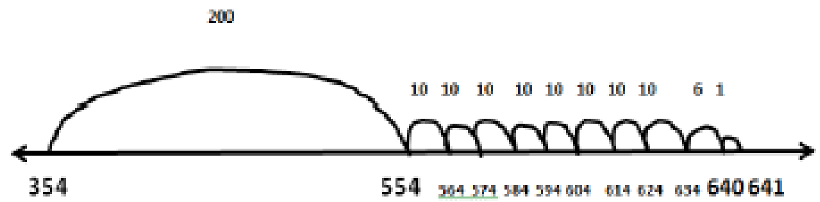
(F) analyze mathematical relationships to connect and communicate mathematical ideas; and

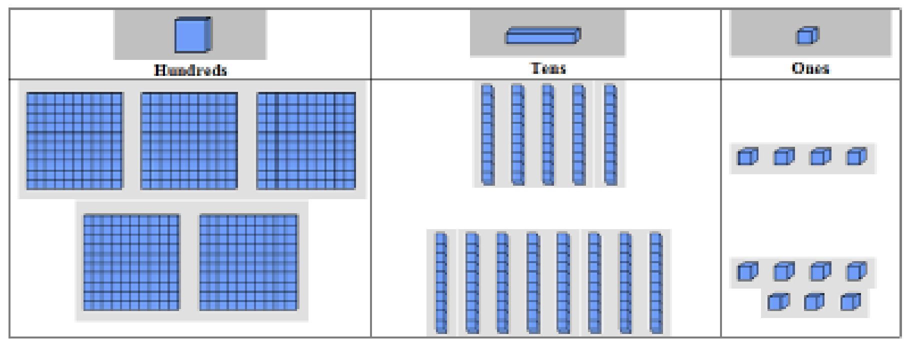
(G) display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.

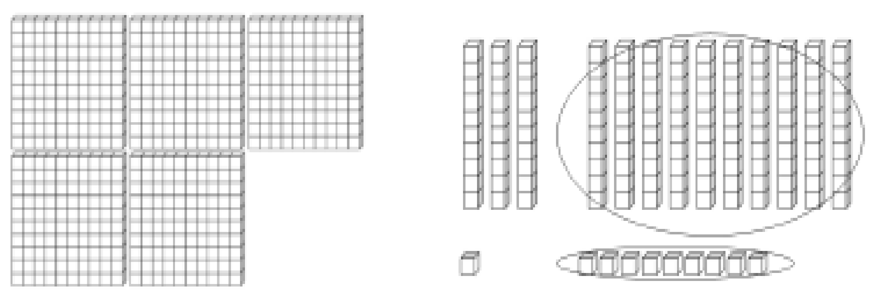
Number and Operations: TEK: 2.2	**The student applies mathematical process standards to understand how to represent and compare whole numbers, the relative position and magnitude of whole numbers, and relationships within the numeration system related to place value. The student is expected to:**
2.2(A) Use concrete and pictorial models to compose and decompose numbers up to 1,200 in more than one way as a sum of so many thousands, hundreds, tens, and ones	Compose and decompose numbers up to 1,200 Picture models Second Grade students extend their base-ten understanding to hundreds as they view 10 tens as a unit called a “hundred”. They use manipulative materials and pictorial representations to help make a connection between the written three-digit numbers and hundreds, tens, and ones.  As in First Grade, Second Graders’ understanding about hundreds also moves through several stages: **Counting By Ones**; **Counting by Groups & Singles; and Counting by Hundreds, Tens and Ones.** **Counting By Ones:** At first, even though Second Graders will have grouped objects into hundreds, tens and left-overs, they rely on counting all of the individual cubes by ones to determine the final amount. It is seen as the only way to determine how many. **Counting By Groups and Singles:** While students are able to group objects into collections of hundreds, tens and ones and now tell how many groups of hundreds, tens and left-overs there are, they still rely on counting by ones to determine the final amount. They are unable to use the groups and left-overs to determine how many.

	<u>Example:</u> **Teacher:** How many blocks do you have? **Student:** I have 3 hundreds, 4 tens and 2 left-overs. **Teacher:** Does that help you know how many? How many do you have? **Student**: Let me see. 100, 200, 300… ten, twenty, thirty, forty. So that's 340 so far. Then 2 more. 342. **Counting by Hundreds, Tens & Ones:** Students are able to group objects into hundreds, tens and ones, tell how many groups and left-overs there are, and now use that information to tell how many. Occasionally, as this stage becomes fully developed, second graders rely on counting to "really" know the amount, even though they may have just counted the total by groups and left-overs. **<u>Example:</u>** **Teacher:** How many blocks do you have? **Student:** I have 3 hundreds, 4 tens and 2 left-overs. **Teacher:** Does that help you know how many? How many do you have? **Student:** Yes. That means that I have 342. **Teacher:** Are you sure? **Student:** Um. Let me count just to make sure. 100, 200, 300,…340, 341, 342. Yes. I was right. There are 342 blocks. Understanding the value of the digits is more than telling the number of tens or hundreds. Second Grade students who truly understand the position and place value of the digits are also able to confidently model the number with some type of visual representation. Others who seem like they know, because they can state which number is in the tens place, may not truly know what each digit represents. **<u>Example: Student Mastered</u>** **Teacher:** What is this number? 726 **Student:** seven hundred twenty-six **Teacher:** Make this amount using your place value cards. **Student:** Uses 7 hundreds card, 2 ten cards and 6 singles. **Teacher:** Pointing to the 6, Can you show me where you have this? **Student:** Points to the 6 singles. **Teacher:** Pointing to the 2, Can you show me where you have this?

	Student: Points to the two tens. **Teacher**: Pointing to the 7, Can you show me where you have this? **Student:** Points to the 7 hundreds. **<u>Example: Student Not Yet Mastered</u>** **Teacher:** What is this number? 726 **Student:** Seven hundred sixteen. **Teacher:** Make this amount using your place value cards. **Student:** Uses 7 hundreds card, 2 ten cards and 6 singles. **Teacher:** Pointing to the 6, Can you show me where you have this? **Student**: Points to the 6 singles. **Teacher:** Pointing to the 2, Can you show me where you have this? **Student:** Points to two of the 6 singles (rather than two tens). Second graders extend the work from 2.NBT. to two 3-digit numbers. Students should have ample experiences using concrete materials and pictorial representations to support their work. This standard also references composing and decomposing a ten. This work should include strategies such as making a 10, making a 100, breaking apart a 10, or creating an easier problem. The standard algorithm of carrying or borrowing is not an expectation in Second Grade. Students are not expected to add and subtract whole numbers using a standard algorithm until the end of Fourth Grade. **<u>Example:</u>** **<u>354 + 287 = ___</u>**

<table>
<tr><td>Student A</td><td>I started at 354 and jumped 200. I landed on 554. I then made 8 jumps of 10 and landed on 634. I then jumped 6 to land on 640. Then I jumped 1 more and landed on 641. 354 + 287 = 641


</td></tr>
<tr><td>Student B</td><td>I used place value blocks and a place value mat. I broke all of the numbers and placed them on the place value mat.
I first added the ones.4 + 7 = 11.
I then added the tens. 50 + 80 = 130.
I then added the hundreds. 300 + 200 = 500.
I then combined my answers. 500 + 130 = 630. 630 + 11= 641.


</td></tr>
<tr><td>Student C</td><td>I used place value blocks. I made a pile of 354. I then added 287. That gave me 5 hundreds, 13 tens and 11 ones. I noticed that I could trade some pieces. I had 11 ones, and traded 10 ones for a ten. I then had 14 tens, so I traded 10 tens for a hundred. I ended up with 6 hundreds, 4 tens and 1 one. So, 354 + 287 = 641

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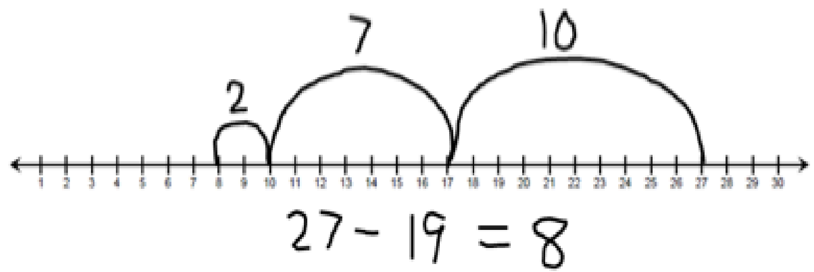
</table>

2.2(B) Use standard, word, and expanded forms to represent numbers up to 1,200;	Up to 1,200 **For example:** 951, nine hundred fifty one, 900 + 50 + 1 = 951
2.2(C) Generate a number that is greater than or less than a given whole number up to 1,200;	NEW! Student's ability to verbalize a number that is greater or less than a number previously stated up to 1,200.
2.2(D) Use place value to compare and order whole numbers up to 1,200 using comparative language, numbers, and symbols (>, <, or =);	Use comparative language (such as: greater than, less than, equal to) to 1,200 and order
2.2(E) Locate the position of a given whole number on an open number line; and	Students will use an open number line that does not have to explicitly show each marked number.

Building upon their experiences with open number lines, Second Grade students create number lines with evenly spaced points corresponding to the numbers to solve addition and subtraction problems to 100. They recognize the similarities between a number line and a ruler.

Example: **There were 27 students on the bus. 19 got off the bus. How many students are on the bus?**

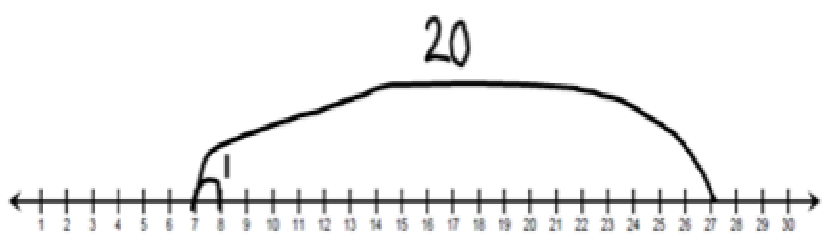
Student A: I used a number line. I started at 27. I broke up 19 into 10 and 9. That way, I could take a jump of 10. I landed on 17. Then I broke the 9 up into 7 and 2. I took a jump of 7. That got me to 10. Then I took a jump of 2. That's 8. So, there are 8 students now on the bus.

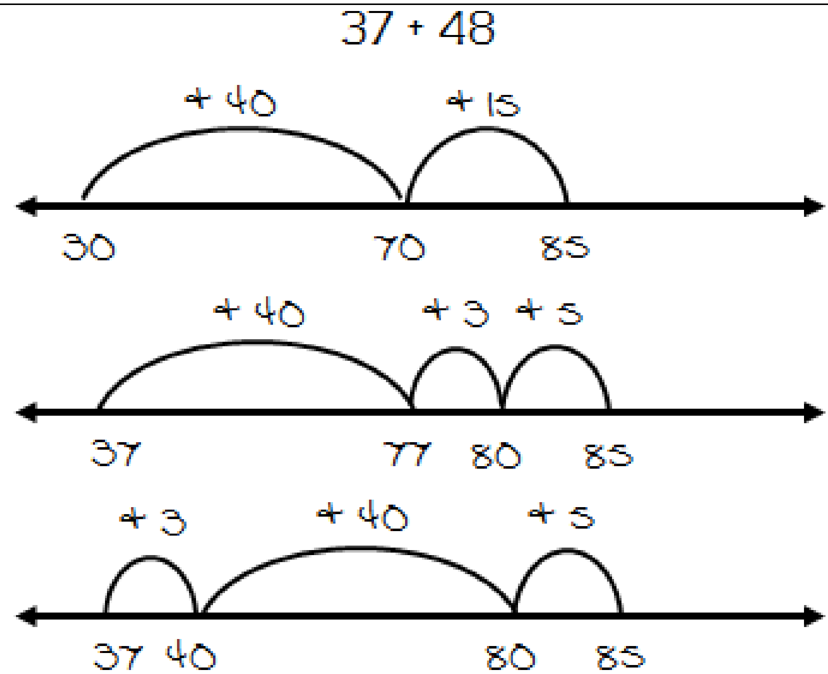


Student B: I used a number line. I saw that 19 is really close to 20. Since 20 is a lot easier to work with, I took a jump of 20. But, that was one too many. So, I took a jump of 1 to make up for the extra. I landed on 8. So, there are 8 students on the bus.

$27 - 20 = 7$

$7 + 1 = 8$



	
2.2(F) Name the whole number that corresponds to a specific point on a number line.	Open Number Line Lessons and Explanations http://www.contextsforlearning.com/samples/K3SampUnitOverFINAL.pdf http://www.uwosh.edu/coehs/cmagproject/concepts/documents/Empty_Number_Line.pdf

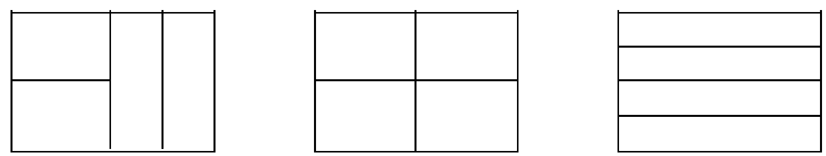
Number and operations: TEK:2.3	**The student applies mathematical process standards to recognize and represent fractional units and communicates how they are used to name parts of a whole. The student is expected to:**
2.3(A) Partition objects into equal parts and name the parts, including halves, fourths, and eighths, using words;	Partition objects…partition is a verb communicating that the child needs to be able to separate objects into equal parts. Second Grade students partition circles and rectangles into 2, 3 or 4 equal shares (regions). Students should be given ample experiences to explore this concept with paper strips and pictorial representations. Students should also work with the vocabulary terms halves, thirds, half of, third of, and fourth (or quarter) of. While students are working on this standard, teachers should help them to make the connection that a “whole” is composed of two halves, three thirds, or four fourths.

This standard also addresses the idea that equal shares of identical wholes may not have the same shape.

Example:

Teacher: Partition each rectangle into fourths a different way.

Student A: I partitioned this rectangle 3 different ways. I folded or cut the paper to make sure that all of the parts were the same size.



Teacher: In your 3 pictures, how do you know that each part is a fourth?

Student: There are four equal parts. Therefore, each part is one-fourth of the whole piece of paper.

NOTE: It is important for students to understand that fractional parts may not be symmetrical. The only criteria for equivalent fractions is that the area is equal, as illustrated in the first example above.

Example: How many different ways can you partition this 4 by 4 geoboard into fourths?

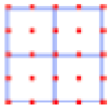
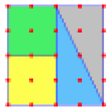
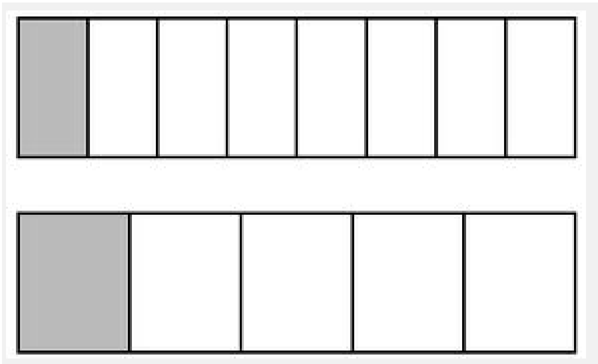
Student A: I partitioned the geoboard into four equal sized squares.

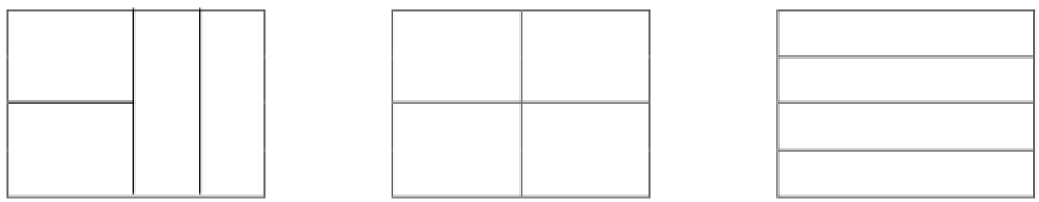
Teacher: How do you know that each section is a fourth?

Student A: Because there are four equal sized squares. That means that each piece is a fourth of the whole geoboard.

Student B: I partitioned the geoboard in half down the middle. The section on the left I divided into two equal sized squares. The other section I partitioned into two equal sized triangles.

Teacher: How do you know that each section is a fourth?

	Student B: Each section is a half of a half, which is the same as a fourth.   Such as strips, lines, regular polygons and circles AND such as “one-half” and “three- fourths”
2.3(B) Explain that the more fractional parts used to make a whole, the smaller the part; and the fewer the fractional parts, the larger the part;	Understanding the meaning of the denominator, and being able to verbalize this understanding. 
2.3(C) Use concrete models to count fractional parts beyond one whole using words and recognize how many parts it takes to equal one whole; and	Such as: “one-fourth, two-fourths, three-fourths, four-fourths, five-fourths OR one and one-fourth” AND “four fourths = one whole” Once students understand how fractional parts (e.g., thirds, fourths, fifths) are named, they can count these parts in much the same way as they would count other objects (e.g., “One fourth, two fourths, three fourths, four fourths, five fourths”). Activities in which students count fractional parts help them develop an understanding of fractional quantities greater than one whole. Such activities give students experience in representing improper fractions concretely and allow them to observe the relationship between improper fractions and the whole (e.g., that five fourths is the same as one whole and one fourth). Activities for breaking up fractional parts 4-6

	http://www.eworkshop.on.ca/edu/resources/guides/NSN_vol_5_Fractions.pdf
2.3(D) Identify examples and non-examples of halves, fourths, and eighths	Second grade students partition circles and rectangles into 2, 3 or 4 equal shares (regions). Students should be given ample experiences to explore this concept with paper strips and pictorial representations. Students should also work with the vocabulary terms halves, thirds, half of, third of, and fourth (or quarter) of. While students are working on this standard, teachers should help them to make the connection that a "whole" is composed of two halves, three thirds, or four fourths. This standard also addresses the idea that equal shares of identical wholes may not have the same shape. Example: **Teacher**: Partition each rectangle into fourths a different way. **Student A**: I partitioned this rectangle 3 different ways. I folded or cut the paper to make sure that all of the parts were the same size.  **Teacher:** In your 3 pictures, how do you know that each part is a fourth? **Student:** There are four equal parts. Therefore, each part is one-fourth of the whole piece of paper. NOTE: It is important for students to understand that fractional parts may not be symmetrical. The only criteria for equivalent fractions is that the area is equal, as illustrated in the first example above.

Number and operations: **TEK: 2.4**	**The student applies mathematical process standards to develop and use strategies and methods for whole number computations in order to solve addition and subtraction problems with efficiency and accuracy. The student is expected to:**
2.4(A) Recall basic facts to add and subtract within 20 with automaticity;	Automaticity - No manipulatives or fingers Building upon their work in First Grade, Second Graders use various addition and subtraction strategies in order to fluently add and subtract within 20: **1.OA.6** <u>Mental Strategies</u> • Counting on • Making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14) • Decomposing a number leading to a ten (e.g., 13 – 4 = 13 – 3 – 1 = 10 – 1 = 9) • Using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 – 8 = 4) • Creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12, 12 + 1 = 13 Second Graders internalize facts and develop fluency by repeatedly using strategies that make sense to them. When students are able to demonstrate fluency they are accurate, efficient, and flexible. Students must have efficient strategies in order to know sums from memory. Research indicates that teachers can best support students' memory of the sums of two one-digit numbers through varied experiences including making 10, breaking numbers apart, and working on mental strategies. These strategies replace the use of repetitive timed tests in which students try to memorize operations as if there were not any relationships among the various facts. When teachers teach facts for automaticity, rather than memorization, they encourage students to think about the relationships among the facts. (Fosnot & Dolk, 2001) It is no accident that the standard says "know from memory" rather than "memorize". The first describes an outcome, whereas the second might be seen as describing a method of achieving that outcome. So no, the standards are not dictating timed tests. (McCallum, October 2011)

	Example: 9 + 5= __ **Student A** *Counting On* I started at 9 and then counted 5 more. I landed on 14. **Student B** *Decomposing a Number-Leading to a Ten* I know that 9 and 1 is 10, so I broke 5 into 1 and 4. 9 plus 1 is 10. Then I have to add 4 more, which is 14. **Example:** 13 - 9 = __ **Student A** *Using the Relationship between Addition and Subtraction* I know that 9 plus 4 equals 13. So 13 minus 9 is 4. **Student B** *Creating an Easier Problem* Instead of 13 minus 9, I added 1 to each of the numbers to make the problem 14 minus 10. I know the answer is 4. So 13 minus 9 is also 4.

2.4(B) Add up to four two-digit numbers and subtract two-digit numbers using mental strategies and algorithms based on knowledge of place value and properties of operations;	Four two digit numbers-(e.g. 25+42+17+10) Second Grade students add a string of two-digit numbers (up to four numbers) by applying place value strategies and properties of operations. **Example:** 43 + 34 + 57 + 24 = __ **Student A** *Associative Property* I saw the 43 and 57 and added them first. I know 3 plus 7 equals 10, so when I added them 100 was my answer. Then I added 34 and had 134. Then I added 24 and had 158. 43 + 57 + 34 + 24 = 158 **Student B** *Place Value Strategies* I broke up all of the numbers into tens and ones. First I added the tens. 40 + 30 + 50 + 20 = 140. Then I added the ones. 3 + 4 + 7 + 4 = 18. That meant I had 1 ten and 8 ones. So, 140 + 10 is 150. 150 and 8 more is 158. So, 43 + 34 + 57 + 24 = 158 **Student C** *Place Value Strategies and Associative Property* I broke up all the numbers into tens and ones. First I added up the tens. 40 + 30 + 50 + 20. I changed the order of the numbers to make adding easier. I know that 30 plus 20 equals 50 and 50 more equals 100. Then I added the 40 and got 140. Then I added up the ones. 3 + 4 + 7 + 4. I changed the order of the numbers to make adding easier. I know that 3 plus 7 equals 10 and 4 plus 4 equals 8. 10 plus 8 equals 18. I then combined my tens and my ones. 140 plus 18 (1 ten and 8 ones) equals 158.
2.4(C) Solve one-step and multi-step word problems involving addition and subtraction within 1,000 using a variety of strategies based on place value, including algorithms; and	Within 1,000, using a variety of strategies Algorithms-a process for solving a problem Second Grade students extend their work with addition and subtraction word problems in two major ways. First, they represent and solve word problems within 100, building upon their previous work to 20. In addition, they represent and solve one and two-step word problems of all three types (Result Unknown, Change Unknown, Start Unknown). Please see **Table 1** at end of document for examples of all problem types.

One-step word problems use one operation. Two-step word problems use two operations which may include the same operation or opposite operations.

One Step Word Problem One Operation	**Two-Step Word Problem** Two Operations, Same	**Two-Step Word Problem** Two Operations, Opposite
There are 15 stickers on the page. Brittany put some more stickers on the page. There are now 22 stickers on the page. How many stickers did Brittany put on the page? 15 + □ = 22 22 – 15 = □	There are 9 blue marbles and 6 red marbles in the bag. Maria put in 8 more marbles. How many marbles are in the bag now? 9 + 6 + 8 = □	There are 9 peas on the plate. Carlos ate 5 peas. Mother put 7 more peas on the plate. How many peas are on the plate now? 9 –5 + 7 = □

Two-Step Problems: Because Second Graders are still developing proficiency with the most difficult subtypes (shaded in white in Table 1 at end of the glossary): *Add To/Start Unknown; Take From/Start Unknown; Compare/Bigger Unknown; and Compare/Smaller Unknown*, two-step problems do **not** involve these sub-types (Common Core Standards Writing Team, May 2011). Furthermore, most two-step problems should focus on single-digit addends since the primary focus of the standard is the problem-type.

2nd Grade Mathematics ●

As second grade students solve one- and two-step problems they use manipulatives such as snap cubes, place value materials (groupable and pre-grouped), ten frames, etc.; create drawings of manipulatives to show their
thinking; or use number lines to solve and describe their strategies. They then relate their drawings and materials to equations. By solving a variety of addition and subtraction word problems, second grade students determine the unknown in all positions (*Result* unknown, *Change* unknown, and *Start* unknown). Rather than a letter ("*n*"), boxes or pictures are used to represent the unknown number. For example:

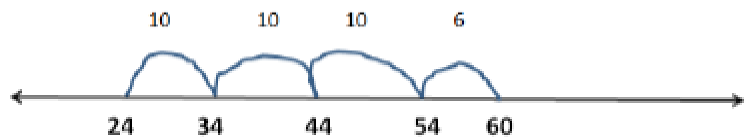
Problem Type: Add To		
Result Unknown: There are 29 students on the playground. Then 18 more students showed up. *How many students are there now?* 29 + 18 = □	*Change* Unknown: There are 29 students on the playground. *Some more students show up*. There are now 47 students. How many students came? 29 +  = 47	*Start* Unknown: *There are some students on the playground*. Then 18 more students came. There are now 47 students. How many students were on the playground at the beginning? □ + 18 = 47

Second Graders use a range of methods, often mastering more complex strategies such as making tens and doubles and near doubles for problems involving addition and subtraction within 20. Moving beyond counting and counting-on, second grade students apply their understanding of place value to solve problems.

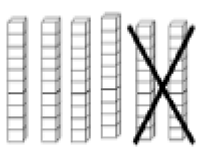
One-Step Example:

Some students are in the cafeteria. 24 more students came in. Now there are 60 students in the cafeteria. How many were in the cafeteria to start with? Use drawings and equations to show your thinking.

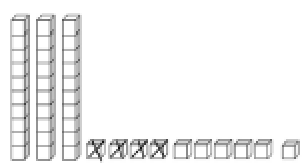
Student A: I read the equation and thought about how to write it with numbers. I thought, “What and 24 makes 60?” So, my equation for the problem is □ + 24 = 60. I used a number line to solve it. I started with 24. Then I took jumps of 10 until I got close to 60. I landed on 54. Then, I took a jump of 6 to get to 60. So, 10 + 10 + 10 + 6 = 36. So, there were 36 students in the cafeteria to start with.



Student B: I read the equation and thought about how to write it with numbers. I thought, “There are 60 total. I know about the 24. So, what is 60 – 24?” So, my equation for the problem is 60 – 24 = □ I used place value blocks to solve it.
I started with 60 and took 2 tens away.



I needed to take 4 more away. So, I broke up a ten into ten ones. Then, I took 4 away.



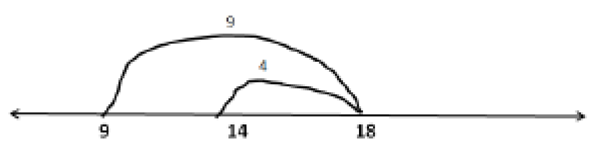
That left me with 36. So, 36 students were in the cafeteria at the beginning. 60 – 24 = 36

Two-Step Example:

There are 9 students in the cafeteria. 9 more students come in. After a few minutes, some students leave. There are now 14 students in the cafeteria. How many students left the cafeteria? Use drawings and equations to show your thinking.

Student A

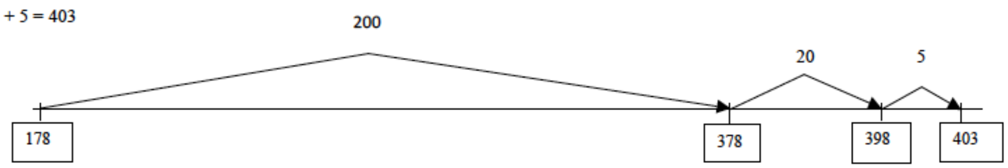
I read the equation and thought about how to write it with numbers: 9 + 9 - □ = 14. I used a number line to solve it. I started at 9 and took a jump of 9. I landed on 18. Then, I jumped back 4 to get to 14. So, overall, I took 4 jumps. 4 students left the cafeteria.



Student B

I read the equation and thought about how to write it with numbers: 9 + 9 - □ = 14. I used doubles to solve it. I thought about double 9s. 9 + 9 is 18. I knew that I only needed 14. So, I took 4 away, since 4 and 4 is eight.

So, 4 students left the cafeteria.

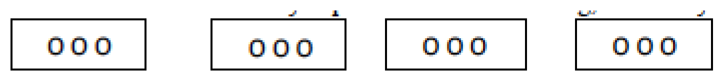
2.4(D) generate and solve problem situations for a given mathematical number sentence involving addition and subtraction of whole numbers within 1,000.	Within 1,000 **Example:** The re are 178 fourth graders and 225 fifth graders on the playground. What is the total number of students on the playground? Student 1 100 + 200 = 300 70 + 20 = 90 8 + 5 = 13 300 + 90 + 13 = 403 students Student 2 I added 2 to 178 to get 180. I added 220 to get 400. I added the 3 left over to get 403. Student 3 I know the 75 plus 25 equals 100. I then added 1 hundred from 178 and 2 hundreds from 275. I had a total of 4 hundreds and I had 3 more left to add. So I have 4 hundreds plus 3 more which is 403. Student 4 178 + 225 = ? 178 + 200 = 378 378 + 20 = 398 398 + 5 = 403 

Number and operations: **TEKS: 2.5**	**The student applies mathematical process standards to determine the value of coins in order to solve monetary transactions. The student is expected to:**
2.5(A) Determine the value of a collection of coins up to one dollar; and	For these values to make sense, students must have an understanding of 5, 10, and 25. More than that, they need to be able to think of these quantities without seeing countable objects… A child whose number concepts remain tied to counts of objects [one object is one count] is not going to be able to understand the value of coins. *Van de Walle & Lovin, p. 150, 2006*

	Just as students learn that a number (38) can be represented different ways (3 tens and 8 ones; 2 tens and 18 ones) and still remain the same amount (38), students can apply this understanding to money. For example, 25 cents can look like a quarter, two dimes and a nickel, and it can look like 25 pennies, and still all remain 25 cents. This concept of equivalent worth takes time and requires numerous opportunities to create different sets of coins, count sets of coins, and recognize the "purchase power" of coins (a nickel can buy the same things a 5 pennies). As teachers provide students with sufficient opportunities to explore coin values (25 cents) and actual coins (2 dimes, 1 nickel), teachers will help guide students over time to learn how to mentally give each coin in a set a value, place the random set of coins in order, and use mental math, adding on to find differences, and skip counting to determine the final amount. **Example:** **How many different ways can you make 37¢ using pennies, nickels, dimes, and quarters?** **Example:** **How many different ways can you make 12 dollars using $1, $5, and $10 bills?**
2.5(B) Use the cent symbol, dollar sign, and the decimal point to name the value of a collection of coins.	

Number and operations: **TEKS:2.6**	**The student applies mathematical process standards to connect repeated addition and subtraction to multiplication and division situations that involve equal groupings and shares. The student is expected to:**
2.6(A) Model, create, and describe contextual multiplication situations in which equivalent sets of concrete objects are joined; and	Contextual Situations-within a word problem This standard interprets products of whole numbers. Students recognize multiplication as a means to determine the total number of objects when there are a specific number of groups with the same number of objects in each group or of an equal amount of objects were added or collected numerous times. Multiplication requires students to think in terms of groups of things rather than individual things.

	Students learn that the multiplication symbol ‘x’ means “groups of” and problems such as 5 x 7 refer to 5 groups of 7. A major conceptual challenge when teaching multiplication to children is helping them understand that multiplication has a variety of meanings and is not just a sequence of isolated facts. Providing experiences with the different meanings of multiplication, especially in contextual situations, is extremely useful. ***Example*** *of equal grouping model: Repeated addition* There are eight crayons in a box. How many crayons are there in three boxes? 8+8+8 ***Example*** *of multiplicative comparison model* Mark has eight marbles. His brother has three times as many marbles. How many marbles does Mark’s brother have? ***Example*** *of rate model* Josh walks three miles an hour. How many miles does he walk in eight hours? ***Example*** *of Cartesian product model* Judy’s Cafe offers three main courses and 5 side dishes. A customer can order the Bargain Dinner by selecting one main dish and one side dish. How many different Bargain Dinners are possible? ***Example*** *of area model* A sheet of wrapping paper is three feet wide and eight feet long. What is the area of the sheet of paper?

2.6(B) Model, create, and describe contextual division situations in which a set of concrete objects is separated into equivalent sets.	Contextual Situations-within a word problem This standard focuses on two distinct models of division: partition models and measurement (repeated subtraction) models. Partition models provide students with a total number and the number of groups. These models focus on the question, “How many objects are in each group so that the groups are equal?” A context for partition models would be: There are 12 cookies on the counter. If you are sharing the cookies equally among three bags, how many cookies will go in each bag? Measurement (repeated subtraction) models provide students with a total number and the number of objects in each group. These models focus on the question, “How many equal groups can you make?” A context for measurement models would be: There are 12 cookies on the counter. If you put 3 cookies in each bag, how many bags will you fill?  *Because of the relationship between multiplication and division, division problems can occur in each of the above contexts. When the context is equal groupings, the problem can be categorized as either partitive division (fair- sharing) or measurement division (repeated subtraction).*

Algebraic reasoning: TEKS:2.7	**The student applies mathematical process standards to identify and apply number patterns within properties of numbers and operations in order to describe relationships. The student is expected to:**
2.7(A) Determine whether a number up to 40 is even or odd using pairings of objects to represent the number;	Using pairing of objects to represent the number. Second graders apply their work with doubles to the concept of odd and even numbers. Students should have ample experiences exploring the concept that if a number can be decomposed (broken apart) into two equal addends or doubles addition facts (e.g., 10 = 5 + 5), then that number (10 in this case) is an even number. Students should explore this concept with concrete objects (e.g., counters, cubes, etc.) before moving towards pictorial representations such as circles or arrays.

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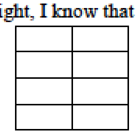
Example:
Is 8 an even number? Justify your thinking.

Student A
I grabbed 8 counters. I paired counters up into groups of 2. Since I didn't have any counters left over, I know that 8 is an even number.

Student B
I grabbed 8 counters. I put them into 2 equal groups. There were 4 counters in each group, so 8 is an even number.

Student C
I drew 8 boxes in a rectangle that had two columns. Since every box on the left matches a box on the right, I know that 8 is even.



Student D
I drew 8 circles. I matched one on the left with one on the right. Since they all match up I know that 8 is an even number.

Student E
I know that 4 plus 4 equals 8. So 8 is an even number.

The focus of this standard is on the conceptual understanding of even and odd numbers. An even number is an amount that can be made of two equal parts with no leftovers. An odd number is one that is not even or cannot be made of two equal parts. The number endings of 0, 2, 4, 6, and 8 are only an interesting and useful pattern or observation and should not be used as the definition of an even number. *(Van de Walle & Lovin, 2006, p. 292)*

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<td>2.7(B) Use an understanding of place value to determine the number that is 10 or 100 more or less than a given number up to 1,200; and</td>
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Up to 1,200

Second Grade students mentally add or subtract either 10 or 100 to any number between 100 and 1200. As teachers provide ample experiences for students to work with pre-grouped objects and facilitate discussion, second graders realize that when one adds or subtracts 10 or 100 that only the tens place or the digit in the hundreds place changes by 1. As the teacher facilitates opportunities for patterns to emerge and be discussed, students notice the patterns and connect the digit change with the amount changed.

Opportunities to solve problems in which students cross hundreds are also provided once students have become comfortable adding and subtracting within the same hundred.

Examples: *Within the same hundred*

What is 10 more than 218?

What is 241 – 10?

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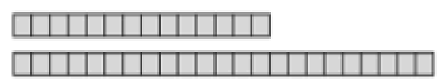
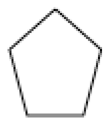
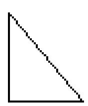
	Examples: *Across hundreds* **293 + 10 = ☐** **What is 10 less than 206?** This standard focuses only on adding and subtracting 10 or 100. Multiples of 10 or multiples of 100 can be explored; however, the focus of this standard is to ensure that students are proficient with adding and subtracting 10 and 100 mentally.
2.7(C) Represent and solve addition and subtraction word problems where unknowns may be any one of the terms in the problem.	Second grade students apply the concept of length to solve addition and subtraction word problems with numbers within 100. Students should use the same unit of measurement in these problems. Equations may vary depending on students' interpretation of the task. Notice in the examples below that these equations are similar to those problem types in Table 1 at the end of this document. Example: **In P.E. class Kate jumped 14 inches. Mary jumped 23 inches. How much farther did Mary jump than Kate? Write an equation and then solve the problem.** **Student A** My equation is 14 + __ = 23 since I thought, "14 and what makes 23?". I used Unifix cubes. I made a train of 14. Then I made a train of 23. When I put them side by side, I saw that Kate would need 9 more cubes to be the same as Mary. So, Mary jumped 9 more inches than Kate. 14 + **9** = 23.  **Student B** My equation is 23 - 14 = __ since I thought about what the difference was between Kate and Mary. I broke up 14 into 10 and 4. I know that 23 minus 10 is 13. Then, I broke up the 4 into 3 and 1. 13 minus 3 is 10. Then, I took one more away. That left me with 9. So, Mary jumped 9 more inches than Kate. That seems to make sense since 23 is almost 10 more than 14. 23 – 14 = **9**. 23 – 10 = 13 13 – 3 = 10 10 – 1 = 9

Geometry and Measurement TEK 2.8	The student applies mathematical process standards to analyze attributes of two-dimensional shapes and three-dimensional solids to develop generalizations about their properties. The student is expected to:
2.8(A) Create two-dimensional shapes based on given attributes, including number of sides and vertices;	Second Grade students identify (recognize and name) shapes and draw shapes based on a given set of attributes. These include triangles, quadrilaterals (squares, rectangles, and trapezoids), pentagons, hexagons and cubes. Example: **Teacher**: Draw a closed shape that has five sides. What is the name of the shape? **Student**: I drew a shape with 5 sides. It is called a pentagon.  Example: **Teacher:** I have 3 sides and 3 angles. What am I? **Student**: A triangle. See, 3 sides, 3 angles. 

2.8(B) Classify and sort three-dimensional solids, including spheres, cones, cylinders, rectangular prisms (including cubes as special rectangular prisms), and triangular prisms, based on attributes using formal geometric language;	Second graders need to be able to identify 2 - 3 dimensional figures and arrange these figures by common attributes. Attributes usually include the number of sides, vertices, edges, faces. Students need to be able to use vocabulary of the tek: 3-dimensional, sphere, cone, cylinder, rectangular prism, triangular prism, side, vertices, edges, faces
2.8(C) Classify and sort polygons with 12 or fewer sides according to attributes, including identifying the number of sides and number of vertices;	Students need to be able to name polygons (such as triangles, quadrilaterals, pentagons, hexagons, and octagons) as well as understand the meaning of sides and vertices Polygon Game: http://www.math-play.com/Polygon-Game.html
2.8(D) Compose two-dimensional shapes and three-dimensional solids with given properties or attributes; and	Such as: Build a rectangle out of unit squares or build a rectangular prism out of unit cubes. Composing instead of "describing how." Second graders must create the solids using materials such as: centimeter cubes, pattern blocks, tooth picks & marshmallows, straws & playdo, linker cubes
2.8(E) Decompose two-dimensional shapes such as cutting out a square from a rectangle, dividing a shape in half, or partitioning a rectangle into identical triangles and identify the resulting geometric parts.	Making new shapes into other shapes… Vocabulary is important; Students will need to understand what compose and decompose mean; Have students start with composing (putting together) shapes using centimeter cubes, pattern blocks and then decompose the shapes. Example lesson: https://www.juab.k12.ut.us/index.php?option=com_content&view=article&id=1159:2nd-grade-geometry-lesson-plan-composing-a-decomposing-shapes&catid=66:grammar&Itemid=58

Geometry and measurement: **TEK 2.9**	**The student applies mathematical process standards to select and use units to describe length, area, and time. The student is expected to:**
2.9(A) Find the length of objects using concrete models for standard units of length;	Measurement is used to understand and describe the world including sports, construction, and explaining the environment. Students recognize the need for standard units of measure. Example: **Who is taller?** **Student**: Let's stand back to back and compare our heights. Look! I'm taller!

	Example: **Find at least 3 objects in the classroom that are the same length as, longer than, and shorter than your forearm.** Sometimes, a third object can be used as an intermediary, allowing *indirect* comparison. For example, if we know that Aleisha is taller than Barbara and that Barbara is taller than Callie, then we know (due to the transitivity of "taller than') that Aleisha is taller than Callie, even if Aleisha and Callie never stand back to back. This concept is referred to as the transitivity principle for indirect measurement. Example: **The snake handler is trying to put the snakes in order- from shortest to longest. She knows that the red snake is longer than the green snake. She also knows that the green snake is longer than the blue snake. What order should she put the snakes?** **Student**: Ok. I know that the red snake is longer than the green snake and the blue snake because, since it's longer than the green, that means that it's also longer than the blue snake. So the longest snake is the red snake. I also know that the green snake and red snake are both longer than the blue snake. So, the blue snake is the shortest snake. That means that the green snake is the medium sized snake.
2.9(B) Describe the inverse relationship between the size of the unit and the number of units needed to equal the length of an object;	The instructional progression for teaching measurement begins by ensuring that students can perform direct comparisons. Then children should engage in experiences that allow them to connect number to length, using manipulative units that have a standard unit of length, such as centimeter cubes. These can be labeled "length units" with the students. Students learn to lay such physical units end-to-end and count them to measure a length. They compare the results of measuring to direct and indirect comparisons. Such as: the longer the unit, the fewer needed; the shorter the unit, the more needed The smaller the unit, the more you will have when measuring something that is larger…
2.9(C) Represent whole numbers as distances from any given location on a number line;	The number line constitutes a unifying and coherent representation for the different sets of numbers which other models cannot do. The many uses of the number line were introduced only a few years ago, in part resulting from research at the Freudenthal Institute. Most teachers are familiar only with the traditional number line with the whole counting numbers already in place. Using this model to actually build conceptual understanding of a variety of standards will be challenging.
2.9(D) Determine the length of an object to the nearest marked unit using rulers, yardsticks, meter sticks, or measuring tapes;	Second Graders build upon their non-standard measurement experiences in First Grade by measuring in standard units for the first time. Using both customary (inches and feet) and metric (centimeters and meters) units, Second Graders select an attribute to be measured (e.g., length of classroom), choose an appropriate unit of measurement (e.g., yardstick), and determine the number

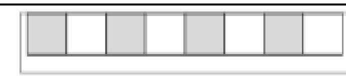
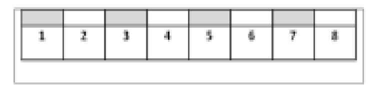
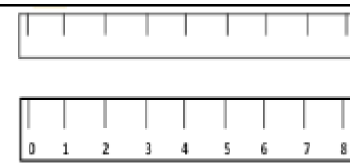
of units (e.g., yards). As teachers provide rich tasks that ask students to perform real measurements, these foundational understandings of measurement are developed:

Understand that larger units (e.g., yard) can be subdivided into equivalent units (e.g., inches) (partition)

Understand that the same object or many objects of the same size such as paper clips can be repeatedly used to determine the length of an object (iteration).

Understand the relationship between the size of a unit and the number of units needed (compensatory principal). Thus, the smaller the unit, the more units it will take to measure the selected attribute.

When Second Grade students are provided with opportunities to create and use a variety of rulers, they can connect their understanding of non-standard units from First Grade to standard units in second grade. For example:

By helping students progress from a "ruler" that is blocked off into colored units (no numbers)…	
…to a "ruler" that has numbers along with the colored units…	
…to a "ruler" that has inches (centimeters) with and without numbers, students develop the understanding that the numbers on a ruler do not count the individual marks but indicate the spaces (distance) between the marks. This is a critical understand students need when using such tools as rulers, yardsticks, meter sticks, and measuring tapes.	

By the end of Second Grade, students will have also learned specific measurements as it relates to feet, yards and meters:

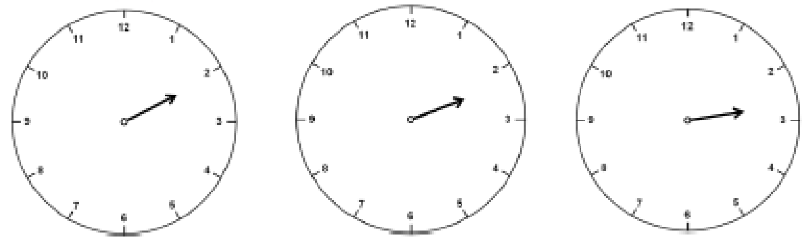
There are 12 inches in a foot.

There are 3 feet in a yard.

There are 100 centimeters in a meter.

2.9(E) determine a solution to a problem involving length, including estimating lengths;	Second Grade students estimate the lengths of objects using inches, feet, centimeters, and meters prior to measuring. Estimation helps the students focus on the attribute being measured and the measuring process. As

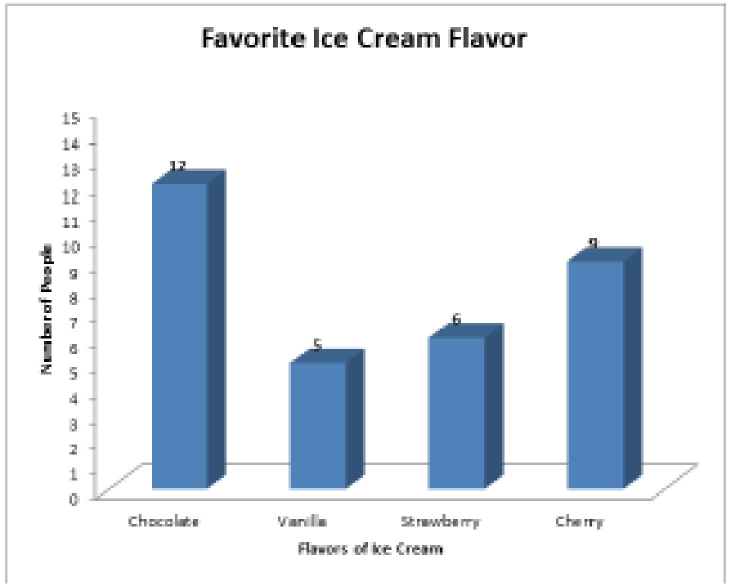
	students estimate, the student has to consider the size of the unit- helping them to become more familiar with the unit size. In addition, estimation also creates a problem to be solved rather than a task to be completed. Once a student has made an estimate, the student then measures the object and reflects on the accuracy of the estimate made and considers this information for the next measurement. **<u>Example</u>:** **Teacher**: How many inches do you think this string is if you measured it with a ruler? **Student**: An inch is pretty small. I'm thinking it will be somewhere between 8 and 9 inches. **Teacher**: Measure it and see. **Student**: It is 9 inches. I thought that it would be somewhere around there.
2.9(F) Use concrete models of square units to find the area of a rectangle by covering it with no gaps or overlaps, counting to find the total number of square units, and describing the measurement using a number and the unit; and	Students will recognize area as an attribute of plane figures and understand concepts of area measurement, such as 24 square units.
2.9(G) Read and write time to the nearest one-minute increment using analog and digital clocks and distinguish between a.m. and p.m.	Learning to tell time is challenging for children. In order to read an analog clock, they must be able to read a dial-type instrument. Furthermore, they must realize that the hour hand indicates broad, approximate time while the minute hand indicates the minutes in between each hour. As students experience clocks with only hour hands, they begin to realize that when the time is two o'clock, two-fifteen, or two forty-five, the hour hand looks different- but is still considered "two". Discussing time as "about 2 o'clock", "a little past 2 o'clock", and "almost 3 o'clock" helps build vocabulary to use when introducing time to the nearest minute.

	 All of these clocks indicte the hour of "two", although they look slightly different. This is an important idea for students as they learn to tell time.

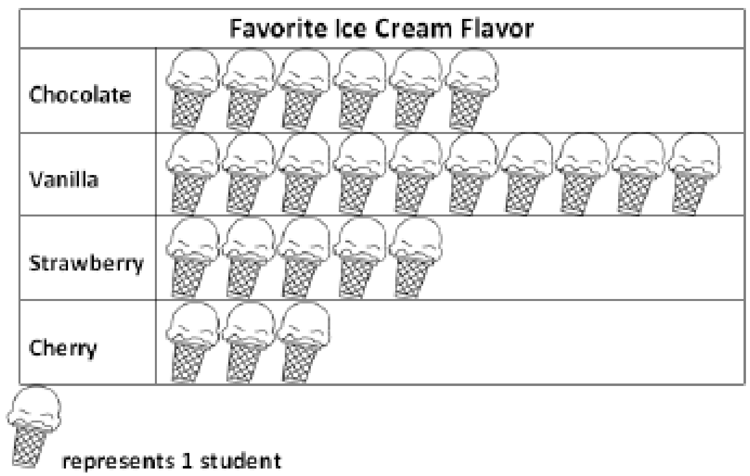
Data Analysis: **TEK:2.10**	**The student applies mathematical process standards to organize data to make it useful for interpreting information and solving problems. The student is expected to:**
2.10(A) Explain that the length of a bar in a bar graph or the number of pictures in a pictograph represents the number of data points for a given category;	**New** Pictograph term
2.10(B) Organize a collection of data with up to four categories using pictographs and bar graphs with intervals of one or more;	Construction to organization of data In Second Grade, students pose a question, determine up to 4 categories of possible responses, collect data, represent data on a picture graph or bar graph, and interpret the results. This is an extension from first grade when students organized, represented, and interpreted data with up to three categories. They are able to use the graph selected to note particular aspects of the data collected, including the total number of responses, which category had the most/least responses, and interesting differences/similarities between the four categories. They then solve simple one-step problems using the information from the graph. **Example**: The Second Graders were responsible for purchasing ice cream for an Open House event at school. They decided to collect data to determine which flavors to buy for the event. As a group, the students decided on the question, "What is your favorite flavor of ice cream?" and 4 likely responses, "chocolate", "vanilla", "strawberry", and "cherry".

	The students then divided into teams and collected data from different classes in the school. Each team decided how to keep track of the data. Most teams used tally marks to keep up with the responses. A few teams used a table and check marks. When back in the classroom, each team organized their data by totaling each category in a chart or table. Team A's data was as follows: **Flavor** / **Number of People**: Chocolate 12; Vanilla 5; Strawberry 6; Cherry 9 Each team selected either a picture graph or a bar graph to display their data and created it using either paper or the computer. Team A and Team B graphs are provided here: **Team A:** Bar Graph

Flavor	Number of People
Chocolate	12
Vanilla	5
Strawberry	6
Cherry	9



Team B: Picture Graph



2.10(C) Write and solve one-step word problems involving addition or subtraction using data represented within pictographs and bar graphs with intervals of one; and	Write word problems based on your graphs
2.10(D) Draw conclusions and make predictions from information in a graph.	Students will need to be able to interpret information presented in graph format. example of lesson: Lucy's Lemonade Stand powerpoint https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=

Personal financial literacy: **TEK 2.11**	**The student applies mathematical process standards to manage one's financial resources effectively for lifetime financial security. The student is expected to:**
2.11(A) Calculate how money saved can accumulate into a larger amount over time;	Patterns in real life Read the story Spend or Save. see activity ideas at website that follows: http://ecedweb.unomaha.edu/lessons/savek-2.pdf Sample Lessons: http://smartertexas.org/?page_id=914
2.11(B) Explain that saving is an alternative to spending;	Taught in social studies Sample Lessons: http://smartertexas.org/?page_id=914
2.11(C) Distinguish between a deposit and a withdrawal;	Students will need to understand the definitions of deposit and withdrawals. online banking for kids: http://educatorstudio.com/lessons/online-banking-kids-with-zefty Sample Lessons: http://smartertexas.org/?page_id=914
2.11(D) Identify examples of borrowing and distinguish between responsible and irresponsible borrowing;	Students will need to define the terms responsible borrowing and irresponsible borrowing. Teachers could help students make connection to borrowing library books and returning them

	Sample Lessons: http://smartertexas.org/?page_id=914
2.11(E) Identify examples of lending and use concepts of benefits and costs to evaluate lending decisions; and	Students need to be able to define lending and loans. Students will need to be able to make decisions about the wisdom of taking and making a loan. Sample Lessons: http://smartertexas.org/?page_id=914
2.11(F) Differentiate between producers and consumers and calculate the cost to produce a simple item.	Students need to know the difference between a producer and consumer. Calculate the cost to produce a simple item, such as, a shirt, a pitcher of lemonade, or a class art project Sample Lessons: http://smartertexas.org/?page_id=914