Core Content

Cluster Title: Add and subtract within twenty.
Standard 5: Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).
MASTERY Patterns of Reasoning:
Conceptual: Students will understand counting on to solve addition problems. Students will understand counting backward to solve subtraction problems. **Procedural:** Students can use the strategy of counting on to solve addition. Students can use the strategy of counting backward to solve subtraction problems. **Representational:** Students can model counting on and counting back to solve sums and differences.

Supports for Teachers

Critical Background Knowledge
Conceptual: Students will have number sense. Students will know how to count to 20. Students will know how to count forward and backward. **Procedural:** Student can recognize numerals 0-20. Student can demonstrate counting forward and backward using manipulatives. **Representational:** Student can model counting forward and backward in math facts up to 20.

Academic Vocabulary and Notation	
counting forward, counting backward, numerals	
Instructional Strategies Used	**Resources Used**
Teacher may begin instruction by modeling a guided practice for addition and subtraction problem. Then continue the guided practice by using students to relate counting to math problems. Next, allow the students to practice problems independently by counting strategies. <u>Get on the Bus!</u> Line up chairs like seats on a bus. You can act as the bus driver and sit in the front. You can even use a hoop or a plate as the steering wheel. Then have a group of students get on the bus. Pretend to pick up 1, 2, or 3 more students. As the bus driver, ask the class to find out how many people are on the bus. "There were 5 students on the bus, and then 2 more students got on. How many students are on the bus now?" Have volunteers write a number sentence on the board. Continue with more examples and have other students take the driver's seat and create the story problem. <u>Math Stories</u> Choose an addition number sentence, such as 8 + 2 = 10. Then challenge your students to write or tell a story that describes the number sentence. You can provide a model, such as "Once upon a time there were 8 mice who lived in a forest. One day, 2 mice from the city came to visit. All the mice had a picnic together. The 10 mice had fun playing." Encourage your students to be creative. You may wish to have small groups or pairs create a story together and act it out in front of the class.	Barbieri McGrath, Barbara. *The M&M's Brand Chocolate Candies Counting Board Book.* Charlesbridge Publishing, 1997. Hutchings, Amy. *The Gummy Candy Counting Book (Read with Me Cartwheel Books (Scholastic Paperback)).* Cartwheel, 1997. Rhodes, Immacula. *Shoe Box Learning Centers: Counting: 30 Instant Centers with Reproducible Templates and Activities That Help Kids Practice Important Math Skills—Independently! (Shoe Box Learning Centers).* Scholastic, Inc., 2005. Join Them Together/Take Them Away: http://www.learnnc.org/lp/pages/3649 Counting Back and Counting On: http://illuminations.nctm.org/LessonDetail.aspx?ID=L35

<u>What's in the Bag?</u> Give small groups a lunch bag. Have one student put counters inside the bag and write the number on the front of the bag. Then have him/her present 0, 1, 2, or 3 additional counters. Have other students add to find the sum. The bag prevents students from counting each item one by one. Have group members work together to find the sum and use different strategies. You may want to provide number lines or hundred charts to help students add. Then have students swap roles until everyone has had a chance to put counters into the bag. <u>Snacking On 1, 2, or 3</u> Almost every meal is an opportunity to have fun with math. Provide a small group of healthful snacks such as raisins, grapes, pretzels, or nuts. Present a group of raisins to a child and have him/her count on 1, 2, or 3 raisins to find the total. Write the number sentence together. You may want to let a child write the number sentence in yogurt on a plate, then wipe it away with the counters and eat them all as a snack. <u>May I Have One More?</u> Form a group of treats or toys and count them together. Then ask a child, "May I have one more, please?" Have the child add to the group and count up by one. You can repeat the activity asking for two or three more. Then you can switch roles with the child.	

Assessment Tasks Used	
Skill-Based Task: *Addition:* Example: Given number 8, count on to 11. 8, _, _, 11 (counting on using manipulatives, representations, etc.) *Subtraction:* Example: Given number 11, count back to 8. 11, _, _, 8 (counting back using manipulatives, representations, etc.)	**Problem Task:** Refer to examples in the instructional samples and assess separately.

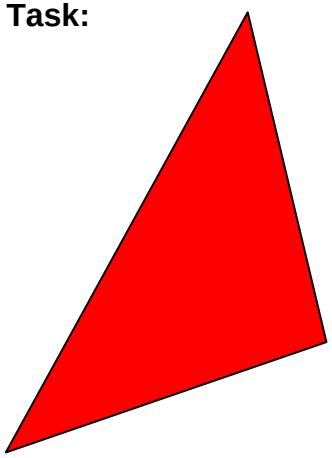
Core Content

Cluster Title: Reason with shapes and their attributes.
Standard 1: Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes.
MASTERY Patterns of Reasoning:
Conceptual: Students will understand the definition of an attribute. Students will understand that the defining attributes of shapes include number of sides, number of angles, etc. Students will understand that non-defining attributes of shapes include color, overall size, orientation, etc. **Procedural:** Students can identify and describe the defining attributes of triangles, circles, rectangles, trapezoids, etc. Students can sort shapes by common non-defining attributes. Students can sort shapes by a common defining attribute. Students can list and explain the defining attributes of each shape. **Representational:** Students can draw, build, and find shapes that possess defining attributes.

Supports for Teachers

Critical Background Knowledge
Conceptual: Students will understand that shapes have specific names regardless of size or orientation. **Procedural:** Students can describe, compare, name and analyze basic shapes in different sizes and orientations. Students can build and draw shapes **Representational:** Students can build and draw shapes using manipulatives. Students can compose larger shapes using simple shapes.
Academic Vocabulary and Notation
attribute, defining attribute, non-defining attribute, triangle, rectangle, square, half-circle, quarter-circle, trapezoid, closed figure

Instructional Strategies Used	Resources Used
Pattern or attribute blocks can be used to model defining attributes for shapes. Ask students to create their own rule for sorting shapes. Have students share sorting rules with classmates and provide examples that support their rules. Classmates draw a new shape that fits a sorting rule after it is shared. Compose shapes that possess defining attributes using a number of different methods (e.g., Geoboards, clay, strings, sticks, pattern blocks, tangram pieces, etc.). Students choose a shape and describe it to classmates using appropriate terminology (e.g., square: 4 equal sides, 4 angles).	NLVM Pre-K-2—Number & Operations Manipulatives http://nlvm.usu.edu/en/nav/category_g_1_t_1.html Smartboard applications keyword attributes Teaching Ideas—Maths—2-D Shapes http://www.teachingideas.co.uk/maths/contents_shape.htm Pallotta, Jerry. *Icky Bug Shapes.* Scholastic, Inc., 2004. Allen, Nancy Kelly. *What Is an Attribute? (Little World Math).* Rourke Publishing, 2010.

Assessment Tasks Used	
Skill-Based Task:  Name this shape:_____ Circle all of the defining attributes. red 3 angles large 3 sides open 4 sides small 5 angles closed	**Problem Task:** Draw a group of shapes with the same defining attributes. Justify your choices. _____ _____ _____

Core Content

Cluster Title: Reason with shapes and their attributes.

Standard 2: Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.[4]

[4]Students do not need to learn formal names such as “right rectangular prism.”

MASTERY Patterns of Reasoning:

Conceptual:

Students will understand that composite shapes are composed of two or more shapes.
Students will recognize defining attributes of three-dimensional shapes.

Procedural:

Students can identify and describe two-dimensional shapes (square, rectangle, trapezoid, triangle, etc.).
Students can identify and describe three-dimensional shapes (cube, rectangular prism, cone, cylinder, etc.).
Students can identify shapes used to create a composite shape.

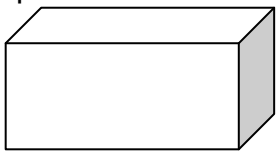
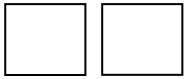
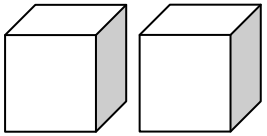
Representational:

Students can compose two-dimensional shapes.
Students can compose three-dimensional shapes.
Students can compose composite shapes from two- or three-dimensional shapes.
Students can decompose composite shapes to create new shapes (e.g., rectangular prism into two cubes).

Supports for Teachers

Critical Background Knowledge
Conceptual: Students will understand the differences between two- and three-dimensional shapes. Students will understand the attributes of a two-dimensional shape. Students will understand the attributes of a three-dimensional shape. **Procedural:** Students can identify and name two- and three-dimensional shapes. **Representational:** Students can compose simple shapes to form larger shapes.
Academic Vocabulary and Notation
composite shape, compose, rectangular prism, geometric solid, two-dimensional, three-dimensional, face

Instructional Strategies Used	Resources Used
Compose composite shapes using different methods (pattern blocks, clay, paper, etc.). Decompose composite shapes using different methods. Students use a set of shapes to create two different composite shapes, then compare/contrast how the composite shapes are alike and different. Use pattern block mats to compose and decompose new shapes.	Two- and Three-Dimensional Shapes Lesson Plan Ideas http://www.mcrel.org/pdf/curriculum/5021cm_shapes.pdf Castle Logix game from Educational Insights Smart Board Application—keyword “dimensional shapes”

Assessment Tasks Used	
Skill-Based Task: Which two shapes could you use to create this composite shape?  a.  b.  c. 	**Problem Task:** Create and record a composite shape using two or more shapes. Create and record a different composite shape using those same shapes.

Core Content

Cluster Title: Reason with shapes and their attributes.

Standard 3: Partition circles and rectangles into two and four equal shares; describe the shares using the words *halves*, *fourths*, and *quarters;* and use the phrases *half of*, *fourth of*, and *quarter of*. Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.

MASTERY Patterns of Reasoning:

Conceptual:

Students will understand that circles and rectangles can be divided into equal shares.
Students will understand that circles and rectangles can be divided into non-equal shares.
Students will understand that two equal shares of a shape are halves.
Students will understand that four equal shares of a shape are fourths or quarters.
Students will understand that decomposing circles and rectangles into more equal shares creates smaller shares.

Procedural:

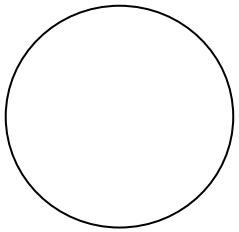
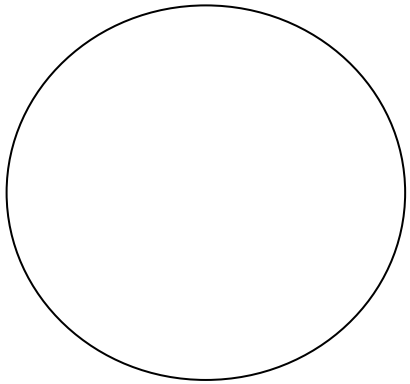
Students can identify shares as halves and fourths/quarters.
Students can identify a share as half of or fourth of/quarter of a whole.
Students can determine that two or four equal shares can equal a whole.
Students can explain part/whole relationships using mathematical vocabulary (halves, fourths, quarters, etc.).
Students can combine halves and fourths into a whole.

Representational:

Students can partition circles and rectangles into two equal shares using manipulatives (e.g., fraction circles).
Students can partition circles and rectangles into four equal shares using manipulatives (e.g., fraction circles).

Supports for Teachers

Critical Background Knowledge	
Conceptual: Students will understand attributes of a circle. Students will understand attributes of a rectangle. **Procedural:** Students can identify circles of various sizes and orientations. Students can identify rectangles of various sizes and orientations. **Representational:** Students can draw a circle. Students can draw a rectangle.	
Academic Vocabulary and Notation	
half, whole, quarter, fourth, partition, equal share, fourth of, half of, quarter of,	
Instructional Strategies Used	**Resources Used**
Partition many different circles and rectangles into equal shares (pizza, cookies, Hershey bars, graham crackers, apples, sandwiches, tortillas, etc.). Use Geoboards to create rectangles and circles and divide them into halves and fourths.	Smart Board applications—keyword “equal parts” Ideas for teaching partitioning Ideas for Teaching Fractions: http://www.superteacherworksheets.com/fraction-cont.html Murphy, Stuart J. *Give Me Half (MathStart 2)*. HarperCollins, 1996.

Assessment Tasks Used	
Skill-Based Task: Partition the rectangle into halves.  Partition the circle into fourths. 	**Problem Task:** Sam is having a pizza party. Show how Sam can share the pizza equally. 

Core Content

Cluster Title: Measure lengths indirectly and by iterating length units.

Standard 1: Order three objects by length; compare the lengths of two objects indirectly by using a third object.

MASTERY Patterns of Reasoning:

Conceptual:

Students will understand the value of a start line to line up objects.
Students will understand typical words in the language of measurement (e.g., *long*, *longer*, *longest*, *tall*, *taller*, *tallest*).
Students will understand that a third object may be used to compare the length of two objects.

Procedural:

Students can use a start line when ordering three objects.
Students can identify the object that is shorter, shortest, longer, longest, taller or tallest, when comparing three objects.
Students can choose a third object to compare two different objects (e.g., using a pencil, compare the size of a water bottle to a cup).

Representational:

Students can record findings with words or pictures.

Supports for Teachers

Critical Background Knowledge
Conceptual: Students will understand the concept of “big” and “small” and “bigger” and “smaller.” Students will understand that all objects have length. Students will understand that the words “long” and “short” describe length. Students will understand that various lengths, as well as various heights, can be compared. **Procedural:** Students can directly compare two objects according to length or height (e.g., directly compare the heights of two children and describe one as taller/shorter). **Representational:** Given a picture, students can draw an additional object that is longer/taller or shorter than the given object. Students can compose a picture and identify objects as longer/taller or shorter than another object in the same picture.

Academic Vocabulary and Notation	
compare, length, height, long, longer, longest, tall, taller, tallest, short, shorter, shortest, start line, unit	
Instructional Strategies Used	**Resources Used**
Provide a start line using masking tape on desk or floor, a line on a paper, etc. for students to begin comparing objects. Provide a wide variety of manipulatives for students to practice comparing using their start line. Allow students to compare and trade their objects. Pair students, then have them take turns tracing their partner's shadow with chalk. Use a third object to compare the shadow sizes. Which is longer? Which is shorter? How do you know? Using different sets (a set consists of three pictures with varied length or height), have students label the pictures using words in the language of measurement.	Lesson plans and activities: http://www.hasbro.com/playdoh/en_US/discover/teachers/pdf/7F5A1D7E-D56F-E112-4A26C0F8E454D270.pdf Coffelt, Nancy. *Big, Bigger, Biggest*. Henry Holt and Co. (BYR), 2009. Murphy, Stuart. *Bigger, Better, Best!* HarperCollins, 2002. Walton, Rick. *Pig, Pigger, Piggest.* Gibbs Smith Publishers, 1997.

Assessment Tasks Used	
Skill-Based Task: Given three objects, students will order them from longest/tallest to shortest, or shortest to longest/tallest. Given two objects, students will select a third object to use as a tool for comparing the first two objects.	**Problem Task:** Here are some sample problem tasks: Johnny, Sally, and Juan are students in first grade. Johnny is taller than Sally. Sally is shorter than Juan. Who is the tallest? Who is not the tallest and not the shortest? How do you know? In order to make more room in our classroom for Grandparents' Day, we are going to put the bookcase in the coat closet. How can we find out if the bookcase will fit in the coat closet without moving it?

Core Content

Cluster Title: Measure lengths indirectly and by iterating length units.

Standard 2: Express the length of an object as a whole number of length units by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.

MASTERY Patterns of Reasoning:

Conceptual:

Students will understand linear measurement.
Students will understand that to measure an object, one must use the same unit of measurement, end to end, with no gaps or overlaps.
Students will understand that almost any object can become a unit of measurement (paperclips, unifix cubes, teddy bear counters, mittens, shoes, etc.).
Students will understand how to record measurements and correctly label with the unit used.

Procedural:

Students can measure a variety of objects using a variety of nonstandard tools (paperclips, unifix cubes, teddy bear counters, etc.).
Students can measure accurately (i.e., line up end to end, leave no gaps, allow no overlays, and use a starting point).
Students can express the length of the object with a whole number and label with the appropriate units.
When comparing objects, students will use the same unit to measure both items (e.g., the book is 10 counters long, the desk is 40 counters long). Using that information, students will draw conclusions about the length of the two objects (the desk is longer than the book).

Representational:

Students can record measurements through words and pictures and label the nonstandard units.

Supports for Teachers

Critical Background Knowledge
Conceptual: Students will understand that all objects have length. Students will understand that the words “long,” “tall,” and “short” describe length. Students will understand that length and height can be measured. **Procedural:** Students can directly compare two objects according to length (e.g., directly compare the heights of two children and describe one as taller/shorter). **Representational:** Given a picture, students can draw an additional object that is longer/taller or shorter than the given object. Students can compose a picture and identify objects as longer/taller or shorter than another object in the same picture.
Academic Vocabulary and Notation
unit, measurement, data, record, length, height, starting point, compare, iterate, long, longer, longest, tall, taller, tallest, short, shorter, shortest

Instructional Strategies Used	Resources Used
Read *Super Sandcastle Saturday* and discuss as an introduction to measurement. Provide a variety of manipulatives (paperclips, unifix cubes, teddy bear counters, etc.) for students to use as tools when measuring a variety of objects. Have multiple students measure the same thing using different units. Read and discuss *How Big Is a Foot?* Have students use their own feet to measure a predetermined distance (e.g., the hallway between two points, the basketball court). Compare results and discuss. Have students trace their hand. Using a variety of materials, (buttons, beans, counters, links, etc.), have students measure their hand in four different ways. Record their findings inside of their hand outline. Use seasonal themes to measure different items (e.g., measure with candy canes in December, measure your feet with different manipulatives during Dr. Seuss Week, etc.).	Lesson plans and activities: http://www.uen.org/Lessonplan/preview?LPid=10729 http://www.proteacher.org/c/335_Linear_Measurement.html Murphy, Stuart. *Super Sand Castle Saturday.* HarperCollins, 1999. Leedy, Loreen. *Measuring Penny.* Henry Holt & Co (BYR), 2000. Lionni, Leo. *Inch by Inch.* Knopf Books for Young Readers, 2010. Myllar, Rolf. *How Big Is a Foot?* Yearling, 1991.

Assessment Tasks Used	
Skill-Based Task: Provide a paper with a variety of lines (different lengths and directions). Have students use a few different manipulatives to measure the same line (e.g., Skittles, marshmallows, cubes, counters, etc.).	**Problem Task:** Here is a sample problem-task: You got a new book from the library. It is 10 paperclips tall and 8 paperclips wide. Will the book fit in your backpack? How do you know?

Core Content

Cluster Title: Tell and write time.
Standard 3: Tell and write time in hours and half-hours using analog and digital clocks.
MASTERY Patterns of Reasoning:
Conceptual: Students will understand the difference between analog and digital clocks. Students will understand the minute hand and how it moves (i.e., goes down to the right, comes up to the left, once in one hour). Students will understand the hour hand and how it moves (i.e., goes around the clock in 12 hours). Students will understand the significance of the placement of the hour hand, on and between numbers. Students will understand the significance of the minute hand on the 12 and on 6. **Procedural:** Students can tell time to the hour and half hour on a digital and analog clock. Students can distinguish between digital and analog clocks. Students can convert time from a digital format to an analog format and vice versa. **Representational:** Students can represent a certain time on a clock (analog and digital) to the hour and half hour.

Supports for Teachers

Critical Background Knowledge
Conceptual: Students will identify numbers. Students will understand that time can be measured. **Procedural:** Students will understand the sequence of numbers one to twelve. Students can orally label numbers one to twelve. **Representational:** Students can draw day time and night time.
Academic Vocabulary and Notation
hour, half hour, minute hand, hour hand, time, face, clock, analog, digital, o'clock, thirty

Instructional Strategies Used	Resources Used
Use commercial or homemade student clocks. Move the minute hand around the clock to the half hour position and the hour position counting by half hours, e.g., 12:30, 1:00, 1:30, 2:00. Match times on digital and analog clocks. "Time of the day"—have a student choose a time (hour or half hour) and represent it on a commercial or homemade clock. Have other students read the clock. Put clocks with your schedule, as appropriate, to show hours and half hours.	Sample lesson plans: http://www.fi.edu/time/Journey/JustInTime/contents.html Clock worksheets, hour and half hour (analog time provided): http://homeschooling.about.com/od/freeprintables/ss/mathtime2print.htm Blank analog clocks: http://math.about.com/library/blankclock.pdf Virtual manipulatives: http://nlvm.usu.edu/ Murphy, Stuart. *It's About Time.* HarperCollins, 2005. Carle, Eric. *The Grouchy Ladybug.* HarperCollins, 1996. Gray, Kes. *Cluck O'Clock.* Hodder Children's, 2004. Harris, Trudy. *The Clock Struck One (Math is Fun!).* Millbrook Pr. Trade, 2009. Sierra, Judy. *What Time is it, Mr. Crocodile?* Sandpiper, 2007.

Assessment Tasks Used	
Skill-Based Task: Have child show you specific times on his/her clock, in both analog and digital formats. Copy a page of blank clocks or a page with some clocks filled in (with either the analog or the digital time). Students will fill in the missing information.	**Problem Task:** Your friend in kindergarten hasn't learned to tell time yet. He can describe where the hands are, but you need to help him know what time it is. For example: The long hand is on the 12, the short hand is on the 4. What time is it? The hour hand is half way between the 7 and the 8. The minute hand is on the 6. What time is it? How do you know?

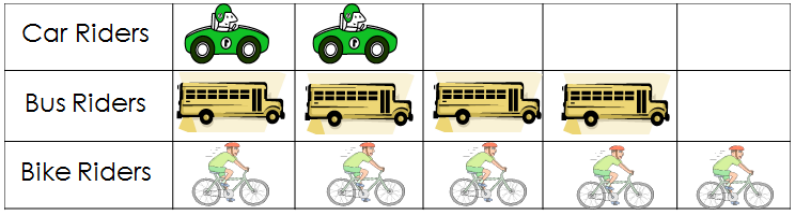
Core Content

Cluster Title: Represent and interpret data.
Standard 4: Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.
MASTERY Patterns of Reasoning:
Conceptual: Students will understand that there are different ways to represent data. Students will understand that the same data can be organized in many ways. Students will understand data collection processes. Students will understand that data is gathered from answering questions, and that questions can be answered by analyzing data. **Procedural:** Students can use three categories to organize and present information. Students can ask and answer questions to generate data. Students can organize data in a logical way. Students can use the generated data to answer questions (e.g., How many in each category? How many more or less are in one category than in another?). Students can collect and categorize data. Students can organize data as a class. **Representational:** Students can record answers to simple questions and make comparisons from analysis of a given data set.

Supports for Teachers

Critical Background Knowledge
Conceptual: Students can classify objects into given categories. Students can count the numbers of objects in each category. **Procedural:** Students can ask questions to gain information. Students can sort objects into categories. **Representational:** Students can draw a picture to represent categories and label with attribute and quantity.
Academic Vocabulary and Notation
data, sort, classify, group, organize, graph (pictograph, t-chart), tally marks, category, attribute, less than, more than, fewer, compare, title, labels, survey

Instructional Strategies Used	Resources Used
Using a daily question (like lunch count), have students respond on a graph (pocket chart, Smart Board, clothes pins on a poster board, etc.) then discuss: “How many are the same? How many are different? How do you know? How many more __ than __?” etc. Create a pictograph of the weather each day. Ask questions about the data. Have students generate questions (eye color, how you get to school, favorite sport, food, etc.) and three possible categories. Have the students survey (gather data) other students in the classroom (or in their family, other classes, etc.). Represent the data visually (pictograph, t-chart, or other graphic organizers, any student lead ideas, etc.).	Math activities and lessons: http://illuminations.nctm.org/ Graphing manipulatives: http://www.nlvm.usu.edu Graphing game: http://toytheater.com/fruit-fall.php Lessons and activities: http://www.abcteach.com/directory/basics/math/graphing/ Leedy, Loreen. *The Great Graph Contest.* Holiday House, 2006. Murphy, Stuart. *Lemonade for Sale (MathStart 3).* HarperCollins, 1997. Murphy, Stuart. *Tally O’Malley (MathStart 2)*. HarperCollins, 2004. Carlson, Nancy. *Harriet’s Halloween Candy.* First Avenue Editions, 2002.

Assessment Tasks Used	
Skill-Based Task: Mr. Smith's class took a survey of how they get school every day. How Do You Get to School?  How many students ride in a car to get to school? How many students ride a bike to get to school? How many students ride on a bus to get to school? How many more students ride their bike to school than ride the bus to school? How many fewer students ride in a car than ride a bike to get to school?	**Problem Task:** See graphics and problem on next page.

Domain: Measurement and Data

Grade: 1

A first grade class was asked what their favorite sport was.
Organize the data below to answer the questions.

How many students are in each category?
How many more students like soccer than basketball?
How many fewer students like football than soccer?

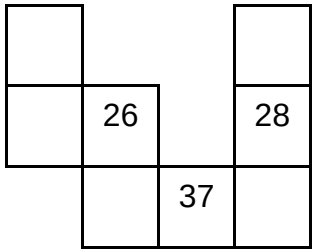
Code: 1.MD.4

Core Content

Cluster Title: Extend the counting sequence.
Standard : 1. Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral.
MASTERY Patterns of Reasoning:
Conceptual: Understand that any number is part of a continued, patterned, sequence. Understand that numerals can represent a set of objects. Understand that one can count forward, backward, and in patterns such as counting by 2, 5 and 10. Understand that one can start at different numbers and still count in patterns. Ex. Count by 10: 3, 13, 23…. **Procedural:** Count any number of given objects within 120 and represent them with a written numeral. Orally say a number when seeing it. Correctly write a numeral when hearing its name. Identify a number from a set when orally given the number. Find numbers on the hundreds chart using patterning strategies. Read and write numerals in and out of sequence to 120. **Representational:** Draw simple illustrations to represent a number.

Supports for Teachers

Critical Background Knowledge
Conceptual: Understand one-to-one correspondence. **Procedural:** Identify and write a number by name for number 0-20 Count to 100. **Representational:** Correctly form numbers 0-9.
Academic Vocabulary and Notation
Count Back, Count On, Counting Up, Number, Numeral, Sequence, Whole Numbers

Instructional Strategies Used	Resources Used
Use a hundreds chart that has numbers to 120 or extend your own hundred chart to identify numbers and patterns. I Spy a Number-While students are facing another way, cover up or remove numbers from the hundreds chart. Students identify missing numbers and explain how they know which number was missing. Use number cards or tiles and have students put them in count up or count down sequence. Give students number cards from 0-20, or another sequence, and time them while they line up in the correct order. Use a partial hundreds chart and fill in missing numbers using counting pattern skills.  A target counting sequence is given eg. 4-16. Students stand up one at a time and say the number that comes next When they reach 16 the next student stands and begins counting backward until all students have had a turn.	Van de Walle, John A. and Lovin, LouAnn H. *Teaching Student-Centered Mathematics Grade K-3* (P 40). Allyn & Bacon. 2005 Pinczes, Elinor. *One Hundred Hungry Ants*. Sandpiper. 1999 Wells, Margaret. *Emily's First 100 Days of School*. Hyperion Books. 2005 Cuyler, Margaret. *100th Day Worries (Jessica Worries).* Simon & Schuster Books for Young Readers. 2000

Assessment Tasks Used	
Skill-based Task: Listen to student count from 0-120. Give students a number and have them write it down. Show students a number and have them say the number name. Have students put number cards in counting sequence. In small segments, have students write numbers within 0-120 in order.	**Problem Task:** Story problem: Cathy is walking down the street and trying to find her friend's house. The house numbers are in order from 1-20. (or adjust to higher numbers or do odd or even numbers). Cathy is at house number 5. Her friend lives at house number 17. How will she find her friend's house? Students will then explain different scenarios of solving the problem possibly including: counting by ones, counting up.

Core Content

Cluster Title: Understand place value.

Standard: 2. Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases:

a. 10 can be thought of as a bundle of ten ones — called a “ten.”
b. The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones.
c. The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones).

MASTERY Patterns of Reasoning:

Conceptual:

Understand that 10 can be represented as a bundle of ten ones-called a “ten”.
Understand that in place value a specific digit represents how many tens or how many ones compose the number.

Procedural: These objects can be used for the following activities: Unifix cubes, counters, straws, beans, kids, links, candy or set of any classroom objects.

Look at a group of tens and ones and write the associated number.
Identify the amount of tens in a number and ones in the number by looking at or hearing a number.
Look at a number and represent it with sets of tens and ones.
Write a given number in expanded form.
Write the numbers when given the expanded form.
Organize objects into sets of tens and ones.

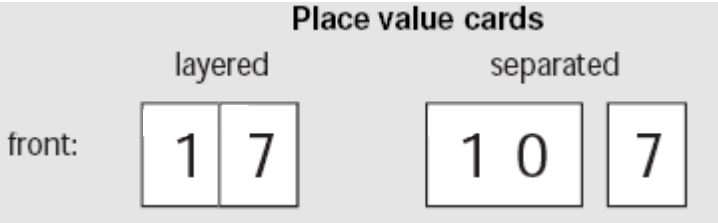
Representational:

Represent a number in all of the following ways:

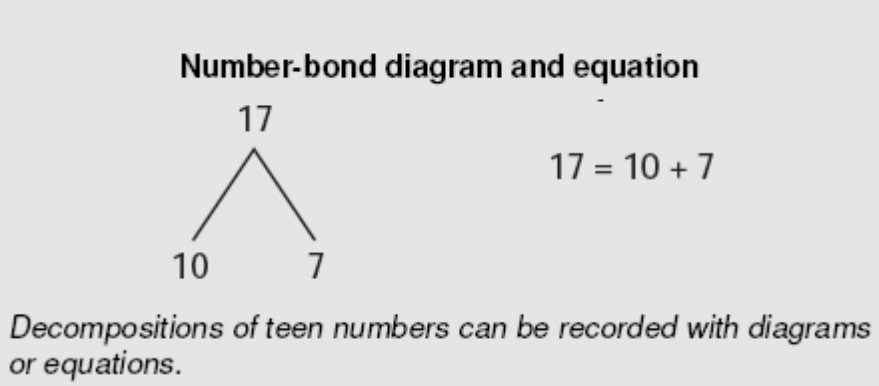
- Numeral - 25
- Picture - II…..
- Value of each digit - 2 tens 5 ones
- Expanded form - 20+5

Supports for Teachers

Critical Background Knowledge
Conceptual: Understand that numbers can be composed and decomposed. Understand the counting sequence and patterns. **Procedural:** Count to 99 and represent numbers in this sequence. Identify numbers and write the numerals associated with them. Say the name of the number when shown the number. Write numbers to 20 in order. **Representational:** Draw a circle around a set of 10 objects and identify a teen number as a ten and some ones.

Academic Vocabulary and Notation	
Compose, Decompose, Digit, Making Tens, Number, Numeral, One, Place Value, Sequence, Tens	
Instructional Strategies Used	**Resources Used**
Race to 100 variations: • Students need beans, cups, place value mats and number cubes. Students take turns rolling a number cube and adding that amount of beans to a place value mat. Each time a ten is made, the beans are transferred to a cup and moved to the tens place. Play alternates until one student passes one hundred and wins the game. • Students need base ten blocks, abacus or base ten manipulatives and 2 different colored number cubes. One cube represents tens and the other represents ones. Students take turns rolling both number cubes at the same time. The student states the number that has been rolled and adds that to their current amount. When ten or more ones are collected the students exchange ten ones for a ten. Play continues until a student passes one hundred, becoming the winner of the game. Alternate ending: The student who reaches exactly 100 first wins. Use place value cards to help students identify the value of the number in the tens place and the value of the number in the ones place and represent it in expanded form.  Taken from the Common Core Progressions http://commoncoretools.me/	Van de Walle, John A. and Lovin, LouAnn H. *Teaching Student-Centered Mathematics Grade K-3 (P 123-140)*. Allyn & Bacon. 2005 Math Their Way http://www.center.edu/MathTheirWay.shtml Common Core Progressions with illustrations Number and Operations in Base Ten Domain http://commoncoretools.me/ Learning Teen Numbers Rap http://www.youtube.com/watch?v=S5eaBjKI8xQ

Use number bond diagrams to decompose numbers to 99 using sets of tens and ones.



Taken from the Common Core Progressions
http://commoncoretools.me/

Give pairs of students random number cards ranging between 0-99 and Unifix Cubes, base ten blocks, abacus, or other base ten manipulatives. The first student gives the other student clues about the number by telling how many tens or ones are in the number. The second student uses tens and ones to create the number. When that student identifies the number they both look at the card and objects to make sure the numbers match. Switch roles each time.

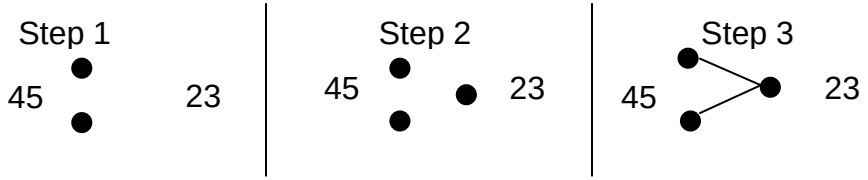
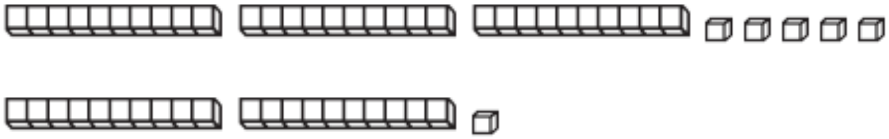
Assessment Tasks Used	
Skill-based Task: Students will be able to show teen numbers with objects in tens and ones. Students will explain that teens are made of a ten and some ones and identify the patterns in the words. Students draw a picture of a two-digit number showing tens and ones. Students will be able to look at a two-digit number and identify which number is in the tens place and which number is in the ones place.	**Problem Task:** Give students a set of beans and ask them how many there are. Ask students how they figured this out. Listen to many different strategies. Give students a paper with many pictures of the same small object. Ask the students to circle sets of ten (these are not organized on the paper), find how many objects there are and represent the number in expanded form.

Core Content

Cluster Title: Understand place value.
Standard : 3. Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <.
MASTERY Patterns of Reasoning:
Conceptual: Understand that the number in the tens place always has a greater value than the number in the ones place. Understand the meaning of the symbols >, =, <. **Procedural:** Write two numbers in expanded form and compare the value of the tens. Use base ten blocks to represent numbers, identify the number that is more or less, and explain reasoning. Identify the number that is greater or less than on paper using appropriate symbols. Write in a journal explaining reasoning for why one number is less than, more than, or equal to another number. **Representational:** Draw the correct comparison sign when seeing two two-digit numbers on paper.

Supports for Teachers

Critical Background Knowledge
Conceptual: Understand the meaning of more, less, and equal. Understand the meaning of greater than, less than, fewer than. Understand how many tens and ones are in a two-digit number. **Procedural:** Compare numbers 0-10 using correct vocabulary. Compare objects using the terminology more, less, greater than, less than, fewer. **Representational:** Show a set of objects that is greater or less than a given number. Circle a number that is greater, or less, depending on instructions.

Academic Vocabulary and Notation	
Compare, Different, Equal, Fewer, Greater Than, Less Than, More	
Instructional Strategies Used	**Resources Used**
Students will learn that the less than/more than sign can be drawn in the following way: two dots go next to the greater number and one dot is placed next to the smaller number. Students connect the dots  Students will use base ten blocks, Unifix Cubes or stick pretzels with units of ten ones from a broken pretzel to compare two two-digit numbers. Display the tens and ones in a straight train end-to-end and compare the two trains. Student will then determine which number is greater or less and explain their answer.  Students will work in partners. Partner one will make a two-digit number with manipulatives. Partner two will draw a symbol card with >, <, = and then make a number that is >, <, = to partner one's number. Student will play a game where partner one draws a number card. Partner two guesses the number and partner one gives them clues using vocabulary such as greater than, fewer than, more than, less than, equal to. The use of vocabulary is key! The round is complete when partner one tells partner two the number is "equal".	Howe, Roger. *Three Pillars of First Grade Mathematics*. 2012 http://commoncoretools.me/2012/02/08/article-by-roger-howe-three-pillars-of-first-grade-mathematics/ Hunderterfeld app Rhythms and Rhymes for Special Times CD-Jack Hartmann -100 days of School Today http://www.jackhartmann.com/rhythms-rhymes-for-special-times-cd/

For this whole-class activity the teacher will display a number card on the board. Every student will display a number that is <, >, or = to depending on instructions. Students will then explain reasoning to each other. Each student represents and writes down a number on paper. Students then use two stick pretzels to show the relationship of the numbers using symbols <, >, =. Students will be the manipulatives to compare numbers. Each student standing is worth 10. Each student on the floor crouching is a 1. Two teams each make a number. Two students lay down and make the correct <, >, = between the two groups.	

Assessment Tasks Used	
Skill-based Task: Students will explain how they know a number is more, less or equal to another given numbers in all forms including concrete, pictorial and abstract.	**Problem Task:** Student will solve this problem: Joey is planning his birthday party. He buys packages of 10 prizes for his friends. 13 friends are coming to the party. How many prizes will he buy? On Halloween night Meg and Troy count their Halloween candy. Meg has 64 pieces of candy and Troy has 59. Who has less candy? Explain how you know this.

Core Content

Cluster Title: Use place value understanding and properties of operations to add and subtract.

Standard : 4. Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.

MASTERY Patterns of Reasoning:

Conceptual:

Understand that numbers can be decomposed in many ways to simplify the process of addition.
Understand that the process of adding one-digit numbers transfers over to adding two-digit numbers.
Understand that the value of the tens place can be seen as “2 tens” or “20” (for example).
The inverse relationship between addition and subtraction in one-digit numbers transfers over to two-digit numbers.

Procedural:

Manipulate numbers in the tens or ones place individually.
Manipulate both the tens and ones place in the same problem.
Make (compose) a ten when the situation of making (composing) a ten occurs.
Solve a two-digit addition problem with paper and pencil using many strategies.
Explain through journal writing how to add two-digit numbers.

Representational:

Organize manipulatives to help explain the process of solving the problem.

Supports for Teachers

Critical Background Knowledge
Conceptual: Understand that a two-digit number is made of tens and ones. Understand the basic skill of addition and subtraction. Understand basic addition and subtraction facts. Understand the value of the number in the tens place. Understand the inverse relationship between addition and subtraction in one-digit numbers. **Procedural:** Read a two-digit number. Circle the number in the tens place. Circle the number in the ones place. Write a two-digit number. Answer addition problems presented in vertical and horizontal formats. **Representational:** Represent a two-digit number pictorially. Represent a two-digit number with manipulatives.
Academic Vocabulary and Notation
Add, Addend, Compose, Equation, Making (Composing) Tens, Ones, Place Value, Sum

Instructional Strategies Used	Resources Used
Using base ten manipulatives such as base ten blocks, Unifix Cubes, or abacuses to manipulate the tens place. Students write a number between 1 and 9 and show it with manipulatives. Each student rolls a number cube and adds that many tens to the original number. Students then write the new number on their recording sheet and roll again until they pass 100. Students then begin again with a new number. Students will pick two cards that each have a two digit number on them. Provide numbers on the cards that don't require regrouping. Students will draw one card, represent it with manipulatives, draw a second card, represent it and finally combine the manipulatives to identify the sum. Provide an activity using expanded form to solve a two-digit addition problem. Students will write numbers in expanded form first. Then add the tens and ones separately, finishing with combining the tens and ones as follows. 35 — 30+5 +21 — 20+1 50+6=56 Use the following diagram to show the value of the tens and ones to solve the problem.	Teaching Student-Centered Mathematics, Grades K-3, John A. Van de Walle, LouAnn H. Lovin Coolmath4kids.com http://gamequarium.com/addition3.html *www.dositey.com/addsub/add5a.html*

$\begin{array}{r} 35 \\ +\,21 \\ \hline 50 \\ +\;\;6 \\ \hline 56 \end{array}$ Students roll a number cube with low numbers to create two two-digit numbers . Students write down the numbers, demonstrate solving with pictures or manipulatives, then write the answer.	

Assessment Tasks Used	
Skill-based Task:	**Problem Task:**

Domain: Number and Operations in Base Ten Grade: 1

Students will demonstrate mastery of the concept by adding two two-digit numbers with and without manipulatives and writing the sum.	In John's rock collection he counted thirty-two rocks. His father came home from a vacation and gave him three rocks and a bag filled with twenty. How can John figure out how many rocks are in his collection now? On Saturday Cindy jumped thirty-six times without stopping. On Sunday she was tired and only jumped twenty six times without stopping. What would you do to find the difference of how many times Cindy jumped?

Code: 1.NBT.4

Core Content

Cluster Title: Use place value understanding and properties of operations to add and subtract.
Standard : 5. Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.
MASTERY Patterns of Reasoning:
Conceptual: Understand place value of ones and tens. Understand more and less. Understand that ten more is ten more ones, or 1 more ten. Understand that adding/subtracting ten does not change the ones place. **Procedural:** Identify the tens and ones place of given number. Explain why a given number is ten more/less. Mentally add/subtract ten from a given number. **Representational:** Draw a picture to justify what 10 more/less of a given number is.

Supports for Teachers

Critical Background Knowledge
Conceptual: Understand numbers can be composed and decomposed. Understand the counting sequence. Understand the concept of 1 more/less. Understand the concept of place value of ones and tens **Procedural**: Count to 99. Identify numbers and name them. Count forward beginning from a given number within a known sequence (instead of having to begin at 1). **Representational:** Represent a number of objects with a written numeral (0-20)
Academic Vocabulary and Notation
ten, one, more, less, place value

Instructional Strategies Used	Resources Used
Use base 10 blocks or 10 frames to model understanding of 10 more/less. Draw pictures to model 10 more/less. Play dice games to practice the concept. Have students create real world problems using 10 more/less. Review with “I have, Who has?” games. Review using a Hundreds chart. Allow students to explain/prove their thinking during any of these strategies.	“I have, Who has?” Game example. "Who Is" Cards http://www.teachingideas.co.uk/maths/whoiscards.htm Game Idea http://www.primaryresources.co.uk/maths/pdfs/10moreor10lessgame.pdf 10 more 10 less Activities http://tenframesystem.com/Ten-Frame_Math_FAQ_10_more_than_10_less_than.pdf
Assessment Tasks Used	
Skill-based Task: Write the number that it 10 more than 52.____ Write the number that is 10 less than 37. ____	**Problem Task:** Think of something you would like to buy. How many dollars would you need? Record the price. _____ The cost of the item changes $10. What is the new price? _____ Explain what happened to your price. _____ _____

Core Content

Cluster Title: Use place value understanding and properties of operations to add and subtract.
Standard : 6. Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.
MASTERY Patterns of Reasoning:
Conceptual: Understand that tens place can be decreased by units of ten. Understand that the difference can be checked by using the inverse relationship between addition and subtraction. **Procedural:** Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 Demonstrate taking tens away from a number using manipulatives. Use paper and pencil using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction to solve a subtraction problem. Journal to explain the process of taking tens away. **Representational:** Demonstrate with pictures how to subtract ten and explain their reasoning.

Supports for Teachers

Critical Background Knowledge
Conceptual: Understand how many tens are in a number and the value of that number. Understand basic subtraction concepts and basic facts. Understand the format of subtraction in vertical and horizontal position. **Procedural:** Recognize and count numbers to 100. Answer specific subtraction problems within 10. **Representational:** Represent subtraction problems within 10 with manipulatives Represent a number with objects.

Academic Vocabulary and Notation	
Counting Back, Difference, Equation, Making Tens, Multiple of Tens, Subtract	
Instructional Strategies Used	**Resources Used**
Play bingo with a card labeled with 10, 20, 30, 40, 50, 60,70, 80, 90 as answers; some will be repeated. Orally and/or visually give the students subtraction problems and they cover the answer. Eg. 90-40=50, 10-10=0, 60-30=30. Variation to game: Ask students to use the inverse relationship with addition and subtraction to solve problems. Eg. 90-___=50, 60-____=40 Play race to 0 with a hundreds chart. Start at 100 and roll a number cube. Take away that many tens. The student that lands exactly on 0 first wins the game. Play repeated.	Online games and printable pages http://maths.primarytopics.co.uk/calculating/mental/year3/pages/55subm10.htm Online game for student practice http://www.ixl.com/math/grade-2/subtract-two-digits-multiples-of-10 http://www.sheppardsoftware.com/mathgames/fruitshoot/fruitshoot_subtraction.htm
Assessment Tasks Used	
Skill-based Task: Students will demonstrate subtracting tens from multiples of ten using manipulatives and on paper. Numbers can be given orally or in written form.	**Problem Task:** Sarah's mom bought 8 boxes of Capri Suns with ten in each box. At Sarah's party friends drank 30 drinks. How do you know how many drinks Sarah has left? Jake's class had 30 tadpoles in a tank. 10 turned into frogs. How many frogs are in the tank? How many tadpoles are in the tank? Explain your reasoning for solving the problem. Write an equation to show how you solved the problem.

Core Content

Cluster Title: Represent and solve problems involving addition and subtraction.

Standard 1: Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem. (See Glossary, Table 1.)

MASTERY Patterns of Reasoning:

Conceptual:

Students will understand how to solve addition word problems within 20.
Students will understand how to solve subtraction word problems within 20.
Students will understand how to solve word problems with unknowns in all positions using these strategies:
- Adding to
- Taking from
- Putting together
- Taking apart
- Comparing

Procedural:

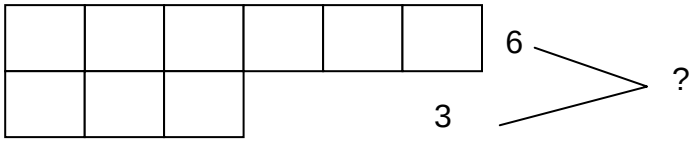
Students can solve addition and subtraction word problems with the unknown in all positions using objects, drawings, and equations with a symbol.

Representational:

Students can model addition and subtraction word problems using objects, drawings, and equations.
Students can represent an unknown number with a symbol using drawings and equations.

Supports for Teachers

Critical Background Knowledge
Conceptual: Students will know basic addition word problem strategies. Students will know basic subtraction word problem strategies. Students will know how numbers and symbols are used to represent word problems (i.e., +, -, =). Students will know that the unknown number can be in any position in an equation (e.g., 5 + __ = 10; __ + 6 = 10; 7 + 3 = __). Students will know how to use objects, drawings, and equations to represent and solve the addition and subtraction word problems. **Procedural:** Students can solve addition and subtraction word problems for all types: Adding to Taking from Putting together Taking apart Comparing **Representational:** Students can model addition and subtraction word problems with objects, drawings, and equations.
Academic Vocabulary and Notation
adding to, taking from, putting together, taking apart, comparing, unknown, position, plus/adding, minus/subtracting, equals to, numerals, and digits

Instructional Strategies Used	Resources Used
Teacher may begin instruction with teacher modeling a guided practice for word problems using drawings, objects, and equations. Then the teacher may continue the guided practice by using their students to solve the word problems using drawings, objects, and equations. Next, allow the students to practice and solve the word problems independently using drawings, objects and equations. Activity 1: Model Drawing Jamie has 6 cats that live with her. Her grandma gave her 3 more for her birthday. How many cats does she have altogether? Jamie  6 + 3 = 9 Jamie has 9 cats altogether.	Pallotta, Jerry. *The Hershey Kisses Addition Book.* Scholastic, 2001. Pallotta, Jerry. *The Hershey Kisses Subtraction Book.* Scholastic, 2002. *Word Problems Grade 1. (Kumon Math Workbooks)*. Kumon Publishing North America, 2009. Comparing Sets: http://illuminations.nctm.org/LessonDetail.aspx?ID=L36 Scholastic website-search for teacher resource books for addition and subtraction words problems: http://www.scholastic.com/teachers/teaching-resources

Assessment Tasks Used	
Skill-Based Task Examples: *Adding to*: Example 1: There were 9 frogs on a log. 8 more frogs jumped on the log. How many frogs are on the log now? 9 + 8= ☐ (NOTE: When teaching this word problem, use pictures to illustrate the problem. Also, you can use objects to demonstrate the word problem.) Example 2: Katie had 12 seashells. Her friend gave her some more. Now Katie has 20 seashells. How many did her friend give her? 12 + ☐ = 20 (NOTE: For this kind of problem, using objects for hands-on support will be best.) *Taking from:* Example 1: There were 18 students on a bus. 7 students got off at the first stop. How many students stayed on the bus? 18 – 7= ☐	**Problem Task:** Refer to examples and assess separately.

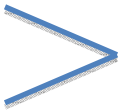
(NOTE: when teaching this word problem, use pictures to illustrate the problem. Also, you can use objects to demonstrate the word problem.) *Comparing:* Example 1: There are 6 red books on a shelf. There are 4 blue books on the shelf. How many more red books are there than blue books? ■ ■ ■ ■ ■ ■ ◆ ◆ ◆ ◆ 6 – 4 = □	

Core Content

Cluster Title: Represent and solve problems involving addition and subtraction.
Standard 2: Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.
MASTERY Patterns of Reasoning:
Conceptual: Students will extend understanding of word problems involving the addition of two whole numbers to solve word problems involving three whole numbers whose sum is less than or equal to 20. Students will understand that these word problems can be solved by using objects, drawings, and equations. Students will understand that a symbol represents a whole number (see 1.OA.1). **Procedural:** Students can solve word problems involving the addition of 3 whole numbers by using strategies involving objects, drawings, and equations. **Representational:** Students can model word problems with 3 whole numbers by using manipulative objects (e.g., students set up the problem using three groups of objects and then find the unknown). Students can model word problems with 3 whole numbers by using drawings (e.g., students set up the problem using a bar model and then find the unknown).

Supports for Teachers

Critical Background Knowledge
Conceptual: Students will know how to solve basic whole number addition problems using objects, drawings, and equations. Students will know how to count on. Students will know how to recognize numbers and symbols in an addition problem. **Procedural:** Students can solve basic whole number addition problems in a word problem. **Representational:** Students can model basic addition word problems using objects, drawings, and equations.
Academic Vocabulary and Notation
combine, adding to, plus/add, equals to, sum

Instructional Strategies Used	Resources Used
Teacher may begin instruction with teacher modeling a guided practice for word problems using drawings, objects, and equations. Then the teacher may continue the guided practice by using students to solve the word problems using drawings, objects, and equations. Next, allow the students to practice and solve the word problems independently using drawings, objects and equations. Activity 1: Model drawing Pam has 3 goldfish, 2 cats, and 5 puppies. How many pets does Pam have in all? Goldfish ☐☐☐ 3 Cats ☐☐ 2 Puppies ☐☐☐☐☐ 5  7 3 + 2 + 5 = 10 Pam has 10 pets in all.	http://www.mathplayground.com/ http://www.funbrain.com/

Assessment Tasks Used	
Skill-Based Task: Example 1: Jake had 3 blue jellybeans, 6 red jellybeans, and 4 pink jellybeans. How many jellybeans does Jake have? 3 + 6 + 4 = ☐ Example 2: There were 12 fleas on the dog. 2 more jumped on. Then 1 more flea jumped on the dog. How many fleas in all? 12 + 2 + 1 =☐ (NOTE: When teaching this word problem, use pictures to illustrate the problem. Also, you can use objects to demonstrate the word problem.)	**Problem Task:** There are three students in Ms. Arnstein's class who have a total of 15 pencils. If Maria has 4 pencils and Anna has 5 pencils, how many pencils does Charlie have? Give the problem to the students and let them use their own strategies to solve it. They can use objects, drawings, or equations to come up with their answers. They should represent the problem as follows: 4 + 5 + ☐ = 15 Have students share their strategies and evaluate.

Core Content

Cluster Title: Understand and apply properties of operations and the relationship between addition and subtraction.

Standard 3: Apply properties of operations as strategies to add and subtract. (Note: Students need not use formal terms for these properties.) Examples: If 8 + 3 = 11 is known, then 3 + 8 = 11 is also known (commutative property of addition). To add 2 + 6 + 4, the second two numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 = 12 (associative property of addition).

MASTERY Patterns of Reasoning:

Conceptual:

Students will understand the commutative property of addition (e.g., 8 + 3 = 11 and 3 + 8 = 11).
Students will understand the associative property of addition (e.g., 2 + 6 + 4 = 2 + 10 = 12).
Students will understand the identity property of addition (e.g., 8 + 0 = 8).
Students will understand the identity property of subtraction (e.g., 8 – 0 = 8).
Students will understand that there is no commutative property of subtraction (e.g., 8 – 3 = 5 but 3 – 8 ≠ 5).

Procedural:

Students can add numbers using the commutative property of addition (number bonds, fact families).
Students can add numbers using the associative property of addition (e.g., ten frames, abacuses).
Students can show why the commutative property does not apply to subtraction.
Students can add numbers using the identity property of addition.
Students can subtract numbers using the identity property of subtraction.

Representational:

Students can use objects or drawings to represent the commutative property of addition.
Students can use objects or drawings to represent the associative property of addition.
Students can use objects or drawings to explore why the commutative property doesn’t apply to subtraction.

Supports for Teachers

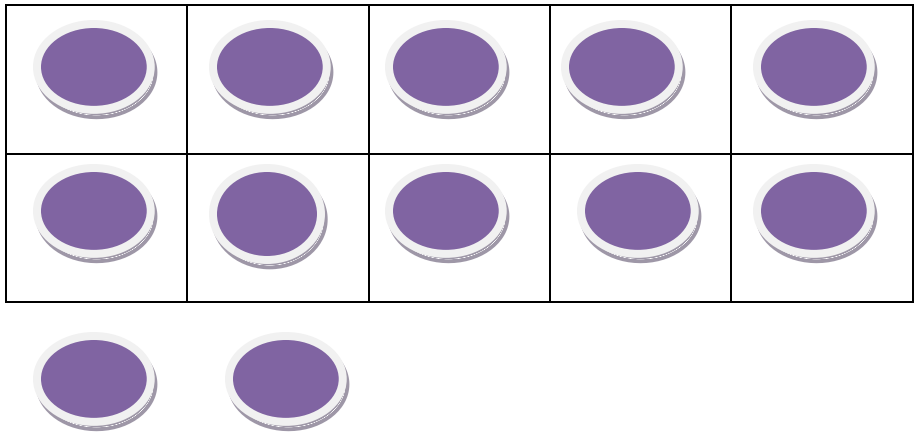
Critical Background Knowledge
Conceptual: Students will know patterns in an equation and recognize that switching the parts within the addition problem does not change the sum. Students will know the math facts that equal 10. Students will know how to add on to the number 10 to get a new sum of a 3 numeral, whole number problem. **Procedural:** Students can combine two parts to make a whole. Students can separate two parts from the whole. Students can practice math facts that add up to 10. **Representational:** Represent addition and subtraction number equations (e.g., number bonds, ten frames, abacuses).
Academic Vocabulary and Notation
part, whole, fact family, number bonds, add, subtract, equation, sum, difference, equals to, add on, combine, switch, separate

Instructional Strategies Used	Resources Used
Teacher may begin instruction by modeling a guided practice for number equations using manipulatives. Continue guided practice by using students to solve the number equations using manipulatives. Next, allow the students to practice and solve the number equations independently using manipulatives. For example, ask the students to put a group of 6 manipulatives out on their desks or table. Then ask them to put out a group of 5 manipulatives. Ask them to write the equation that would add the two groups, using a box for the unknown answer. Then have them solve the equation. Next, ask them to switch the two groups (put the 5 first and then the 6). Ask them to write the equation and solve it. Why is the sum the same? Have the students to do the same with 3 other groups of numbers. Then discuss what they have learned. Tell them that this works for all addition problems. Then have the students explore the same way with subtraction. Be careful not to get into a discussion about negative numbers. Simply ask the students if the answers are the same. For example, 10 – 5 = 5. Does 5 – 10 = 5? Do several others. Tell the students that when they are older they will find out ways to solve subtraction problems where the subtrahend is larger than the minuend.	Introduction to fact families—Addition (commutative property): http://www.learnnc.org/lp/pages/3223 CatherineKuhns.com: http://www.catherinekuhns.com/index.html

Domain: Operations and Algebraic Thinking

Grade: 1

Activity 1:
Using a ten frame
2 + 6 + 4 = 10 + 2 = 12

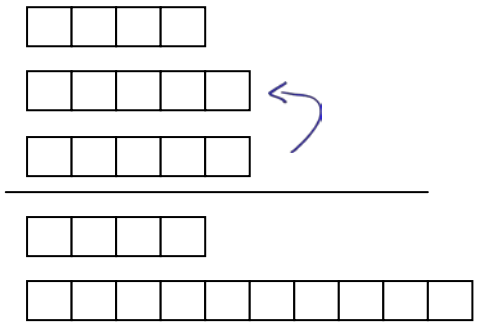


Code: 1.OA.3

Assessment Tasks Used	
Skill-Based Task: Commutative property of addition: Example: 4 + 2 = 6 2 + 4 = 6 Associative property of addition: Example: 5 + 5 + 2 = 10 + 2	**Problem Task:** Find three ways to solve this problem: Jenny has 4 toy cars, 5 teddy bears, and 5 dolls. How many toys does Jenny have? Possible solutions: Use objects Draw the groups and add them. Addition: 4 + 5 + 5 = 14 Associative property of addition: 4 + 5 + 5 = ☆ 4 + 10 = 14 Commutative property of addition: 4 + 5 + 5 = ☆ 5 + 5 + 4 = ☆ 10 + 4 = 14

Domain: Operations and Algebraic Thinking

Grade: 1

	Bar model with associative property: 

Code: 1.OA.3

Core Content

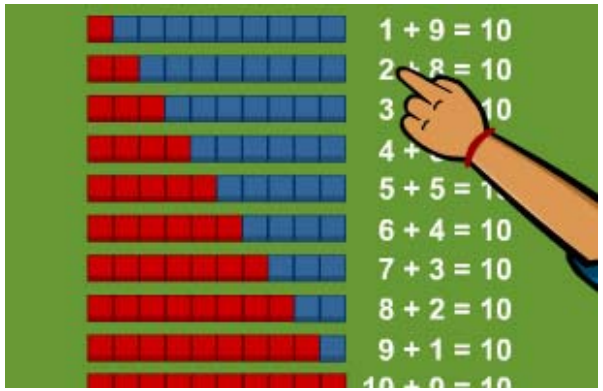
Cluster Title: Understand and apply properties of operations and the relationship between addition and subtraction.
Standard 4: Understand subtraction as an unknown-addend problem. For example, subtract 10 – 8 by finding the number that makes 10 when added to 8.
MASTERY Patterns of Reasoning:
Conceptual: Students will understand that subtraction as an unknown-addend problem can help find answers to problems. Students will understand how to count on from a given number to get to the whole (e.g., given the number 8, add on 2 more to get the whole: 8 + ☐ = 10). **Procedural:** Students can use the counting on strategy to solve an unknown-addend problem. **Representational:** Students can model counting on to solve an unknown-addend problem.

Supports for Teachers

Critical Background Knowledge
Conceptual: Students will know the commutative property of addition. Students will know how to count on in an equation. **Procedural:** Students can switch the parts within a given equation. Students can count on from the part to equal the whole. Students can find a missing number addend. **Representational:** Students can model subtraction number equations.

Academic Vocabulary and Notation	
commutative property, counting on, fact family, number bond, subtract/minus, addend, whole, sum	
Instructional Strategies Used	**Resources Used**
Teachers may begin instruction with teacher modeling a guided practice for the number equation. Then the teacher may continue the guided practice by using their students to solve the number equations. Next, allow the students to practice and solve the number equations independently. Use the abacus and ten frames for this standard. <u>Making Ten Memory</u> From two standard decks of cards, collect the ace through ten as well as the joker, which will represent zero. Then have your child play a game of "memory." He/she can match the numbers that can be added together to make ten. Make sure your child writes down the number sentences during or at the end of the game.	First Grade Math Skills List: http://www.ixl.com/math/grade-1 RightStart Mathematics: http://www.alabacus.com BrainPOP Interactive Tools: http://www.brainpop.com The Learning Box Online Tools: http://www.learningbox.com Illuminations Activities: http://illuminations.nctm.org

<u>Ten in the Bag</u>
Place different numbers of items, such as counters, beads, dried beans, or crayons, in clear bags. Then challenge pairs or small groups to figure out how many more items are needed in order to have a total of ten in the bag. Students can write number sentences, or create missing addend sentences to solve. They can find the other students in the room who have their missing amount to complete a perfect 10!



Assessment Tasks Used

Skill-Based Task:
Example: 15 + ☐ = 18; therefore, 18 – 15 = 3

(NOTE: Students are given an equation where the addend is unknown. Then they take the given part, and count on to reach the whole. This is the same as subtracting the whole from the given part.)

Problem Task:
I have 11 grasshoppers in my collection. I want to have 18 grasshoppers. How many more grasshoppers do I have to collect? Represent the problem two ways—as an unknown-addend and as subtraction. Write the equations. Then solve the equation.

Write your own unknown-addend problem. Give it to your elbow partner to solve.

Core Content

Cluster Title: Add and subtract within twenty.

Standard 6: Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as 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); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13).

MASTERY Patterns of Reasoning:

Conceptual:

Students will understand addition strategies in order to solve math facts to 20.
Students will understand subtraction strategies in order to solve math facts to 20.
Students will be fluent with addition and subtraction facts up to 10. (Note: Fluency is characterized by skill in carrying out procedures flexibly, accurately, efficiently, and appropriately [*Adding it Up,* National Research Council, 2001, p. 116]. It does not necessarily mean rote memorization. By utilizing the strategies listed in this standard, most students will develop fluency.)

Procedural:

Some of the mental strategies students use may include:

Counting on: 8 + 4 = □ (8 …9, 10, 11, 12)

Counting back: 12 - 4 = □ (12…11, 10, 9, 8)

Making tens: 5 + 7 = □ (5 = 2 + 3 so 3 + 7 = 10 therefore 10 + 2 = 12)

Doubles: 6 + 6 = □

Doubles plus/minus one: 6 + 7 = □ (6 + 6 + 1 or 7 + 7 – 1)

Decomposing a number leading to a ten: 15 – 7 = □, so 15 – 5 = 10, therefore 10 – 2 = 8)

Working knowledge of fact families/related facts: 3 + 9 = 12 so 12 – 9 = □

Representational:

Students can model strategies to calculate sums and differences.

Supports for Teachers

Critical Background Knowledge
Conceptual: Students will know how to count to 20. Students will know how to add and subtract. Students will know how to use drawings and manipulatives to solve the math facts up to 20. Students will have familiarity with fact families or number bonds. **Procedural:** Students can recognize numerals 0-20. **Representational:** Students can model adding and subtracting math facts up to 20. Students can represent addition and subtraction equations using manipulatives.
Academic Vocabulary and Notation
doubles, fact families, add/plus, subtract/minus, difference, sum, equation

Instructional Strategies Used	Resources Used
Teachers will provide opportunities for students to develop each of the mental strategies, and encourage students to share their strategies for solving problems. Teachers will also model the strategy with concrete or visual materials and allow for sufficient practice using the same materials. Remember, the goal is to move students to mental computation strategies. Following are some suggestions: **STEP ONE** Develop the strategies using visual representations in a "Number Talk" routine (see resources on the right). ten frames and two-color counters dot pattern cards rekenrek linking cubes **STEP TWO** Apply the strategies to given combinations of numbers. Some strategies lend themselves to specific number sets. (Leading to a ten is very helpful for +8 and +9.) **STEP THREE** Move students toward using the strategy mentally by solving without the use of concrete items. (Note: Each of these steps is essential in providing vital foundational understanding. Repeated practice develops the flexibility required to achieve fluency.)	Game: Ace the Numbers http://www.fuelthebrain.com/Game/play.php?ID=1 Finding Addition Patterns http://illuminations.nctm.org/LessonDetail.aspx?ID=L97

Assessment Tasks Used	
Skill-Based Task: *Counting on:* Example 1: 17 + 3 = 20 *Making Ten:* Example 1: 9 + 7 = 9 + 1 + 6 = 10 + 6 = 16 *Decomposing a number leading to a ten:* Example 1: 14 – 5 = 14 – 4 – 1 = 10 – 1 = 9 *Commutative Property:* Example 1: 5 + 7 = 12 and 12 – 7 = 5 *Doubles plus one:* 7 + 8 = 7 + 7 + 1 = 14 + 1 = 15	**Problem Task:** Give the students an addition or subtraction word problem and have them solve it mentally using one of the above strategies. Do this on a daily basis to give students plenty of practice to develop fluency.

Core Content

Cluster Title: Work with addition and subtraction problems.
Standard 7: Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. For example, which of the following equations are true and which are false? 6 = 6, 7 = 8 – 1, 5 + 2 = 2 + 5, 4 + 1 = 5 + 2.
MASTERY Patterns of Reasoning:
Conceptual: Students will understand the meaning of the equal sign. Students will understand that equations can be true or false by using the equal sign. **Procedural:** Students can practice addition and subtraction equations on either side of the equal sign. Students can determine if equations are true or false. **Representational:** Students can model true and false equations.

Supports for Teachers

Critical Background Knowledge
Conceptual: Students will know how to solve addition and subtraction equations. Students will know the meaning of “true” and “false.” **Procedural:** Students will be able to solve addition and subtraction equations. **Representational:** Students can model addition and subtraction equations.

Academic Vocabulary and Notation	
balanced equations, equals to, addition, subtraction, equation	
Instructional Strategies Used	**Resources Used**
Teachers may begin instruction by modeling a guided practice for the number equation. Continue the guided practice by using students to solve the number equations. Next, allow the students to practice and solve the number equations independently. Use a physical scale, and use Unifix cubes and do a number equation on each side to find out if they are balanced or not. If they are balanced, they are true. If they are not, they are false. 10 + 2 9 + 3	Balancing: http://illuminations.nctm.org/LessonDetail.aspx?ID=L40 Pan Balance Numbers: http://illuminations.nctm.org/ActivityDetail.aspx?ID=33
Assessment Tasks Used	
Skill-Based Task: Example 1: 5 + 2 = 3 + 4 7 = 7 True Example 2: 11 + 5 = 12 + 3 16 ≠ 15 False	**Problem Task:** Ramon says that 9 apples plus 4 apples is the same thing as 5 apples plus 8 apples. Is what Ramon said true? Write the equation then solve both sides.

Core Content

Cluster Title: Work with addition and subtraction problems.

Standard 8: Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8 + ? = 11, 5 = $\square$ – 3, 6 + 6 = $\square$.

MASTERY Patterns of Reasoning:

Conceptual:

Students will understand that equations involving addition and subtraction relates three whole numbers in fact families (e.g., $3+\square=11, 11-\square=3, 11-3=\square$).

Procedural:

Students can solve addition and subtraction equations with the unknown whole number in all positions, relating 3 whole numbers.
Students can determine the unknown whole number in an addition equation relating 3 whole numbers.
Students can determine the unknown whole number in a subtraction equation relating 3 whole numbers.

Representational:

Students can represent an unknown whole number in an addition and subtraction equation, using 3 whole numbers.

Supports for Teachers

Critical Background Knowledge
Conceptual: Students will know basic addition and subtraction equation strategies. Students will know numbers and symbols. Students will know various math strategies to solve the equations (e.g., counting on, making ten, doubles, decomposing numbers, etc.). **Procedural:** Students can solve addition and subtraction equations of all types. **Representational:** Students can model addition and subtraction equations using various math strategies.
Academic Vocabulary and Notation
addition, subtraction, equation, number sentence, unknown number, whole number, equals to

Instructional Strategies Used	Resources Used
Teacher may begin instruction with teacher modeling a guided practice for equations. Continue the guided practice by using students to solve the equation. Next, allow the students to practice and solve the equation independently. <u>Instructional Procedures:</u> Out of Sight 1. Give each student a sheet of paper. 2. Pair students and provide each pair with a paper cup and a bag of 12 dried beans. 3. Teacher chooses the sum. Students place that number of beans on their desk. 4. The first student closes his/her eyes. The second student places a random number of beans under the cup. The student announces the total number of beans not covered underneath the cup, signaling his/her partner to open her eyes. 5. The partner writes a corresponding addition sentence, using a box for the missing addend (the number of covered beans). The student then completes the addition sentence and lifts the cup to check the answer. 6. Both students record their problem in their math journals. 7. The partners switch roles and repeat the activity as time allows.	Pattern Block Addition: http://www.learnnc.org/lp/pages/3851 Math Madness: http://www.fuelthebrain.com/Game/play.php?ID=69 Math Fact Café: http://www.mathfactcafe.com Sierra, Judy and Hillenbrand, Will. *Counting Crocodiles*. Sandpiper, 2001. Grossman, Bill. *My Little Sister Ate One Hare*. Dragonfly Books, 1998. Sturges, Philemon. *Ten Flashing Fireflies*. North-South/Night Sky Books, 1997. Young, Ed. *Seven Blind Mice*. Puffin, 2002.

Sunny Solutions 1. Prepare several 8” yellow construction paper circles to represent the sun. 2. Along the edge of each circle, write six basic facts, each with a missing addend. 3. Have each pair of students select a prepared circle. 4. One student reads a problem, the other student writes it on his/her paper. 5. Students use the manipulatives to determine the solution, arranging the final quantity of manipulatives beside the problem to resemble a ray of sunshine. 6. After each student writes the answer on his/her paper, the pair solves the remaining problems in a similar manner	
Assessment Tasks Used	
Skill-Based Task: *Addition:* Example 1: 7 + 3 = ☐ Example 2: 7 + ☐ = 10 Example 3: ☐ + 3 = 10 *Subtraction:* Example 1: 10 – 3 = ☐ Example 2: 10 – ☐ = 7 Example 3: ☐ – 7 = 3	**Problem Task:** This is a skill-based task. There is no problem task associated with it.