Core Content

Cluster Title: Reason with shapes and their attributes.

Standard 1: Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.

Note: Sizes are compared directly or visually, not compared by measuring.

MASTERY Patterns of Reasoning:

Conceptual:

Students will understand that two-dimensional and three-dimensional shapes have angles.
Students will understand that three-dimensional shapes have faces.
Students will understand the difference between two-dimensional shapes and three-dimensional shapes.
Students will recognize the attributes of a triangle, quadrilateral, pentagon, hexagon, and cube.
Students will recognize that all four-sided shapes are quadrilaterals.

Procedural:

Students can identify and describe a two-dimensional shape.
Students can identify and describe a three-dimensional shape.
Students can identify the number of angles on a triangle, quadrilateral, pentagon, and hexagon.
Students can identify the number of equal faces on a cube.

Representational:

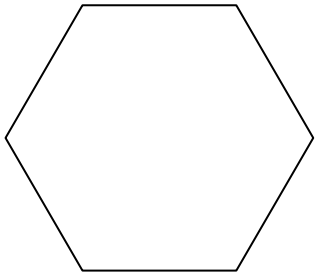
Students can draw a two-dimensional shape when given a specific number of angles.
Students can draw a three-dimensional shape when given a specific number of equal faces.
Students can build/find shapes when given specific attributes.
Students can write about the differences between a two-dimensional shape and a three-dimensional shape.

Supports for Teachers

Critical Background Knowledge
Conceptual: Students will understand the attributes of a shape (e.g., angles, faces**,** number of sides, sides of equal length). **Procedural:** Students can identify and describe two-dimensional shapes (rectangles, squares, triangles, circles, half circles, and quarter circles). Students can identify and describe three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders). **Representational:** Students can build and draw shapes to possess specific attributes.
Academic Vocabulary and Notation
two-dimensional (plane shape), three-dimensional (solid shape), side, edge, angle, face, triangle, quadrilateral, pentagon, hexagon, cube

Instructional Strategies Used	Resources Used
• Have students find real-world representations of three-dimensional and two-dimensional shapes (e.g., a shape scavenger hunt, shape walk, etc.). • Have students create two-dimensional shapes using a number of different methods (e.g., white boards, geoboards, pretzels, etc.). • Have students create a cube using a number of different methods (e.g., paper, toothpicks as sides and marshmallows as corners, clay, etc.). • View the shapes in different orientations. • Manipulate and combine pattern blocks into different shapes. • “I have… who has?” (“I have a triangle. Who has a	A Maths Dictionary for Kids: http://www.amathsdictionaryforkids.com Burns, Marilyn. *The Greedy Triangle*. Scholastic Press, 1999. Feldman, Judy. *Shapes in Nature*. Children’s Press, 1991. BrainPOP Jr.Geometry http://www.brainpopjr.com/math/geometry/ Shapes Galore Lesson Plan http://www.uen.org/Lessonplan/preview.cgi?LPid=21489

quadrilateral with four equal sides? I have a square. Who has a two-dimensional shape with six angles?”) • Sort shapes in various ways (by number of angles, number of faces, three-dimensional shapes vs. two-dimensional shapes, etc.). • Draw a picture using specific two-dimensional shapes (e.g., a picture of a house using a quadrilateral, triangle, pentagon, hexagon, etc.).	That’s So Square Lesson Plan http://www.uen.org/Lessonplan/preview.cgi?LPid=10964

Assessment Tasks Used	
Skill-Based Task: Look at the shape below. Name the shape and identify the number of sides and angles.  Name of shape: _____ Number of angles: _____ Number of sides:_____	**Problem Task:** Farmer Brown wants to plant a garden. He wants his garden to have five angles and five equal sides. Draw the shape of Farmer Brown’s garden. Name the shape of the garden: _____

Domain: Geometry Grade: 2

Core Content

Cluster Title: Reason with shapes and their attributes.
Standard 2: Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.
MASTERY Patterns of Reasoning:
Conceptual: Students will understand that a row is horizontal. Students will understand that a column is vertical. Students will understand the meaning of partition. **Procedural:** Students can identify and describe a row. Students can identify and describe a column. Students can determine the number of same-size squares in a rectangle. **Representational:** Students can draw and partition a rectangle into rows and columns of same-size squares.

Supports for Teachers

Critical Background Knowledge
Conceptual: Students will understand the attributes of a rectangle. Students will understand that a rectangle can be divided into same-size squares. **Procedural:** Students can identify a rectangle. Students can identify a square. Students can determine whether squares are the same size.

Code: 2G2

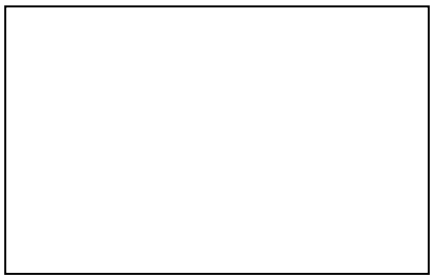
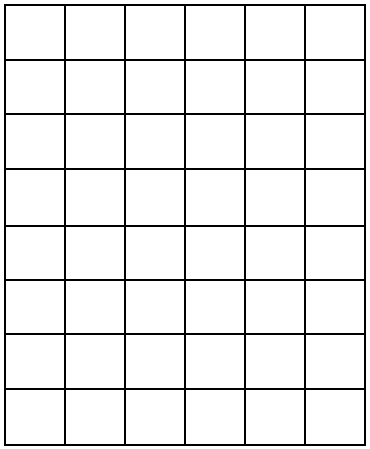
Domain: Geometry Grade: 2

Representational: Students can draw a rectangle and a square.	
Academic Vocabulary and Notation	
rectangle, row, column, same-size, partition, square	
Instructional Strategies Used	**Resources Used**
Compose and decompose rectangles using square tiles. Use grid paper to create a rectangle when given the number of rows and columns. Have students create a quilt square. Put the students' squares together in rows and columns to create a class quilt. Count the number of quilt squares in each row and column.	K-5 Math Teaching Resources: http://www.k-5mathteachingresources.com/index.htm

Code: 2G2

Domain: Geometry

Grade: 2

Assessment Tasks Used	
Skill-Based Task: Partition the rectangle into 2 rows and 3 columns. Record the total number of squares.  Number of squares: _____	**Problem Task:** Aunt Sue is making a quilt. Her quilt is partitioned into 8 rows and 6 columns of squares. How many quilt squares will she need to make her quilt? 

Code: 2G2

Domain: Geometry Grade: 2

Core Content

Cluster Title: Reason with shapes and their attributes.

Standard 3: Partition circles and rectangles into two, three, or four equal shares; describe the shares using the words *halves*, *thirds*, *half of*, *a third of*, etc.; and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.

MASTERY Patterns of Reasoning:

Conceptual:

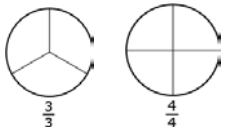
Students will understand the meaning of partition.
Students will understand that circles and rectangles can be divided into two, three, and four equal shares.
Students will recognize halves, thirds, and fourths of a shape.
Students will understand that two halves equal one whole, three thirds equal one whole, and four fourths equal one whole.
Students will recognize that equal shares of identical wholes do not necessarily have the same shape.

Procedural:

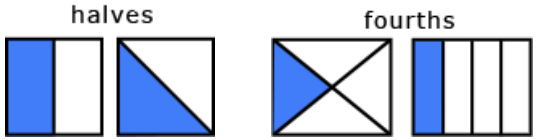
Students can identify two, three, and four equal shares of a whole.
Students can identify equal shares by using the vocabulary *halves, half of, thirds, third of, fourths,* and *fourth of*.
Students can identify that equal shares within identical circles/rectangles may not have the same shape.
Students can describe a circle/rectangle as having two halves, three thirds, or four fourths.

Representational:

Draw a circle/rectangle showing two, three, or four equal shares.



Partition two identical circles/rectangles in different ways to show that equal shares do not need to have the same shape.



Code: 2G3

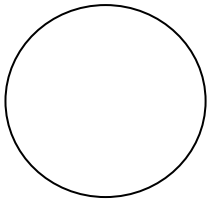
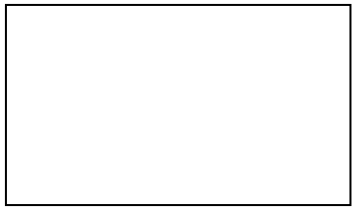
Supports for Teachers

Critical Background Knowledge
Conceptual: Students will recognize halves and fourths. Students will understand equal shares. Students will understand that a shape can be divided into two and four equal shares. Students will understand that decomposing into more equal shares creates smaller shares. Students will understand that fourths and quarters have the same meaning. (This comes from first grade core.) **Procedural:** Students can identify a shape as being divided into halves and fourths/quarters. Students can describe a shape as being divided into halves and fourths/quarters. Students can describe the whole as two (or four) of the shares. **Representational:** Students can draw circle/rectangles show two or four equal shares. Students can partition circle/rectangles into halves or fourths/quarters.
Academic Vocabulary and Notation
partition, circle, rectangle, halves, thirds, fourths, equal shares

Instructional Strategies Used	Resources Used
Give students three circles or rectangles. Have them partition the shapes into halves, thirds, and fourths. Make sure the students partition the shapes in different ways to show that equal shares do not need to have the same shape. Use geoboards to create rectangles and divide them into halves, thirds, and fourths.	http://www.k-5mathteachingresources.com/geometry-activities.html http://www.ixl.com/math/grade-2/halves-thirds-and-fourths www.beaconlearningcenter.com/WebLessons/IWantMyHalf/default.htm http://www.uen.org/Lessonplan/preview.cgi?LPid=18835 http://www.uen.org/Lessonplan/preview.cgi?LPid=10811

Domain: Geometry

Grade: 2

Assessment Tasks Used	
Skill-Based Task: Partition the circle into fourths:  Partition the rectangle into thirds: 	**Problem Task:** Alex has a candy bar he wants to share with his three friends. He divides the candy bar into equal shares. Show two different ways Alex can partition the candy bar. How many equal pieces will Alex need to share with his friends?  

Code: 2G3

Core Content

Cluster Title: Measure and estimate lengths in standard units.
Standard 1: Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.
MASTERY Patterns of Reasoning:
Conceptual: Students will identify and understand the difference between the standard tools for linear measurement. Students will understand that longer units of measure take fewer repetitions to measure objects. Students will understand that shorter units of measure take more repetitions to measure objects. Students will understand that they will typically use tools closest to the size of the measured object for efficiency (e.g., use a ruler to measure a book, not a meter stick). Students will identify and understand the beginning point of the appropriate measuring tool. **Procedural:** Students can investigate and use customary and metric tools of linear measurement. Students can learn tool names and linear measurement vocabulary. Students can measure a variety of objects using the appropriate tools. Students can measure accurately (leave no gaps, allow no overlays, and start at 0 on a measurement tool). **Representational:** Students can identify and record the appropriate length and unit (5 inches, 2 yards, or 9 cm).

Supports for Teachers

Critical Background Knowledge
Conceptual: Students will understand linear measurement (measurement of length). Students will understand repeated use of the same unit of measurement to measure one object. Students will understand units of measure (paper clips, unifix cubes, inches, feet, centimeters, meters, etc.). **Procedural:** Students can measure length by comparing two (or more) objects and identify which is longer and which is shorter. Students can use multiple copies of one object or one object repeatedly end to end to measure another object (e.g., paper clips to measure a book). **Representational:** Students can record length and unit of measure.
Academic Vocabulary and Notation
inch, foot, yard, yardstick, ruler, centimeter, meter, meter stick, measuring tape, length, customary, metric, measure, unit(s)

Instructional Strategies Used	Resources Used
Transition from nonstandard to standard units—*Read 12 Snails to One Lizard.* Show standard tools together for comparison. Use inch squares and rulers to measure in inches; use centimeter cubes and centimeter rulers to measure in centimeters. Measure irregular objects with a soft tape measure. Go outside and measure longer objects with a measuring tape.	Hightower, Susan. *12 Snails to One Lizard*. Simon & Schuster, 1997. Myller, Rolf. *How Big Is a Foot?* Yearling, 1991. Briggs, Raymond. *Jim and the Beanstalk*. Puffin, 1997. http://www.k-5mathteachingresources.com/measurement-and-data-activities.html

Domain: Measurement and Data Grade: 2

Assessment Tasks Used	
Skill-Based Task: Measure the length of the door; include length and unit. Measure the length of your partner's arm. Measure the length of your classroom. Measure the crayon box, length of your pencil, etc. When shown several pictures of different sized items, students determine which measurement tool would be most appropriate for measuring each item.	**Problem Task:** We need to decorate for our party. How much ribbon will we need to go across four desks placed side by side? Be sure to include your tool and unit of measure. Why did you use that unit?

Code: 2MD1

Domain: Measurement and Data Grade: 2

Core Content

Cluster Title: Measure and estimate lengths in standard units.
Standard 2: Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.
MASTERY Patterns of Reasoning:
Conceptual: Students will identify and understand the difference between the standard tools for linear measurement. Students will understand that longer units of measure take fewer repetitions to measure objects. Students will understand that shorter units of measure take more repetitions to measure objects. Students will understand the difference between the size of units (e.g., centimeters/inches, meters/yards, inches/feet, feet/yards). **Procedural:** Students can measure the same object with two different measurement tools and compare the difference in units used. **Representational:** Students can record the measurements using the correct units, and record their observations with a focus on the comparison and unit difference (centimeters vs. inches, inches vs. feet, etc.).

Supports for Teachers

Critical Background Knowledge
Conceptual: Students will understand linear measurement. Students will understand repeated use of the same unit of measurement to measure one object. Students will understand units of measure (paperclips, unifix cubes, inches, feet, centimeters, meters, etc.). Students will understand how to record measurement in proper units.

Code: 2MD2

Procedural:

Students can measure length by comparing units, identify which units are smaller and larger, and compare sizes.
Students can use multiple copies of one object or one object repeatedly end to end to measure another object (e.g., centimeter cubes or inches to measure a book).
Students can correctly use measurement tools (e.g., start at 0; stay in a straight line).

Representational:

Students can record the length of an object using two different units of measurement

Academic Vocabulary and Notation

inch, foot, yard, yardstick, ruler, centimeter, meter, meter stick, measuring tape, length, customary, metric, measure, unit(s)

Instructional Strategies Used	Resources Used
Use a T chart to record measurements of objects using different units of measure. Compare measurements. (Use one T chart for comparing inches to feet, a different one for comparing centimeters to inches, etc.) We are not asking students to convert, just compare.	Aboff, Marcie. *If You Were an Inch or a Centimeter*. Picture Window Books, 2009. Myller, Rolf. *How Big Is a Foot?* Yearling, 1991. Lionni, Leo. *Inch by Inch*. HarperCollins, 1995. http://www.k-5mathteachingresources.com/measurement-and-data-activities.html

Assessment Tasks Used

Skill-Based Task:	Problem Task:
Measure how tall your chair is in inches, then measure how tall your chair is in centimeters. Which measurement required more units? Explain why.	

Domain: Measurement and Data Grade: 2

Core Content

Cluster Title: Measure and estimate lengths in standard units.
Standard 3: Estimate lengths using units of inches, feet, centimeters, and meters.
MASTERY Patterns of Reasoning:
Conceptual: Students will understand the length of inches, feet, centimeters, and meters. Students will understand the value of using a point of reference when estimating length (e.g., the top joint of your thumb is approximately an inch). Students will understand how to check the reasonableness of an estimate and adjust as needed. **Procedural:** Students can estimate a length, then justify the reasonableness of the estimation and the unit of measurement used. Students can estimate a length, measure only a small section, then adjust the estimation as needed. **Representational:** Students can record the estimation of an object's length and specify the purpose for the unit of measurement used. Students can show justification for use of chosen unit of measurement.

Supports for Teachers

Critical Background Knowledge
Conceptual: Students will understand linear measurement. Students will understand iterating (using one object, end to end, to measure another object). Students will understand units of measure (inches, feet, centimeters, meters). Students will understand the concept of measuring length by comparing units. They will identify which units are smaller and larger, and compare sizes.

Code: 2MD3

Procedural:

Estimation strategies should be taught and then estimation incorporated into all other measurement activities for maximum learning.
Students will know how to measure objects to check reasonableness of estimates.
Students can use measurement tools correctly (e.g., start with 0, not 1, on the measurement tool).

Representational:

Students can record length and unit of measure.

Academic Vocabulary and Notation

estimate, inch, foot, ruler, centimeter, meter, meterstick, measuring tape, length, customary, metric, measure, unit(s)

Instructional Strategies Used	Resources Used
Practice estimating and measuring often. Use a three-column chart to track estimates, actual measurements, and the difference. Use parts of students' bodies to measure classroom objects and make an estimate, then measure with a standard tool (e.g., measure with the top joint of your thumb and then test with inches). Shel Silverstein's poem "How Many, How Much" is freely available on the Internet. Read the poem to the students and have them discuss in small groups which parts of the poem are measureable, and which are not. Which parts could be estimated in inches and centimeters? Which in what other measurement system? How might you estimate them?	Adler, David A. *How Tall, How Short, How Far Away?* Holiday House, 2000. Murphy, Stuart. *Betcha (MathStart Level 3).* HarperCollins, 1997. Clement, Rod. *Counting on Frank.* Houghton Mifflin School, 1994. Silverstein, Shel. "How Many, How Much" from *A Light in the Attic*. HarperCollins, 1981. Available at http://www.youtube.com/watch?feature=endscreen&NR=1&v=9sbUkLHz5UE&safety_mode=true&persist_safety_mode=1 or http://www.manmachine.org/gj/silverstein.html or http://smiley00.tripod.com/poem228.html

Domain: Measurement and Data Grade: 2

Assessment Tasks Used	
Skill-Based Task: Estimate the length of your hand. Test your estimate. Think about your principal's height. Which is the best estimate of his/her height? Will you estimate in centimeters, inches, feet, or meters? Why? Estimate the distance from your desk to the door in feet. Make the same estimate in inches. Why is the number of inches different from the number of feet?	**Problem Task:** You need to tell your Grandma how tall you are, but you don't have anything to measure yourself with. Tell how tall you think you are using inches, feet, centimeters, or meters. What unit of measurement did you use? Why? How do you know that your estimate is reasonable?

Code: 2MD3

Domain: Measurement and Data Grade: 2

Core Content

Cluster Title: Measure and estimate lengths in standard units.
Standard 4: Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.
MASTERY Patterns of Reasoning:
Conceptual: Students will understand that differences in length can be measured. Students will understand how to express the difference in length between two objects in terms of standard length units. **Procedural:** Students can compare objects visually, side by side, and measure the difference. Students can express that difference in terms of a standard length unit. **Representational:** Students can record length and unit of measure of actual objects. Students can record lengths of objects in scientific units (plant growth [K-2 Science, Grade 2, Standard 4, Objective 2], size of rocks [K-2 Science, Grade 2, Standard 2, Objective 1], length of a shadow [K-2 Science, Grade 2, Standard 2, Objective 3], length of a fall [K-2 Science, Grade 2, Standard 3, Objective 1]).

Supports for Teachers

Critical Background Knowledge
Conceptual: Students will understand linear measurement and tools. Students will understand iterating (using one object, end to end, to measure another object). Students will understand units of measure (inches, feet, centimeters, meters, yards). Students will understand the concept of measuring length by comparing units, identify which units are smaller and larger, and compare sizes. **Procedural:** Students know that, when comparing objects visually, the starting point of both objects must be the same. (Comparing is in first grade core.)

Code: 2MD4

Students know that, when measuring, we start with 0 on the measurement tool.

Representational:

Students can model the difference between the lengths of two different objects.
Students can record length of difference and unit of measure.

Academic Vocabulary and Notation

inch, foot, yard, yardstick, ruler, centimeter, meter, meter stick, measuring tape, length, customary, metric, measurement, measure, unit(s), difference, compare

Instructional Strategies Used	Resources Used
Compare objects visually, side by side, and measure the difference. Express that difference in terms of a standard length unit. Integrate this standard with science units. As you teach the units in the K-2 Science Core, look for opportunities to have students measure.	Connelly, Luella. *Let's Measure It (Learning to Read Series)*. Creative Teaching Press, 1996. http://www.schools.utah.gov/CURR/science/Elementary/Second-Grade.aspx

Assessment Tasks Used

Skill-Based Task:	Problem Task:
Put several pictures of items side by side on a worksheet. Have students measure and record the difference in length between the two items.	Annika has a candy bar. Jayme has one as well. Measure the candy bars on the next page. Who has the longest candy bar? How do you know? What measure of length did you choose? Why?

Domain: Measurement and Data

Grade: 2

Annika’s Candy Bar:

Jayme’s Candy Bar:

Code: 2MD4

Domain: Measurement and Data Grade: 2

Core Content

Cluster Title: Relate addition and subtraction to length.
Standard 5: Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.
MASTERY Patterns of Reasoning:
Conceptual: Students will understand how to add and subtract lengths. Students will understand how to interpret a word problem involving lengths. Students will understand how to set up equations, including a measurement unit, and solve for the unknown number. **Procedural:** Students can measure different lengths (objects or activities such as jumping distances). Students can record measurements. Students can compute different length equations with the unknown in different positions. Use a variety of lengths within 100 (sum of 100 or less; e.g., 45 + 36). Students can solve word problems involving lengths of various objects. **Representational:** Students can use pictures, words, and or numbers to solve measurement equations. Record the results.

Supports for Teachers

Critical Background Knowledge
Conceptual: Students will understand addition and subtraction within 100. Students will understand units of measure. Students will understand that numbers represent SOMETHING. For length, numbers represent a linear quantity. Students will understand that a missing quantity or the unknown can happen at the start, the change, or the result. Students will understand how to extract information from word problems, write equations, and solve.

Code: 2MD5

Procedural:

Students should know how to keep their calculations organized so that the addition of measurement units does not pose a problem.

Students should know how to write an equation using information from a word problem.

Representational:

Students can record with pictures, words, and or numbers how to solve the equations.

Academic Vocabulary and Notation

addition, subtraction, measurement, length, equation, unit, unknown, symbol

Instructional Strategies Used	**Resources Used**
Measure, draw picture and record answer including equation. Gather and chart measurement data. Use this class data to compare lengths, add lengths, or subtract lengths. Use this data in word problems. Have students create their own word problems. They can create questions from the class data or create their own data. Tell “fish” stories. (“My fish was this big!”) Compare the sizes of the different fish.	Connelly, Luella. *Let’s Measure It (Learn to Read Math Series)*. Creative Teaching Press, 1996.

Assessment Tasks Used

Skill-Based Task:	**Problem Task:**
I have two twelve-inch rulers in my desk. How many inches do I have? Draw a picture and write an equation to show your work. Each lunch table is sixteen feet long. How long are two tables together? Draw a picture and write an equation to show your work.	Work with a partner. Mark a starting line. Each partner throws a small paper plate like a Frisbee. Measure how far your plate went. Work with your partner to answer these questions and show the equation. How far did Partner A throw? How far did Partner B throw? How far did you throw together? How much longer distance did one travel than the other? How much shorter distance did one travel than the other?

Core Content

Cluster Title: Relate addition and subtraction to length.

Standard 6: Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers (0, 1, 2...), and represent whole-number sums and differences within 100 on a number line diagram.

MASTERY Patterns of Reasoning:

Conceptual:

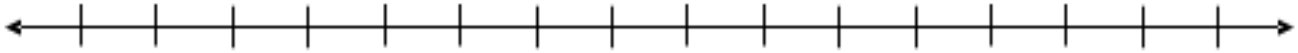
Students will understand that 0 represents the beginning point of the number line.
Students will understand that numbers can label an equal space marked on a number line.
Students will understand that numbers from 0 to 100 can be placed on the number line.
Students will understand that addition and subtraction problems can be solved using a number line that does not begin at zero.

Procedural:

Students can consider the numbers in the addition or subtraction problem to determine the range of numbers needed for the number line.
Students can create a number line using the numbers that correspond to an addition or subtraction problem, and solve the problem using the number line to perform the operation.

Representational:

Students can draw a number line with equally spaced points to illustrate thinking used in finding sums and differences of given problems.



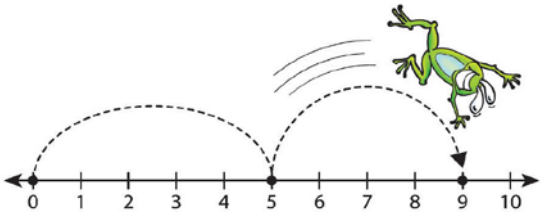
Domain: Measurement and Data Grade: 2

Supports for Teachers

Critical Background Knowledge
Conceptual: Students will understand that numbers are assigned a position on a number line to represent equally spaced points. Students will understand that when using the number line, it is the space between each line that represents the number, not the line itself. Students will understand that as you move to the right on a number line the numbers will be greater, but as you move to the left on a number line the numbers will be less. Students will understand what a number line looks like. **Procedural:** Students can expose students to the visual concept of a number line using numbers within 100. **Representational:** Students can create a classroom number line and demonstrate classroom contextual situations.   
Academic Vocabulary and Notation
number line, sum, difference, greater, less

Instructional Strategies Used	Resources Used
I Do: Using the NCTM Illuminations lesson at the right, model using the number line to solve addition and subtraction equations within 100. We Do: Guide students in using the number line to solve addition and subtraction.	NCTM Resources for Teaching Math—Hopping the Number Line: http://illuminations.nctm.org/LessonDetail.aspx?ID=L53

Code: 2MD6

You Do: Provide opportunities for using a number line during practice.	
Assessment Tasks Used	
Skill-Based Task: Have students use a number line to solve addition and subtraction equations (e.g., 5 + 4 = 9).  	**Problem Task:** Have students use a number line to solve addition and subtraction situations in context (e.g., “We have 11 girls and 13 boys in our class. How many total students are in our class?”).

Domain: Measurement and Data Grade: 2

Core Content

Cluster Title: Work with time and money.

Standard 7: Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.

MASTERY Patterns of Reasoning:

Conceptual:

Students will understand that the numbers on an analog clock are divided into intervals of five minutes.
Students will understand that a day is 24 hours long and is divided into two 12-hour segments, one being called a.m. and the other p.m.

Procedural:

Students can look at a clock, count by fives to the position of the minutes hand, note the position of the hour hand, and figure out the time to the nearest five minutes.
Students can use analog and digital clocks.
Students can write the time using correct format (e.g., 5:40 p.m.) to the nearest five minutes.

Representational:

Students can use both digital and analog clocks.
Students can include a.m. and p.m.

Code: 2MD7

Supports for Teachers

Critical Background Knowledge
Conceptual: Students will understand that there are 60 minutes in an hour and 30 minutes in a half-hour. Students will understand the difference between analog and digital clocks. Students will understand the minute hand and how it moves (i.e., goes around the clock in one hour). Students will understand the hour hand and how it moves (i.e., goes around the clock in 12 hours). **Procedural:** Students can skip-count by fives (2.NBT.2). **Representational:** Students can use both digital and analog clocks.
Academic Vocabulary and Notation
time, clock, analog, digital, hours, minutes, a.m., p.m.

Instructional Strategies Used	Resources Used
Use commercial or homemade student clocks. Move the minute hand around the clock five minutes at a time (skip-counting by fives). Match times on digital and analog clocks. Use real-life examples to teach a.m. and p.m.	http://www.k-5mathteachingresources.com/measurement-and-data-activities.html http://www.fi.edu/time/Journey/JustInTime/contents.html http://www.ixl.com/math/grade-2

Assessment Tasks Used	
Skill-Based Task: Ask students to tell time to the nearest five minutes from an analog clock. Give them context to determine whether the time is a.m. or p.m.	**Problem Task:** Have students record their activities throughout the day, labeling them as a.m./p.m. Activities could include: wake up, eat breakfast, start school, recess, school ends, sports practice, music practice, play with friends, eat dinner, and go to bed.

Domain: Measurement and Data Grade: 2

Core Content

Cluster Title: Work with time and money.

Standard 8: Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately. *Example: If you have 2 dimes and 3 pennies, how many cents do you have?*

MASTERY Patterns of Reasoning:

Conceptual:

Students will recognize the different coins and their names.
Students will understand the values of each of the coins and bills.
Students will understand that coins represent a part of a dollar.
Students will understand that only one money symbol should be used ($ for dollars, ¢ for cents only).
(Since students haven't been exposed to decimals, use problems with either only dollars or only cents.)

Procedural:

Students can introduce each of the coins individually, stating its name and value.
Students can introduce money symbols ($ for dollars, ¢ for cents only).
Students can practice counting money, starting with the larger values and adding on the smaller ones.
Students can write monetary amounts using the correct notations (e.g., 57¢ or $1).

Representational:

Students can represent money by writing amounts (e.g., 25¢ + 30¢ =55¢).

Code: 2MD8

Supports for Teachers

Critical Background Knowledge
Procedural: Students can skip-count by ones, fives, and tens. **Note: Since money is not addressed in other grades' Core Curricula, background knowledge must not be assumed. The basics, including recognition, value, and counting, must be included to successfully teach this standard.**
Academic Vocabulary and Notation
bill, coin, value, penny, nickel, dime, quarter, dollar, $, ¢.

Instructional Strategies Used	**Resources Used**
Introduce one coin at a time (starting with the smallest). Teach its name, value, and correct symbol (penny,  , 1¢ or dime,  , 10¢). Have students make sets of coins equivalent to other values up to $1 (two nickels in one dime, five nickels in one quarter, four quarters in $1). Use money to solve problems with real-life context.	http://www.k-5mathteachingresources.com/measurement-and-data-activities.html http://illuminations.nctm.org/ (search "money") http://www.ixl.com/math/grade-2

Assessment Tasks Used	
Skill-Based Task: Ashley has 1 quarter, 4 dimes, and 2 nickels in her piggy bank. How much money does Ashley have?	**Problem Task:** Parker has 6 dimes and 7 pennies. He bought a pack of gum for 25¢. How much money does Parker have left?

Domain: Measurement and Data Grade: 2

Core Content

Cluster Title: Represent and interpret data.

Standard 9: Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.

MASTERY Patterns of Reasoning:

Conceptual:

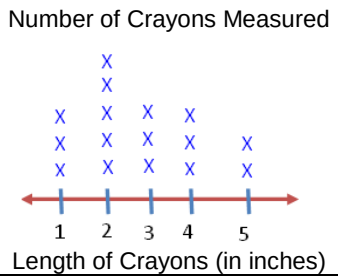
Students will understand that a line plot is a visual representation of data.
Students will understand and interpret data on a line plot.
Students will understand data and how to transfer it to a line plot.

Procedural:

Students can take measurements and collect data.
Students can make a line plot. Include a horizontal scale, title, labels, and straight columns of data marks.
Students can transfer measurement data to the line plot.
Students can read information from the completed line plot.
Students can make comparisons from the data.

Representational:

Students can represent data in a visual line plot.



Code: 2MD9

Supports for Teachers

Critical Background Knowledge
Conceptual: Students will understand linear measurement. Students will understand units of measure (inches, feet, yards, centimeters, meters). Students will understand the concept of measuring length by comparing units, and identify which units are smaller and larger. Students will understand how to organize data. **Procedural:** Students can, when measuring, start with 0 on the measurement tool. Students can draw straight lines. **Representational:** Students can record length and unit of measure.
Academic Vocabulary and Notation
data, line plot, horizontal scale, inch, foot, yard, yardstick, ruler, centimeter, meter, meter stick, measuring tape, length, customary, metric, measurement, measure, units, difference, compare

Instructional Strategies Used	Resources Used
Have students measure similar objects of varying length (pencils, crayons, height of students, etc.) or measure an activity (e.g., how far students can jump or toss a ball). Use measurement data to create a line plot. Teach organizational strategies, such as using grid/graph paper to keep information straight.	http://www.amathsdictionaryforkids.com/dictionary.html http://www.ixl.com/math/grade-2/interpret-line-plots

Assessment Tasks Used	
Skill-Based Task: Create a line plot from measurement data.	**Problem Task:** What is length of items in your desk? Measure eight or more items in your desk. Record the data. Transfer your data to a line plot.

Core Content

Cluster Title: Represent and interpret data.

Standard 10: Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and comparison problems using information presented in a bar graph.

MASTERY Patterns of Reasoning:

Conceptual:

Students will understand what a picture graph is and what the pictures represent.
Students will understand what a bar graph is and what the data represents.
Students will understand how to organize data in picture and bar graphs.
Students will understand the parts of a graph and how to label them.
Students will understand how to read and interpret bar and picture graphs.
Students will understand that data can be used to solve problems.

Procedural:

Students can read and understand data.
Students can organize data into up to four categories.
Students can draw a graph representing these categories.
Students can label the parts of a graph.
Students can analyze and solve put-together, take-apart, and comparison problems using a graph.

Representational:

Using procedural steps, students can create a picture graph and bar graph to represent data.
Students can solve simple problems using these graphs.
Students can make comparisons within data sets.

Supports for Teachers

Critical Background Knowledge
Conceptual: Students will understand that there are different types of graphs. Students will understand that a given data set can create a variety of graphs. Students will understand the data collection process. **Procedural:** Students can collect, organize, and represent the data in categories. **Representational:** Students can collect and categorize data. Students can create graphs (i.e., represent multiple data sets) with class. Students can record answers to simple questions and comparisons taken from analysis of a given graph.

Academic Vocabulary and Notation
key, data, graph, survey, category, title, labels, columns, picture graph, bar graph, compare

Instructional Strategies Used	Resources Used
Collect data as a class. Using the data collected, create a graph with students. Use this time to model the process of creating a graph (using student mastery procedural skills). Upon completion, let children create another graph on their own using another data set. Analyze and interpret the data presented in the graph. Ask students questions about the data set.	http://www.k-5mathteachingresources.com/measurement-and-data-activities.html http://illuminations.nctm.org/ (search for "graph activities")

Assessment Tasks Used	
Skill-Based Task: Use the data to complete the graph, then answer the questions that follow.	**Problem Task:** A survey was taken to find out the favorite color in Mr. Parker's class. The results are listed below:

Domain: Measurement and Data

Grade: 2

Mrs. Castro asked her students which fruit they had eaten for lunch. Here are the results:

Apples: 5
Grapes: 9
Pears: 2
Bananas: 7

Which fruit did most students choose at lunch?

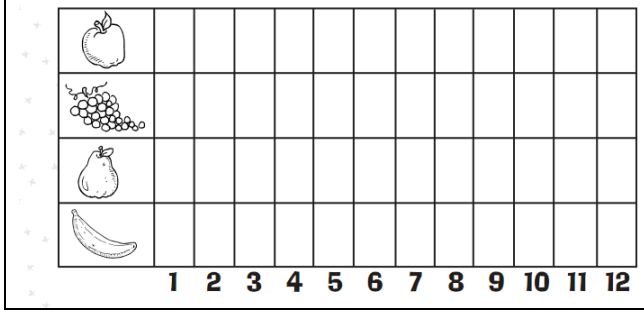
Which fruit did the least number of students choose?

How many more children ate grapes than pears?

How many children ate fruit at lunch that day?

How many less children chose pears than bananas?

If two more children ate apples, how many children would have eaten apples at lunch?



blue	green	blue
yellow	yellow	pink
pink	blue	green
green	pink	pink
blue	green	yellow
green	green	blue

Organize these results into a bar graph or picture graph. Analyze the graph and write five sentences telling what you learned from this graph (e.g., most popular color, least favorite color, etc.).

Code: 2MD10

Core Content

Cluster Title: Understand place value.

Standard 1: Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases:
a. 100 can be thought of as a bundle of ten tens—called a “hundred.”
b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).

MASTERY Patterns of Reasoning:

Conceptual:

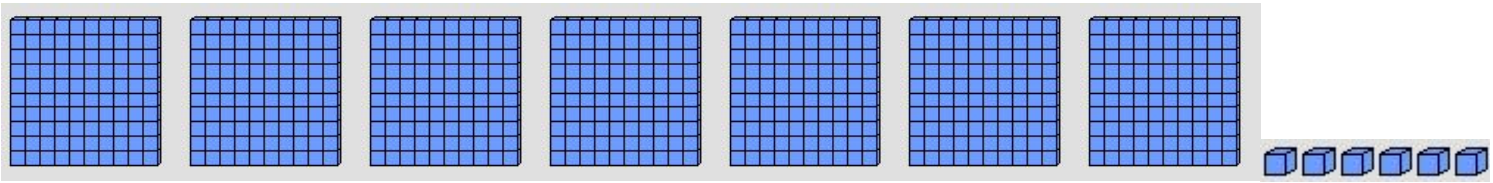
Students will understand that one represents a single unit of measurement in counting.
Students will understand that ten ones can be “bundled” together to make one set of ten; a ten can also be represented as 10 single units.
Students will understand that ten sets of ten can be “bundled” together to make a hundred; a hundred can also be represented as 100 single units.
Students will understand that when numbers are bundled into sets of hundreds, there are zero tens and zero ones.

Procedural:

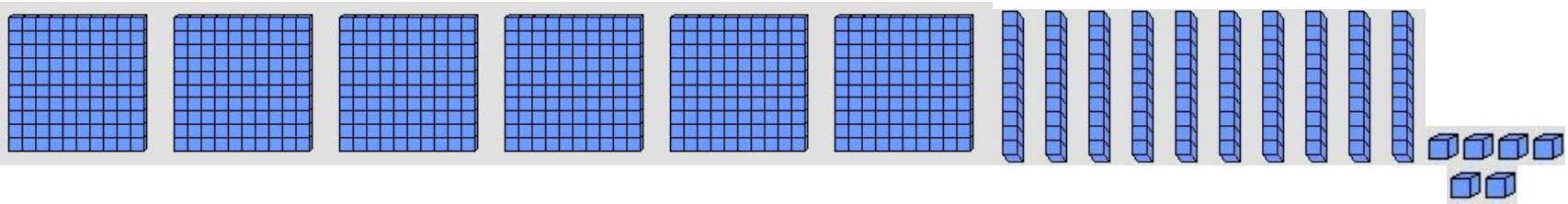
Students can identify the value of a given digit in a three-digit number (e.g., find the value of the 7 in 706; where 7 = 700).

Representational:

Students can model a given number using base ten blocks, straws, beans, etc (e.g., of most “efficient” form of base 10 where 706 can be thought of as 7 hundreds and 6 ones).



Students can model the same number in different ways (example using 706 again; 706 can be thought of as 6 hundreds, 10 tens, and 6 ones).



Students can illustrate a given number using a place value drawing in a math notebook.

Supports for Teachers

Critical Background Knowledge

Conceptual:

Students can identify the value of a given number in hundreds, tens, and ones.

Procedural:

Students can group 10 single units into a bundle of 10; group 10 sets of 10 into a bundle of 100.
Students can identify the value of a digit in a two-digit number (e.g., find the value of the 2 in 29; where the 2 represents 20).

Representational:

Students can model various numbers using base ten blocks representing hundreds, tens, and ones.
Students can compose a bundle of 10 from ten single units and decompose a bundle of 10 into 10 single units.
Students can model the same number in different ways.

Academic Vocabulary and Notation

ones, tens, hundreds, cube, long, flat, decomposing, composing, trading, grouping, regrouping or ungrouping

Domain: Number and Operations in Base Ten Grade: 2

Instructional Strategies Used	Resources Used
Teacher models how to represent a three-digit number with base 10 blocks (suggested use: http://nlvm.usu.edu/ or base 10 manipulatives and document camera). Students model the same number using manipulatives or pictorial representations. Students need repeated practice building numbers with a variety of materials. Students should also write the numbers and be asked to label the place value position. Teacher models the concept of grouping 10 single units into a bundle of 10; also groups 10 sets of 10 into a bundle of 100 (suggested use: http://nlvm.usu.edu/ or base 10 manipulatives and document camera). Student models the concept of grouping 10 single units into a bundle of 10; also groups 10 sets of 10 into a bundle of 100 using manipulatives or pictorial representations. Teacher presents three-digit number with one of the digits underlined (e.g., 251—What is the value of the 5 in this number?). Students need repeated practice identifying the value of the underlined digit in a multi-digit number.	http://www.amathsdictionaryforkids.com/dictionary.html http://nlvm.usu.edu/ http://mathwire.com/numbersense/placevalue.html Pallotta, Jerry. *100 Ways to get to 100*. Cartwheel Books, 1949. Lopresti, Angeline Sparagna. *A Place for Zero*. Charlesbridge Publications, 2003. Richardson, Kathy. *Understanding Numbers: Place Value*. Math Perspectives. Web site: http://mathperspectives.com/pub_un.html Richardson, Kathy. *Assessing Math Concepts: Grouping Tens*. Math Perspectives. Web site: http://mathperspectives.com/pub_amc.html Richardson, Kathy. *Assessing Math Concepts: Two Digit Addition and Subtraction*. Math Perspectives. Web site: http://mathperspectives.com/pub_amc.html

Code: 2NBT1

Assessment Tasks Used	
Skill-Based Task: Student will correctly model three three-digit numbers using base 10 blocks or pictorial representation: 248; 309; 780 Student will correctly identify the value of an underlined digit in a three-digit number.	**Problem Task:** 1. There are 431 animals that need to be transported to the circus. If 10 animals can fit in a trailer and 10 trailers can fit on a truck, how many trucks and trailers will be needed to transport the animals to the circus? Show your thinking with pictures, words or numbers. **2.** Given three digit cards, build the largest number possible and the smallest number possible. Students should also use a model to build or draw the numbers. Label the place value positions and tell the value of each digit.

Core Content

Cluster Title: Understand place value.

Standard 2: Count within 1000; skip-count by fives, tens, and hundreds.

MASTERY Patterns of Reasoning:

Conceptual:

Students will understand that numbers increase through counting patterns.
Students will understand that counting patterns can start from any number of that pattern's multiple.
Students will understand that counting by fives is just half of counting by 10s.
Students will understand that when counting by tens within a hundred, only the digit in the tens place increases.
Students will understand that when counting by hundreds within a thousand, only the digit in the hundreds place increases.
Students will understand that skip-counting is the same as repeated addition.

Procedural:

In addition to standard skip-counting patterns starting at zero (such as 10, 20, 30, etc.) students need to be able to add 5, 10, or 100 to ANY starting number within the counting pattern and extend the counting pattern (e.g., 425 – count on by fives: 430, 435, 440, etc.).
Students will be able to demonstrate multiple skip-counting patterns from the same starting point (example: start at 200 – skip count by 5s, 10s, and 100s).

Representational:

Students can model skip-counting with objects.
Students can use a hundreds chart to skip-count by fives, tens, or hundreds and highlight each pattern (by coloring or using objects).
Students can use number line to skip-count.
Students can model the relationship between skip-counting and monetary units (nickel, dime, dollar).

Supports for Teachers

Critical Background Knowledge
Conceptual: Students should have a conceptual understanding of movement between rows and patterns on a hundreds chart. **Procedural:** Students can count to 100 by ones, starting at any number less than 100. **Representational:** Students can model skip-counting with base ten blocks to show the relationship between skip-counting and place value.
Academic Vocabulary and Notation
pattern, skip count, extend, repeated addition, inverse, repeated subtraction, multiples

Instructional Strategies Used	**Resources Used**
Using a hundreds chart, students will model skip-counting patterns, starting at either zero or another given number, by coloring the multiples of five and ten using different colors. Teach students that counting backwards (inverse) is the same as repeated subtraction and follows a similar counting pattern (e.g., 50, 45, 40, 35, 30, etc.). Skip-count orally together while raising a hand in the air for each number. Stop on a given number, and skip-count backward together while moving a hand down for each number (e.g., 15—hand up each time, 25, 35, 45, 55, Stop, 45—hand down each time, 35, 25, etc). Have students complete the pattern 500, ____, _____, 800, ____, 1000.	Slater, Teddy. *Ready or Not, Here I Come*. Scholastic, 1999. Losi, Carol A. *512 Ants on Sullivan Street*. Cartwheel Books, 2006. Pallotta, Jerry. *100 Ways to get to 100*. Cartwheel Books, 1949. Princzes, Elinor J. *One Hundred Hungry Ants*. Sandpiper, 1999. Guettier, Benedicte. *The Father Who had 10 Children*. Dial, 1999. Hope, Jack A., Leutzinger, Larry, Reys, Barbara J., Reys, Robert E. *Mental Math in the Primary Grades*. Dale Seymour, 1988.

Pop game: Have students stand in a circle. Decide what number you are skip-counting by and what number you are stopping at (such as skip-counting by fives, and stopping at 35). Students take turns going around the circle counting by the pattern. When it gets to the student with the chosen stopping number, instead of saying 35, the student says “pop” and sits down. Play continues with the next student starting again at 5, (still using 35); each time a child gets to the number 35 he/she says “pop” and sits down. Keep playing until every child has sat down. After students understand how to play Pop, they can play in teams and race to be the first team with everyone sitting down.	
Assessment Tasks Used	
Skill-Based Task: Give students a blank hundreds chart and have them skip-count and write the numbers in starting at a given number (such as 415 and skip-count by fives, or 780 and skip-count by tens). This can be done multiple times as an ongoing assessment. Start at a different number each time and use different skip-counting patterns each time.	**Problem Task:** Chris skip-counts by fives. Ryan skip-counts by tens. If both boys start at zero and count 8 times, what number will they end at? Will it be the same number? If both boys continue their skip counting pattern 4 more times, what number will each boy reach? Show your thinking using words, pictures or numbers.

Core Content

Cluster Title: Understand place value.

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

MASTERY Patterns of Reasoning:

Conceptual:

Students will understand that there are multiple ways to express a given number (base ten, number name, expanded form).
Students will understand what expanded form is.
Students will understand how to compose and decompose numbers between standard and expanded form.

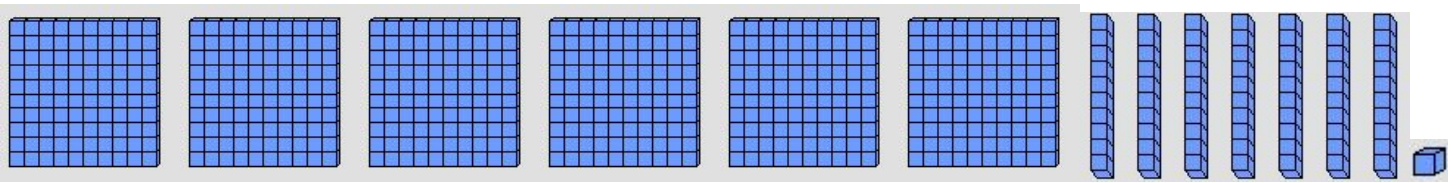
Procedural:

Students can express the same number in multiple ways:

- 671
- Six hundred seventy-one
- 6 hundreds, 7 tens, and 1 one
- 600 + 70 + 1 (six hundred plus seventy plus one)

Representational:

In addition to the procedural process, students can show the number 671 pictorially with base 10 blocks or drawing:



Students will write the related expanded form problem for a given pictorial representation.

Supports for Teachers

Critical Background Knowledge	
Conceptual: Students will understand that numbers can be represented as words. Students will understand that the two digits of a two-digit number represent amounts of tens and ones. **Procedural:** Students can represent one number in multiple ways. **Representational:** Students can use base ten blocks, straws, beans or virtual manipulatives to demonstrate the connection between the written form and the pictorial representation.	
Academic Vocabulary and Notation	
thousands, hundreds, tens, ones, standard form (e.g., 726), word form (e.g., seven hundred twenty-six), expanded form (e.g., 700 + 20 + 6), base ten language (e.g., seven hundreds, two tens, and six ones), models (e.g., flat, bar, cube)	
Instructional Strategies Used	**Resources Used**
1. Teachers and students will create place value cards (five index cards per number with each of the five models shown): 643 600 + 40 +3 (picture of base 10 blocks) 6 hundreds 4 tens 3 ones Six hundred forty three 2. Students can then use the place value cards for multiple learning activities (differentiate as needed based on readiness and learning levels): ▪ Memory game: Use two of the cards for each number and have students make matches (e.g., sets of standard and expanded form cards placed face up or down depending on challenge level).	Pinczes, Elinor J. *100 Hungry Ants*. Houghton Mifflin, 1993. place value dice Stack-A-Value Cards: http://coreacademy.usu.edu/Materials/2004/Handbooks/SecondGrade.pdf (see pages 162-165)

- "I have…/Who has…?"—Distribute all of the cards to students and play "I have…/Who has…?" Students will find the rest of their number forms and get into groups together.
- "Scoot"—Each student has one card on his/her desk, and students "scoot" from desk to desk. Children have a recording sheet and write down the number at each desk, as well as one other way that the number can be represented.
- Use Stack-A-Value Cards from 2004 Core Academy web site.

Assessment Tasks Used

Skill-Based Task:
Students will complete the following assessment on three given numbers of teacher's choice (or teacher can use place value dice)

Number:

Word form:

Expanded form:

____ + ____+_____ =_____

Place value:

hundreds	tens	ones

Pictorial Model:

Problem Task:
Suzie went trick-or-treating and collected 238 pieces of candy. Show three different examples of how Suzie could represent how much candy she collected using examples of standard form, word form, or expanded form. Place value (hundreds, tens, and ones) and pictorial models can also be used.

Core Content

Cluster Title: Understand place value.

Standard 4: Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.

MASTERY Patterns of Reasoning:

Conceptual:

Students will understand that when comparing two numbers, one is looking at the whole number, not just individual digits.
Students will understand that when comparing two numbers, if the number of hundreds is the same then one should look at and compare the number of tens.
Students will understand that two three-digit numbers that have equal value are represented by the = sign.

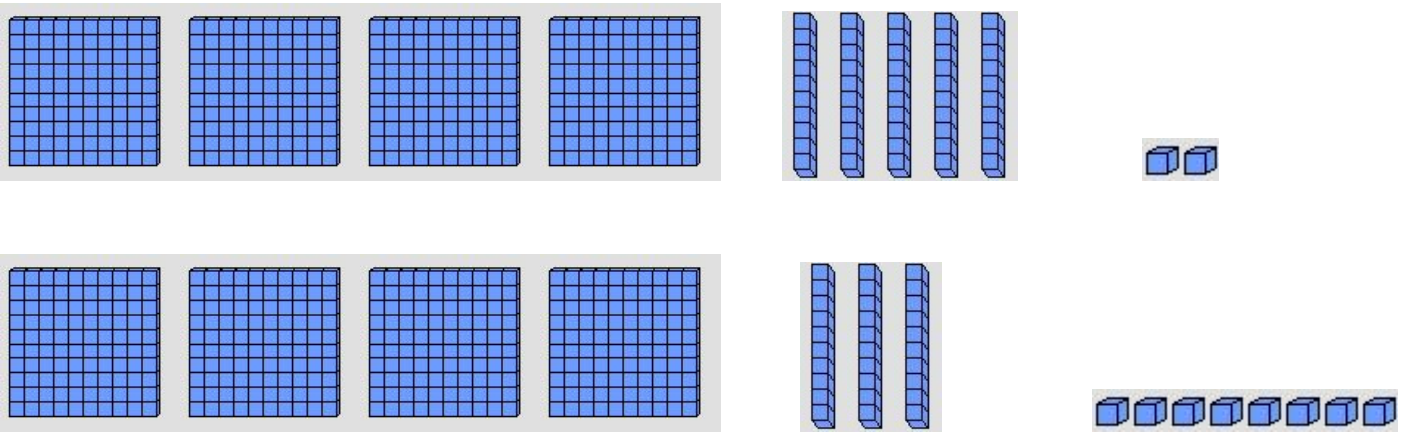
Procedural:

Students can use the vocabulary words (greater than, less than, equal to) to compare two three-digit numbers in terms of value.
Students can use the vocabulary words and >, <, = symbols together to compare two three-digit numbers in terms of value.
Students can use only symbols to compare two three-digit numbers in terms of value.

Representational:

Students can model greater than, less than and equal to using sets of money.
Students can model each number with base ten blocks (straws, beans, or place value drawings, etc.), attending to precision in the placement of hundreds with hundreds, tens with tens, and ones with ones.

(Example: 452 > 438, 452 is greater than 438)



Supports for Teachers

Critical Background Knowledge
Conceptual: Students will understand comparison of two-digit numbers using the words *greater than*, *less than*, and *equal to*. **Procedural:** Students can solve problems using only the vocabulary words. Students can solve problems using >, =, and < symbols. **Representational:** Students can compare sets of objects using vocabulary. Students can compare two-digit numbers using >, =, and < symbols.

Academic Vocabulary and Notation	
greater than, less than, more, fewer, compare, equal to, < , > , =	
Instructional Strategies Used	**Resources Used**
Before introducing the symbols, teach the vocabulary and review the concept of comparing two double-digit numbers using the words greater than, less than, and equal to. Play “guess my number” using a classroom number line. The teacher picks a number, then children ask questions in terms of greater than or less than. (For example, the teacher chooses a number between 10 and 80; students begin guessing numbers, and the teacher offers clues such as “My number is less than Billy’s guess of 45”; “My number is more than Jamie’s guess of 21” etc.) The teacher writes the clues on the board using the < and > symbols. Later, the students can choose the numbers and give the clues. “Fruit Basket”: give every student an index card and have him/her create his/her own three-digit number. Once everyone has chosen a number, students quickly find a partner and compare their numbers to decide who has the greater number. The teacher calls out “fruit basket,” and all students pick a new partner. The teacher can choose each time whether students are identifying the number that is “greater than” or “less than.” Play continues for five to eight rounds.	Murphy, Stuart J. *More or Less (MathStart 2)*. HarperCollins, 2005. Murphy, Stuart J. *Just Enough Carrots (MathStart 2)*. HarperCollins, 1997.

Assessment Tasks Used	
Skill-Based Task: Students will compare sets of numbers using symbols (see example): Student problem: 435 532 Completed: 435 < 532	**Problem Task:** Terri wants to know if her school has more students than her cousin’s. Her school has 556 students. Her cousin’s school has 567 students. Which school has more students? Use <, > or = symbols to show the results of the comparison. How do you know your answers are correct?

Core Content

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

Standard 5: Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.

MASTERY Patterns of Reasoning:

Conceptual:

Students will understand a variety of computation strategies for addition and subtraction.
Students will understand related addition and subtraction facts and how to use addition to solve for subtraction (and vice versa).
Students will understand the commutative property, associative property of addition, and identity property of zero.
Students will understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and that sometimes it is necessary to compose or decompose tens or hundreds.

Procedural:

Students can solve single- and double-digit addition and subtraction problems in both vertical and horizontal form using a variety of strategies.
Students can use more than one strategy to solve a given equation:

- Adding by place value 58 + 34 (50 + 30 = 80 8 + 4 = 12 80 + 12 = 92)
- Properties of operation—commutative property: 7 + 8 = 15 8 + 7 = 15; associative property: (3 + 8) + 1 = 12 3 + (8 + 1) = 12; identity property of zero: 9 + 0 = 9
- Compensation (48 + 22 22 – 2 = 20 48 + 2 = 50 50 + 20 = 70)
- Incremental (58 + 34 58 + 10 68 + 10 78 + 10 88 + 4 = 92)

Students can demonstrate the relationship between addition and subtraction.
Example: fact family (25 + 12 = 37 12 + 25 = 37 37 – 12 = 25 37 – 25 = 12)

Representational:

Students can represent addition and subtraction strategies in oral and written form.
Students can model addition and subtraction problems and their relationship using manipulatives such as base ten blocks, straws, beans, or place value drawings.
Students can use the number line to model addition and subtraction situations.

Supports for Teachers

Critical Background Knowledge	
Conceptual: Students will understand mental math strategies to solve all one-digit-plus-one-digit addition and subtraction facts from “Operations and Algebraic Thinking” (2.0A2) (i.e., doubles, doubles plus/minus one, ways to make ten, counting on, compensation, incremental adding or subtracting). Students will understand the relationship between addition and subtraction. Students will understand that in adding or subtracting two-digit numbers one adds or subtracts tens and tens, ones and ones, and that sometimes it is necessary to compose a ten. **Procedural:** Solve addition and subtraction problems within 100 using a variety of strategies. Solve addition and subtraction problems using multiples of ten. **Representational:** Model addition and subtraction problems within 100 using a variety of models.	
Academic Vocabulary and Notation	
commutative property, associative property, identity property, sum, difference, fact family, related facts, vertical and horizontal format, addition, subtraction, place value	
Instructional Strategies Used	**Resources Used**
1. Have the class play “Race to 100”—each pair of students needs a die, base ten blocks, place value work mat, and a hundreds chart. Player one rolls the die, takes the given number of ones cubes to put on his/her place value mat, and marks that many spaces on his/her hundreds chart. Play continues with player two, and player one and two alternate take turns. Whenever a ten can be made, students will trade their ten ones for a ten rod (showing regrouping), and eventually one player will win by being the first to trade his/her ten sets of ten rods for a 100 flat.	Cleary, Brian P. *The Mission of Addition*. Millbrook Press, 2005. Cleary, Brian P. *The Action of Subtraction*. Millbrook Press, 2006. Richardson, Kathy. *Understanding Numbers: Place Value.* Math Perspectives, 2004.

To relate this game to subtraction, play “Race to Zero”: Each player starts at 100 and subtracts the number he/she rolls as he/she tries to clear his/her mat and make it down to zero.

2. Using two colors of linking cubes, each student creates a two-digit number (e.g., 30 blue cubes four red cubes equals 34), then two students join their cubes to find the sum of the two-digit numbers, manipulating cubes to show relationship between addition and subtraction.

3. Separate the class into groups. Give each group a domino. Working together, the group must create a fact family for the given domino. The groups then pass their dominos to another group and create a fact family for the new domino. Passing continues until each group has made a fact family for all of the dominos. When students are more proficient in creating fact families, have students work individually to make the fact families.

Assessment Tasks Used

Skill-Based Task:

Solve 58+34=

76-47=

Solve

67	47
+17	-29

Problem Task:
Mr. James’ class collected 22 books for the book drive. Mrs. Kim’s class collected 59 books for the book drive. How many books did the two classes collect all together? How many more books did Mrs. Kim’s class collect than Mr. James’ class? Solve using at least two different strategies. Show your work.

Core Content

Cluster Title: Use place value understanding and properties of operations to add and subtract.
Standard 6: Add up to four two-digit numbers using strategies based on place value and properties of operations.
MASTERY Patterns of Reasoning:
Conceptual: Students will recognize that adding with more than two addends follows the same process as adding with two addends. Students will understand the commutative property (e.g., 23 + 15 = 15 + 23) and associative property (e.g., [13 + 2] + 57 = 13 + [2 + 57]) of addition. Students will understand that “regrouping” may be necessary when adding up to four two-digit numbers. **Procedural:** Students can solve double-digit addition problems in both vertical and horizontal form. Students can use more than one strategy to solve a given equation. **Representational:** Students can draw a model of a problem with more than two addends. Students can represent sums and differences in oral and written form. Students can demonstrate with manipulatives or writing how to group the order of addends while solving the problem. Students can model addition of two-digit numbers up to four addends with base ten blocks.

Supports for Teachers

Critical Background Knowledge
Conceptual: Students will understand how to add more than two single-digit addends. Students will understand computation strategies (e.g., doubles and doubles plus/minus one, making 10, counting on, compensation, incremental adding). Students will understand how to properly line numbers up in the correct place value column when writing addition problems in vertical form.

Students will understand the “regrouping” process of two-digit addition.

Procedural:

Students can model two-digit addition with two addends.
Students can add two two-digit numbers with or without regrouping.

Representational:

Students can show how to solve problems involving two two-digit numbers.
Students can draw a model of what happens when numbers require regrouping.

Academic Vocabulary and Notation	
add, sum, place value, addend, regrouping, digit	
Instructional Strategies Used	**Resources Used**
Have students work in pairs. Each player will roll a number cube four (or six or eight) times and record each roll in his/her math journal. Using the four digits rolled, each child will create two two-digit numbers and add them together to find the sum. Players in each pair will compare their sums at the end of each round. Play continues for a total a five rounds; the player who rolled the highest sum the most times is the winner. (Ideas for differentiation: After students have mastery with adding two two-digit numbers, they will play again and create three two-digit numbers, and eventually four two-digit numbers. The teacher can use blank number cubes to make numbers easier or harder to work with, based on students’ individual needs.)	Hulme, Joy N. *Sea Sums*. Hyperion, 1996. Murphy, Stuart. *Mall Mania (MathStart 2)*. HarperCollins, 2006.

Assessment Tasks Used	
Skill-Based Task: 24 + 36 + 18 + 32 =	**Problem Task:** The second grade classes are going on a field trip to the dinosaur museum. There are 24 students in Mrs. Carter’s class, 28 in Mr. Hall’s class, and 27 in Mr. Smith’s class. How many students are going on the field trip? If there are 12 adults going, how many people are going on the field trip altogether? Justify your answer.

Core Content

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

Standard 7: Add and subtract within 1000, 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. Understand that, in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones, and sometimes it is necessary to compose or decompose tens or hundreds.

MASTERY Patterns of Reasoning:

Conceptual:

Students will understand computation strategies relating to place value (hundreds and hundreds, tens and tens, ones and ones).
Students will understand how to compose and decompose large numbers in addition and subtraction.
Students will understand the principle of decomposing a number with relation to subtraction (commonly known as regrouping).
Students will understand that ten ones can be composed into a ten in the ten's place. Similarly, ten tens can be composed into a hundred in the hundreds place (this is commonly known as regrouping).
Students will understand how to strategically use compensation to make friendly numbers.
Students will understand how to use incremental adding (i.e., breaking one number into tens and ones).

Procedural:

Students can solve addition and subtraction problems (up to 1,000) in both vertical and horizontal form.
Students can use more than one strategy to solve a given equation.
Students can demonstrate the relationship between addition and subtraction.

Representational:

Students can represent sums and differences in oral and written form.
Students can model addition and subtraction problems and their relationships using manipulatives.

Supports for Teachers

Critical Background Knowledge

Conceptual:

Concepts taught in Standard 5 must be mastered prior to teaching this standard.
Students should already have a solid understanding of place value terms and meanings, and be able to add and subtract fluently within 100 before moving onto larger numbers.

Procedural:

Students can show how to properly line numbers up in the correct place value column when writing addition and subtraction problems in vertical form.

Students can use a variety of strategies when adding and subtracting one- and two-digit numbers.

Representational:

Model two-digit addition and subtraction with or without composing or decomposing numbers.

Show a solution for a two-digit problem.

Academic Vocabulary and Notation

compose, decompose, compensation, incremental adding/subtracting, regrouping

Instructional Strategies Used	**Resources Used**
Use manipulatives to model addition and subtraction problems. Students will use a deck of number cards (0–9). Playing with partners, each student will draw three cards and create a number of his/her choice. Partners then add their two numbers together, and record the problem and answer in their math journal or on a response sheet. After students record the answer in their journals, they will model the numbers using base ten blocks to self-check for the correct answer. The game is played the same way with subtraction, but with the consideration of place value and understanding that in subtraction, the number with the greater value is placed in the top position.	Sharmat, Marjorie W. *The 329th Friend*. Simon and Schuster, 1992. Kras, Sara Louise. *Animal Giants*. Cooper Square Publishing, 2005. Ochitree, Diane. *Cats Add Up (Hello Reader Math Level 1)*. Cartwheel Books, 1998.

Assessment Tasks Used

Skill-Based Task:	**Problem Task:**
Give students an addition or subtraction problem (such as 482 + 326 =). Students will choose their preferred strategy and solve; they will also relate the strategy to a written method and explain the steps taken to solve the problem.	The second grade collected 235 cans for the food drive. The third grade collected 137 cans. How many cans did the second and third grades collect all together? How many more cans did the second grade class collect than the third grade? How many more cans do they need to get to 500? Justify your answer.

Core Content

Cluster Title: Use place value understanding and properties of operations to add and subtract.
Standard 8: Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.
MASTERY Patterns of Reasoning:
Conceptual: Students will understand that adding 10 or 100 to any number only changes the digit in the 10s or 100s place. **Procedural:** Students can add or subtract 10 or 100 mentally. **Representational:** Students can draw a picture of the number in base ten format (or use base ten blocks), and demonstrate the change being made (i.e., cross out a set of 10 or 100, or draw another set of 10 or 100). After children have a solid understanding of how to relate the drawing to adding/subtracting 10 or 100, they can demonstrate proficiency in being able to mentally add or subtract 10 or 100 from a given number.

Supports for Teachers

Critical Background Knowledge
Conceptual: Students will understand that counting patterns can start from any number. Students will understand how to use a hundreds chart. Students will understand skip-counting patterns (e.g., by 10s, 20s, 30s, etc.). **Procedural:** Students can count on and back by one. Students can skip-count by tens and hundreds; discuss how the number in the tens place changes when skip-counting by tens; and discuss how the number in the hundreds place changes when skip-counting by hundreds. Students can add or subtract ten or 100 to ANY starting number and extend the counting pattern (e.g., 28: 38, 48, 58, etc.).

Representational:

Students can model (using base ten blocks) addition or subtraction of 10 or 100.

Students can show the relationship between skip-counting by 10s and mentally adding 10 to a given number (e.g., with the number 64, the related skip-counting pattern is 60, 70, so that to mentally add 10 to 64, the answer would be 74), and apply the same concept when adding or subtracting hundreds.

Academic Vocabulary and Notation

increase, decrease, skip count, mental math

Instructional Strategies Used	**Resources Used**
Roll the place value dice and build the number using base ten blocks; draw a “change” card and follow the directions on the card to change the number. Make the change with the blocks and record both number and answer in math journal. Write down the change that was made. Play a game similar to “I have…/Who has…” where each child has a number and a statement such as “Who has ten more?” and the next person has the answer and a new question.	hundreds chart base ten blocks place value dice numeral cards

Assessment Tasks Used

Skill-Based Task:

Teacher will create an assessment using the following format (choose amount of problems and difficulty of numbers according to ability level of class):

- 100	- 10	Number	+ 10	+100

Problem Task:

Sara reads 313 pages during the week. Mark reads 100 more pages than Sara. Gary reads ten fewer pages than Mark.

How many pages does Gary read? Explain how you know.

Core Content

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

Standard 9: Explain why addition and subtraction strategies work, using place value and the properties of operations. Note: Explanations may be supported by drawings or objects.

MASTERY Patterns of Reasoning:

Conceptual:

Students will understand place value and the value of each digit, as well as the whole number represented.
Students will understand the properties of operations.

Procedural:

Students can solve the same problem in more than one way, as well as:

- Clearly explain their thinking and justify their reasoning.
- Connect a given addition problem to a related subtraction problem.
- Connect a given subtraction problem to a related addition problem.
- Connect models to written numbers in relation to addition and subtraction problems.
- Connect properties of operations to addition and subtraction strategies.

Representational:

Students can represent the connections between strategies and identify similarities and differences of various strategies.
Students can use numbers, pictures, or words to explain addition and subtraction strategies.

Supports for Teachers

Critical Background Knowledge

Conceptual:

Students will prior understanding of multiple addition and subtraction strategies. (Concepts taught in Standard 2NBT2 must be mastered prior to assessing this standard.)
Students will understand how to justify reasoning in math problems.
Students will understand how to make connections between strategies (similarities and differences).

Procedural:

Students can demonstrate solving one problem with multiple strategies.

Be able to guide student thinking through higher-order questioning.
Teachers need to enable their students to explain, clarify, and justify their thinking.

Representational:
Model the process of solving a problem and explaining the steps taken to arrive at a given answer.

Academic Vocabulary and Notation	
place value, properties of operations, addition, subtraction, strategy, inverse, justify, clarify, reasoning, explain	
Instructional Strategies Used	**Resources Used**
Give students a problem, and allow them time to explore the problem. Then have students solve the problem in more than one way (using multiple strategies). Ask students to explain why they chose the strategy they used. Have students share their answers Guide the discussion: “Explain your thinking. Why do you know that your answer is right? How do you know that it will work every time? How are your two strategies different from each other and how are they the same? How do the numbers relate to your picture?”	a variety of types of problem-solving activities with differentiated numbers various manipulatives

Assessment Tasks Used	
Skill-Based Task: Have children solve a few two- and three-digit addition and subtraction problems, using two different strategies, and explain their process in solving the problem.	**Problem Task:** Sarah has 33 marbles in a bag. Jeff has 29 marbles in a bag. How many marbles do they have if they put them all together? o Solve the problem in two different ways. o Show both strategies. o Explain all of your thinking and how you know that your answer is right. o How are your two strategies different from each other and how are they the same? How do the numbers say the same thing as your picture? Have students create a story problem, solve, and justify their answer.

Core Content

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

Standard 1: Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions (e.g., by using drawings and equations with a symbol for the unknown number to represent the problem).

MASTERY Patterns of Reasoning:

Conceptual:

Students will understand how to solve one-step word problems using addition and subtraction within 100.
Students will understand how to solve two-step word problems using addition and subtraction within 100. (This could include two addition functions, two subtraction functions or both an addition and subtraction function in the same word problem.)
Students will understand how to solve word problems with unknowns in all positions using these problem types:

- adding to
- taking from
- putting together/taking apart
- comparing

(Refer to Glossary, Table 1 and Standard 1.OA.6 for a list of mental strategies.)

Procedural:

Students can solve one- and two-step word problems with the unknown in all positions using objects, drawings, number lines or hundreds charts.
Students can write equations for one- and two-step word problems for each problem type.

Representational:

Students can model each one- and two-step word problem type using objects, drawings, number lines or hundreds.
Students can represent an unknown number with a symbol using drawings and equations.

Supports for Teachers

Code: 1.OA.1

Critical Background Knowledge
Conceptual: Students will understand basic addition and subtraction problem solving strategies. Students will understand how numbers and symbols are used to represent word problems. Students will understand that the unknown number can be in any position in an equation. Students will understand how to efficiently use objects, models and drawings as tools to represent and solve word problems. See Standard 1.OA.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 that 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). **Procedural:** Students can solve one- and two-step word problems for all problem types: • adding to • taking from • putting together/taking apart • comparing Students can write equations that represent the problem using a symbol to represent the unknown. **Representational:** Students can model addition and subtraction word problems with objects, tools (number lines, hundreds charts), and drawings.
Academic Vocabulary and Notation
adding to, taking from, putting together, taking apart, comparing, unknown, position, symbol (plus, minus, equals, unknown symbol), represent, change

Instructional Strategies Used	Resources Used
Teachers may begin instruction by asking students to role play or visualize the situation before solving.	Carpenter, Fennema, Franke, Levi, and Empsom. *Children's Mathematics: Cognitively Guided Instruction*. Heinemann, 1999.

Samples of one-step problem types:

Take From: *Result Unknown* Patty had 58 gumballs. She gave 27 gumballs to Susan. How many gumballs does Patty have now? 58 – 27 = ☐	**Add to:** *Change Unknown* Brock had 27 rocks. His friend gave him some more rocks. Now Brock has 58 rocks. How many rocks did his friend give him? 27 + ☐ = 58
Compare: *Result Unknown* Amy has 58 pencils. Jenny has 27 pencils. How many more pencils does Amy have than Jenny? Write an equation for the problem. 58 – 27 = ☐ or 27 + ☐ = 58	**Take From:** *Start Unknown* Ben had some marbles. He gave 27 to Mike. Now Ben has 31 marbles. How many marbles did Ben start with? Write an equation for the problem. ☐ – 27 = 31

Samples of two-step problem types:

Add to/ take from: *Result Unknown* There were 67 children on the playground. 20 more children came. Some of the children got on the bus to go home. Now there are 27 children on the playground. How many students got on the bus? Write an equation for the problem. 67 + 20 = ☐ 87– 27 = ☐	**Compare** Molly has 12 erasers. Jeff has 6 less erasers than Molly. How many erasers do they have all together? Write the equations used to solve the problem. 12 – 6 = ☐ 12 + 6 = ☐

Van de Walle, John and Lovin, LouAnn. *Teaching Student Centered Mathematics K – 3*. Allyn and Bacon, 2005.

Wells, Rosemary. *Emily's First 100 Days of School*. Turtleback, 2005.

Assessment Tasks Used	
Skill-Based Task: This objective requires a word problem that is embedded into the Problem Task. (Note: This objective has the intent of helping children learn to solve one- and two-step word problems and represent their thinking using an algebraic equation. The intent is **not** to introduce traditional algorithms or rules.)	**Problem Task:** Use the pattern of problem types given in the Instructional Strategies section. Create contexts and use numbers that are appropriate for the needs of your learners. Each problem type needs to be assessed separately.

Core Content

Cluster Title: Add and subtract within 20.

Standard 2: Fluently add and subtract within 20 using mental strategies. By end of grade 2, know from memory all sums of two one-digit numbers.

MASTERY Patterns of Reasoning:

Conceptual:

Students will understand how to use whole-part relationships of numbers to efficiently compose and decompose one-digit numbers.
Students will understand the relationship between addition and subtraction.
Students will understand that fluency includes accuracy, efficiency, appropriateness, and flexibility.

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 = □

(See Standard 1.OA.6 for a list of mental strategies.)

Representational:

Students may use objects, pictures, words, and numbers to show and explain their thinking process at the beginning. By the time they reach fluency they should be using mental strategies and their explanations should reflect that.

Supports for Teachers

Critical Background Knowledge	
Conceptual: Students will understand that each number has a unique value. Students will understand what it means to compose and decompose numbers. Students will understand that whole numbers can be decomposed into parts that make them easier to work with. Students will understand the number combinations of 10. **Procedural:** Students can recognize and form combinations of 10. Students can add and subtract two whole numbers. Students can add and subtract within 20. **Representational:** Students can draw pictures and use objects, a number line, and/or words to understand and solve addition and subtraction problems. Students can communicate strategy for determining the total number of dots on a given dot card.	
Academic Vocabulary and Notation	
decompose, compose, number relationships, mental strategies, number combinations, doubles, doubles plus/minus one, equal part, expanded notation, facts, sum, difference, addend, subtrahend, fact family, fluency	
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. Some suggestions are: **<u>STEP ONE</u>** Develop the strategies using visual representations in a “Number Talk” routine (see resources on the right). • ten frames and two color counters	Tens Go Fish Game (“go fish” game, looking for combinations of ten) Turn Over Ten (concentration, looking for combinations of ten) Hong, Lily Toy. *Two of Everything*. Albert Whitman and Company, 1993. Richardson, Kathy. *Thinking with Numbers: Numbers Talks* DVD. Math Perspectives.

• 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.)	Parrish, Sherry. *Number Talks: Helping Children Build Mental Math and Computation Strategies, Grades K-5*. Math Solutions, 2010. Hope, Jack A., Leutzinger, Larry, Reys, Barbara J., Reys, Robert E. *Mental Math in the Primary Grades*. Dale Seymour, 1988. http://www.k-5mathteachingresources.com/ 2nd-grade-number-activities.html http://www.mathwire.com/numbersense/bfacts.html

Assessment Tasks Used	
Skill-Based Task: Use a written number fact assessment showing students' ability to solve addition and subtraction facts of all two-digit numbers without the aid of objects or tools.	**Problem Task:** This objective specifies that the student solves addition and subtraction problems within 20 using ***mental strategies***. This assessment is done without a context to demonstrate fluency. This could be accomplished in an interview with the student or while observing partner interaction.

Core Content

Cluster Title: Work with equal groups of objects to gain foundations for multiplication.

Standard 3: Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by twos; write an equation to express an even number as a sum of two equal addends.

MASTERY Patterns of Reasoning:

Conceptual:

Students will understand that an even number can be separated into two equal groups without any left over.
Students will understand that an odd number cannot be separated into two equal groups without having a leftover.
Students will understand that the number in the ones place shows whether a number is odd or even.
Students will understand that a group of tens will always be even.
Students will understand that an equation with two equal addends will have an even sum.

Procedural:

Students can identify an odd number by pairing objects and having one left over.
Students can identify an even number by pairing objects and having none left over.
Students can solve problems with two equal addends.
Students can count by twos.

Representational:

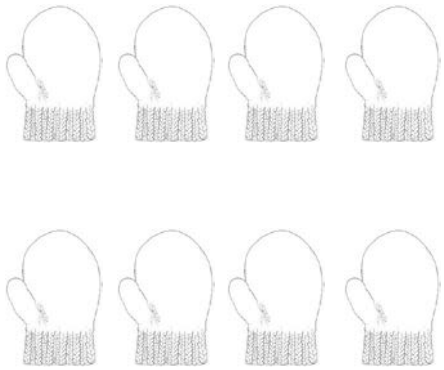
Students can draw pictures or arrange counters to show even and odd numbers.
Students can search for and highlight patterns on a hundreds chart.
Students can write equations showing double facts (e.g., 2 + 2 = 4; 5 + 5 = 10).

Supports for Teachers

Critical Background Knowledge
Conceptual: Students will understand that “even” means two groups having the same number in each group. Students will understand what it means to put objects in pairs. Students will understand how to use numbers and symbols to make an equation. **Procedural:** Students can use objects to represent a number. Students can divide the objects into two groups. Students can determine whether the groups have an equal or unequal number of objects. **Representational:** Students can draw a picture to show equal groups. Students can write an addition equation.
Academic Vocabulary and Notation
odd, even, equal, equation, unequal, pair, group, sum, addend.

Instructional Strategies Used	Resources Used
Explore even and odd numbers with concrete objects. (buttons, blocks, etc.). Progress to showing even and odd numbers using pictures and words (e.g., arrays and written descriptions). Students should be expected to share how they know that the sum is odd or even. Teach the “Doubles Rap” to help the students learn the doubles problems. Recognize that the sum of each equation is an even number and is the sum of two equal addends. Even and Odd Game Show—Write even and odd numbers on index cards. Cover them with a point value. Have two	Cristaldi, Katheryn. *Even Steven & Odd Todd*. Cartwheel Books, 1996. The Doubles Rap: http://www.smbsd.org/uploaded/files/Fine_Arts/Doubles_Rap.doc Aboff, Marcie. *If You Were an Even Number*. Picture Window Books, 2008. Aboff, Marcie. *If You Were an Odd Number*. Picture Window Books, 2008.

students come up. One student chooses a point value. The teacher shows the students the number. The first student to answer “Odd or Even” gets the point for his or her team. Give students a group of objects. Have them divide the objects into pairs. Identify whether they have an even or odd number. Give the students a number line to 20. Color the odd numbers green and the even numbers blue. Give each student a group of cubes. Have them pair the cubes and determine whether they have an odd or even number. Read *The Missing Mitten* by Stuart J. Murphy. Give each student a page with pictures of mittens on it. Have the students draw a string between two mittens to make pairs. Determine whether there is an even or odd amount of mittens. Put the students in pairs. Have them roll two dice. If both numbers are even or odd, player 1 gets a point. If one number is even and one number is odd, player 2 gets a point. Determine whether the date is odd or even on the calendar.	http://www.brainpopjr.com/math/numbersense/evenandodd/grownups.weml Odd and Even Songs: http://www.thevirtualvine.com/images/math/odd&evensong.pdf Murphy, Stuart J. *Missing Mittens*. Turtleback, 2001. Murphy, Stuart J. *Double the Ducks*. HarperCollins, 2002.

Assessment Tasks Used	
Skill-Based Task: Pair the mittens. Determine whether there is an odd or even amount of mittens. If it is even, write the doubles problem for the mittens. 	**Problem Task:** Jenna, Hannah, Jessica, Patty, and Lil eat lunch together at the same table. Are there an odd or an even number of girls at the table? Show your thinking with words, pictures or numbers. Note: For both types of assessment, students should be required to explain how they know the sum is odd or even.

Core Content

Cluster Title: Work with equal groups of objects to gain foundations for multiplication.

Standard 4: Use addition to find the total number of objects arranged in rectangular arrays with up to five rows and up to five columns; write an equation to express the total as a sum of equal addends.

MASTERY Patterns of Reasoning:

Conceptual:

Students will understand what a rectangular array is.
Students will understand how to arrange any set of objects into a rectangular array.
Students will understand how the rectangular array represents repeated addition.
Students will understand how to write an addition equation representing the array as a sum of equal addends.

Procedural:

Students can determine the total number of objects in each row or column for arrays with up to five rows and up to five columns.
Students can use addition to find the total number of objects in a rectangular array.
Students can write an addition equation to express the total of objects or representations in a rectangular array as a sum of equal addends (adding either columns or rows).

Representational:

Students can build a rectangular array with objects.
Students can build a rectangular array on a geoboard.
Students can draw a rectangular array using grid paper or a pictorial representation.

Supports for Teachers

Critical Background Knowledge

Conceptual:

Students will understand the attributes of a rectangle.
Students will understand that a rectangle can be divided into rows and columns.

Students will understand how to write an addition equation.
Students will understand the definition of sum and addend.

Procedural:

Students can identify an array as being arranged in rows and columns.
Students can identify the number of rows in a rectangular array.
Students can identify the number of columns in a rectangular array.
Students can identify the number of squares within a row/column.
Students can write an addition equation and find the sum of the addends.

Representational:

Students can create a rectangle using objects.
Students can create a rectangle on a geoboard.
Students can draw a rectangle.

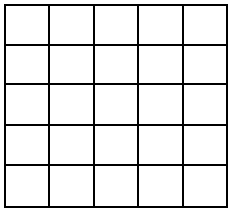
Academic Vocabulary and Notation	
rectangular array, repeated addition, row, column, equation, sum, and addend	
Instructional Strategies Used	**Resources Used**
Use square color tiles to create an array. Split the array into rows to represent a repeated addition equation. Roll two number cubes. One cube will represent the number of columns in an array; The other cube will represent the number of rows in an array. Create an array with color tiles. Write an addition problem with equal addends to express the total sum of color tiles in the array. Put students into cooperative groups. Give each group 12 small objects. Challenge the groups to make as many different rectangular arrays as possible. Have them draw a picture to show all the arrays they were able to create. With each picture, have them write a repeated addition equation to express the total sum of the objects.	Hutchins, Pat. *The Doorbell Rang*. Live Oaks Media, 2004. Princzes, Elinor J. *One Hundred Hungry Ants*. Sandpiper, 1999. plastic square color tiles Arrays at BrainPOP Jr.: http://www.brainpopjr.com/math/multiplicationanddivision/arrays/grownups.weml *Fit!* Game: http://www2.edc.org/thinkmath/lib/samples/G3C2L2TG_Sample.pdf (see p. 24)

Give the students dot paper and counters. Have the students arrange the counters in many different arrays. Next, have the students mark the dots in each array on the dot paper. Next to each array, write a repeated addition equation to show the sum of the dots.

Read the book *The Doorbell Rang* by Pat Hutchins. Give the students 12 paper cookies. As the teacher reads the book, have the students arrange their cookies into arrays to match the story. Write a repeated addition problem for each array. This activity can also be done with *One Hundred Hungry Ants* by Elinor J. Princzes.

Assessment Tasks Used

Skill-Based Task:
Write a repeated addition problem for the following array.



Problem Task:
Sally got a box of chocolates for Valentine's Day. She wants to eat one row of chocolates each day. How many chocolates will she eat in four days? Write an addition problem to find the number of chocolates she will eat.