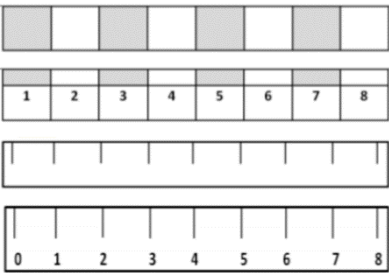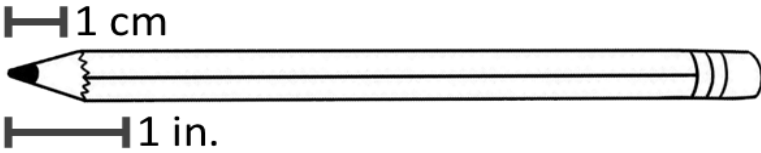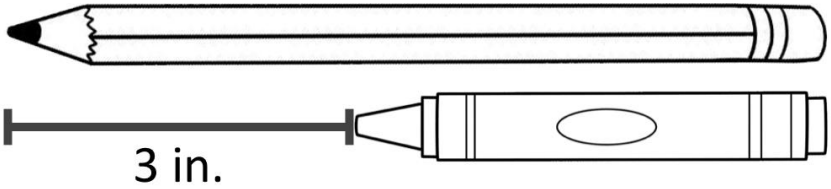| Measure and estimate lengths in standard units (Standards 2.MD.1–4) |
|---|

Standard 2.MD.1 Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.

Concepts and Skills to Master

- Identify and understand the difference between standard tools for linear measurement (rulers, yardsticks, meter sticks, and measuring tapes)
- Understand it may be more efficient to use tools closer to the size of the measured object (For example, use a ruler to measure a book, not a meter stick)
- Identify and understand the beginning point of the appropriate measuring tool
- Accurately measure a variety of objects using appropriate tools (leave no gaps, allow no overlays, and start at 0 on a measurement tool)
- Identify and record the appropriate length and unit (5 inches, 2 yards, 9 cm)

Teacher Note: Second grade is the first time students measure using standard units of measurement. In first grade, students lay multiple copies of the same object end to end to measure another object, such as measuring a pencil using paperclips. In second grade, students draw on this background knowledge as they transition to standard units of measurement. While it is important to teach students to start measuring on 0, they should also understand that they could start measuring at any whole number and then count the number of units in the length. Activities such as measuring with a "broken ruler" reinforce iterations of units being measured.

Related Standards: Current Grade Level	Related Standards: Future Grade Levels
2.MD.2 Measure the length of an object using units of different lengths	**3.MD.2** Measure and estimate liquid volumes and masses of objects using
2.MD.3 Estimate lengths using units of inches, feet, centimeters and meters	standard units of grams, kilograms, milliliters, and liters
2.MD.4 Measure to determine how much longer one object is than another	**3.MD.4, 4.MD.4** Generate and display measurement data
2.MD.5 Use addition and subtraction to solve word problems involving lengths	**3.MD.5–8, 4.MD.3** Extend understanding to area and perimeter
2.MD.6 Represent whole numbers as lengths from 0 on a number line diagram	**4.MD.1** Know relative sizes of measurement units
2.MD.9 Generate measurement data by measuring lengths of several objects	**4.MD.2** Use the four operations to solve measurement word problems

Critical Background Knowledge from Previous Grade Levels

- Order three objects by length; compare the lengths of two objects indirectly by using a third object (1.MD.1)
- Express the length of an object as a whole number of length using nonstandard units (1.MD.2)
- Describe measurable attributes of objects, such as length (K.MD.1)
- Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute (K.MD.2)

Academic Vocabulary

measure, unit(s), length, customary, inch (in.), foot (ft.), yard (yd.), ruler, yardstick, metric, centimeter (cm), meter (m), meter stick, measuring tape

Suggested Models	Suggested Strategies

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

- Measure different objects around the classroom
- Determine which measurement tool would be most appropriate for measuring each item
- Create rulers using inch-tiles and compare to a commercial ruler
- Investigate and use customary and metric linear measurement tools

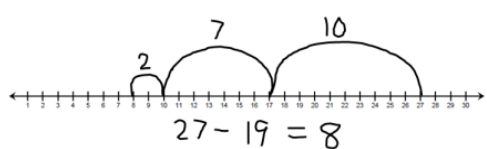Image Source: http://www.dpi.state.nc.us/docs/curriculum/mathematics/scos/2.pdf

2.MD.1

Measure and estimate lengths in standard units (Standards 2.MD.1–4)

Standard 2.MD.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.

Concepts and Skills to Master

- Identify and understand the difference between standard tools for linear measurement (rulers, yardsticks, meter sticks, and measuring tapes)
- Understand that when measuring, longer units of measure take fewer repetitions to measure objects
- Understand that when measuring, shorter units of measure take more repetitions to measure objects
- Understand the relative sizes between different units of measure (centimeters/inches, meters/yards, inches/feet, feet/yards)
- Record measurements using appropriate standard units

Teacher Note: Second grade students measure an object using two units of different lengths. This experience helps students realize that the unit used is as important as the attribute being measured. This is a difficult concept for young children and will require numerous experiences for students to predict, measure, and discuss outcomes.

Related Standards: Current Grade Level	Related Standards: Future Grade Levels
2.MD.1 Measure the length of an object by selecting and using appropriate tools	**3.NF.2** Understand and represent fractions on a number line diagram
2.MD.3 Estimate lengths using units of inches, feet, centimeters and meters	**3.NF.3** Compare fractions by reasoning about their size
2.MD.4 Measure to determine how much longer one object is than another	**3.MD.4** Generate measurement data by measuring lengths
2.MD.5 Use addition and subtraction to solve word problems involving lengths	**4.MD.1** Know relative sizes of measurement units within each system
2.MD.6 Represent whole numbers as lengths from 0 on a number line diagram	

Critical Background Knowledge from Previous Grade Levels

- Order three objects by length; compare the lengths of two objects indirectly by using a third object (1.MD.1)
- Express the length of an object as a whole number of length units (1.MD.2)
- Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object (K.MD.1)
- Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute (K.MD.2)

Academic Vocabulary

measure, unit(s), length, customary, inch (in.), foot (ft.), yard (yd.), ruler, yardstick, metric, centimeter (cm), meter (m), meter stick, measuring tape

Suggested Models	Suggested Strategies
Example: A student measured the length of a desk in both feet and inches. She found that the desk was 3 feet long. She also found out that it was 36 inches long. **Teacher:** Why do you think you have two different measurements for the same desk? **Student:** It only took 3 feet because the feet are so big. It took 36 inches because an inch is a whole lot smaller than a foot.	- Provide measurement activities using two different units (cm and in., ft. and yds., etc.) - Discuss results in measuring an object in both inches and feet and centimeters and meters - Use t-charts to compare the measurement of objects measured in two different units and describe how the two measurements relate to the size of the unit chosen

Image Source: https://commoncoretools.files.wordpress.com/2012/07/ccss_progression_gm_k5_2012_07_21.pdf

Measure and estimate lengths in standard units (Standards 2.MD.1–4)	
Standard 2.MD.3 Estimate lengths using units of inches, feet, centimeters, and meters.	
Concepts and Skills to Master	
- Understand that longer units of measure take fewer repetitions to measure objects - Understand that shorter units of measure take more repetitions to measure objects - Develop points of reference in order to estimate using inches, feet, centimeters, and meters (For example, an inch is about the distance between the first and second joints of the pointer finger) - Understand that estimates are approximate, and are not expected to be exact	
Related Standards: Current Grade Level	Related Standards: Future Grade Levels
2.MD.1 Measure the length of an object by selecting and using appropriate tools **2.MD.2** Measure the length of an object twice, using length units of different lengths for the two measurements **2.MD.4** Measure to determine how much longer one object is than another	**3.MD.2** Measure and estimate liquid volumes and masses of objects using standard units of grams, kilograms, milliliters, and liters **3.NF.2** Understand and represent fractions on a number line diagram **4.MD.1** Know relative sizes of measurement units
Critical Background Knowledge from Previous Grade Levels	
- Order three objects by length; compare the lengths of two objects indirectly by using a third object (1.MD.1) - Express the length of an object as a whole number of length units (1.MD.2) - Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute (K.MD.2) - Understand the relationship between numbers and quantities (K.CC.4)	
Academic Vocabulary	
estimate, measure, unit(s), length, inch, foot, centimeter, meter	
Suggested Models	Suggested Strategies
Example: When asked to estimate the length of a pencil in inches and centimeters, a student may estimate that the pencil is 6 inches or 10 centimeters. ⊢⊣1 cm ⊢⊣1 in.	- Practice estimating and measuring often - Use a three-column chart to track estimates, actual measurements, and the difference to analyze accuracy of estimations - Use parts of students' bodies to measure classroom objects and make an estimate, then measure with a standard tool (measure with the top joint of your thumb, then test with inches) - Estimate a length, then justify the reasonableness of the estimation and the unit of measurement used - Estimate a length, measure only a small section, then adjust the estimation as needed

2.MD.3

Measure and estimate lengths in standard units (Standards 2.MD.1–4)

Standard 2.MD.4 Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit. *For example, after measuring a pencil and a crayon, a student uses the measurements to determine that the pencil is two inches longer than the crayon.*

Concepts and Skills to Master

- Understand that differences in length can be measured (see Suggested Models below)
- Record the measure of two separate objects
- Compare the length of two separate objects and state which is longer/shorter than the other
- Find the difference in length of two separate objects and calculate the difference in the measurement units (for example, if a pencil is 10 cm and a marker is 8 cm, the marker is 2 cm shorter than the pencil)
- State the difference between the length of two objects in the same units as they were measured (for example, if a pencil and marker are measured in inches, the difference between the two objects will be stated in inches)

Related Standards: Current Grade Level	Related Standards: Future Grade Levels
2.OA.1 Use addition and subtraction to solve one- and two-step word problems **2.MD.1** Measure the length of an object **2.MD.2** Measure the length of an object twice, using length units of different lengths for the two measurements **2.MD.3** Estimate lengths using units of inches, feet, centimeters and meters **2.MD.10** Draw a picture graph and a bar graph to represent a data set with up to four categories. Solve simple comparison problems using information presented in a bar graph	**3.MD.2** Measure and estimate liquid volumes and masses of objects using standard units of grams, kilograms, milliliters, and liters **3.MD.4** Generate measurement data by measuring lengths using rulers **3.NF.3** Explain equivalence and compare fractions

Critical Background Knowledge

- Order three objects by length; compare the lengths of two objects indirectly by using a third object (1.MD.1)
- Express the length of an object as a whole number of length units (1.MD.2)
- Understand the relationship between numbers and quantities (K.CC.4)
- Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object (K.MD.1)
- Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute (K.MD.2)

Academic Vocabulary

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

Suggested Models	Suggested Strategies
A student may lay the pencil and crayon end to end then measure the difference in distance between the tip of the pencil and the tip of the crayon. 3 in.	- Align two objects side by side and measure the difference between them (see Suggested Models to the left) - Estimate the difference in length between two objects, then measure to check the accuracy of the estimate - Measure different objects and use subtraction to find the difference in measurements

2.MD.4

Relate addition and subtraction to length (Standards 2.MD.5–6).

Standard 2.MD.5 Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units. *For example, use drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.*

Concepts and Skills to Master

- Interpret word problems involving length
- Represent and solve word problems involving length using visual models, pictures, and equations
- Attach measurement units to values when appropriate (for example, 5 inches will be listed as "5 inches" or "5 in." rather than "5")

Related Standards: Current Grade Level	Related Standards: Future Grade Level
2.OA.1 Use addition and subtraction to solve one- and two-step word problems **2.MD.1** Measure the length of an object **2.MD.4** Measure to determine how much longer one object is than another	**3.MD.2** Measure and estimate liquid volumes and masses of objects using standard units of grams, kilograms, milliliters, and liters **3.MD.4** Generate measurement data by measuring lengths using rulers **3.MD.8** Solve real world and mathematical problems involving perimeters **4.MD.2** Use the four operations to solve word problems using units of measure

Critical Background Knowledge

- Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes. (2.MD.1)
- Use addition and subtraction within 20 to solve word problems (1.OA.1)
- Express the length of an object as a whole number of length units (1.MD.2)
- Understand the relationship between numbers and quantities. (K.CC.4)
- Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object (K.MD.1)
- Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. (K.MD.2)

Academic Vocabulary

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

Suggested Models	Suggested Strategies
Eva's train is 9 inches long, Jim's train is 7 inches long. How much longer is Eva's train than Jim's? 9 – 7 = ? or 7 + ? = 9 Eva's Train Jim's Train	- Act out the problem in order to develop a solution path - Create measurement word problems using student observations and measurements - Solve problems using manipulatives such as connecting cubes (see Suggested Models to the left comparing the length of Eva's and Jim's trains)

2.MD.5

Relate addition and subtraction to length (Standards 2.MD.5–6).

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

Concepts and Skills to Master

- Draw a number line with equally spaced points
- Understand that a mark is used to indicate positions of whole numbers on a number line
- Understand that the numbers on a number line will increase to the right and decrease to the left
- Understand number lines as a measurement model
- Understand that when using the number line, it is the space between each line that represents the number/value, not the line itself
- Use a number line to calculate sums and differences within 100

Related Standards: Current Grade Level	Related Standards: Future Grade Levels
2.OA.1 Use addition and subtraction to solve one- and two-step word problems **2.MD.4** Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit. **2.MD.5** Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same unit **2.MD.9** Show measurement data by making a line plot, where the horizontal scale is marked off in whole-number units	**3.NBT.2** Fluently add and subtract within 1,000 using strategies and algorithms **3.NF.2** Understand a fraction as a number on the number line; represent fractions on a number line diagram **3.MD.4** Show data by making a line plot, where the horizontal scale is marked off in appropriate units

Critical Background Knowledge

- Use addition and subtraction within 20 to solve word problems (1.OA.1)
- Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20 (1.OA.2)
- Add within 100 using concrete models or drawings and strategies (1.NBT.4)
- Given a two-digit number, mentally find 10 or more 10 less without having to count (1.NBT.5)
- Subtract multiples of 10 in the range 10–90 from multiples of 10 in the range 10–90 (1.NBT.6)

Academic Vocabulary

number line, sum, difference, greater than, less than, equal

Suggested Models

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

$$27 - 19 = 8$$

Suggested Strategies

- Read the addition or subtraction problem to determine the range of numbers needed for the number line
- Create a classroom number line and demonstrate classroom contextual situations
- Use open number lines to solve problems
- Compare number lines to rulers to solve problems and note the similarities

2.MD.6

Work with time and money (Standards 2.MD.7–8)
Standard 2.MD.7 Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.
Concepts and Skills to Master
● Understand the numbers on an analog clock and view time in intervals of five minutes ● Understand a day is 24 hours long and is divided into two 12-hour segments, one being called a.m. and the other p.m. ● Represent and write time on analog and digital clocks using a.m. and p.m. ● Understand the relationship between the hour and minute hands as they move through time ● Represent time displayed in a digital format to the nearest five minutes on an analog clock ● Represent time displayed on an analog clock to the nearest five minutes in a digital format ● Use descriptive terms such as *half past, quarter after, five 'til*, etc.

Related Standards: Current Grade Level	Related Standards: Future Grade Levels
2.NBT.2 Skip-count by fives **2.G.3** Partition circles into two and four equal shares. Describe the shares using the words halves and quarters. **2.MD.8** Solve problems involving nickels (5 cents)	**3.MD.1** To the nearest minute, add and subtract time intervals in word problems **4.MD.1** Know relative sizes of hours, minutes, and seconds. Express hours as minutes or seconds and minutes as seconds.) **4.MD.2** Solve word problems involving intervals of time

Critical Background Knowledge
● Understand and tell time on analog and digital clocks to the hour and half hour (1.MD.3) ● Understand the difference between the minute and hour hands on an analog clock (1.MD.3) ● Partition circles into two and four equal shares. Describe the shares using the words halves and quarters (1.G.3)

Academic Vocabulary
time, hour, minute, minute hand, hour hand, quarter of, quarter past, quarter after, quarter to/till, analog clock, digital clock, a.m., p.m., midnight, noon

Suggested Models	Suggested Strategies
 All of these clocks indicte the hour of "two", although they look slightly different. This is an important idea for students as they learn to tell time.	● Manipulate a physical clock to represent time to the nearest five minutes ● Manipulate a virtual clock to represent time to the nearest five minutes ● Match times on digital and analog clocks ● Apply time to real world situations (class schedule, school events, etc.)

Image Source: http://www.dpi.state.nc.us/docs/curriculum/mathematics/scos/2.pdf

2.MD.7

Work with time and money (Standards 2.MD.8)
Standard 2.MD.8 Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately. *For example, if you have 2 dimes and 3 pennies, how many cents do you have?*
Concepts and Skills to Master

- Understand that coins represent a part of a dollar
- Select coins for a given amount and create equivalent coin collections (same amounts, different coins)
- Identify the dollar bill and understand its value
- Use the dollar symbol to write the value of a dollar ($1, $7)
- Solve word problems involving dollars or cents and record using appropriate symbols For example, $6 and 25¢

Teacher Note: This standard does not include decimal notation. Students do not use decimal notation until 4th grade.

Related Standards: Current Course	Related Standards: Future Courses
2.NBT.2 Skip-count by fives and tens **2.NBT.5** Fluently add and subtract within 100 **2.NBT.7** Add and subtract within 1,000 **2.OA.1** Use addition and subtraction within 100 to solve one- and two-step word problems	**4.MD.2** Solve word problems involving money

Critical Background Knowledge from Previous Grade Level

- Identify the values of pennies, nickels, dimes and quarters and know their comparative values (1.MD.5)
- Use appropriate notation to designate a coin's value (1.MD.5)

Academic Vocabulary
bill, dollar ($), coin, penny, nickel, dime, quarter, cent (¢), value

Suggested Models	Suggested Strategies
2 dimes, 2 nickels, and 3 pennies 10¢ + 10¢ + 5¢ + 5¢ + 1¢ + 1¢ + 1¢ = 33¢	- Use money to solve problems with real-life contexts - Use physical coins to solve word problems - When counting sets of coins, group same coins together, start with larger values and add on smaller values

2.MD.8

Represent and interpret data (Standards 2.MD.9–10)
Standard 2.MD.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.

Concepts and Skills to Master
- Measure lengths of several objects to the nearest whole unit (inches, feet, yards, centimeters, meters)   - Understand that data such as the lengths of several objects may be represented on a line plot with whole number units   - Understand line plots represent measurement data, not categorical data   - Make a line plot using generated measurements; include a horizontal scale, title, labels, and straight columns of symbols (● or **X**) to represent the data points   - Relate line plots to number lines   Teacher Note: Students do not have to generate the data each time they make line plots. That would be too time consuming. After some experiences in generating data, most work in producing line plots can be done by providing students with data sets. While scaffolds may be in place to support students in creating line plots when appropriate, students are expected to create the horizontal scale with tick marks when making line plots. While the emphasis of this standard is on generating data and making line plots, students may pose and answer simple questions about the data.

Related Standards: Current Grade Level	Related Standards: Future Grade Levels
2.MD.1 Use appropriate tools to measure length **2.MD.3** Estimate lengths using units of inches, feet, centimeters, and meters **2.MD.6** Represent whole numbers as lengths on a number line **2.MD.10** Draw, represent and interpret categorical data with up to four categories	**3.MD.4** Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot where the horizontal scale is marked off in appropriate units-whole numbers, halves, or quarters **4.MD.4** Make a line plot to display a data set of measurements in fractions of a unit (halves, quarters, and eighths). Solve problems involving addition and subtraction with like denominators of fractions by using information presented in line plots

Critical Background Knowledge
- Express the length of an object as a whole number of length units (1.MD.2)   - Organize, represent, and interpret data with up to three data categories (1.MD.4)   - Describe measureable attributes of objects such as length (K.MD.1)

Academic Vocabulary
data, line plot, horizontal scale, measurement, measure, units, tick mark (measurement on line plot)

Suggested Models	Suggested Strategies
A Line Plot of Statue Height Data Height of the statue (inches)	- Generate ideas about what measurement data could be generated and represented on a line plot - Measure physical objects or distances varying in length; use data to create a line plot - Students may use tally marks or data tables to record measurements prior to creating a line plot or they may produce the line plot as the data are being collected

Image Source: https://commoncoretools.files.wordpress.com/2011/06/ccss_progression_md_k5_2011_06_20.pdf

2.MD.9

Represent and interpret data (Standards 2.MD.9–10)
Standard 2.MD.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.
Concepts and Skills to Master
- Draw a bar graph with a single-unit scale to represent data, with up to four categories; include title, labels, a horizontal and vertical axis (one axis representing categories and the other axis representing a scale showing counts in whole numbers)   - Draw a picture graph with a single-unit scale to represent data, up to four categories; include title, labels, a horizontal and vertical axis (one axis representing categories and the other axis representing a scale showing counts in whole numbers)   - Solve put-together (addition) and take-apart (subtraction) problems using information in a bar graph   - Solve comparison problems using information in a bar graph   Teacher Note: The Standards in Grades 1–3 do not require students to gather categorical data, just to represent it. Gathering data may be used as an instructional strategy, but it is not required of students.

Related Standards: Current Grade Level	Related Standards: Future Grade Level
2.OA.1 Solve addition and subtraction word problems (within 100) **2.OA.2** Add and subtract (within 20)	**3.MD.3** Draw scaled picture and bar graph

Critical Background Knowledge
- Organize, represent and interpret data with up to three categories. Ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another (1.MD.4)   - Count the number of objects in each category and sort the categories by count (K.MD.3)
Academic Vocabulary
Graph, picture graph, bar graph, key, data, compare, category, title, labels, horizontal axis, vertical axis, rows, straight columns

Suggested Models	Suggested Strategies
	- Collect data as a class. Create a graph with students. Use this time to model the process of creating a graph. Upon completion, let children create another graph on their own using another data set. - Give students a set of data, determine up to four categories of possible responses, represent data on a picture graph or bar graph, and interpret the results . - Discuss which type of graph (bar or picture) best represents the data
Image Source: http://www.dpi.state.nc.us/docs/curriculum/mathematics/scos/2.pdf	

2.MD.10