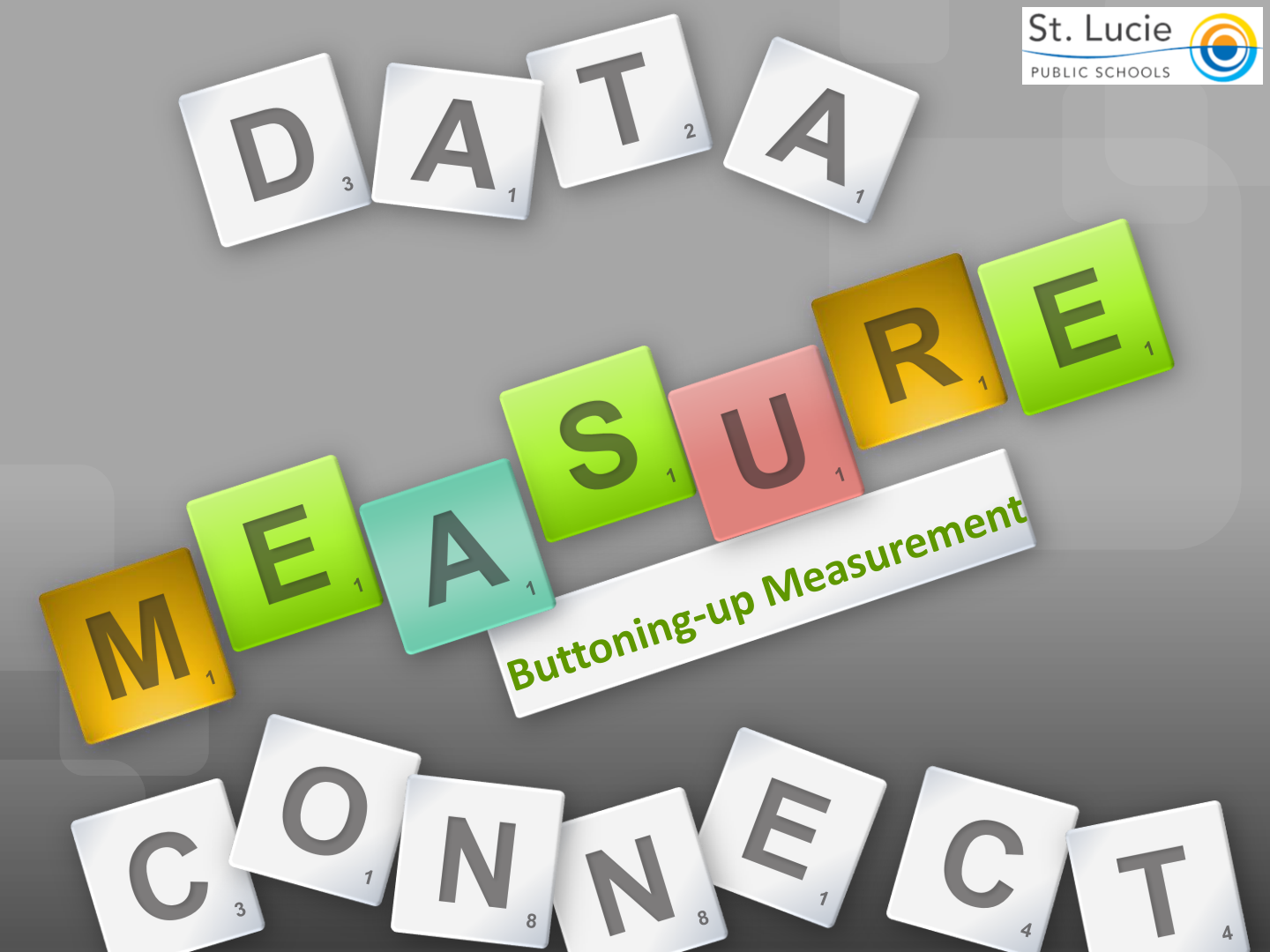
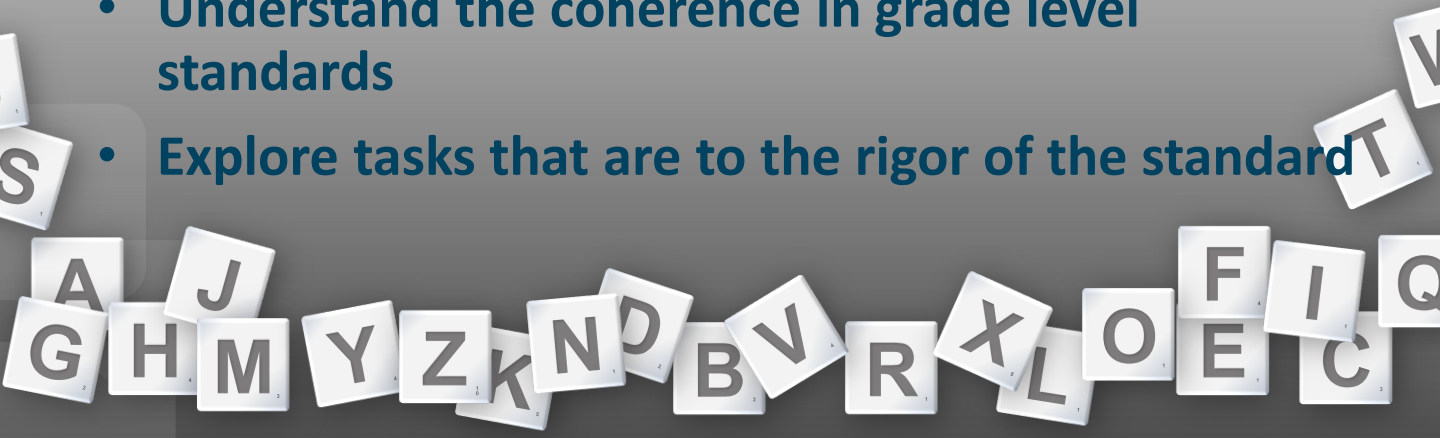

DATA
MEASURE
Buttoning-up Measurement
CONNECT

GOALS

- Understand the similarities and differences in categorical data and measurement data
- Understand the coherence in the measurement and data standards
- Understand the coherence in grade level standards
- Explore tasks that are to the rigor of the standard



Measurement and Data Sort

Sort your cards into furry animals and not furry animals

Furry

Not Furry

Categorical Data

Sort the animals into 2 categories.
Be prepared to explain your category choice.

- *What categories did you choose?*

Sort the animals into 3 categories.
Be prepared to explain your category choice.

- *What categories did you choose?*

Sort the animals into these categories.
Be prepared to explain your category choice.

- ***Mammals***
- ***Reptiles***
- ***Birds***
- ***Fish***
- ***Other***

DATA

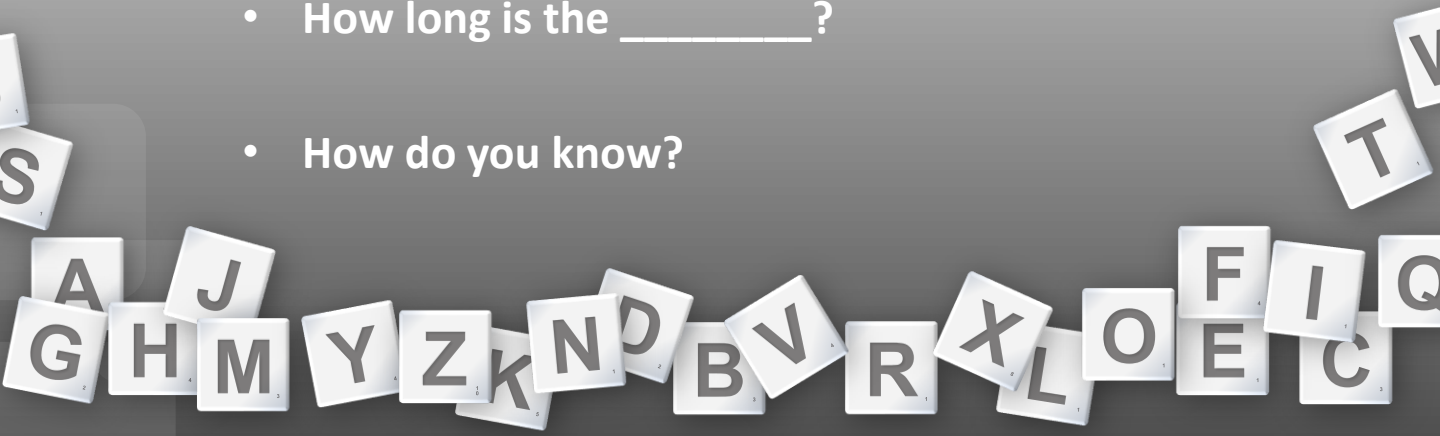
- Represents data that can be divided into groups based on attributes and qualified with a number

- Qualitative

Categorical Data

MEASURE

- We are going to answer the following questions.
- What can we use to find the length?
- How long is the _____?
- How do you know?



MEASURE

Let's think it through….

- Using your button- How long is the marker?
- How do you know? What steps did you use?

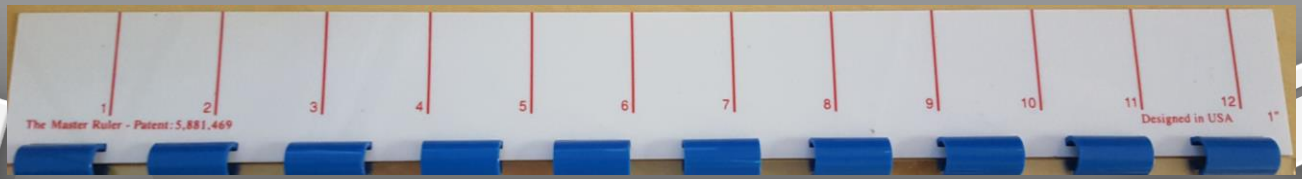
MEASURE

Let's think it through….

- Using your tiles- How long is the marker?
- How do you know? What steps did you use?

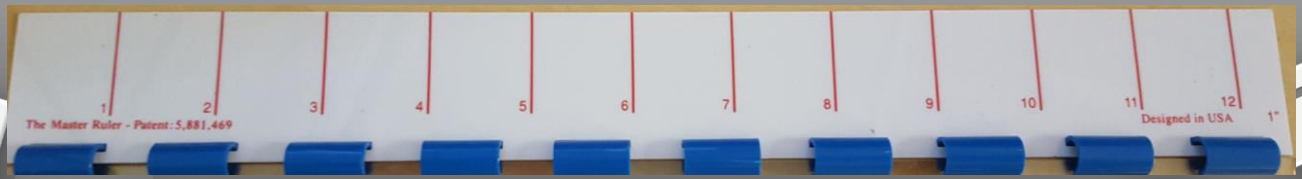
MEASURE

- We are going to answer the following questions with the most precise measurements.
- What can we use to find the length?
- How long is the marker?
- How do you know?



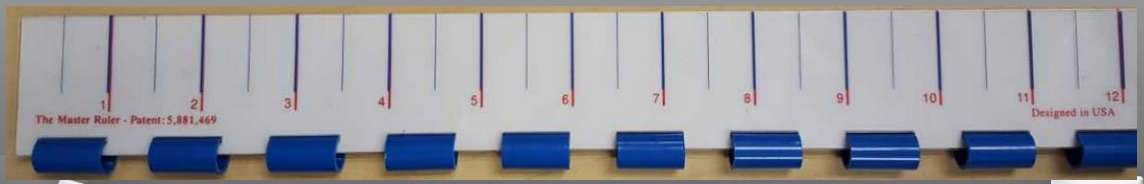
MEASURE

- **Using the ruler measure these items to the nearest one-inch:**
- **Highlighter**
- **Glue Stick**
- **Tape**
- **Marker**
- **Post-it**
- **Scissors**
- **Pen**



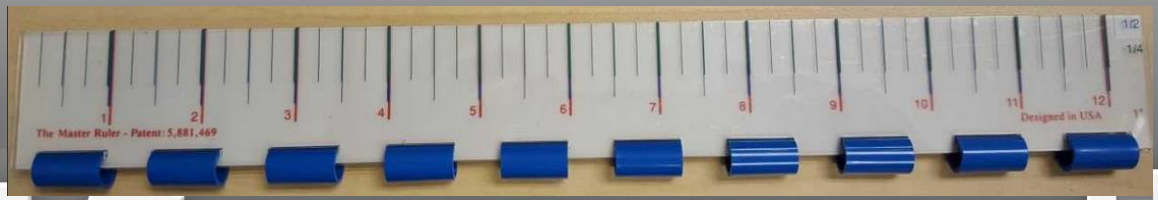
MEASURE

- **Using the ruler measure these items to the nearest half-inch:**
- **Highlighter**
- **Glue Stick**
- **Tape**
- **Marker**
- **Post-it**
- **Scissors**
- **Pen**



MEASURE

- **Using the ruler measure these items to the nearest quarter-inch:**
- **Highlighter**
- **Glue Stick**
- **Tape**
- **Marker**
- **Post-it**
- **Scissors**
- **Pen**



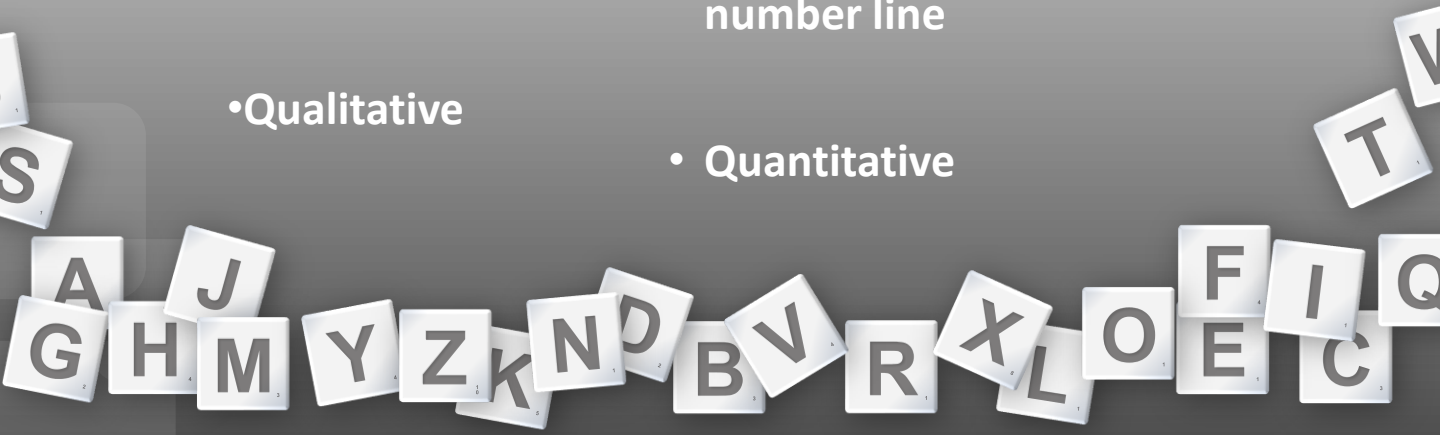
MEASURE

- Represents data that can be divided into groups based on attributes and qualified with a number

- Qualitative

- Measurement data has a numerical value based on quantitative data that can be placed on a number line

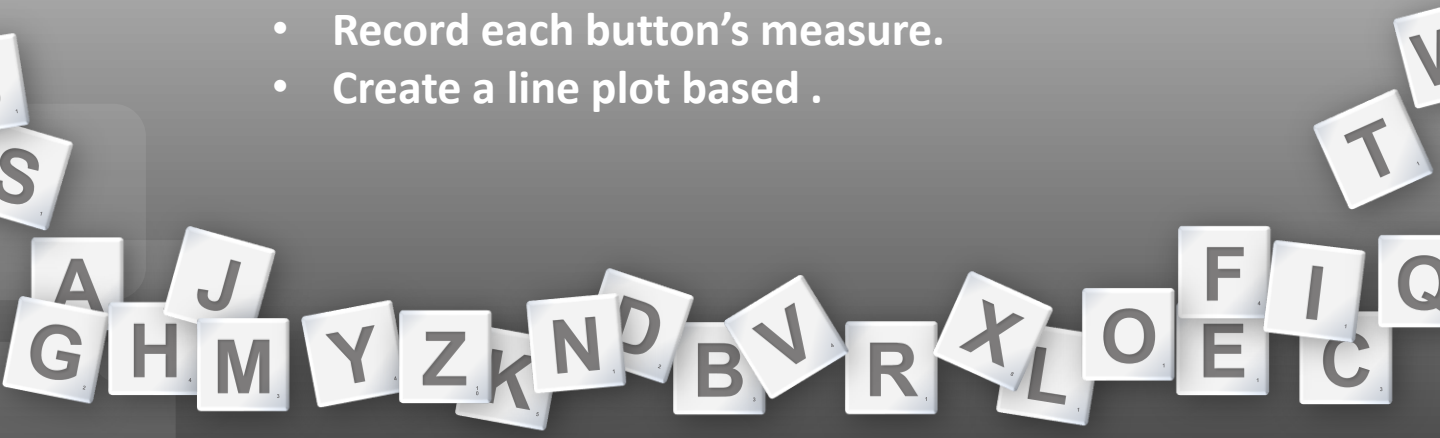
- Quantitative



MEASURE

Using the quarter- inch measurements:

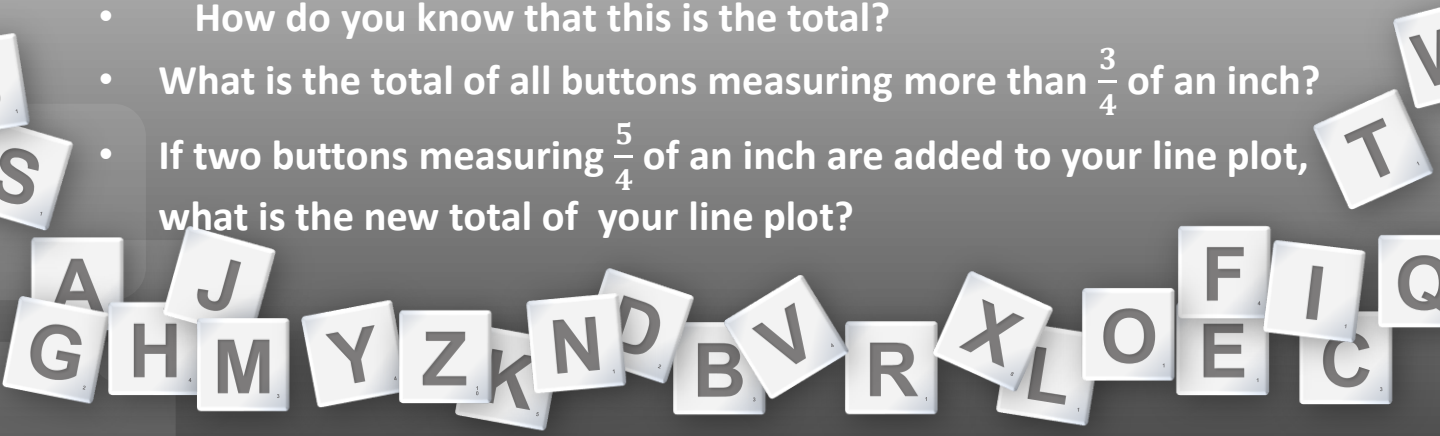
- **Measure the button and as a table decide on the measure of the button.**
- **Remember to measure the buttons at the widest part of the button.**
- **Record each button's measure.**
- **Create a line plot based .**



MEASURE

Answer the questions below based on the line plot created:

- What is the measure of the largest button?
- What is the measure of the smallest button?
- What is the difference in the length of the largest and smallest buttons?
- What is the total length of all of the buttons on your line plot?
- How do you know that this is the total?
- What is the total of all buttons measuring more than $\frac{3}{4}$ of an inch?
- If two buttons measuring $\frac{5}{4}$ of an inch are added to your line plot, what is the new total of your line plot?



Literary Connections

https://illuminations.nctm.org/lesson.aspx?id=843
How Big is a Foot by Rolf Mylier
Grades K-3
https://www.wccusd.net/cms/lib/CA01001466/Centricity/domain/60/lessons/grade%202%20lessons/MeasurementInPrimaryGrades.pdf
Twelve Snails to One Lizard by Susan Hightower
Grades K-2
http://illuminations.nctm.org/Lesson.aspx?id=1933
Jim and the Beanstalk by Raymond Briggs
Grade 3

MEASURE

Elementary Resources for Standards Based Instruction

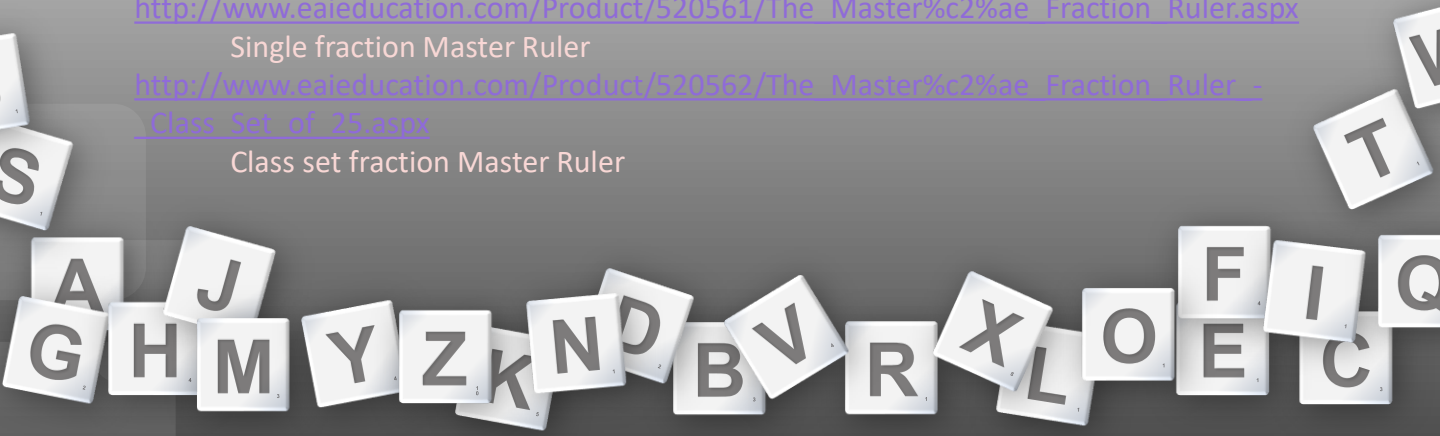
https://printable-ruler.net/elementary-rulers/
Printable Rulers with various increments

http://www.eaieducation.com/Product/520567/The_Master%c2%ae_Ruler_Standard.aspx
Single original Master Ruler

http://www.eaieducation.com/Product/531150/The_Master%c2%ae_Ruler_Kits_Standard_(Original)_Kit.aspx
Class set original Master Ruler

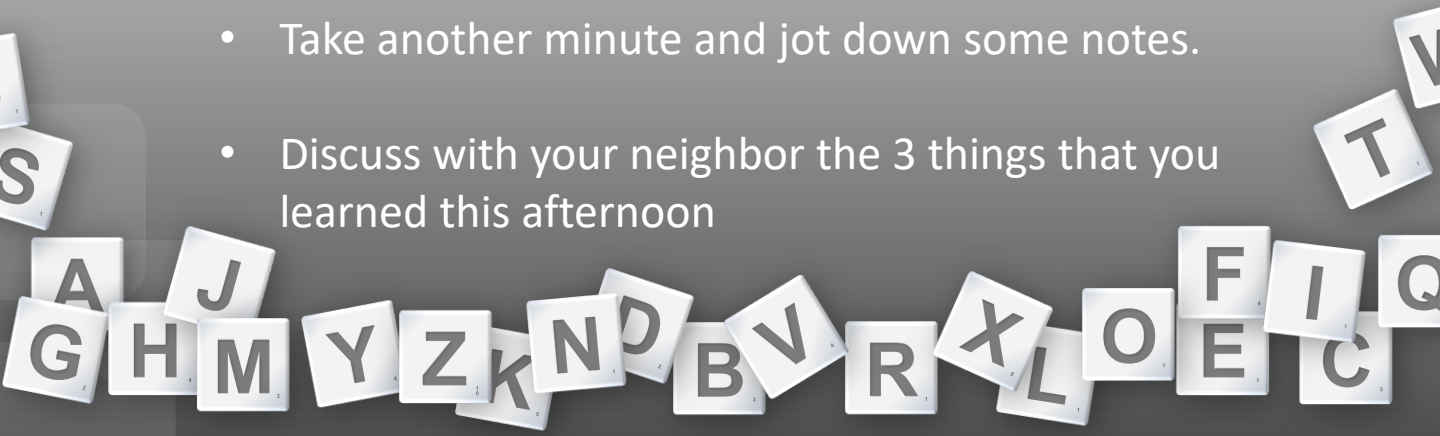
http://www.eaieducation.com/Product/520561/The_Master%c2%ae_Fraction_Ruler.aspx
Single fraction Master Ruler

http://www.eaieducation.com/Product/520562/The_Master%c2%ae_Fraction_Ruler_-_Class_Set_of_25.aspx
Class set fraction Master Ruler



MEASURE & DATA

- Take 1 minute and think about all the information we have learned this afternoon
- Take another minute and jot down some notes.
- Discuss with your neighbor the 3 things that you learned this afternoon



MEASURE & DATA

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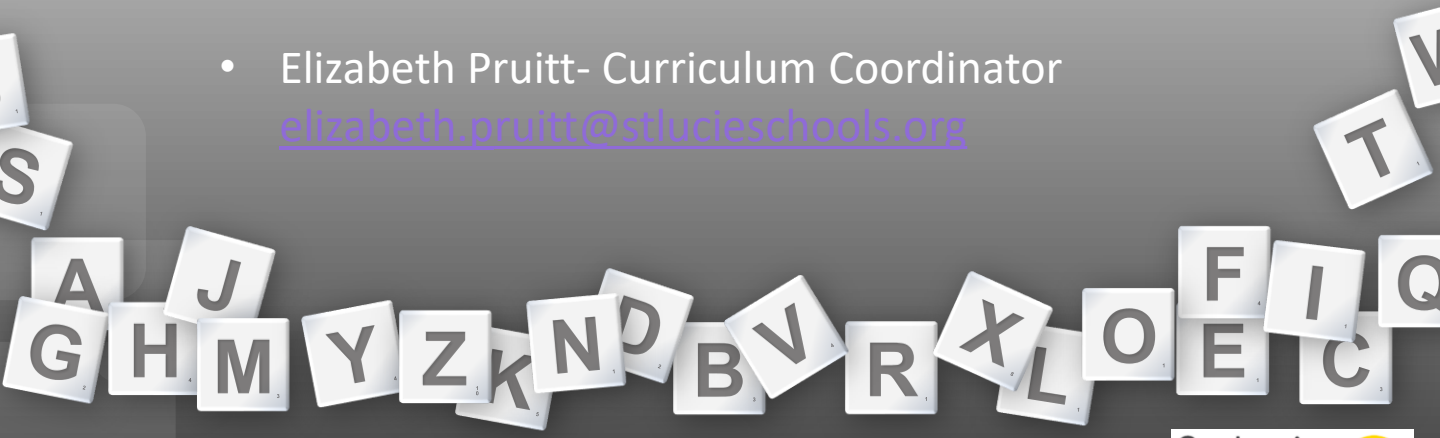
  elizabeth.pruitt@stlucieschools.org



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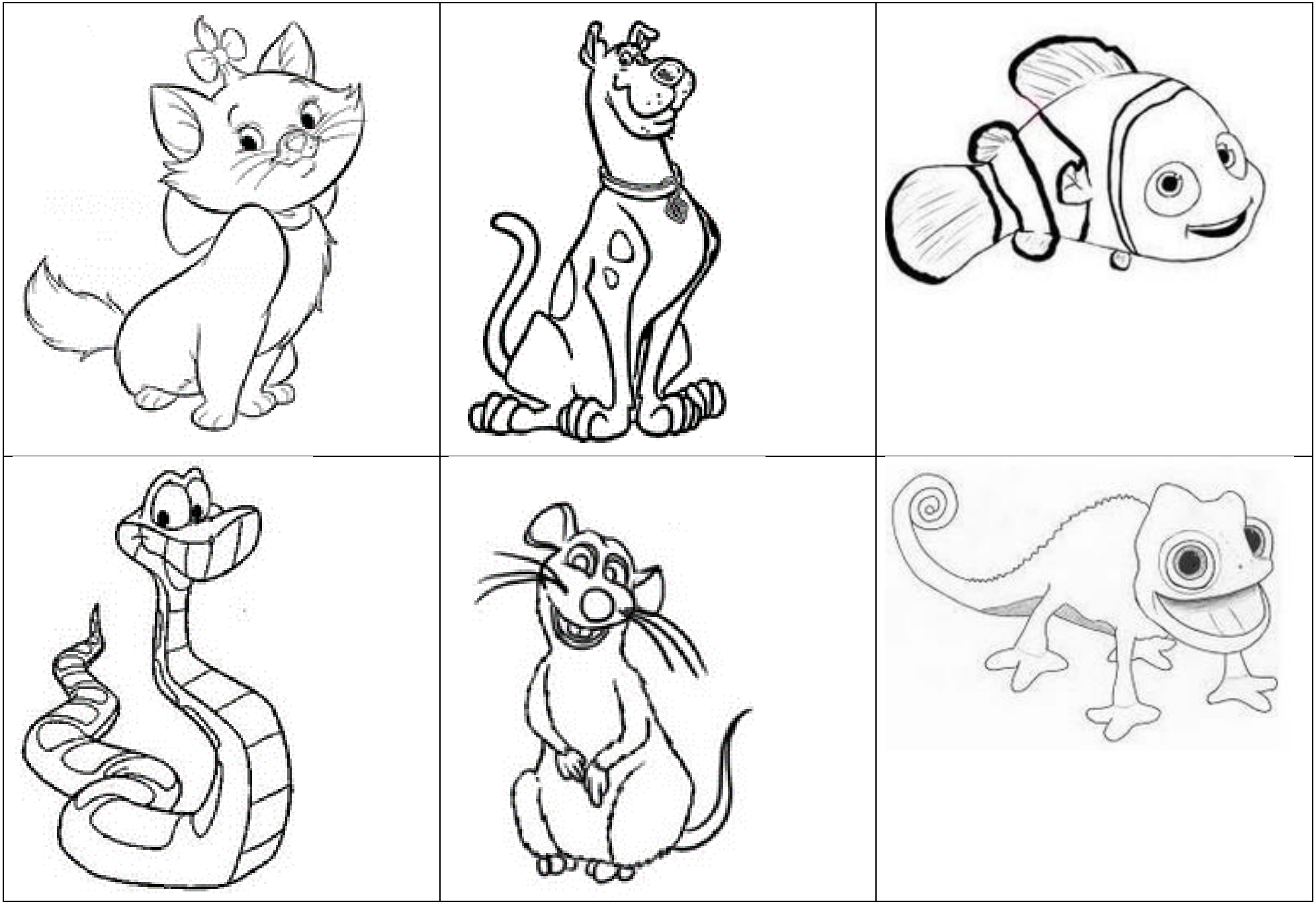
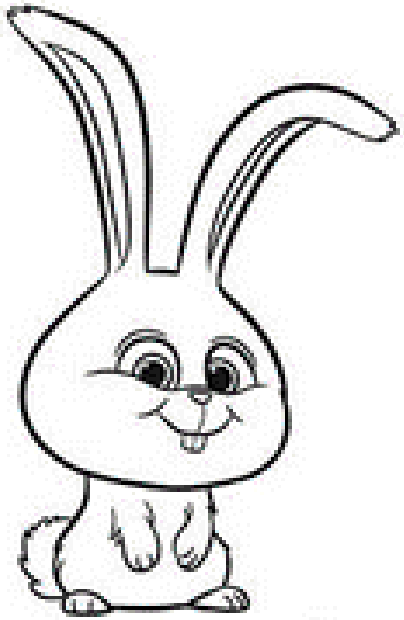
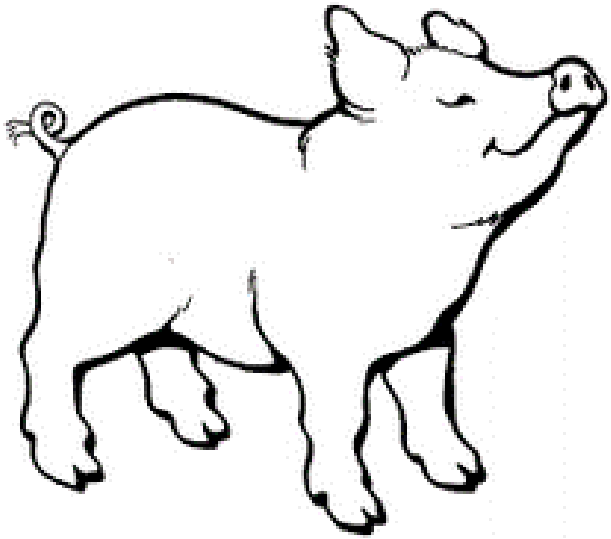
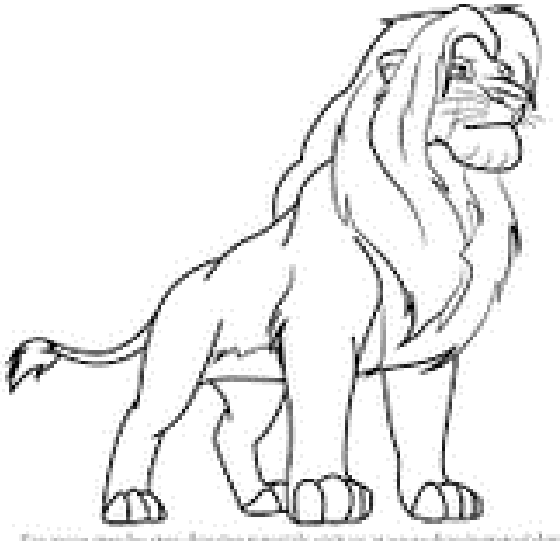
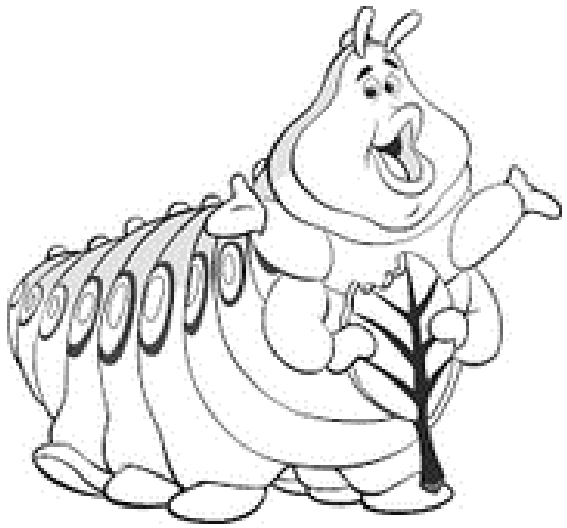
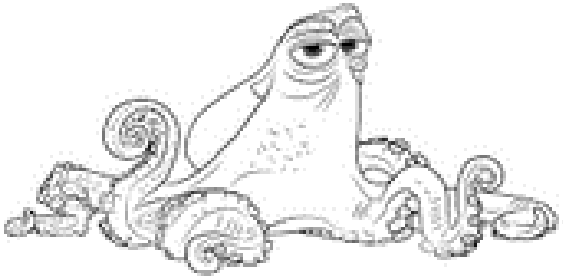


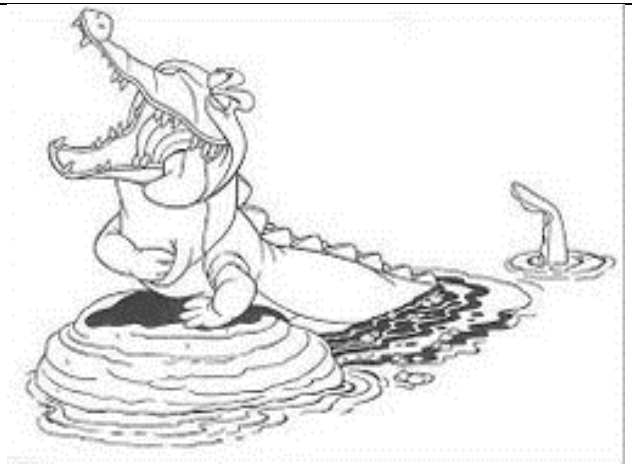


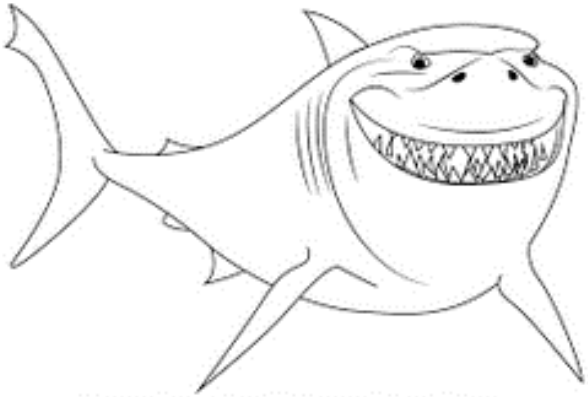


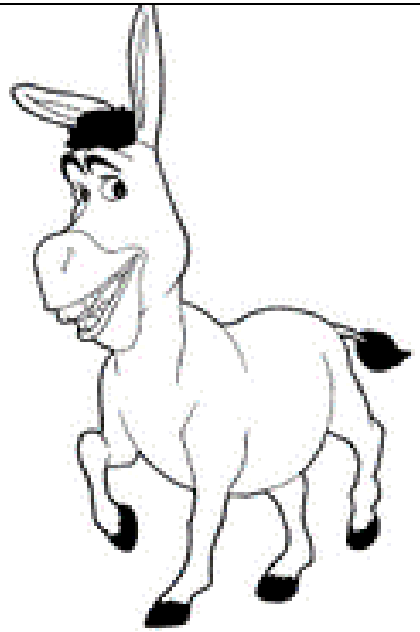


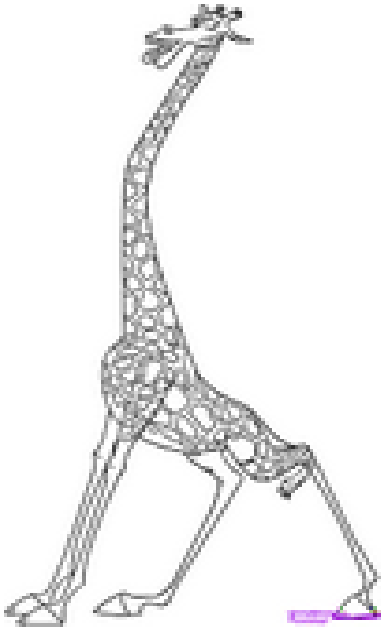


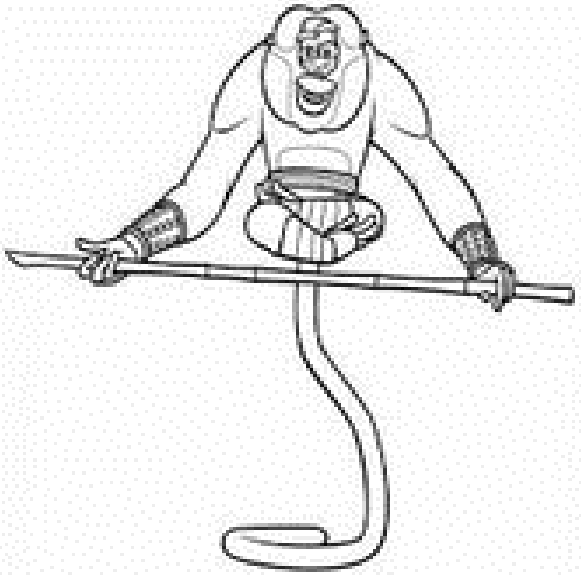


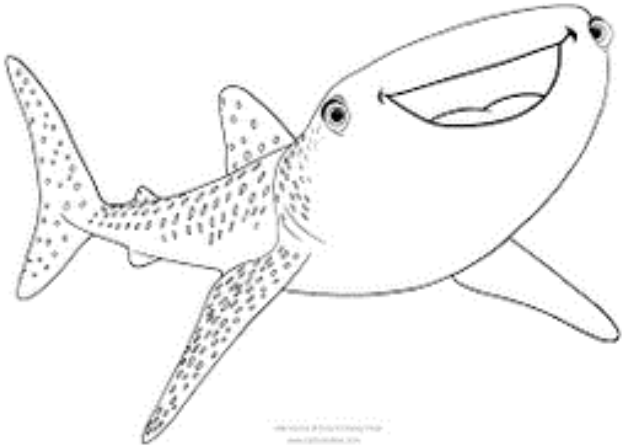


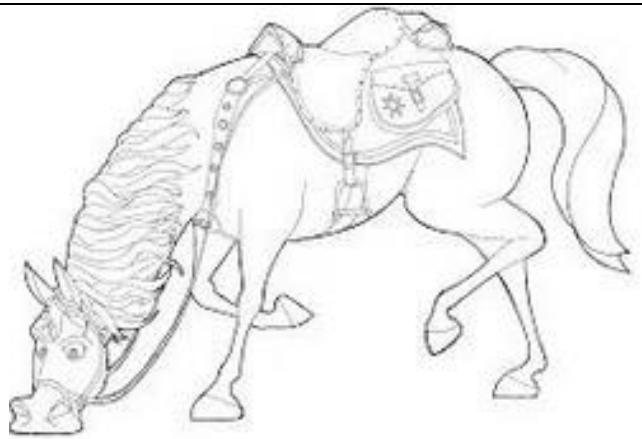


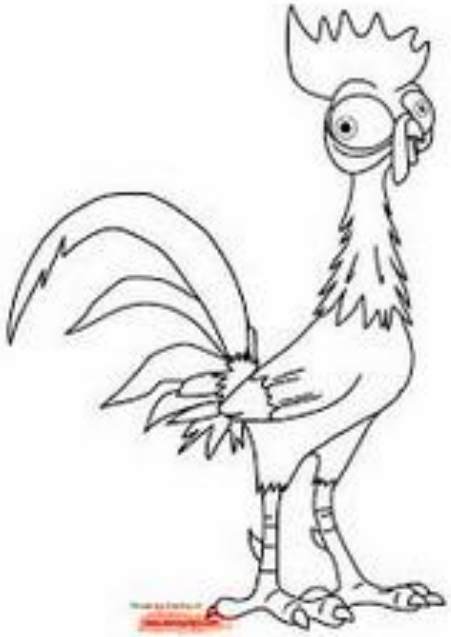


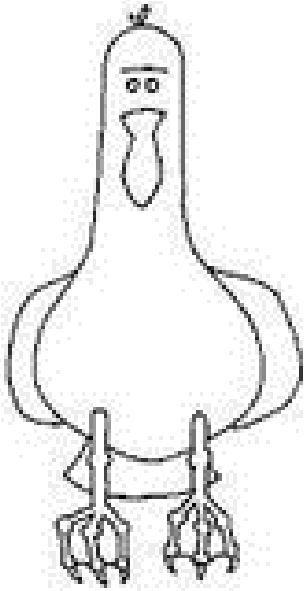








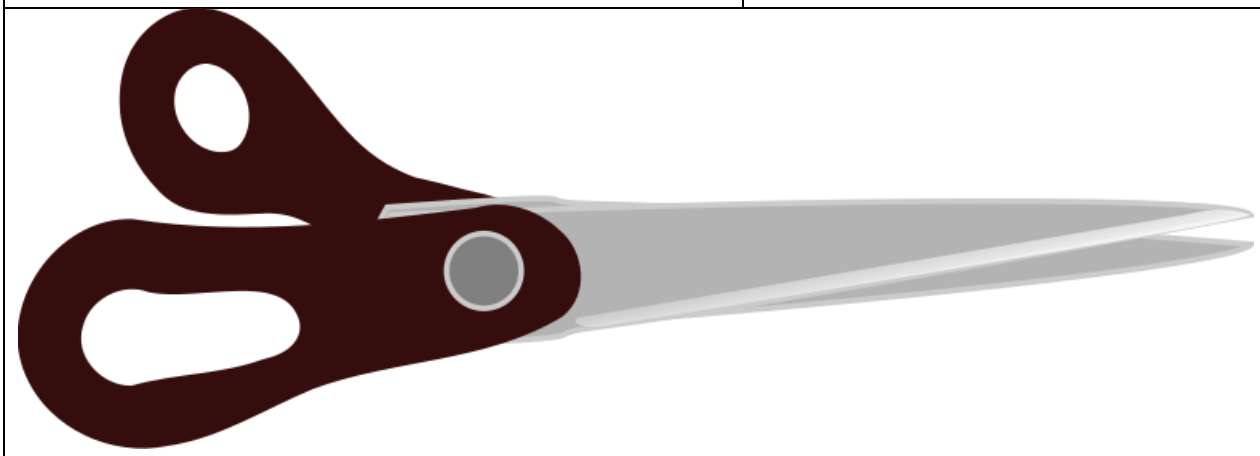


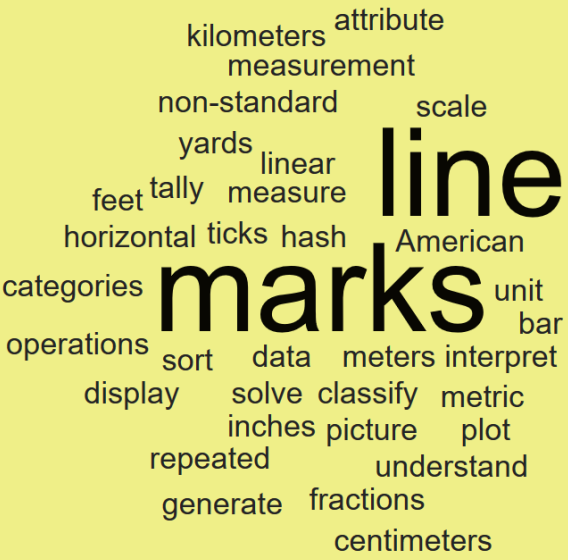



remove by friction


Washable
School Glue
ELMER'S


Matte Finish
Magic™ Tape
1/2 IN x 800 IN
(22.2 YD)
12.7 mm x 20.3 m
Photo
Safe
Scotch
3M

Post-it Note	Marker
	
	



Buttoning-up Measurement in Kindergarten through Third Grade

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  Elizabeth.Pruitt@stlucieachools.org

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Measurement and Data: Data and Line Plots

- What do you think of when you think of Data?

- What do you think of when you think of Line Plots?

Categorical Data	Measurement Data
Types of Graphs:	**Types of Graphs:**

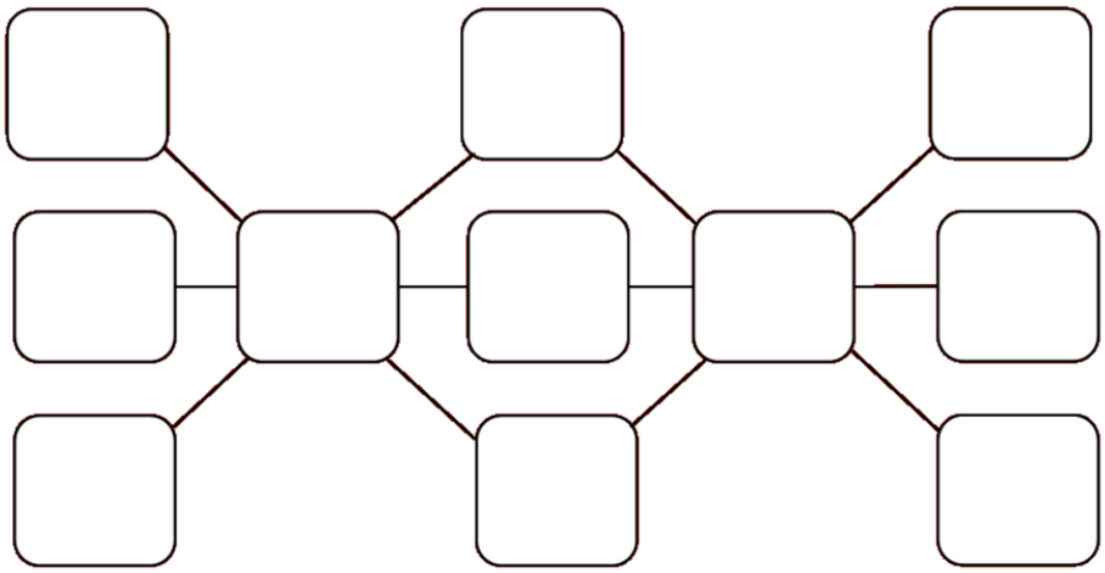
Sorting into 2 categories:

- **What do students need to know to "sort" into 2 categories?**
- **What kind of questions could be asked of students when sorting items into 2 categories?**
- **Could the categories be compared? If so how?**

Sorting into 3 categories:

- **What do students need to know to "sort" into 3 categories?**
- **What kind of questions could be asked of students when sorting items into 3 categories?**
- **Could the categories be compared? If so how?**

How are sorting into 2 and 3 categories different? How are they alike?



Beyond Sorting:

Create a graph to show the data-

What questions could be asked about the data?

Do these questions differ from the questions on the previous page? If so how?

Measuring the Marker:

Length in button units: _____

Partners length in button units: _____

- **If you are measuring the same marker, how can the marker measure two different lengths?**

Length in color tile units: _____

Partners length in color tile units: _____

- **Are the measurements the same? Why or why not?**

Length of the marker in whole inches: _____

Partners length in whole inches: _____

- **Are the measurements the same? Why or why not?**

- **What do you notice about the measurements of the marker?**

Notes:

Measure the following items to the nearest inch:

Item	Length
Highlighter	
Glue stick	
Tape	
Marker	
Post-it (large)	
Scissors	
Pen	

Compare your measurements to partners are they the same? different?

Measure the following items to the nearest half-inch:

Item	Length
Highlighter	
Glue stick	
Tape	
Marker	
Post-it (large)	
Scissors	
Pen	

Compare your measurements to partners are they the same? different?

Measure the following items to the nearest quarter-inch:

Item	Length
Highlighter	
Glue stick	
Tape	
Marker	
Post-it (large)	
Scissors	
Pen	

Compare your measurements to partners are they the same? different?

Create a line plot to reflect the measurement data:

Create a line plot to reflect the measurement data:

Create a line plot to reflect the measurement data:

How are the line plots the same? How are they different?

Why did we remeasure the same items for each line plot?

What kind of questions could be asked about the line plots?

- **Noticings?**

- **Wonderings?**

Questions to be answered based on your line plot:

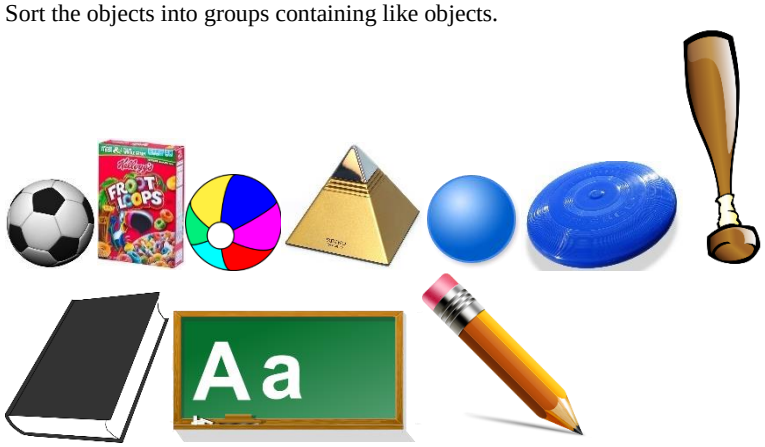
- ***What is the measure of the largest button?***
- ***What is the measure of the smallest button?***
- ***What is the difference in the length of the largest and smallest buttons?***
- ***What is the total length of all of the buttons on your line plot?***
    - ***How do you know that this is the total?***
- ***What is the total of all buttons measuring more than $\frac{3}{4}$ of an inch?***
- ***If two buttons measuring $\frac{5}{4}$ of an inch are added to your line plot, what is the new total of your line plot?***

Literary Resources:

- *How Big is a Foot? By Rolf Mylier*
- *Twelve Snails to One Lizard by Susan Hightower*
- *Jim and the Beanstalk by Raymond Briggs*

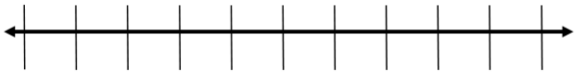
Notes:

Standards	K-3 Categorical Data	Coherence in Standards
CCSS.K.MD.3	Classify objects into given categories, count the number of objects in each category and sort[1] the categories by count. *[1]Limit category counts to be less than or equal to 10.*	**K.CC.4:** Understand the relationship between numbers and quantities; counting to cardinality **K.CC.5:** Counting items in an array, circle, line or scattered **K.CC.6:** Identify whether a group of objects has a value greater than, less than or equal to
CCSS.1.MD.4	Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.	**1.OA.1:** Use addition and subtraction within 20 to solve word problems **1.OA.2:** Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20
CCSS.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 compare problems using information presented in a bar graph.	**2.OA.1:** Use addition and subtraction within 100 to solve one- and two- step word problems **2.NBT.5:** Fluently add & subtract within 100 using strategies **2.NBT.6:** Add up-to 4 two-digit numbers using strategies
CCSS.3.MD.3	Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets.*	**3.OA.3:** Use multiplication and division within 100 to solve word problems in situations using models and strategies **3.OA.8:** Solve one- and two- step word problems using the 4 operations. **3.G.1:** Understand that shapes in different categories may share attributes & shared attributes define a larger category.
Standards	**K- 5 Measurement Data**	**Coherence in Standards**
MAFS.K.MD.1.a	Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps.	**K.MD.1:** Describe measurable attributes of objects (length/ weight) & describe several measurable attributes **K.MD.2:** Directly compare two objects with a measurable attribute in common to see which has more or less of an attribute
MAFS.1.MD.1.a	Understand how to use a ruler to measure to the nearest inch.	**1.MD.1:** Order objects by length; compare two lengths indirectly by using a third object
CCSS.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.	**2.MD.6**: Represent whole numbers as lengths from 0 to a number on a line diagram with equally spaced points corresponding to whole numbers and represent whole number sums and differences.
CCSS.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.	**3.NF.2:** Understand a fraction as a number on a number line; represent fractions on a number line diagram.
CCSS.4.MD.4	Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.*	**4.NF.3:** Understand a fraction $\frac{a}{b}$ with $a > 1$ as a sum of $\frac{1}{b}$. **4.NF.4:** Apply & extend previous understandings of multiplication to multiply a fraction by a whole number.
CCSS.5.MD.2	Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). se operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.*	**5.NF.1/ 5.NF.2:** Add & Subtract fractions with unlike denominators using equivalent fraction models & strategies with & without real-world context (*within the same whole*) **5.NF.4/ 5.NF.6:** Multiply fractions by fractions using strategies & models with & without real-world context **5.NF.7:** Extend understanding of division to divide fractions by whole numbers & vice versa using models & strategies

<table>
<tr><th>Standards</th><th>K-3 Categorical Data</th><th>Coherence in Standards</th></tr>
<tr><td>CCSS.K.MD.3</td><td>Each student will complete the task.
1) Sort the objects into groups containing like objects.
 
2) After the items are sorted ask the following questions:
• Which group has more items? How did you know that?
• Which group has less items? How did you know that?
• Did the groups have the same number objects? How did you know whether or not they did?
http://www.cpalms.org/Public/PreviewResourceAssessment/Preview/36699</td><td>K.CC.4
K.CC.5
K.CC.6</td></tr>
<tr><td>CCSS.1.MD.4</td><td>Give students a worksheet with the data below.
Ten students were asked which of the following fruits is your favorite: banana, apple or grapes?
<table><tr><td>Abby - banana</td><td>Kim- grapes</td></tr><tr><td>Terry- grapes</td><td>Dana- apple</td></tr><tr><td>Bob- banana</td><td>Kevin- apple</td></tr><tr><td>Glenn- apple</td><td>Steve- banana</td></tr><tr><td>Barb- grapes</td><td>Paul- banana</td></tr></table>
Organize the data to answer the questions below.
1) Which fruit was chosen the most?
2) How many more people chose bananas than grapes?
http://www.cpalms.org/Public/PreviewResourceAssessment/Preview/36711</td><td>1.OA.1
1.OA.2</td></tr>
<tr><td>CCSS.2.MD.4.10</td><td>Kyle surveyed his second-grade class to find the sport that they enjoy. The data is shown in the picture graph below.
<table><tr><th>Sport</th><th>Number of Votes</th></tr><tr><td>Baseball</td><td>☺☺☺☺</td></tr><tr><td>Basketball</td><td>☺☺☺</td></tr><tr><td>Football</td><td>☺☺☺☺☺</td></tr><tr><td>Soccer</td><td>☺☺☺☺☺☺☺</td></tr></table>Answer the questions about the information from the graph.
1) How many students enjoy football and soccer combined? How do you know?
2) How many more students enjoy soccer than basketball? How do you know?
http://www.cpalms.org/Public/PreviewResourceAssessment/Preview/42691</td><td>2.OA.1.1
2.NBT.2.5
2.NBT.2.6</td></tr>
<tr><td>CCSS.3.MD.3</td><td>Create a bar graph with the following data taken when surveying 3rd grade students.
<table><tr><th>Favorite Star Wars Character</th><th>Number of Votes</th></tr><tr><td>Rey</td><td>26</td></tr><tr><td>Han Solo</td><td>14</td></tr><tr><td>Chewbacca</td><td>17</td></tr><tr><td>Yoda</td><td>25</td></tr><tr><td>Darth Vader</td><td>19</td></tr><tr><td>BB8</td><td>8</td></tr><tr><td>Finn</td><td>12</td></tr></table>
1) Students will need to decide on the “best fit” scale for the bar graph and explain their thinking.
2) They will need to answer the following questions.
• What is the total number of students that were surveyed in 3rd grade?</td><td>3.OA.3
3.OA.8
3.G.1</td></tr>
</table>

	• Which two characters were the most popular characters? What is the difference in the number of votes that they received? • What is the difference in the number of votes that Rey received and the number of votes that Chewbacca and Han Solo received? • How many more votes did Yoda and Darth Vader receive than Finn? • How many total votes did the newer characters of Rey, Finn and BB8 receive? 3) Students should write their own question about the data. They should write a question that is two-step. http://www.cpalms.org/Public/PreviewResourceAssessment/Preview/44776	
Standards	**3- 5 Measurement Data**	**Coherence in Standards**
CCSS.K.MD.1.a	Students will measure a pencil using snap cubes. The teacher will give the students a pencil (of their choice) and a basket of snap cubes. The teacher asks, "what is the length of the pencil in snap cubes?" The student should be able to use the snap cubes and create a "train" (a number of snap cubes) snapped together that measure the exact length of the pencil. The student will state, "the pencil is ____ snap cubes in length." The teacher asks. "how do you know? Please explain your thinking." The student should say, "I know that the pencil is ____ snap cubes long because I started the first snap cube at the eraser end of the pencil and snapped cubes together until I reached the full length of the pencil at the end." The teacher says, "Thank you for your answer and your thinking." http://www.cpalms.org/Public/PreviewResourceAssessment/Preview/36647	**K.MD.1** **K.MD.2**
CCSS.1.MD.1.a	Understand how to use a ruler to measure to the nearest inch. The ruler that students are using should only have markings for whole units. Give students an item to measure (or an image of an item to measure.) The item must measure to the closest inch. Ask the following questions: • How would you determine the length of the object? or Where would you begin in measuring the length of the car? with Where would you stop when measuring the length of the car? • What tool could you use to measure the item? • With the ruler in front of them ask these questions: How would you use the ruler to measure the item? Where would you start? How do you know the length of the item? What do the marks on the ruler mean? • What is the length of the item? • http://www.cpalms.org/Public/PreviewResourceAssessment/Preview/122980	**1.MD.1**
CCSS.2.MD.9	Give students a group of items to measure. Items should measure to the nearest whole inch (centimeter) or close to it. The ruler that students are using should only have markings for whole units. • Students will need to measure the items to the nearest inch. They will measure each item 3 time. They can complete a table like the following for the 3 measures. Item | Measure 1 | Measure 2 | Measure 3 | | | | • Students will compare measures with a partner and verify that their measurements are accurate. The teacher will be monitoring by asking individual students questions about how to measure. Ex. How do you know that the item measures exactly or close to 3 inches (centimeters)? • After the measurements of the items are completed, the students will chart their data on a corresponding line plot.  The teacher will monitor and ask questions. What do you notice about the data on the line plot? Which measurement has the most number of items? Which measurement has the has the least number of items? Are there any measurements that have the same number of items? What measurements are missing items on the line plot?	**2.MD.6**

	(Items that could be used to measure: stickers, buttons, writing utensils, crackers, Legos etc.) http://www.cpalms.org/Public/PreviewResourceAssessment/Preview/46267	
CCSS.3.MD.4	Give students a group of items to measure. Items should measure to quarters, halves or whole units. The ruler that students are using should only have markings for the units they are using to measure. If the units are measured in halves, halves should what the ruler is marked as. • Students will be given a specific increment of measure to be used for the items (fourths, halves or whole units). Students may be given something that measures $\frac{7}{8}$ inches and asked to measure to the nearest half or whole. This allows for students to make decisions based on their knowledge of the distance of the measurement of the item to the appropriate increment of measure. • They will record their data. They will need to make a list of items and their measurements. (list, chart, table) If they are measuring items that are similar but different lengths, they may have just a list of measurements. The teacher will be monitoring by asking individual students questions about how to measure. Ex. How do you know that the item measures exactly or close to $\frac{3}{2}$ inches? • After the measurements of the items are completed, the students will chart their data on a corresponding line plot.  The teacher will monitor and ask questions. How did you know to label your line plot with those measurements? What do you notice about the data on the line plot? Which measurement has the most number of items? Which measurement has the has the least number of items? Are there any measurements that have the same number of items? What measurements are missing items on the line plot? Please remember that when students are labeling the number line that the measurements should have the same denominator and that fractions that are equivalent or greater than one, can/ should be used. (Items that could be used to measure: stickers, buttons, writing utensils, crackers, Legos, bolts, screws, gum, candy etc.) http://www.cpalms.org/Public/PreviewResourceAssessment/Preview/45671	**3.NF.2**
CCSS.4.MD.4	Students are given a data set of measurements with all measurements measuring to $\frac{1}{4}, \frac{1}{8}, or\ \frac{1}{2}$. Measurements greater than one maybe written as fractions greater than one or mixed numbers. The ruler that students are using should only have markings for the units they are using to measure. If the units are measured in fourths, fourths should what the ruler is marked as. • Students will organize their data to create a line plot. This data could be cups of sugar used per recipe or lengths of ribbon for hair ties in feet. ○ $\frac{5}{4}, \frac{1}{4}, \frac{3}{4}, \frac{1}{4}, \frac{2}{4}, \frac{5}{4}, \frac{1}{4}, \frac{5}{4}, \frac{3}{4}$ • After the measurements of the items are completed, the students will chart their data on a corresponding line plot.  The teacher will be monitoring and asking questions as students build the line plot. How did you know to label your line plot with those measurements? What do you notice about the data on the line plot? Which measurement has the most number of items? Which measurement has the has the least number of items? Are there any measurements that have the same number of items? What measurements are missing items on the line plot? Please remember that when students are labeling the number line that the measurements should have the same denominator and that fractions that are equivalent or greater than one, can/ should be used. • The students will answer questions about the data based on the fraction standards for the grade level. What is the difference in the longest measurement and the shortest measurement? What is the total length of the items that measure ____? What is the total of measurements of the items measuring more than _____? What is the total length of the items measuring	**4.NF.3** **4.NF.4**

	less than _____? What is the total of all the items measurements? What would the total be if we added an item measuring ____? Which measurement has the most items? Which measurement has the least items? What is the difference in the items measuring ____ and the items measuring _____? What 3 measurements would have to added to the line plot to have a new total of ____? • Students will have decisions points in whether they are using repeated addition or multiplication when totaling a measurement. http://www.cpalms.org/Public/PreviewResourceAssessment/Preview/62833	
CCSS.5.MD.2	Students are given a data set of measurements with all measurements measuring to $\frac{1}{4}, \frac{1}{8}, or\ \frac{1}{2}$. Measurements greater than one maybe written as fractions greater than one or mixed numbers. The ruler that students are using should only have markings for the units they are using to measure. Students will need to determine what increment that they are using to measure and what increment of measure to use on their line plot. Students could use the rulers, measuring cups, etc. to measure items to create the data. • Students will organize their data to create a line plot. • After the measurements of the items are completed, the students will chart their data on a corresponding line plot. Students can create the line plot without labeling each mark.  How did you know to label your line plot with those measurements? What do you notice about the data on the line plot? Which measurement has the most number of items? Which measurement has the has the least number of items? Are there any measurements that have the same number of items? What measurements are missing items on the line plot? Please remember that when students are labeling the number line that the measurements should have the same denominator and that fractions that are equivalent or greater than one, can/ should be used. • The students will answer questions about the data based on the fraction standards for the grade level. What equation can be written to find the difference between the total length of _____ and the total length of _____ measurements? If all of the measurements were combined and then divided evenly, what would be the average measurement? What is the difference in the longest measurement and the shortest measurement? What is the total length of the items that measure ____? What is the total of measurements of the items measuring more than _____? What is the total length of the items measuring less than _____? What is the total of all the items measurements? What would the total be if we added an item measuring ____? Which measurement has the most items? Which measurement has the least items? What is the difference in the items measuring ____ and the items measuring _____? What 3 measurements would have to added to the line plot to have a new total of ____? • When using the line plot for division, please remember that it is an application of CCSS.5.NF.2.3 which is a whole number divided by a whole number. http://www.cpalms.org/Public/PreviewResourceAssessment/Preview/62840	**5.NF.1/ 5.NF.2** **5.NF.4/ 5.NF.6** **5.NF.7**