Plainfield Public Schools
Mathematics
Unit Planning Organizer

Grade/Course	6th Grade
Unit of Study	**Statistics and Data**
Pacing	7 weeks / 2 weeks re-teaching or enrichment
Dates	April 11- June 15,2017

STANDARDS FOR MATHEMATICAL PRACTICES

MP1. Make sense of problems and persevere in solving them.
MP2. Reason abstractly and quantitatively.
MP3. Construct viable arguments and critique the reasoning of others.
MP4. Model with mathematics.
MP5. Use appropriate tools strategically.
MP6. Attend to precision.
MP7. Look for and make use of structure.
MP8. Look for and express regularity in repeated reasoning.

Hyperlinks are noted underlined in italics.

NEW JERSEY STUDENT LEARNING STANDARDS
6.RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems*, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations* **6.RP.A.3. A Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.** **6.RP.A.3. B Solve unit rate problems including those involving unit pricing and constant speed. For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?** **6.RP.A.3.C Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.** **6.RP.A.3. D Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.** **6.NS.C.8. Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.** **6.SP.A.1 Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.*** **6.SP.A.2 Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.** **6.SP.A.3 Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.** **6.SP.A.5 Summarize numerical data sets in relation to their context, such as by:** **c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviation from the overall pattern with reference to the context in which the data were gathered.** **d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.**

Hyperlinks are noted underlined in italics.

"Unwrapped" Skills	Unwrapped" Concepts	DOK Levels
FOCUS STANDARD: **6.RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems*, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations***		
Use	Ratio Rate reasoning	2

"Unwrapped" Skills	Unwrapped" Concepts	DOK Levels
FOCUS STANDARD: **6.RP.A.3.A Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.**		
Make	ratios	2

"Unwrapped" Skills	Unwrapped" Concepts	DOK Levels
FOCUS STANDARD: **6.RP.A.3. B Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed*?**		
Solve	Unit rate	2

"Unwrapped" Skills	Unwrapped" Concepts	DOK Levels
FOCUS STANDARD: **6.RP.A.3.C Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.**		
Find	percent	1

"Unwrapped" Skills	Unwrapped" Concepts	DOK Levels
FOCUS STANDARD: **6.RP.A.3. D Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities**		
Use	Ratio Rate reasoning	2

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **6.NS.C.8. Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.*(benchmarked)**		
solve	coordinate	2

"Unwrapped" Skills	Unwrapped" Concepts	DOK Levels
ADDITIONAL STANDARD: **6.SP.A.1 Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.***		
Recognize	Variability	1

Unwrapped Standards	Unwrapped Concepts	DOK Level
ADDITIONAL STANDARD: **6.SP.A.2 Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape**.		
Understand	a set of data	1

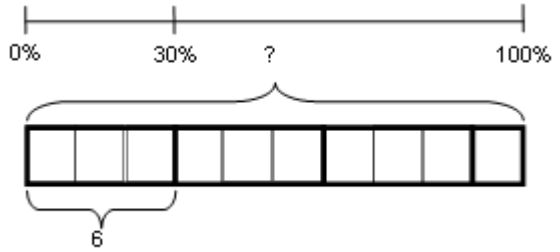
"Unwrapped" Skills	Unwrapped" Concepts	DOK Levels
ADDITIONAL STANDARD: **6.SP.A.3 Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.**		
Recognize	Measures of center	1

"Unwrapped" Skills	Unwrapped" Concepts	DOK Levels
ADDITIONAL STANDARD **6.SP.B.4 Display numerical data in plots on a number line, including dot plots, histograms, and box plots.**		
Display	Numerical data	2

Hyperlinks are noted underlined in italics.

Unwrapped Standards	Unwrapped Concepts	DOK Level
ADDITIONAL STANDARD: **6.SP.B.5 Summarize numerical data sets in relation to their context,** **c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviation from the overall pattern with reference to the context in which the data were gathered.** **d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered**		
Summarize	Numerical Data (median , mean, interquartile range, absolute deviation)	3

II. NEW JERSEY STUDENT LEARNING STANDARDS AND MATHEMATICAL PRACTICES …. Explanation and Examples

STUDENTS ARE ABLE TO ;	*MATHEMATICAL PRACTICES*	*EXPLANATIONS AND EXAMPLES*
6.RP.A.3. Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. a. Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios. b. Solve unit rate problems including those involving unit pricing and constant speed. For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed? c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means $30/100$ times the quantity); solve problems involving finding the whole, given a part and the percent.	*6.MP.1.* Make sense of problems and persevere in solving them. *6.MP.2.* Reason abstractly and quantitatively. *6.MP.4.* Model with mathematics *6.MP.5.* Use appropriate tools strategically. *6.MP.7.* Look for and make use of structure.	**Examples:** • Using the information in the table, find the number of yards in 24 feet. Feet | 3 | 6 | 9 | 15 | 24 Yards | 1 | 2 | 3 | 5 | ? There are several strategies that students could use to determine the solution to this problem. ○ Add quantities from the table to total 24 feet (9 feet and 15 feet); therefore, the number of yards must be 8 yards (3 yards and 5 yards). ○ Use multiplication to find 24 feet: 1) 3 feet x 8 = 24 feet; therefore 1-yard x 8 = 8 yards, or 2) 6 feet x 4 = 24 feet; therefore 2 yards x 4 = 8 yards. • Compare the number of black to white circles. If the ratio remains the same, how many black circles will you have if you have 60 white circles? ● ● ● ● ○ ○ ○ Black | 4 | 40 | 20 | 60 | ? White | 3 | 30 | 15 | 45 | 60 • If 6 is 30% of a value, what is that value? (Solution: 20)  *Continued on next page*

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<tr>
<td>6.RP.A.3. continued

d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.</td>
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A credit card company charges 17% interest on any charges not paid at the end of the month. Make a ratio table to show how much the interest would be for several amounts. If your bill totals $450 for this month, how much interest would you have to pay if you let the balance carry to the next month? Show the relationship on a graph and use the graph to predict the interest charges for a $300 balance.

<table>
<tr><td>Charges</td><td>$1</td><td>$50</td><td>$100</td><td>$200</td><td>$450</td></tr>
<tr><td>Interest</td><td>$0.17</td><td>$8.50</td><td>$17</td><td>$34</td><td>?</td></tr>
</table>
</td>
</tr>
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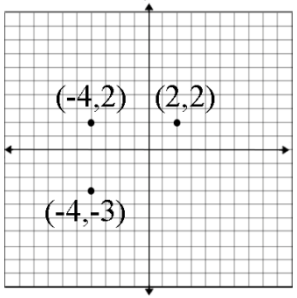
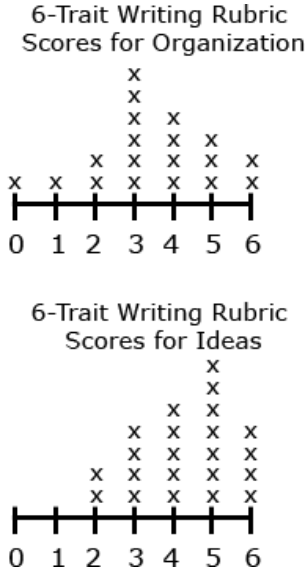
Standards ***Students are expected to:***	*Mathematical Practices*	*Explanations and Examples*
6.NS.C.8. Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.	*6.MP.1.* Make sense of problems and persevere in solving them. *6.MP.2.* Reason abstractly and quantitatively. *6.MP.4.* Model with mathematics. *6.MP.5.* Use appropriate tools strategically. *6.MP.7.* Look for and make use of structure.	**Example:** • If the points on the coordinate plane below are the three vertices of a rectangle, what are the coordinates of the fourth vertex? How do you know? What are the length and width of the rectangle?  To determine the distance along the x-axis between the point (-4, 2) and (2, 2) a student must recognize that -4 is $\|-4\|$ or 4 units to the left of 0 and 2 is $\|2\|$ or 2 units to the right of zero, so the two points are total of 6 units apart along the x-axis. Students should represent this on the coordinate grid and numerically with an absolute value expression, $\|-4\| + \|2\|$.

Hyperlinks are noted underlined in italics.

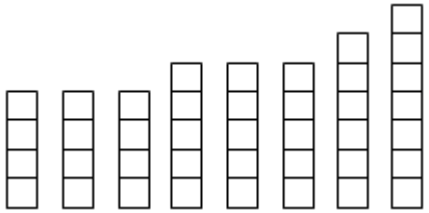
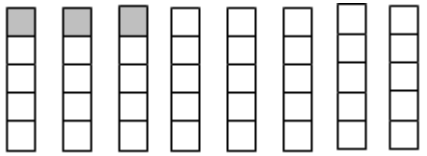
Statistics and Probability (SP) **Develop understanding of statistical variability.**		
Standards *Students are expected to:*	*Mathematical Practices*	*Explanations and Examples*
6.SP.A.1. Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.*	*6.MP.1.* Make sense of problems and persevere in solving them. *6.MP.3*. Construct viable arguments and critique the reasoning of others. *6.MP.6.* Attend to precision.	Statistics are numerical data relating to an aggregate of individuals; statistics is also the name for the science of collecting, analyzing and interpreting such data. A statistical question anticipates an answer that varies from one individual to the next and is written to account for the variability in the data. Data are the numbers produced in response to a statistical question. Data are frequently collected from surveys or other sources (e.g., documents). Questions can result in a narrow or wide range of numerical values. For example, asking classmates "How old are the students in my class in years?" will result in less variability than asking "How old are the students in my class in months?" Students might want to know about the fitness of the students at their school. Specifically, they want to know about the exercise habits of the students. So rather than asking "Do you exercise?" they should ask about the amount of exercise the students at their school get per week. A statistical question for this study could be: "How many hours per week on average do students at Jefferson Middle School exercise?" To collect this information, students might design a survey question that anticipates variability by providing a variety of possible anticipated responses that have numerical answers, such as: 3 hours per week, 4 hours per week, and so on. Be sure that students ask questions that have specific numerical answers.

6.SP.A.2. Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.	*6.MP.2.* Reason abstractly and quantitatively. *6.MP.4.* Model with mathematics. *6.MP.5.* Use appropriate tools strategically. *6.MP.6.* Attend to precision. *6.MP.7.* Look for and make use of structure.	The two dot plots show the 6-trait writing scores for a group of students on two different traits, organization and ideas. The center, spread and overall shape can be used to compare the data sets. Students consider the context in which the data were collected and identify clusters, peaks, gaps, and symmetry. Showing the two graphs vertically rather than side by side helps students make comparisons. For example, students would be able to see from the display of the two graphs that the ideas scores are generally higher than the organization scores. One observation students might make is that the scores for organization are clustered around a score of 3 whereas the scores for ideas are clustered around a score of 5. 

6.SP.A.3. Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.	*6.MP.2.* Reason abstractly and quantitatively. *6.MP.4.* Model with mathematics. *6.MP.5.* Use appropriate tools strategically. *6.MP.6*. Attend to precision. *6.MP.7.* Look for and make use of structure.	When using measures of center (mean, median, and mode) and range, students are describing a data set in a single number. The range provides a single number that describes how the values vary across the data set. The range can also be expressed by stating the minimum and maximum values. **Example:** • Consider the data shown in the dot plot of the six trait scores for organization for a group of students. ○ How many students are represented in the data set? ○ What are the mean, median, and mode of the data set? What do these values mean? How do they compare? ○ What is the range of the data? What does this value mean? 

Statistics and Probability (SP) **Summarize and describe distributions**		
Standards *Students are expected to:*	*Mathematical Practices*	*Explanations and Examples*
6.SP.B.4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots.	*6.MP.2.* Reason abstractly and quantitatively. *6.MP.4.* Model with mathematics. *6.MP.5.* Use appropriate tools strategically. 6.MP.6. Attend to precision. *6.MP.7.* Look for and make use of structure.	In order to display numerical data in dot plots, histograms or box plots, students need to make decisions and perform calculations. Students are expected to display data graphically in a format appropriate for that data set as well as reading data from graphs generated by others students or contained in reference materials. Students can use applets to create data displays. Examples of applets include the Box Plot Tool and Histogram Tool on NCTM's Illuminations. Box Plot Tool - *http://illuminations.nctm.org/ActivityDetail.aspx?ID=77* Histogram Tool - *http://illuminations.nctm.org/ActivityDetail.aspx?ID=78* Dot plots are simple plots on a number line where each dot represents a piece of data in the data set. Dot plots are suitable for small to moderate size data sets and are useful for highlighting the distribution of the data including clusters, gaps, and outliers. In most real data sets, there is a large amount of data and many numbers will be unique. A graph (such as a dot plot) that shows how many ones, how many twos, etc. would not be meaningful; however, a histogram can be used. Students organize the data into convenient ranges and use these intervals to generate a frequency table and histogram. Note that changing the size of the range changes the appearance of the graph and the conclusions you may draw from it. Box plots are another useful way to display data and are plotted horizontally or vertically on a number line. Box plots are generated from the five number summaries of a data set consisting of the minimum, maximum, median, and two quartile values. Students can readily compare two sets of data if they are displayed with side by side box plots on the same scale. Box plots display the degree of spread of the data and the skewness of the data. *Continued on next page*

6.SP.B.5. Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.	*6.MP.2.* Reason abstractly and quantitatively. *6.MP.3.* Construct viable arguments and critique the reasoning of others. *6.MP.4.* Model with mathematics. *6.MP.5.* Use appropriate tools strategically. *6.MP.6.* Attend to precision. *6.MP.7.* Look for and make use of structure.	Students summarize numerical data by providing background information about the attribute being measured, methods and unit of measurement, the context of data collection activities, the number of observations, and summary statistics. Summary statistics include quantitative measures of center, spread, and variability including extreme values (minimum and maximum), mean, median, mode, range, quartiles, interquartile ranges, and mean absolute deviation. The measure of center that a student chooses to describe a data set will depend upon the shape of the data distribution and context of data collection. The mode is the value in the data set that occurs most frequently. The mode is the least frequently used as a measure of center because data sets may not have a mode, may have more than one mode, or the mode may not be descriptive of the data set. The mean is a very common measure of center computed by adding all the numbers in the set and dividing by the number of values. The mean can be affected greatly by a few data points that are very low or very high. In this case, the median or middle value of the data set might be more descriptive. In data sets that are symmetrically distributed, the mean and median will be very close to the same. In data sets that are skewed, the mean and median will be different, with the median frequently providing a better overall description of the data set. Understanding the Mean The mean measures center in the sense that it is the value that each data point would take on if the total of the data values were redistributed equally, and also in the sense that it is a balance point. Students develop understanding of what the mean represents by redistributing data sets to be level or fair. The leveling process can be connected to and used to develop understanding of the computation of the mean. For example, students could generate a data set by measuring the number of jumping jacks they can perform in 5 seconds, the length of their feet to the nearest inch, or the number of letters in their names. It is best if the data generated for this activity are 5 to 10 data points which are whole numbers between 1 and 10 that are easy to model with counters or stacking cubes. *Continued on next page*

6.SP.B.5. *continued*		Students generate a data set by drawing eight student names at random from the popsicle stick cup. The number of letters in each of the names is used to create the data set. If the names drawn were Carol, Mike, Maria, Luis, Monique, Sierra, John, and Karen there would be 3 names with 4 letters each, 3 names with 5 letters each, 1 name with 6 letters and 1 name with 7 letters. This data set could be represented with stacking cubes.  Students can model the mean by "leveling" the stacks or distributing the blocks so the stacks are "fair." Students are seeking to answer the question "If all of the students had the same number of letters in their name, how many letters would each person have?" One block from the stack of six and two blocks from the stack of 7 can be moved down to the stacks of 4 and then all the stacks have five blocks. If all students had the same number of letters in their name, they would have five letters. The mean number of letters in a name in this data set is 5.  If it was not possible to make the stacks exactly even, students could begin to consider what part of the extra blocks each stack would have. *Continued on next page*

6.SP.B.5. *continued*

Name	Number of letters in a name	Deviation from the Mean	Absolute Deviation from the Mean
John	4	-1	1
Luis	4	-1	1
Mike	4	-1	1
Carol	5	0	0
Maria	5	0	0
Karen	5	0	0
Sierra	6	+1	1
Monique	7	+2	2
Total	40	0	6

The mean of the absolute deviations is found by summing the absolute deviations and dividing by the number of data points. In this case, the mean absolute deviation would be 6 ÷ 8 or ¾ or 0.75. The mean absolute deviation is a small number, indicating that there is little variability in the data set.

Consider a different data set also containing 8 names. If the names were Sue, Joe, Jim, Amy, Sabrina, Monique, Timothy, and Adelita. Summarize the data set and its variability. How does this compare to the first data set?

The mean of this data set is still 5. $\frac{(3+3+3+3+7+7+7+7)}{8} = \frac{40}{8} = 5$

Name	Number of letters in a name	Deviation from the Mean	Absolute Deviation from the Mean
Sue	3	-2	2
Joe	3	-2	2
Jim	3	-2	2
Amy	3	-2	2
Sabrina	7	+2	2
Timothy	7	+2	2
Adelita	7	+2	2
Monique	7	+2	2
Total	40	0	16

The mean deviation of this data set is 16 ÷ 8 or 2. Although the mean is the same, there is much more variability in this data set.

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6.SP.B.5. *continued*		Understanding Medians and Quartiles Students can also summarize and describe the center and variability in data sets using the median and a five number summary consisting of the minimum, quartiles, and maximum as seen in the box plot example in 6.SP.4. The median is the middle number of the data set with half the number below the median and half the numbers above the median. The quartiles partition the data set into four parts by dividing each of the halves of the data set into half again. Quartile 1 (Q1 or the lower quartile) is the middle value of the lower half of the data set and quartile 3 (Q3 or the upper quartile) is the middle value of the upper half of the data set. The median can also be referred to as quartile 2 (Q2). The range of the data is the difference between the minimum and maximum values. The interquartile range of the data is the difference between the lower and upper quartiles (Q3 – Q1). The interquartile range is a measure of the dispersion or spread of the data set: a small value indicates values that are clustered near the median whereas a larger value indicates values that are more distributed. Consider the first data set again. Recall that the names drawn were Carol, Mike, Maria, Luis, Monique, Sierra, John, and Karen. The data set can be represented in a numerical list. To find the median and quartile, the values are placed in order from least to greatest. 5 4 5 4 7 6 4 5 ⟶ 4 4 4 5 5 5 6 7 The middle value in the ordered data set is the median. If there are even numbers of values, the median is the mean of the middle two values. In this case, the median would be 5 because 5 is the average of the 4th and 5th values which are both 5. Students find quartile 1 (Q1) by examining the lower half of the data. Again there are 4 values which is an even number of values. Q1 would be the average of the 2nd and 3rd value in the data set or 4. Students find quartile 3 (Q3) by examining the upper half of the data. Q3 would be the average of the 6th and 7th value in the data set or 5.5. The mean of the data set was 5 and the median is also 5, showing that the values are probably clustered close to the mean. The interquartile range is 1.5 (5.5 – 4). The interquartile range is small, showing little variability in the data. 4 4 4 5 5 5 6 7 Q1 = 4 | Q3 = 5.5 Median = 5

III. Essential Questions ……..Corresponding Big Ideas

Essential Questions	Corresponding Big Ideas
How do graphs of distributions help you compare data sets? How do measures of center help you compare data sets? How do measures of spread help you compare data sets	Graphs and tables are useful for displaying distributions of categorical data. Numerical summaries of quantitative data are useful for measuring the amount of variability within a distribution. Graphs and tables based on grouped data are useful for displaying distributions of quantitative data.
How do different sampling plans influence the reliability of sample statistics and resulting conclusions and predictions?	The shape of a distribution influences which summary measure is most appropriate for describing the center of a distribution for quantitative data.
When does it make sense to compare groups using counts, or frequencies? When does it make sense to compare groups using percent, or relative frequencies?	Graphs and tables based on a division of the ordered data into equal sized groups are useful displaying distributions of quantitative data. Some numerical summaries of quantitative data are more resistant than others to extreme data values, called outliers.
How can you use statistics to decide whether differences between samples are expected due to natural variability or reflect measurable differences in underlying populations?	The focus of comparisons between two or more groups of data id on similarities and differences between the distributions. The amount of separation between two or more distributions is related to the amount of variability within them. Source: Kader, Gary D (2010). Developing essential understanding of Statistics teaching mathematics in grades 6-8 . Reston, VA: The National Council of Teachers of Mathematics, Inc.

Hyperlinks are noted underlined in italics.

IV. Student Learning Goals

Learning Goals	Concepts / Skills	Instructional Clarification ***PARCC Assessment Design Mathematics Test Specifics***	Mathematical Practice
Distinguish questions that are statistical (anticipate variability in data) from those that are not6.SP.B.1	**Concept(s):** • Variability/Variation • A statistical question is one that anticipates variability in the data that is related to the question. **Students are able to:** • distinguish questions that are statistical (anticipate variability in data) from those that are not.	Tasks do not assess mode and range.	MP.2 MP.6
Display numerical data in plots on the number line (including dot plots, histograms, and box plots) and summarize in relation to their context. 6.SP.A.2, 6.SP.A.3, 6.SP.A.4	**Concept(s):** • A data set has a distribution which can be described by its center, spread, and overall shape. • A measure of center summarizes, with a single number, the values of an entire data set. • A measure of variation describes, with a single number, how the values of a data set vary. **Students are able to:** • distinguish center from variation. • display numerical data in dot plots on a number line. • display numerical data in	• Tasks might present several distributions graphically and ask which two have nearly the same center, nearly the same spread, or nearly the same overall shape. • Tasks do not assess mode and range. • Tasks might ask students to rate statements True/False/Not Enough Information, such as, "The average height of trees in Watson Park is 65 feet. Are there any trees in Watson Park taller than 65 feet?" • Tasks ask students to identify	MP4

	histograms on a number line. • display numerical data in box plots on a number line.	which display corresponds to a given set of data.	
Summarize numerical data in relation to their context by identifying the number of observations and describing how the data was measured. Calculate, and interpret measures of center (mean and median) and variability (interquartile range and mean absolute deviation); report measures of center and variability appropriate to the shape of the distribution and context. 6.SP.B.5, 6.SP.B.5a, 6.SP.B.5b, 6.SP.B.5c, 6.SP.B.5d	**Concept(s**): No new concept(s) introduced **Students are able to:** • determine the number of observations of a data set. • describe the data in context, including how it was measured and the units of measurement. • calculate measures of center, mean and median. • calculate measures of spread, interquartile range and mean absolute deviation. • describe the overall shape of a distribution (skewed left, skewed right, etc). • identify striking deviations (outliers). • choose measures of center and variability appropriate to the shape of the distribution and context.	• Tasks have a text-based and a graphics-based overview of a numerical data set. • Tasks require students to identify/select from unambiguously true or false statements such as, “About half of the values are greater than the average”; “If this point were deleted from the data set, the median would not change”; etc. • Tasks do not assess mode and range.	MP4
Create and complete tables of equivalent ratios to sole real world and mathematical problems using ratio and rate reasoning that include making tables of equivalent ratios, solving unit rate problems, finding percent of a quantity as a rate per 100.	**Concept(s):** No new concept(s) introduced **Students are able to:** • use ratio and rate reasoning to create tables of equivalent ratios relating quantities with *whole number* measurements, find missing values in tables and plot pairs of values.	• Tasks may or may not contain context. • Expectations for ratios in this grade are limited to ratios of non-complex fractions. The initial numerator and denominator should be whole	MP.2. MP.4. MP.5 MP.6 MP.7 MP.8

Use ratio and rate reasoning to convert measurement units and to transform units appropriately when multiplying or dividing quantities. 6.RP.A.3a, 6. RP.A.3b, 6. RP.A.3c, 6. RP.A.3d	• compare ratios using tables of equivalent ratios. • solve real world and mathematical problems involving unit rate (including unit price and constant speed). • calculate a percent of a quantity and solve problems by finding the whole when given the part and the percent. • convert measurement units using ratio reasoning. • transform units appropriately when multiplying and dividing quantities.	numbers. • Tasks require students to multiply and/or divide dimensioned quantities. • Half of the tasks require students to correctly express the units of the result.	
Solve real world and mathematical problems by graphing points in all four quadrants of the coordinate plane; use the absolute value of the differences of their coordinates to find distances between points with the same first coordinate or same second coordinate. 6.NS.C.8	Concept(s): No new concept(s) introduced **Students are able to:** • graph points in all four quadrants of the coordinate plane in order to solve real-world and mathematical problems. • draw polygons in the coordinate plane. • use absolute value to find distances between points with the same first coordinate or the same second coordinate. • use coordinates to solve real-world distance, perimeter, and area problems.	• Tasks may or may not contain context. • Finding distances is limited to points with integer coordinates.	MP1. MP 2 MP 5

V. Vocabulary Terms

Unit Vocabulary Terms
greatest common factor (GCF) histogram integers interquartile range (IQR) maximum mean absolute deviation (MAD) mean box plots measure of center median quotient absolute value

VI. Differentiating /Modifications Teaching Strategies

Research Based Effective Teaching Strategies	Modifications (how do I differentiate instruction?)	Special Education	Strategies for English Language Learners
Task /Activities that solidifies mathematical concepts Use questioning techniques to facilitate learning Reinforcing Effort, Providing Recognition Practice, reinforce and connect to other ideas within mathematics Promotes linguistic and nonlinguistic representations Cooperative Learning Setting Objectives, Providing Feedback Varied opportunities for students to communicate mathematically Use technological and /or physical tools	**Modifications** Before or after school tutorial program Leveled rubrics Increased intervention Small groups Change in pace Calculators Extended time Alternative assessments Tiered activities/products Color coded notes Use of movements Use any form of technology Provide a template that allows students to justify each step by filling in blank area to for solving for division of fractions. Students use template as model for solving exercises .	Change in pace Calculators Alternative assessments Accommodations as per IEP Modifications as per IEP Use graphic organizer to clarify mathematical functions for students with processing and organizing difficulties'. Constant review of math concepts to strengthen understanding of prior concepts for difficulties recalling facts. Use self-regulations strategies for student to monitor and assess their thinking and performance for difficultly attending to task Cooperative learning (small group, teaming, peer assisted tutoring) to foster communication and strengthen confidence.	*Whiteboards* *Small Group / Triads* *Word Walls* *Partially Completed Solution* *Gestures* *Native Language Supports* *Pictures / Photos* *Partner Work* *Work Banks* *Teacher Modeling* *Math Journals* *See Connected Math Program 3 Classroom Differentiating English Language Learners*

Hyperlinks are noted underlined in italics.

21st Century Learning Skills : Teamwork and Collaboration Initiative and Leadership Curiosity and Imagination Innovation and Creativity Critical thinking and Problem Solving Flexibility and Adaptability Effective Oral and Written Communication Accessing and Analyzing Information	**Extension:** *See Connected Math Program 3 Classroom Differentiation Gifted Students*	Use technology and/or hands on devices to: clarify abstract concepts and process for: 1. Difficulty interpreting pictures and diagram. 2.difficulties with oral communications 3. Difficulty correctly identifying symbols of numeral 4.Difficulty maintaining attentions Simplify and reduces strategies / Goal structure to enhance motivation, foster independence and self-direction for: 1.difficulty attending to task 2. difficulty with following a sequence of steps to solution. 3.difficulty processing and organizing Scaffolding math idea/concepts by guided practice and	

Hyperlinks are noted underlined in italics.

		questioning strategies' to clarify and enhance understanding of math big ideas for: 1.Difficulty with process and organization 2.difficulty with oral and written communication Teacher models strategies' and think out aloud strategies to specify step by step process for 1. Difficulties processing and organization 2. difficulty attending to tasks. Use bold numbers and/or words to draw students' attention to important information. Provide students with friendly numbers in order to focus on the mathematical concept rather than operations of the problem. Have students note and explain the differences between the use of the symbol (-) for subtraction sentences and for identifying negative numbers. Help make connections between everyday situations and the use of positive numbers, negative numbers, or zero by making posters depicting different scenarios, example a lemonade stand. Include illustrations and paragraph explaining the situation. Show coins and paper money to illustrate the problem. Represent a loss with (-) and a profit or gain with (+). Then have students	

		solve problems about the scenario. *See Connected Math Program* *Classroom Differentiation* *Special Need Student*	

Hyperlinks are noted underlined in italics.

VII. Instructional Resources

<table>
<tr><th colspan="3">Instructional Resources and Materials</th></tr>
<tr><th>Formative Assessment</th><th colspan="2">Print</th></tr>
<tr><td rowspan="2">Short constructed responses
Extended responses
Checks for Understanding
Exit tickets
Teacher observation
Projects
Timed Practice Test – Multiple Choice & Open-Ended Questions

<u>Performance Tasks</u>

<u>6.SP.B.5c Number of Siblings</u>
<u>6.SP.B.5d Mean or Median?</u>
<u>Additional Tasks</u>

<u>6.EE.C.9 Families of Triangles</u>
<u>6.SP.A.1 Identifying Statistical Questions</u>
<u>6.SP.A.2, 6.SP.B.4 Puppy Weights</u>
<u>6.SP.A.3 Is It Center or Is It Variability?</u>

<u>Summative Assessment</u>:

Grade 6 End of Year Assessment</td><td colspan="2">Connected Math Program Grade 6: Data About Us: Statistics and Data Analysis
C<u>MP Unit : Data About Us : Statistics and Data Analysis ; Scope and Sequence</u></td></tr>
<tr><td colspan="2">Additional Resources : Print and Technology</td></tr>
<tr><td>Resources for teachers
<u>Connected Math Project (Michigan State University)</u>
<u>My Pearson Training : Connected Math Program</u>
<u>Annenberg Learning : Insight into Algebra 1</u>
<u>National Council of Teachers of Mathematics</u>
<u>Mathematics Assessment Projects</u>
<u>Achieve the Core</u>
<u>Illustrative Mathematics</u>
<u>Mathematics Assessment Projects</u>
<u>Get the Math</u>
<u>Webmath.com</u>
<u>sosmath.com</u>
<u>Mathplanet.com</u>
<u>Interactive Mathematics.com</u>
<u>Inside Mathmatics.org</u>
<u>Asia Pacific Economic Cooperation : :Lesson Study Videos</u>
<u>Genderchip.org</u>
<u>Interactive Geometry</u>
<u>Mathematical Association of America</u>
<u>learner.org</u>
<u>Math Forum : Teacher Place</u>
<u>Shmoop /common core math</u></td><td>Resources for Students
<u>My Math Universe.com</u>
<u>Math is Fun website</u>
<u>Khan Academy</u>
<u>Figure This.org website</u>
<u>Virtual Nerd website</u>
<u>Math Snacks websites</u>

<u>Internet 4 Classroom website</u>
<u>A Maths Dictionary for kids</u></td></tr>
</table>

<u>Hyperlinks are noted underlined in italics.</u>