Richmond Public Schools

Curriculum Framework

Grade 6 Honors (6/7)

Strand: Measurement and Geometry
6.10 The student, given a practical situation, will **a) represent data in a circle graph;** **b) make observations and inferences about data represented in a circle graph; and** **c) compare circle graphs with the same data represented in bar graphs, pictographs, and line plots.** **7.9 The student, given data in a practical situation, will** **a) represent data in a histogram;** **b) make observations and inferences about data represented in a histogram; and** **c) compare histograms with the same data represented in stem-and-leaf plots, line plots, and circle graphs.**
Suggested Pacing

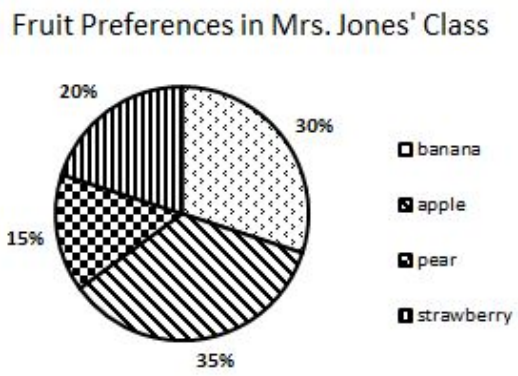
Related Standards	
Spiral Down: 4th Grade: ● SOL 4.14 5th Grade: ● SOL 5.16	Spiral Up: 8th Grade: ● SOL 8.12 ● SOL 8.13
Essential Questions	**Common Misconceptions**
● How can we analyze data/graphs and describe patterns? ● Can we construct more than one kind of graph from the same set of data? ● How can I use degrees of a circle to represent parts of a data set? ● What do sectors tell me about percents of my data? ● How can I use fractions, decimals, and percents to answer questions related to a circle graph? ● How do I organize and interpret data into a histogram?	● Circle Graph: ○ how to calculate the amount of a sector given the percent of the sector and the total ○ finding missing percents (students forget that all the percents should add up to 100%) ○ creating a circle graph given a table with amounts (students have difficulty figuring out the size of the sector using part to whole fractions and converting them to percents ● Histogram: ○ the bars should connect

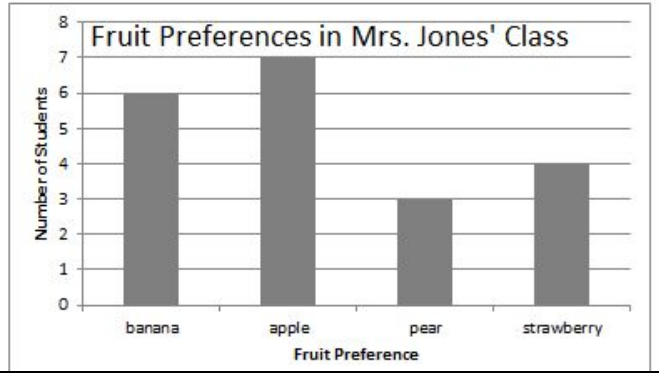
	○ answering questions about the histogram (ie. questions with "at least" and "more than") ○ making the intervals equal
Understanding the Standard	**Essential Knowledge and Skills**
	SOL 6.10: ● Collect, organize and represent data in a circle graph. The number of data values should be limited to allow for comparisons that have denominators of 12 or less or those that are factors of 100 (e.g., in a class of 20 students, 7 choose apples as a favorite fruit, so the comparison is 7 out of 20, $\frac{7}{20}$, or 35%). (a) ● Make observations and inferences about data represented in a circle graph. (b) ● Compare data represented in a circle graph with the same data represented in bar graphs, pictographs, and line plots. (c) SOL 7.9: ● Collect, organize, and represent data in a histogram. (a) ● Make observations and inferences about data represented in a histogram. (b) ● Compare data represented in histograms with the same data represented in line plots, circle graphs, and stem-and-leaf plots. (c)

SOL 6.10:

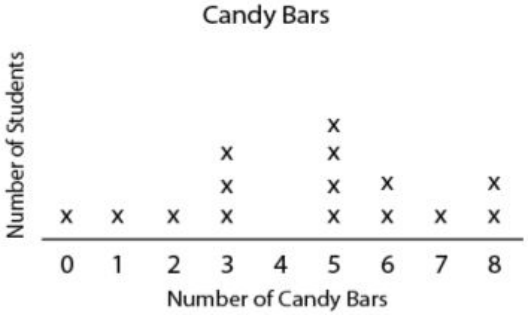
- Circle graphs are used for data showing a relationship of the parts to the whole.
  - Example: the favorite fruit of 20 students in Mrs. Jones class was recorded in the table. Compare the same data displayed in both a circle graph and a bar graph.

Fruit Preference	**# of students**
banana	6
apple	7
pear	3
strawberry	4





- Circle graphs can represent percent or frequency.
- Circle graphs are not useful for representing data with large numbers of categories.
- Teachers should be reasonable about the selection of data values. The number of data values can affect how a circle graph is constructed (e.g., 10 out of 25 would be 40%, but 7 out of 9 would be $77.\overline{7}\%$, making the construction of a circle graph more complex). Students should have experience constructing circle graphs, but a focus should be placed on the analysis of circle graphs.
- Students are not expected to construct circle graphs by multiplying the percentage of data in a category by 360° in order to determine the central angle measure. Limiting comparisons to fraction parameters noted will assist students in constructing circle graphs.
- To collect data for any problem situation, an experiment can be designed, a survey can be conducted, or other data-gathering strategies can be used. The data can be organized, displayed, analyzed, and interpreted to solve the problem.
- Categorical data can be sorted into groups or categories while numerical data are values or observations that can be measured. For example, types of fish caught would be categorical data while weights of fish caught would be numerical data.
- Different types of graphs can be used to display categorical data. The way data are displayed often depends on what someone is trying to communicate.
  - A line plot is used for categorical and discrete numerical data and is used to show frequency of data on a number line. It is a simple way to organize data.
  - Example:



- A bar graph is used for categorical and discrete numerical data (e.g., number of months or number of people with a particular eye color) and is used to show comparisons.
- A pictograph is mainly used to show categorical data. Pictographs are used to show frequency and compare items. However, the use of partial pictures can give misleading information.
  - Example:

The Types of Pets We Have

Cat	Dog	Horse	Fish
			

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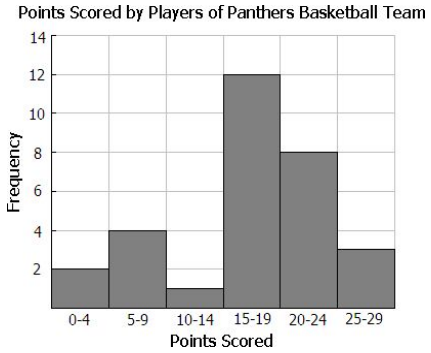
- A circle graph is used for categorical and discrete numerical data. Circle graphs are used to show a relationship of the parts to a whole.
- All graphs must include a title, percent or number labels for data categories, and a key. A key is essential to explain how to read the graph. A title is essential to explain what the graph represents.
- A scale should be chosen that is appropriate for the data values being represented.
- Comparisons, predictions, and inferences are made by examining characteristics of a data set displayed in a variety of graphical representations to draw conclusions.
- The information displayed in different graphs may be examined to determine how data are or are not related, differences between characteristics (comparisons), trends that suggest what new data might be like (predictions), and/or "what could happen if" (inferences).

SOL 7.9:

- A histogram is a graph that provides a visual interpretation of numerical data by indicating the number of data points that lie within a range of values, called a class or a bin. The frequency of the data that falls in each class or bin is depicted by the use of a bar. Every element of the data set is not preserved when representing data in a histogram.
- All graphs must include a title and labels that describe the data.
- Numerical data that can be characterized using consecutive intervals are best displayed in a histogram.
- Teachers should be reasonable about the selection of data values. Students should have experiences constructing histograms, but a focus should be placed on the analysis of histograms.
- A histogram is a form of bar graph in which the categories are consecutive and equal intervals. The length or height of each bar is determined by the number of data elements (frequency) falling into a particular interval.



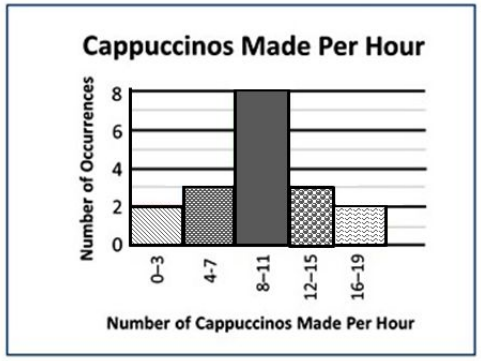
- A frequency distribution shows how often an item, a number, or range of numbers occurs. It can be used to construct a histogram.

Number of Cappuccinos Made per Hour at the Cafe

Number of Cups of Coffee	Tally	Frequency
0 - 3	||	2
4 – 7	|||	3
8 – 11	𝍸 |||	8
12 – 15	|||	3
16 – 19	||	2

To construct a histogram:

- Organize collected data into a table. Create one column for data range categories (bins), divided into equal intervals that will include all of your data (for example, 0-10, 11-20, 21-30), and another column for frequency.
  - Bins should be all the same size.
  - Bins should include all of the data.
  - Boundaries for bins should reflect the data values being represented.
  - Determine the number of bins based upon the data.
  - If possible, the number of bins created should be a factor the number of data values (e.g., a histogram representing 20 data values might have 4 or 5 bins).
- Create a graph. Mark the data range intervals on the *x*-axis (horizontal axis) with no space between the categories. Mark frequency on the *y*-axis (vertical axis), also in equal intervals.
- Plot the data. For each data range category (bin), draw a horizontal line at the appropriate frequency or marker. Then, create a vertical bar for that category reaching up to the marked frequency. Do this for each data range category (bin).



- Note: histograms may be drawn so that the bars are horizontal. To do this, interchange the
  x- and *y*-axis. Mark the data range intervals (bins) on the *y*-axis and the frequency on the
  x-axis. Draw the bars horizontally.

- Comparisons, predictions and inferences are made by examining characteristics of a data set displayed in a variety of graphical representations to draw conclusions. Data analysis helps describe data, recognize patterns or trends, and make predictions.
- There are two types of data: categorical and numerical. Categorical data can be sorted into groups or categories while numerical data are values or observations that can be measured. For example, types of fish caught would be categorical data while weights of fish caught would be numerical data. While students need to be aware of the differences, they do not have to know the terms for each type of data.
- Different types of graphs can be used to display categorical data. The way data is displayed is often dependent on what someone is trying to communicate.
- A line plot provides an ordered display of all values in a data set and shows the frequency of data on a number line. Line plots are used to show the spread of the data, to include clusters (groups of data points) and gaps (large spaces between data points), and quickly identify the range, mode, and any extreme data values.

- A circle graph is used for categorical and discrete numerical data. Circle graphs are used to show a relationship of the parts to a whole. Every element of the data set is not preserved when representing data in a circle graph.
- A stem and leaf plot is used for discrete numerical data and is used to show frequency of data distribution. A stem and leaf plot displays the entire data set and provides a picture of the distribution of data.
- Different situations or contexts warrant different types of graphs, and it helps to have a good knowledge of what graphs are available. Students can determine which graph makes the most sense to use based on the type of data provided and which graph can help them answer questions most easily.
- Comparing different types of representations (charts and graphs) provide students an opportunity to learn how different graphs can show different things about the same data. Following construction of graphs, students benefit from discussions around what information each graph provides.
- The information displayed in different graphs may be examined to determine how data are or are not related, differences between characteristics (comparisons), trends that suggest what new data might be like (predictions), and/or "what could happen if" (inference).

Vocabulary

SOL 6.10

Circle Graph	Bar Graph	Pictograph
Line Plot	Categorical Data	Scale

SOL 7.9

Histogram	Numerical Data	Stem-and-Leaf Plot
Frequency	Prediction/Inference	

Instructional Activities Organized by Learning Objective

Textbook

Notes

Resources
- Print
- Technology-based

Station Activities

Distribution/ Frequency Table			
Assessment			
Cross-Curricular Connections			**Tiered Differentiations**