

Richmond Public Schools
Curriculum Framework
Grade 8

Strand: Probability and Statistics	
8.12 The student will a) represent numerical data in boxplots; b) make observations and inferences about data represented in boxplots; and c) compare and analyze two data sets using boxplots.	
Suggested Pacing	
Fourth Nine Weeks – 4 Instructional Days (including common assessment)	
Related Standards	
<p>Spiral Down</p> <p>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.</p> <p>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.</p>	<p>Spiral Up</p> <p><i>*No Algebra I Spiral</i></p>
Essential Questions	Common Misconceptions
<p>Describe how the data can change the shape of a boxplot? <i>A boxplot can show if a data set is symmetric. Symmetrical data is shown when the median is in the middle of the box. Skewed data is where the median cuts the box into two unequal pieces</i></p>	<ul style="list-style-type: none"> Students will need to be reminded how to interpret data from the box plot. (How to find quartile values and IQR)

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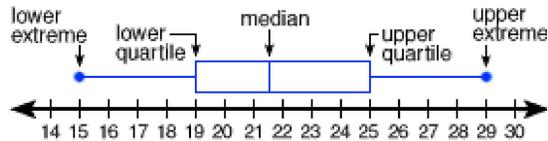
	<ul style="list-style-type: none">• Students have difficulty finding the median when it lies between two data points.• Students confuse range and interquartile range.• Students have trouble remembering that each part of the box-and-whisker plot represents 25% of the data no matter how large the section is.
Understanding the Standard	Essential Knowledge and Skills
<ul style="list-style-type: none">• A boxplot (box-and-whisker plot) is a convenient and informative way to represent single-variable (univariate) data.• Boxplots are effective at giving an overall impression of the shape, center, and spread of the data. It does not show a distribution in as much detail as a stem and leaf plot or a histogram.• A boxplot will allow you to quickly analyze a set of data by identifying key statistical measures (median and range) and major concentrations of data.• A boxplot uses a rectangle to represent the middle half of a set of data and lines (whiskers) at both ends to represent the remainder of the data. The median is marked by a vertical line inside the rectangle.• The five critical points in a boxplot, commonly referred to as the five-number summary, are lower extreme (minimum), lower quartile, median, upper quartile, and upper extreme (maximum). Each of these points represents the bounds for the four quartiles. In the example below, the lower extreme is 15, the lower quartile	<p>The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to</p> <ul style="list-style-type: none">• Collect and display a numeric data set of no more than 20 items, using boxplots. (a)• Make observations and inferences about data represented in a boxplot. (b)• Given a data set represented in a boxplot, identify and describe the lower extreme (minimum), upper extreme (maximum), median, upper quartile, lower quartile, range, and interquartile range. (b)• Compare and analyze two data sets represented in boxplots. (c)

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is 19, the median is 21.5, the upper quartile is 25, and the upper extreme is 29.



- The range is the difference between the upper extreme and the lower extreme. The interquartile range (IQR) is the difference between the upper quartile and the lower quartile. Using the example above, the range is 14 or 29-15. The interquartile range is 6 or 25-19.
- When there are an odd number of data values in a set of data, the median will not be considered when calculating the lower and upper quartiles.
 - Example: Calculate the median, lower quartile, and upper quartile for the following data values:

3 5 6 7 8 9 11 13 13

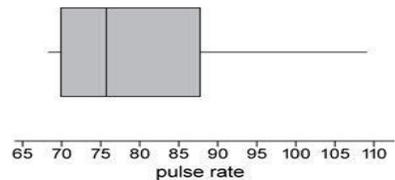
Median: 8; Lower Quartile: 5.5; Upper Quartile: 12

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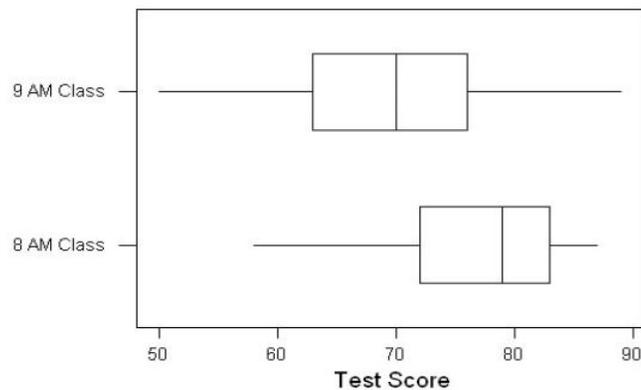
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- In the pulse rate example, shown below, many students incorrectly interpret that longer sections contain more data and shorter ones contain less. It is important to remember that roughly **the same amount of data is in each section**. The numbers in the left whisker (lowest of the data) are spread less widely than those in the right whisker.



- Boxplots are useful when comparing information about two data sets. This example compares the test scores for a college class offered at two different times.



- Using these boxplots, comparisons could be made about the two sets of data, such as comparing the median score of each class or the Interquartile Range (IQR) of each class.

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Vocabulary	Instructional Activities Organized by Learning Objective
Boxplot Box-and-whisker plot Median Five-number Summary Lower Extreme Lower Quartile Upper Quartile Upper Extreme Range Interquartile Range	<p>Virginia Department of Education</p> <p>Textbook <i>Virginia Pre-Algebra</i>, ©2012, Glencoe/McGraw-Hill</p> <ul style="list-style-type: none"> Box-and-Whisker Plots, page(s) 798 – 804 (in part) <p>Notes</p> <ul style="list-style-type: none"> Box-and-Whisker Plots <p>Resources</p> <ul style="list-style-type: none"> Print <i>Virginia Coach</i>, NEW SOL Edition, Grade 8, Mathematics Lesson 16 – page 120 (Box Plots) Technology-based <ul style="list-style-type: none"> <i>ExploreLearning.com (Gizmos)</i> – Box-and-Whisker Plots – Interactive Instructional Resource *Sign-in required <i>BrainingCamp.com</i> – Box and Whisker Plot – Interactive Instructional Video <i>Exchange.Smarttech.com (SMARTBoard)</i> – Box-and-Whisker Plots – SMART Notebook Lesson *SMART Board required <p>Station Activities</p> <ul style="list-style-type: none"> Foldable - Have students create a foldable, describing characteristics, providing examples, and relationships. Provide a data set, have students find the range, median, and construct a boxplot. Dot Card Activity - Directions, Data, and Cards
Assessment	
<p>RPS PowerSchool Unit Test – RPS 8.12 Common Assessment Test ID#:</p> <p>Formative Assessments Kahoot.it Plickers Exit Tickets Graphic Organizers</p>	

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Cross-Curricular Connections	Differentiations
<p>English Have students describe the relationship among mean, median, and range.</p> <p>Health Have students create a box-and-whisker plot using the heights of their classmates. Does the median and range of this data represent data for other children in their age bracket?</p>	<ul style="list-style-type: none">• Have students collect data from others in the class.• Have students match means, medians, mode, and ranges, to data provided.• Have students create the whiskers of data provided to students on graphing paper.• Have students discuss how the whiskers can and do change with the data.