

**STATISTICS, Part 2:**

*15 Minutes*

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**FOR USE IN:** Mathematics

**LEVEL:** Grades 7-9

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MS Educational Psychology, MS Physics

**EDUCATIONAL OBJECTIVES:**

To help the students understand:

**calculating mean, median, and mode averages and how each describe data**

**the range of data**

**the distribution of data by quartiles**

**interquartile range**

**box and whisker plots**

**BACKGROUND INFORMATION:**

In our daily lives, we often deal with problems that involve many related items of numerical information called *data*. For example, in the daily newspaper we can find data dealing with sports, with business, with politics, even with the weather. *Statistics* is the study of numerical data. There are three typical steps in a statistical study of data..

*Step 1.* The collection of data by written questionnaires, interviews, and written logs or diaries of periodic observations..

*Step 2.* The organization of data into tables, charts, and graphs.

*Step 3.* The drawing of conclusions from an analysis of the data.

**Sampling** When conducting a statistical study, it is not always possible to obtain information about every person, object, or situation to which the study applies. Unlike a *census*, in which every person is counted, some statistical studies use only a *sample*, or portion, of the items being investigated.

To find effective medicines, pharmaceutical companies usually conduct tests in which a sample, or small group, of the patients having the disease under study receive the medicine. If the manufacturer of flashlight batteries tested the life span of every battery made, he would soon have a warehouse filled with dead batteries. He tests only a sample of the batteries to determine their average life.

### **BEFORE SHOWING THE VIDEO:**

It is useful to draw the students' attention to the fact that the video will address a very important concept that they often encounter in their daily lives. Describe situations in which it would be useful to know the mean average of events. What is the mean average temperature expected to be in your local area in June? In January? In any given area in the world? What has been the range of grades in a Math class, and how have they been distributed within that range? And so on. The students can be asked to give examples of expressions that they have encountered which contain the word "statistics.", and "average", Are there different types of "averages"?

### **CONTENT OF THE VIDEO:**

First there is a brief review of the statistical graphs and displays presented in Statistics Part 1. We then continue with a girl on a summer job selling ice cream from a cart in a park. In order to choose the type of music to play on her portable CD player which should appeal to the diversity of ages in her patrons, she wants to analyze the distribution of their ages. She had collected the age data from interviews with her customers. Graphs are very useful for representing data in an easy to read form. A very useful description of data is an average. From the collected data of ages, three different averages are calculated: **the mean average, median average, and the mode average**. In each of these averages, data is organized in different ways, which provide helpful insights. Averages however do not show the distribution of the ages within the range of the data. First the median average of the whole set of data is calculated, which divides the data into two equal halves, and locates the position of the **second quartile**. We see how to **calculate where three quartiles lie** by finding the location of the median averages in the lower half and in the upper half of the data. The three quartiles divide the data into four equal parts. We now see what the range of ages are within each quartile or 25% of the total number of customers. The **interquartile range** describes how large the age distribution is in the middle 50% of the data ( ages of customers). To better visualize the distribution of data within the quartiles and the interquartile range, we draw a **box and whisker plot** – so called for its vague resemblance to a box with whisker extensions on either side.

A review follows. Finally the selection of music thought appropriate to the ages of all the customers is heard and the student viewers are asked to second guess the selection given its intended audience.

### **AFTER SHOWING THE VIDEO:**

The students may be given the following problems:

1. The electoral votes cast for the winning presidential candidate in elections from 1900 and 1994 are as follows: 292, 336, 321, 435, 277, 404, 382, 444, 472, 523, 449, 432, 303, 442, 457, 303, 486, 301, 520, 297, 489, 525, 426, 370.
  - a. Find the median average, the mean average, and the mode average of electoral votes.
  - b. Calculate the quartiles and interquartile range of the data.

- c, Make a box and whisker plot of the data.
2. The weights, in kilograms, of five adults are 53, 72, 68, 70, and 72.  
Find: :a. the mean average b. the median average c. the mode average
3. Steve's test scores are 82, 94, and 91. What grade must Steve earn on a fourth test so that the mean average of his four scores will be exactly 90?
4. Express, in terms of  $y$ , the mean average of  $3y - 2$  and  $7y + 18$ .
5. For a certain day, temperature readings were 72, 79, 83, 83, and 88.  
For these data, find a the mean average b the median average c the mode average
6. The table below shows tile distribution of test scores for 32 students in a class. The data have been organized into six score intervals, each having a value of ten. As was shown in Part 1, display the data graphically as a:frequency histogram, and then from the frequency histogram, make a frequency polygon. Remember that there are no spaces between the vertical bars, and the intervals being equal, the width of the bars must also all be the same.

<b>Test Scores (intervals)</b>	<b>Frequency (number of scores)</b>
91—100	6
81—90	8
71---80	11
61—70	4
51—60	0
41—50	3

**Math Series 1, consists of 10 videos:**

**ALGEBRA: A Piece of Cake Part 1**

**ALGEBRA: A Piece of Cake Part 2**

**SLOPES: That's a Bit Steep!**

**PERCENTAGES: That Make Sense**

**LINEAR EQUATIONS and Their Graphs: Let's Get It Straight Part 1**

**LINEAR EQUATIONS and Their Graphs: Let's Get It Straight Part 2**

**INTEGER OPERATIONS: Into the Negative Zone Part 1 Adding and Subtracting**

**INTEGER OPERATIONS: Into the Negative Zone Part 2 Multiplying and Dividing**

**FACTORING IS FANTASTIC Part 1: Common Factors**

**FACTORING IS FANTASTIC Part 2: Quadratic Trinomials**

**Math Series 2, consists of 12 videos:**

**PROBABILITY, Parts 1 & 2**

**RATIOS**

**TRIGONOMETRY, Parts 1 & 2**

**STATISTICS Parts 1 & 2**

**PROBLEM SOLVING Parts 1 & 2**

**GEOMETRIC SOLIDS Parts 1, 2, &3**

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