

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## 12.1 Notes: Measures of Central Tendency

Algebra 1

Qualitative Data	Quantitative Data
<p><b>Overview:</b> Deals with descriptions. Data that can be observed but not measured. Colors, textures, smells, tastes, appearance, beauty, etc. <b>Qualitative</b> → <b>Quality</b></p>	<p><b>Overview:</b> Deals with numbers. Data which can be measured. Length, height, area, volume, weight, speed, time, temperature, humidity, sound levels, cost, members, ages, etc. <b>Quantitative</b> → <b>Quantity</b></p>
<p><b>1. Which set of data can be classified as qualitative?</b></p> <ol style="list-style-type: none"><li>1) scores of students in an algebra class</li><li>2) ages of students in a biology class</li><li>3) numbers of students in history classes</li><li>4) eye colors of students in an economics class</li></ol>	<p><b>2. Which data set describes a situation that could be classified as quantitative?</b></p> <ol style="list-style-type: none"><li>1) the phone numbers in a telephone book</li><li>2) the addresses for students at Hopkins High School</li><li>3) the zip codes of residents in the city of Buffalo, New York</li><li>4) the time it takes each of Mr. Harper's students to complete a test</li></ol>
<p><b>3. Craig sees an advertisement for a car in a newspaper. Which information would <i>not</i> be classified as quantitative?</b></p> <ol style="list-style-type: none"><li>1) the cost of the car</li><li>2) the car's mileage</li><li>3) the model of the car</li><li>4) the weight of the car</li></ol>	<p><b>4. Which set of data can be classified as quantitative?</b></p> <ol style="list-style-type: none"><li>1) first names of students in a chess club</li><li>2) ages of students in a government class</li><li>3) hair colors of students in a debate club</li><li>4) favorite sports of students in a gym class</li></ol>

**When conducting a statistical study, it is not always possible to obtain information about every person or situation to which the study applies. Unlike a census, in which every person is counted, some studies use only a sample or portion of the items being investigated. Whenever a sample is taken, it is vital that it be unbiased (fair); in other words, the sample needs to reflect the overall population.**

**Exercise #1:** To determine which television programs are the most popular in a large city, a poll is conducted by selecting a sample of people at random and interviewing them. Outside which of the following locations would the interviewer be most likely to find a fair sample? Explain your choice and why the others are inappropriate.

(1) A baseball stadium

(3) A grocery store

(2) A concert hall

(4) A comedy club

<p>2. A school wants to add a coed soccer program. To determine student interest in the program, a survey will be taken. In order to get an unbiased sample, which group should the school survey?</p> <ol style="list-style-type: none"> <li>1) every third student entering the building</li> <li>2) every member of the varsity football team</li> <li>3) every member in Ms. Zimmer's drama classes</li> <li>4) every student having a second-period French class</li> </ol>	<p>3. A school newspaper will survey students about the quality of the school's lunch program. Which method will create the <i>least</i> biased results?</p> <ol style="list-style-type: none"> <li>1) Twenty-five vegetarians are randomly surveyed.</li> <li>2) Twenty-five students are randomly chosen from each grade level.</li> <li>3) Students who dislike the school's lunch program are chosen to complete the survey.</li> <li>4) A booth is set up in the cafeteria for the students to voluntarily complete the survey.</li> </ol>
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## Measures of Central Tendency

A statistical measure that gives a value that is representative of the entire value set (a “central value”) about which the values of the data set distribute.

Mean:	Median:
Mode:	Range:

**Exercise #1:** Find the Mean, Median, Mode, and Range of the following Algebra 1 Grades.

**Period 2 (red class):** 68, 95, 32, 79, 55, 59, 90, 60, 77, 54, 96, 86, 26, 85, 64, 76, 93, 81, 73, 83

**Exercise #2:** The two sets of data below are the Quarter 2 and Quarter 3 Grades for your class.

Quarter 2: 65, 94, 21, 74, 54, 59, 90, 62, 75, 54, 97, 84, 26, 85, 64, 75, 89, 73, 77, 86

Quarter 3: 68, 96, 26, 81, 45, 67, 91, 67, 81, 52, 96, 89, 2, 85, 73, 72, 91, 88, 62, 79

Which of the following statements is true?

- |   |   |
|---|---|
| 1) Qtr 2 Mean > Qtr 3 Mean<br>Qtr 2 Range > Qtr 3 Range | 3) Qtr 2 Mean > Qtr 3 Mean<br>Qtr 2 Range < Qtr 3 Range |
| 2) Qtr 2 Mean < Qtr 3 Mean<br>Qtr 2 Range > Qtr 3 Range | 4) Qtr 2 Mean < Qtr 3 Mean<br>Qtr 2 Range < Qtr 3 Range |

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Mean:	Median:
Mode:	Range:

**Exercise #1:** Find the Mean, Median, Mode, and Range of the following Algebra 1 Grades.

**Period 3 (blue class):** 72, 84, 26, 62, 49, 64, 71, 91, 78, 77, 84, 24, 75, 77, 55, 64, 94, 87, 87, 72, 77, 81

**Exercise #2:** The two sets of data below are the Quarter 2 and Quarter 3 Grades for your class.

Quarter 2: 64, 86, 23, 68, 52, 60, 67, 89, 74, 80, 83, 13, 71, 80, 51, 60, 94, 90, 89, 68, 79, 82

Quarter 3: 68, 79, 6, 56, 40, 66, 73, 95, 76, 72, 79, 9, 81, 76, 58, 66, 94, 90, 81, 79, 79, 82

Which of the following statements is true?

- |   |   |
|---|---|
| 2) Qtr 2 Mean > Qtr 3 Mean<br>Qtr 2 Range > Qtr 3 Range | 4) Qtr 2 Mean > Qtr 3 Mean<br>Qtr 2 Range < Qtr 3 Range |
| 3) Qtr 2 Mean < Qtr 3 Mean<br>Qtr 2 Range > Qtr 3 Range | 5) Qtr 2 Mean < Qtr 3 Mean<br>Qtr 2 Range < Qtr 3 Range |

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A statistical measure that gives a value that is representative of the entire value set (a “central value”) about which the values of the data set distribute.

Mean:	Median:
Mode:	Range:

**Exercise #1:** Find the Mean, Median, Mode, and Range of the following Algebra 1 Grades.

**Period 8 (yellow class):** 60, 97, 96, 62, 30, 76, 70, 27, 76, 85, 91, 57, 90, 68, 80, 100, 79, 86, 35, 78, 98, 79, 37

**Exercise #2:** The two sets of data below are the Quarter 2 and Quarter 3 Grades for your class.

Quarter 2: 54, 97, 95, 59, 22, 69, 68, 16, 71, 84, 90, 53, 86, 62, 77, 99, 82, 87, 36, 75, 97, 82, 27

Quarter 3: 72, 99, 98, 56, 19, 71, 61, 14, 77, 87, 94, 69, 90, 79, 79, 100, 82, 84, 19, 82, 97, 82, 35

Which of the following statements is true?

3) Qtr 2 Mean > Qtr 3 Mean  
Qtr 2 Range > Qtr 3 Range

4) Qtr 2 Mean < Qtr 3 Mean  
Qtr 2 Range > Qtr 3 Range

5) Qtr 2 Mean > Qtr 3 Mean  
Qtr 2 Range < Qtr 3 Range

6) Qtr 2 Mean < Qtr 3 Mean  
Qtr 2 Range < Qtr 3 Range

## Measures of Central Tendency

A statistical measure that gives a value that is representative of the entire value set (a “central value”) about which the values of the data set distribute.

Mean:	Median:
Mode:	Range:

**Exercise #1:** Find the Mean, Median, Mode, and Range of the following Algebra 1 Grades.

**Period 7:** 94, 66, 77, 69, 90, 68, 59, 54, 88, 64, 61, 85, 70, 74, 77, 82, 94, 74

**Exercise #2:** The two sets of data below are the Quarter 2 and Quarter 3 Grades for your class.

Quarter 2: 58, 61, 62, 64, 68, 68, 70, 71, 75, 76, 80, 80, 86, 89, 90, 91, 94, 96

Quarter 3: 51, 54, 60, 63, 64, 64, 67, 70, 72, 77, 78, 79, 82, 84, 84, 90, 93, 94

Which of the following statements is true?

4) Qtr 2 Mean  $>$  Qtr 3 Mean  
Qtr 2 Range  $>$  Qtr 3 Range

6) Qtr 2 Mean  $>$  Qtr 3 Mean  
Qtr 2 Range  $<$  Qtr 3 Range

5) Qtr 2 Mean  $<$  Qtr 3 Mean  
Qtr 2 Range  $>$  Qtr 3 Range

7) Qtr 2 Mean  $<$  Qtr 3 Mean  
Qtr 2 Range  $<$  Qtr 3 Range

**Exercise #3:** On his first 5 biology tests, Bob received the following scores: 72, 86, 92, 63, and 77. What test score must Bob earn on his sixth test so that his average (mean score) for all six tests will be 80? Create and solve an algebraic equation to answer the question.

**Exercise #4:** Your overall average for the year in Algebra will be determined by averaging your four quarter grades and your regent's exam grade. Create and solve an algebraic equation using your grades from quarters 1, 2 and 3 to determine what you need to earn quarter 4 and on the regents exam in order to pass the course with a 65. *Assume those grades will be the same.*

**Data sets can have elements that are far away from the rest of the data set. These elements are called \_\_\_\_\_, which can result in a mean that does not best represent the data set.**

**Exercise #5:** On a street in Ballston Spa there are 12 houses. The values of these houses are displayed in the table below.

<b>Value of House (\$)</b>	<b>Number of Houses</b>
230,000	1
245,000	3
270,000	4
280,000	1
300,000	2
450,000	1

- a. Which measure of central tendency, mean or median, better represents the data set? Why?
- b. If another house was built on the street worth \$455,000 would the mean and the median change? If so, how?



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## 12.1 HW: Measures of Central Tendency

Algebra 1

1. The Student Government at Arlington High School decided to conduct a survey to determine where to go on a senior field trip. They asked students the following question: "Would you rather go to a sports event or to an IMAX movie?" At which of the following locations would they most likely get a fair sample?

- (1) The gym, after a game
- (2) The auditorium after a play
- (3) A randomly chosen study hall
- (4) At the Nature Club meeting

2. For the following data set, calculate the mean and median. Any non-integer answers should be rounded to the nearest tenth.

3, 5, 8, 8, 12, 16, 17, 20, 24

3. For five algebra examinations, Maria has an average of 88. What must she score on the sixth test to bring her average up to exactly 90?

4. Which of the following is true about the data set  $\{3, 5, 5, 7, 9\}$ ?

- (1) median  $>$  range
- (2) mean  $>$  median
- (3) median = mean
- (4) median  $>$  mean

5. Which data can be classified as quantitative?

- 1) favorite stores at which you shop
- 2) U.S. Representatives and their home states
- 3) sales tax rate in each New York county
- 4) opinion of a freshman on the color of Paul's shirt

6. A survey is being conducted to determine which types of television programs people watch. Which survey and location combination would likely contain the most bias?

- 1) surveying 10 people who work in a sporting goods store
- 2) surveying the first 25 people who enter a grocery store
- 3) randomly surveying 50 people during the day in a mall
- 4) randomly surveying 75 people during the day in a clothing store

7. A survey is taken by an insurance company to determine how many car accidents the average New York City resident has gotten into on the past 10 years. The company surveyed 20 people who are getting off a train at a subway station. The following Table gives the results of the survey.

(a) Calculate the mean and median number of accidents of this data set. Remember, there are 6-zeros in this data set, 8-ones, etc.

Number of Accidents	Number of People
0	6
1	8
2	4
3	1
11	1

(b) Are there any outliers in this data set? If so, what data value?

(c) Which number, the mean or the median, better represents the number of accidents an average person in this survey had over this 10 year period? Explain your answer.

(d) Does this sample fairly represent the average number of accidents a typical New York City resident would get into over a 10 year period? Why or Why not?