*Mathematics Instructional Plan – Grade 6*

# Effects on Measures of Center

**Strand:** Probability and Statistics

**Topic:** Determining the effect on measures of center when a single value of a data set is added, removed, or changed

**Primary SOL:** 6.11 The student will

1. determine the effect on measures of center when a single value of data is added, removed, or changed.

**Related SOL:** 6.11a

## Materials

* Data Investigation activity sheet (attached)
* Calculators

## Vocabulary

*mean, median, measures of center, mode* (earlier grades)

*outlier* (6.11)

## Student/Teacher Actions: What should students be doing? What should teachers be doing?

1. Begin by reviewing each measure of center. Allow students to share how to calculate the mean, median, and mode of a data set. Ensure that students have calculators for this activity.
2. Place students in pairs or small groups and advise them that they will be performing some statistical investigations.
3. Distribute the Data Investigation activity sheet to each team or partnership.
4. Have students work through each scenario, discussing how they predict the measures of center will change based on the given situations. After making predictions, the teams will then perform calculations and compare the actual changes to their predictions.
5. After each team has completed the activity, pull the class back together to discuss trends shown in their investigation.

## Assessment

### Questions

* + What were some of your findings in the investigation?
  + What were some of the situations that changed the median?
  + How was the mode affected by adding or removing values?
  + Can you think of a scenario where a number can be added to increase or decrease the mean?

### Journal/writing prompts

* + Describe in writing the effect of an outlier on the mean of a data set.
  + Describe the process your team went through to predict how changing various data points would affect the measures of center.

### Other Assessments

* + Scenario four could be used as an independent informal assessment of student thinking.
  + Have students gather a data set by asking 12 people in the room a question. Find the measure of center. Ask a 13th person, and predict what will happen to the measure of center.
  + Have students create a data set with a median of 34. What number can be added to the set so that the median will not change?

## Extensions and Connections

* As an extension, allow the groups to create scenarios and investigate how the measures of center would change as the data set is changed.
* Create more scenario cards that would include cross curricular data, for example scientific data.

## Strategies for Differentiation

* Preteach vocabulary as necessary for some students.
* Have students complete the handout with a partner.
* Ensure that students of varying ability are included in each small group.

**Note: The following pages are intended for classroom use for students as a visual aid to learning.**

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**Data Investigation**

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| --- |
| **Scenario 1**  The following are the results of the last math quiz: 55, 68, 55, 70, 62, 71, 81, 82, 63, and 79. With your team, calculate the measures of center and write them below.  Mean \_\_\_\_\_ Median \_\_\_\_\_ Mode \_\_\_\_\_  Discuss with your team what you think would happen to each measure of center if a student completed a makeup quiz and received a score of 90.  Predictions:  Mean \_\_\_\_\_ Median \_\_\_\_\_ Mode \_\_\_\_\_  Calculate the measures of center with the new score added.  Results:  Mean \_\_\_\_\_ Median \_\_\_\_\_ Mode \_\_\_\_\_ |
| **Scenario 2**  Last week Sarah earned $14, $10, $12, $15, and $13 by doing chores around the house. With your team, calculate the measures of center and write them below.  Mean \_\_\_\_\_ Median \_\_\_\_\_ Mode \_\_\_\_\_  This week, Sarah had cheerleading practice after school and only earned money for chores on four days. She earned $14, $12, $15, and $13. Discuss with your team how you think each measure of center will be affected by earning for four days instead of five days.  Predictions:  Mean \_\_\_\_\_ Median \_\_\_\_\_ Mode \_\_\_\_\_  Calculate the new measures of center and compare to your predictions.  Mean \_\_\_\_\_ Median \_\_\_\_\_ Mode \_\_\_\_\_ |
| **Scenario 3**  The number of dogs groomed each week at Pet Sunshine Grooming Co. is 65, 87, 56, 57, 75, 76, 66, 57, and 64. With your team, calculate the measures of center and write them below.  Mean \_\_\_\_\_ Median \_\_\_\_\_ Mode \_\_\_\_\_  After an audit, it was found that one of the weeks had a recording error and the correct data set should have been: 65, 78, 56, 57, 75, 76, 66, 57, and 64. Discuss with your team how each measure of center will be affected by the error.  Predictions:  Mean \_\_\_\_\_ Median \_\_\_\_\_ Mode \_\_\_\_\_  Calculate the new measures of center and compare to your predictions.  Mean \_\_\_\_\_ Median \_\_\_\_\_ Mode \_\_\_\_\_ |
| **Scenario 4**  Discuss the following using the data set {8, 12, 12, 15, 23}.   1. How will the mean be affected by adding a value greater than 23? 2. How will the mean be affected by adding a value less than 8? 3. What numbers can we add to change the mode? 4. What numbers can we add or remove to change the median?   Explain your thinking.  **Scenario 5**  George recorded the minutes he spent on the phone last week as follows:   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Sunday  175 | Monday  45 | Tuesday  34 | Wednesday  48 | Thursday  40 | Friday  42 | Saturday  48 |   Calculate the measures of center and record them below  Mean \_\_\_\_\_ Median \_\_\_\_\_ Mode \_\_\_\_\_  George’s mom enrolled him into two-hour piano lessons on Sunday and has restricted him from using his phone on that day. Discuss with your team how you think this will affect the measures of center.  Predictions:  Mean \_\_\_\_\_ Median \_\_\_\_\_ Mode \_\_\_\_\_  Calculate the new measures of center and compare to your predictions.  Mean \_\_\_\_\_ Median \_\_\_\_\_ Mode \_\_\_\_\_ |