

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
b) 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**

Mathematics Instructional Plan – Grade 6

- 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

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	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
175	45	34	48	40	42	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 _____