Name _____   Date_____

Understanding Mean Activity Sheet

MATERIALS
- ball of string
- scissors
- meter stick or yardstick

Please work together in groups of at least four members.

DIRECTIONS
1. Use string to measure the length of a person's outstretched arm, from the tip of the middle finger to the shoulder. Mark the string. Beginning from the mark you just made from the end of the first person's arm length, measure the length of another group member's outstretched arm. Mark the string and repeat the process until everyone's arms have been measured on the same string.
2. Cut the string at the last mark. You now have one length of string that is equal to the combined lengths of all the arms in your group. Measure and record the entire length of the string.
3. Cut the string into equal-length sections so that there are as many sections as there are members of your group. Measure and record the length of one section.

QUESTIONS
1. What does the length of one section represent?

2. Does it matter which student gets measured first and which last?

3. If you add a new person to your group and repeat the steps, will your equal-length section be longer or shorter than your original equal-length section?

4. What calculations can you do to find the mean of any set of numbers?

EXTENSION
If time permits, measure everyone's arm with the yardstick or meter stick. Add the values together and divide by the number of members in the group. Do you get the same value as your answer to question 3?

Further Questioning of Whateverville Saga

1. The residents of Whateverville demand that Mayor Wallop use his weather machine to make a mean temperature of 80° for the next 5 days. What should his temperatures be each of those days in order to please them?

2. If the temperatures for 4 consecutive days were 87°, 82°, 84°, and 70°, what would the temperature on the fifth day be to make an average of 80°?

3. Is it a good idea for Whateverville to have a mean temperature of 80° every week for a whole year?

4. Suppose that after keeping the mean temperature at 80° for several weeks, Mayor Wallop loses control of the machine and plunges the city into a five-day freeze, producing temperatures of 3°, 0°, 10°, 19°, 10°. Organize the data on a number line to find the median, mode, range, and mean.

Name _____   Date_____

Understanding Median, Mode, and Mean – Independent Practice

While the rest of the country enjoys mild spring weather, Whateverville continues to suffer under Mayor Wallop's weather experiments. At last the town council brings him weather data from other cities to give him examples of normal weather patterns.

Daily Temperatures in Four U.S. Cities

Anchorage	New Orleans	Saint Louis	San Francisco
45°	88°	69°	64°
47°	91°	70°	66°
44°	98°	73°	61°
50°	97°	69°	64°
47°	93°	71°	66°
Median	Median	Median	Median
Mode	Mode	Mode	Mode
Mean	Mean	Mean	Mean
Range	Range	Range	Range

1. Which city has the highest mean temperature? The lowest?

2. What can you notice about the median and mean?

3. What can you notice about the ranges?

4. If Whateverville is located in the center of the country, which city's weather is the most feasible model?

5. What advice would you give Mayor Wallop?

Name _____   Date_____

Understanding Median, Mode, and Mean – Assessment

1. For any data set, which is greater, the median or mode?

2. Is the mode of a set always one of the numbers in a set?

3. Is the median always one of the numbers in a set?

4. When adding numbers to find the mean, does it matter the order in which they are added?

5. How does the mean change if you add a number to the data that is exactly equal to the mean? Explain.

Name _____   Date_____

Understanding Median, Mode, and Mean – Extension

Ice Cream in Whateverville

Restaurant	Taste	Color	Toppings	Cone	Price
CreamDream Diner	3.5	0.5	4.0	3.5	4.5
Felicity's Fountain	4.0	4.5	4.5	4.0	2.0
Paradise Dairy	5.0	3.0	3.5	3.5	4.0
Sally's Home Cone	0.0	3.0	2.5	3.0	3.0
Gumdrop Gourmet	5.0	5.0	5.0	4.5	0.0

1. To reach conclusive scores for each restaurant, Jamel finds the mean of the five ratings. Which restaurants have the highest mean? Round your answers to the nearest 0.5.

2. Jamel could also compare the medians. Which restaurant has the highest median?

3. What do you think is the better approach, comparing the means or the medians? Explain your reasoning.

4. Jamel considers the taste and the price to be the most important features. He adds each restaurant's ratings again, this time adding the taste and price ratings twice and dividing by a sum of 7. If he uses this system, which restaurant will have the highest score? You may want to use a calculator.

5. Which restaurant's score will drop dramatically?

6. Which feature should Jamel focus on if he wants to compete?

Mean Homework

Order each set of data from least to greatest. Determine the median and mode.

1. 318, 300, 301, 313, 302, 310

2. 163, 79, 182, 120, 156, 165, 197, 134, 233, 256, 120

3. 7.8, 1.12, 3.7, 5.9, 4.5, 8.1, 3.7, 5.5

4. 15, 31, 45, 61, 13, 21, 31, 13, 20

5. Create a data set of 10 numbers with a median of 8 and a mode of 10.
The teachers listed below want every student in their class to make good scores. They use range to measure overall class performance and to critique their own success. Help each teacher find the range of student scores on the most recent test.

6. Mr. Diaz 82, 92, 117, 99, 78, 86, 77

7. Mr. Brown 93, 91, 89, 90, 87, 94, 90

8. Ms. Kingsley 76, 61, 60, 82, 93, 90, 100

9. Ms. Jenkins 80, 78, 85, 82, 81, 78, 84

10. Would a large range or a small range indicate that most students had understood the material on a similar level?

11. Which teacher got the best results from his or her class? Explain your reasoning.

12. Which teacher was more successful, Mr. Diaz or Ms. Kingsley? Explain.

Help the students listed below find their current mean, or average. Some students earned extra credit. Others earned 0s for missing assignments.

13. Lincoln 62, 89, 39, 105, 93, 91

14. Manuela 106, 92, 79, 83, 88, 72

15. Frank 93, 95, 0, 99, 90

16. Seth 72, 69, 81

17. Maria 92, 72, 84, 84

Why did the 0 have such a large effect on Frank's average?

Name _____   Date_____

Whateverville's Temperatures One Week

Sunday	50°
Monday	62°
Tuesday	90°
Wednesday	106°
Thursday	10°
Friday	50°
Saturday	0°

Whateverville's Temperatures for Ten More Days

Sunday	48°
Monday	45°
Tuesday	63°
Wednesday	51°
Thursday	101°
Friday	69°
Saturday	55°
Sunday	62°
Monday	53°
Tuesday	57°

Name _____   Date_____

Mayor Wallop's Popularity Graph

Mayor Wallop's Popularity

Name _____ Date_____
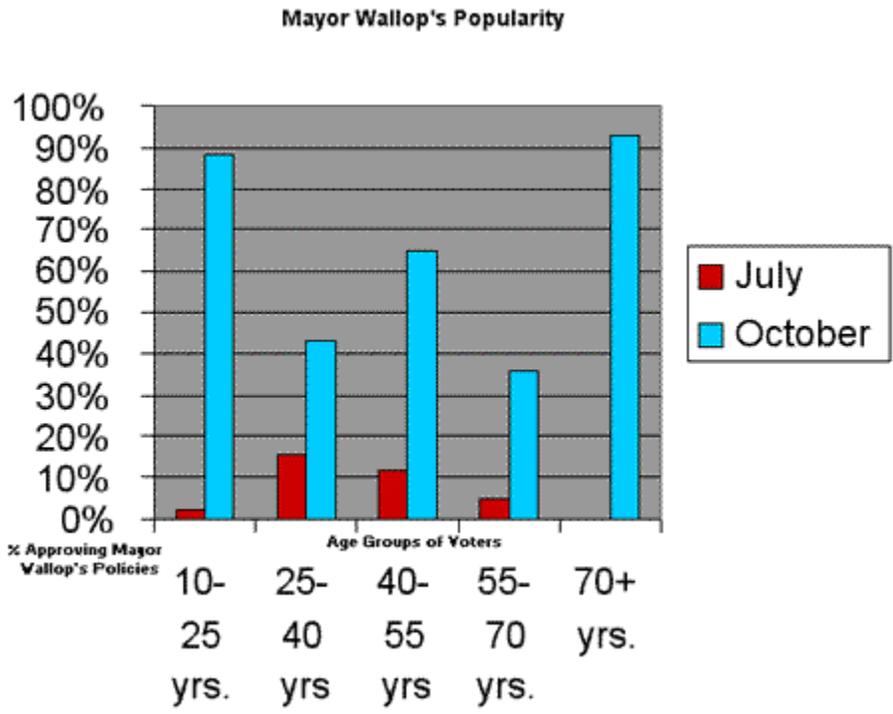
Understanding Mean Answer Key

MATERIALS
- ball of string
- scissors
- meter stick or yardstick

Please work together in groups of at least four members.

DIRECTIONS
1. Use string to measure the length of a person's outstretched arm, from the tip of the middle finger to the shoulder. Mark the string. Beginning from the mark you just made from the end of the first person's arm length, measure the length of another group member's outstretched arm. Mark the string and repeat the process until everyone's arms have been measured on the same string.

2. Cut the string at the last mark. You now have one length of string that is equal to the combined lengths of all the arms in your group. Measure and record the entire length of the string.

3. Cut the string into equal-length sections so that there are as many sections as there are members of your group. Measure and record the length of one section.

QUESTIONS
1. What does the length of one section represent? *(the mean)*

2. Does it matter which student gets measured first and which last? *(No, addition is commutative.)*

3. If you add a new person to your group and repeat the steps, will your equal-length section be longer or shorter than your original equal-length section? *(If the person's arm length is less than the arm length in Step 3, the new mean arm length will decrease. If the person's arm is longer, the mean will increase. If the person's arm is the same length as the mean, the mean stays the same.)*

4. What calculations can you do to find the mean of any set of numbers? *(Find the sum of the numbers and divide by the number of numbers.)*

EXTENSION
If time permits, measure everyone's arm with the yardstick or meter stick. Add the values together and divide by the number of members in the group. Do you get the same value as your answer to question 3?

Name _____   Date_____

Mean Homework – Answer Key

Order each set of data from least to greatest. Determine the median and mode.

1. 318, 300, 301, 313, 302, 310 *(median 306, no mode)*
2. 163, 79, 182, 120, 156, 165, 197, 134, 233, 256, 120 *(median 163, mode 120)*
3. 7.8, 1.12, 3.7, 5.9, 4.5, 8.1, 3.7, 5.5 *(median 5, mode 3.7)*
4. 15, 31, 45, 61, 13, 21, 31, 13, 20 *(median 21, modes 13 and 31)*
5. Create a data set of 10 numbers with a median of 8 and a mode of 10. *(Possible answer: 1, 2, 3, 6, 7, 9, 10, 10, 10, 11)*

The teachers listed below want every student in their class to make good scores. They use range to measure overall class performance and to critique their own success. Help each teacher find the range of student scores on the most recent test.

6. Mr. Diaz 82, 92, 117, 99, 78, 86, 77 *(117 - 77 = 40)*

7. Mr. Brown 93, 91, 89, 90, 87, 94, 90 *(94 - 87 = 7)*

8. Ms. Kingsley 76, 61, 60, 82, 93, 90, 100 *(100 - 60 = 40)*

9. Ms. Jenkins 80, 78, 85, 82, 81, 78, 84 *(85 - 78 = 7)*

10. Would a large range or a small range indicate that most students had understood the material on a similar level? *(a small range)*

11. Which teacher got the best results from his or her class? Explain your reasoning. *(Mr. Brown or Ms. Jenkins got the best results. They have a small range but high scores.)*

12. Which teacher was more successful, Mr. Diaz or Ms. Kingsley? Explain. *(Mr. Diaz. They both have the same ranges, but Mr. Diaz class has higher scores.)*

Help the students listed below find their current mean, or average. Some students earned extra credit. Others earned 0s for missing assignments.
13. Lincoln 62, 89, 39, 105, 93, 91 *(479 ÷ 6 = 79.83)*

14. Manuela 106, 92, 79, 83, 88, 72 *(520 ÷ 6 = 86.7)*

15. Frank 93, 95, 0, 99, 90 *(377 ÷ 5 = 75.4)*

16. Seth 72, 69, 81 *(222 ÷ 3 = 74)*

17. Maria 92, 72, 84, 84 *(332 ÷ 4 = 83)*

Why did the 0 have such a large effect on Frank's average? *(You effectively divide by a score that isn't there.)*

Understanding Median, Mode, and Mean – Extension
Answer Key

1. To reach conclusive scores for each restaurant, Jamel finds the mean of the five ratings. Which restaurants have the highest mean? Round your answers to the nearest 0.5.

Felicity's Fountain, Paradise Dairy, and Gumdrop Gourmet all have means of 4.0

2. Jamel could also compare the medians. Which restaurant has the highest median?

Gumdrop Gourmet

3. What do you think is the better approach, comparing the means or the medians? Explain your reasoning.

Answers may vary. Means take all the scores into account, but a restaurant with good scores will have an unfairly low mean if it scores low in one feature. Medians allow good restaurants to look good.

4. Jamel considers the taste and the price to be the most important features. He adds each restaurant's ratings again, this time adding the taste and price ratings twice and dividing by a sum of 7. If he uses this system, which restaurant will have the highest score? You may want to use a calculator.
Paradise Dairy

5. Which restaurant's score will drop dramatically?
Gumdrop Gourmet

6. Which feature should Jamel focus on if he wants to compete?
Answers will vary.

Name _____   Date_____

Understanding Median, Mode, and Mean – Assessment
Answer Key

1. For any data set, which is greater, the median or mode?
It depends on the data set. Data with several identical low numbers may have a greater median. Data with several identical high numbers may have a greater mode.

2. Is the mode of a set always one of the numbers in a set?
The mode is always a number in a set, unless all of the numbers appear only once. Then there is no mode.

3. Is the median always one of the numbers in a set?
If the data set has an odd number of values, the middle number is the median. If the data set has an even number of values, then the median is the value halfway between the two middle numbers.

4. When adding numbers to find the mean, does it matter the order in which they are added?
No, addition is commutative; the data can be added in any order.

5. How does the mean change if you add a number to the data that is exactly equal to the mean? Explain.
It does not change. Possible explanation: If you add a number greater than the mean, the average is greater. Add one that is less, the mean is less. So, add the same number and the mean remains the same.

Name _____   Date_____

Understanding Median, Mode, and Mean Answer Key

While the rest of the country enjoys mild spring weather, Whateverville continues to suffer under Mayor Wallop's weather experiments. At last the town council brings him weather data from other cities to give him examples of normal weather patterns.

Daily Temperatures in Four U.S. Cities

Anchorage	New Orleans	Saint Louis	San Francisco
45°	88°	69°	64°
47°	91°	70°	66°
44°	98°	73°	61°
50°	97°	69°	64°
47°	93°	71°	66°
Median (47°)	Median (93°)	Median (70°)	Median (64°)
Mode (47°)	Mode (no mode)	Mode (69°)	Mode (64° and 66°)
Mean (46.6°)	Mean (93.4°)	Mean (70.4°)	Mean (64.2°)
Range (6°)	Range (10°)	Range (4°)	Range (5°)

1. Which city has the highest mean temperature? The lowest? *(New Orleans, Anchorage)*

2. What can you notice about the median and mean? *(They are very close together for all four cities.)*

3. What can you notice about the ranges? *(The range is ten or less for all four cities.)*

4. If Whateverville is located in the center of the country, which city's weather is the most feasible model? *(St. Louis)*

5. What advice would you give Mayor Wallop? *(Temperature can only change a few degrees between days, small ranges, no temperatures which throw off the mean.)*

Name _____ Date_____

Further Questioning of Whateverville Saga – Answer Key

1. The residents of Whateverville demand that Mayor Wallop use his weather machine to make a mean temperature of 80° for the next 5 days. What should his temperatures be each of those days in order to please them?

The temperature can be 80° every day, or any combination of 5 numbers that add up to 400 because 400 ÷ 5 = 80.

2. If the temperatures for 4 consecutive days were 87°, 82°, 84°, and 70°, what would the temperature on the fifth day be to make an average of 80°?

87 + 82 + 84 + 70 = 323. 400 - 323 = 77°

3. Is it a good idea for Whateverville to have a mean temperature of 80° every week for a whole year?

Opinions will vary, but there will be no seasonal variety.

4. Suppose that after keeping the mean temperature at 80° for several weeks, Mayor Wallop loses control of the machine and plunges the city into a five-day freeze, producing temperatures of 3°, 0°, 10°, 19°, 10°. Organize the data on a number line to find the median, mode, range, and mean.

0°, 3°, 10°, 10°, 19°. Median 10°, Mode 10°, Range 19°, Mean 8.4°