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Grades 7-8 Mean, Median, and Mode

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Differentiated Lesson Plan: Mean, Median, and Mode

by
Rich Miller III

Subject: Central Tendency/Statistics (Mean, Median, and Mode)

Grade: 7th

Standards: 7.S.1, 7.S.3, 7.S.4, 7.S.6, 7.S.7

Hook:

1. Playing Jeopardy in groups, boys versus girls. A fun way to get them going. Definitely not something that would we would do very often in order to keep it unique and more of a special activity.
2. Bringing in a guest speaker, a mathematician or someone from the real world who works with statistics (i.e. the business world). I never remember having a guest speaker in math class, and hearing another voice when they have to hear yours 180 days a year is refreshing. Speaker will be directly related with the topic at hand.

Essential Questions:

- What are the measures of central tendency?
- What are their definitions?
- How do you calculate them (steps involved)?
- How do they relate to real life?
- How can they be used in or with real life numbers?

Pre-Assessment: Worksheet included, Journal entries from the students

Implementation:

Task 1: Choose any three activities below. Make sure that you get three in a row, column, or diagonal to successfully complete this task! (Hint: measures are defined as either mean, median, and/ or mode)

Choose one of the measures and write a poem which would help to explain them to a non-math person.	Choose one of the measures and make a drawing or cartoon identifying the measure you chose to a non-math person.	Choose one of the measures and depict it using a slogan.
Choose 2 measures and create a story (written or verbal) with any differences and similarities.	Choose 2 measures and create a poster about them.	Choose 2 measures and create a rap or song.
Using all 3 measures,	Using all 3 measures, go	Using all 3 measures, have

debate which is the best for measuring central tendency within your group.	online and use the Smart Board to present the class w/ real life stats and their measures of central tendency.	create an interview in which one person plays the role of interviewer, and the other is a measure of central tendency.
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Task 1 Anchor Activity: Create challenge questions of varying degrees of toughness. They must be associated with the concepts of mean, median, or mode. They will be used for class review before the unit exam. Review will consist of typical review and the possibility of a few rounds of Math Millionaire.

Task 2: Choose the interest that best fits you: sports, music, or cars! Then complete the task(s) that follow in pairs. Assignment will be started in class and completed at home if need be. Presentations will begin the next day. Reflections will be due the day following the last presentation.

Sports:

- Teacher will provide a list of the top players in baseball over the last few years.
- Students will choose two baseball players of their choice.
- Students will access their statistics from the past 6 years (via the internet: <http://sports.yahoo.com/mlb/stats> or reference books provided by the teacher depending on number of available computers/availability of computer lab), more specifically homeruns, hits, RBI's, and batting average.
- Students will make charts of each player, year, and stats.
- Students will graph results on the same graph for each stat, using different colors to differentiate between the two players.
- Students will calculate measures of central tendency.
- Students will calculate the range for each player's stats for that period of time.
- Students will gather all their information and present to class their findings briefly.
- Students will briefly present their findings to the entire class.
- They will discuss:
 - The players they chose, the references used.
 - The statistics.
 - The charts and the graphs.
 - Their calculations of central tendency and range.
 - Their conclusions (i.e. forecast of future)
- Students will also comment on any reasons for discrepancies in the numbers.
- Students are *required* to present and *encouraged* to do a multimedia presentation.
 - In the case of the sports interest group, the student will assume the role of a sportscaster to deliver his stats, results, conclusions, etc. to the class.
 - They may use also the Smart board, PowerPoint, handouts, or any way they feel comfortable presenting.
- Students will begin this in class and have time to work on it today, finish at home if necessary, and be presenting it tomorrow.
- A brief 1-2 paragraph reflection on another student's presentation and what you learned, due day after presentations are complete.

Music:

- Teacher will provide a list of the top songs over the last few years.
- Students will choose at least 2 songs of their choice.

- Students will access the information from the past 6 years (via the internet: http://www.billboard.com/bbcom/charts/chart_display.jsp?g=Singles&f=The+Billboard+Hot+100) more specifically number of days in the top spot, top 10, etc. and the different songs that were there.
- Students will make charts of each song, with a breakdown by year.
- Students will graph results on the same graph for each song, using different colors to differentiate between the two songs.
- Students will calculate measures of central tendency. What was the mean number of days in the top spot, top 10, etc. What was the median, and what song was the mode.
- Students will calculate the range for each songs measures for that period of time.
- Students will gather all their information and present to class their findings briefly.
- Students will briefly present their findings to the entire class.
- They will discuss:
 - The songs they chose, the references used.
 - The statistics.
 - The charts and the graphs.
 - Their calculations of central tendency and range.
 - Their conclusions (i.e. forecast of future)
- Students will also comment on any reasons for discrepancies in the numbers.
- Students are *required* to present and *encouraged* to do a multimedia presentation.
 - In the case of the music interest group, the student will assume the role of a disc jockey to deliver his stats, results, conclusions, etc. to the class.
 - They may also use the Smart board, PowerPoint, handouts, or any way they feel comfortable presenting.
- Students will begin this in class and have time to work on it today, finish at home if necessary, and be presenting it tomorrow.
- A brief 1-2 paragraph reflection on another student's presentation and what you learned, due day after presentations are complete.

Cars:

- Teacher will provide a list of cars over the last few years.
- Students will choose at least 2 cars of their choice.
- Students will access the information from the past 6 years (via the internet: <http://www.caranddriver.com/>) to gather information on the cars and their prices.
- Students will make charts of each car, with a breakdown by year.
- Students will graph results on the same graph for each car, using different colors to differentiate between the two cars.
- Students will calculate measures of central tendency.
- Students will calculate the range for each car measured for that period of time.
- Students will gather all their information and present to class their findings briefly.
- Students will briefly present their findings to the entire class.
- They will discuss:
 - The cars they chose, the references used.
 - The statistics.
 - The charts and the graphs.
 - Their calculations of central tendency and range.
 - Their conclusions (i.e. forecast of future)
- Students will also comment on any reasons for discrepancies in the numbers.
- Students are *required* to present and *encouraged* to do a multimedia presentation.

- In the case of the car interest group, the student will assume the role of a car salesman to deliver his stats, results, conclusions, etc. to the class.
- They may also use the Smart board, PowerPoint, handouts, or any way they feel comfortable presenting.
- Students will begin this in class and have time to work on it today, finish at home if necessary, and be presenting it tomorrow.
- A brief 1-2 paragraph reflection on another student's presentation and what you learned, due day after presentations are complete.

Task 2 Anchor Activity: Think of another interest (i.e. another sport) you may be interested in. Perform some of the same calculations and look for trends in the numbers across different sports (i.e. players in their prime, players in contract years, etc.)

Task 3: In pairs using bags of M & M's, calculate the measures of central tendency.

1. Calculate the mean number of M & M's in each bag (total).
2. Calculate the mean number of each color of M & M's in each bag.
3. Calculate the median number of M & M's based on color totals.
4. Calculate the mode for the M & M's based on color.
5. Calculate the range of M & M's.

Green Groups: Students are obligated to use regular, peanut, and crispy M & M's.

Red Groups: Students are obligated to use regular and peanut M & M's.

Blue Groups: Students are obligated to use regular M & M's.

After making calculations, work with other members of your color to combine your answers and get final number for each. Each group will then have a final set of numbers which will be presented to the class as a whole. The teacher will then tally the total numbers together on the Smart Board to see the differences.

Task 3 Anchor Activity: Research M&M's online on the website: <http://www.m-ms.com/us/>

See if you can find any information on how they are packaged and if there truly is a set way that the company determines how many go in each bag, how many of each color, etc. Comment in your journals.

Other Anchor Activities:

- Read up on the history of mean, median and mode online or via a reference book in the classroom library.
- Use exploringlearning.com and use its gizmos.
- Do more journal writing.
- Help out another group that may be struggling.

Conclusion: Student journal reflection for benefit of both the student and the teacher to gain valuable feedback on these activities and the overall progress and readiness for the upcoming exam on these topics.

Warm-Up

Complete the following worksheet.

1. What is the mean of the following data set? {105, 223, 458, 1,016, 557}
2. What is the mode of the following set of test scores achieved by Steve? {98, 97, 85, 84, 98, 97, 97}
3. What is the median of the following set of points scored in a game by Brian? {12, 5, 31, 17, 14}
4. What is the range of the following set of SAT scores for Cindy? {1250, 900, 1600, 1850, 1375}
5. Jackie has six brothers. There are two sets of twins. Their ages are: 21, 15, 15, 7, 7, and 2. Calculate the mean, median, and mode of their ages. Is there anything special about the mode? What?
6. What is the most common measure of central tendency? *{hint, we talked about this yesterday}*
 - a. **Mean**
 - b. **Median**
 - c. **Mode**
 - d. **Range**

Task 1

Task 1: Choose any three activities below. Make sure that you get three in a row, column, or diagonal to successfully complete this task! It's just like playing tic-tac-toe! (Hint: measures are defined as either mean, median, and/ or mode)

Choose one of the measures and write a poem which would help to explain them to a non-math person.	Choose one of the measures and make a drawing or cartoon identifying the measure you chose to a non-math person.	Choose one of the measures and depict it using a slogan.
Choose 2 measures and create a story (written or verbal) with any differences and similarities.	Choose 2 measures and create a poster about them.	Choose 2 measures and create a rap or song.
Using all 3 measures, debate which is the best for measuring central tendency within your group.	Using all 3 measures, go online and use the Smart Board to present the class w/ real life stats and their measures of central tendency.	Using all 3 measures, have create an interview in which one person plays the role of interviewer, and the other is a measure of central tendency.

Don't be afraid to be creative!!



Task 2



1. Using the handouts or the internet, pick two baseball players and locate their stats over the past 3 years. Use the chart below to organize your data.

	2005	2006	2007
Homeruns			
Hits			
RBI			
AVG			

2. Then graph your results, having a separate graph for each statistic (i.e. both players homerun totals on the same graph, using different colors to tell them apart)
3. Calculate the following measures of central tendency for the statistics that you find over the past 3 years for each of the two players:
 1. Mean for each statistic
 2. Mode for each statistic

3. Median for each statistic
4. Range for each statistic

4) Comment on any discrepancies in the numbers.

5) Prepare a brief presentation for tomorrow in the role of a sportscaster. You are encouraged to use multimedia equipment, but it is not required.

Task 2



4. Using the handouts or the internet, pick at least two cars and locate prices for at least 3 different years. Use the chart below to organize your data.

Cars			
	2005	2006	2007
Car 1			
Car 2			
Car 3			

5. Then graph your results, having a separate graph for each statistic (using different colors to tell them apart)

6. Calculate the following measures of central tendency for the statistics that you find over the past 3 years for each of the cars:
 5. Mean for each statistic
 6. Mode for each statistic
 7. Median for each statistic
 8. Range for each statistic

- 4) Comment on any discrepancies in the numbers.

- 5) Prepare a brief presentation for tomorrow in the role of a car salesman. You are encouraged to use multimedia equipment, but it is not required.

Task 2



7. Using the handouts or the internet, pick at least two popular songs and locate their stats over the past 3 years. Use the chart below to organize your data.

Song "X"			
	2005	2006	2007
Top Song			
Top 5			
Top 10			
Top 100			

8. Then graph your results, having a separate graph for each statistic (using different colors to tell them apart)

9. Calculate the following measures of central tendency for the statistics that you find over the past 3 years for each of the songs:
 9. Mean for each statistic
 10. Mode for each statistic
 11. Median for each statistic
 12. Range for each statistic

- 4) Comment on any discrepancies in the numbers.

- 5) Prepare a brief presentation for tomorrow in the role of a disc jockey. You are encouraged to use multimedia equipment, but it is not required.

Task 3



Green

In pairs using the given bags of regular, peanut, and crispy M & M's, answer the following questions:

6. Calculate the mean number of M & M's in each bag (total).
7. Calculate the mean number of each color of M & M's in each bag.
8. Calculate the median number of M & M's based on color totals.
9. Calculate the mode for the M & M's (hint: based on color).
10. Calculate the range of M & M's.

Red

In pairs using the given bags of regular and peanut M & M's, answer the following questions:

1. Calculate the mean number of M & M's in each bag (total).
2. Calculate the mean number of each color of M & M's in each bag.
3. Calculate the median number of M & M's based on color totals.
4. Calculate the mode for the M & M's (hint: based on color).
5. Calculate the range of M & M's.

Blue

In pairs using the given bags of regular M & M's, answer the following questions:

1. Calculate the mean number of M & M's in each bag (total).
2. Calculate the mean number of each color of M & M's in each bag.
3. Calculate the median number of M & M's based on color totals.
4. Calculate the mode for the M & M's (hint: based on color).
5. Calculate the range of M & M's.

Hint: use a chart like the one on the next page to organize your data.

	Tally		
Color	<i>Regular</i>	<i>Peanut</i>	<i>Crispy</i>
Green			
Red			
Blue			
Orange			
Yellow			
Brown			

Mean, Median, Mode Worksheet #1

Name: _____

Show your work. No calculators allowed.

1. A list of five test scores were: 60, 67, 73, 63 and 67. Find the following:

- a) Mean
- b) Median
- c) Mode

2. Seven people were asked how many minutes they lived from work. The responses were 15, 7, 14, 21, 5, 9 and 13. Find the following:

- a) Mean
- b) Median
- c) Mode

3. At a pet store, a survey was taken asking how many cats each person had. The results were: 2, 5, 3, 1, 0, 4, 2, 7, 0, 2, 7, 3. Find the following:

- a) Mean
- b) Median
- c) Mode

4. A sample of eight students were randomly selected and asked, "How many times did you check your email yesterday?" The numbers were: 3, 0, 8, 7, 10, 2, 6, 12.

Find the following:

- a) Mean
- b) Median
- c) Mode

5. A student received scores of 88, 73, 81, 83, 79, 94 on his tests. The seventh test was coming up and the student want to know:

- a) What was needed on the seventh test to have a mean score of 83. Find the seventh test score.

b) What the median and mode would be using the seventh test score from part a.

Mean, Median, Mode Worksheet #2

Name: _____

Find the mean, median, mode, and range.

1. 233, 430, 508, 127

2. 31, 55, 88, 9, 30, 73, 12, 67, 88, 74

3. 35.9, 21.5, 20, 83.7, 66.9, 35.9, 20

4. 73.2, 42.61, 48.4, 32.8, 218

5. 27.89, 27.39, 12.73, 49.80, 27.89, 311.91, 37.01, 311.91

6. 0.4, 0.03, 0.2, 0.043, 0.015, 0.045, 0.081, 0.076, 0.015

7. A hockey team recorded attendance for its 7 home games.

22,329 81,875 60,312 101,698 22,243 67,415 55,702

Would you use mean, median, mode, or range for each situation? Explain.

1. Kevin noticed that half of the cereal brands in the store cost more than \$3.33.

2. The average score on the last Pre-Algebra test was 85.

3. The most common height on the basketball team is 6 ft 11 in.

4. The heights of players on the basketball team vary by 6 inches.

5. The most common price of a certain type of car is \$25,000.

6. Prices for tickets to the football game vary by \$7.

7. One-half of the cars at a dealership cost less than \$33,000.

8. The average amount spent per customer in a department store is \$58.00.

17
5)
16,
3,
3,
3,
8,
24,
16,
9,
11,
11

mean =
median =
mode =

6)
22,
5,
22,
13,
12,
24,
24,
9,
24,
19

mean =
median =
mode =

7)
23,
1,
1,
18,
1,
3,
18,
10,
7,
3

mean =
median =
mode =

8)
23,
10,
2,
6,
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14,
1,
19,
8,
19

mean =
median =
mode =

9)
8,
21,

mean =
median =

13,
8,
18,
15,
8,
8,
11,
15

mode =

10)
7,
9,
24,
19,
24,
9 ,
18,
3,
3,
3

mean =

median =

mode =

Task 1: Mean, Median, and Mode

Student Name: _____

CATEGORY	4	3	2	1
Mathematical Concepts	Explanation shows complete understanding of the mathematical concepts used to solve the problem(s).	Explanation shows substantial understanding of the mathematical concepts used to solve the problem(s).	Explanation shows some understanding of the mathematical concepts needed to solve the problem(s).	Explanation shows very limited understanding of the underlying concepts needed to solve the problem(s) OR is not written.
Explanation	Explanation is detailed and clear.	Explanation is clear.	Explanation is a little difficult to understand, but includes critical components.	Explanation is difficult to understand and is missing several components OR was not included.
Working with Others	Student was an engaged partner, listening to suggestions of others and working cooperatively throughout lesson.	Student was an engaged partner but had trouble listening to others and/or working cooperatively.	Student cooperated with others, but needed prompting to stay on-task.	Student did not work effectively with others.
Completion	All measures are used.	All but 1 of the measures are used.	All but 2 of the measures are used.	None of the measures are used.
Creativity	Showed a high level of creativity.	Showed some level of creativity.	Showed a limited level of creativity.	Showed no level of creativity.

Task 2: Sports, Music, and Cars

Student Name: _____

CATEGORY	4	3	2	1
Mathematical Concepts	Explanation shows complete understanding of the mathematical concepts used to solve the problem(s).	Explanation shows substantial understanding of the mathematical concepts used to solve the problem(s).	Explanation shows some understanding of the mathematical concepts needed to solve the problem(s).	Explanation shows very limited understanding of the underlying concepts needed to solve the problem(s) OR is not written.
Mathematical Errors	90-100% of the steps and solutions have no mathematical errors.	Almost all (85-89%) of the steps and solutions have no mathematical errors.	Most (75-84%) of the steps and solutions have no mathematical errors.	More than 75% of the steps and solutions have mathematical errors.
Diagrams and Sketches	Diagrams and/or sketches are clear and greatly add to the reader's understanding of the procedure(s).	Diagrams and/or sketches are clear and easy to understand.	Diagrams and/or sketches are somewhat difficult to understand.	Diagrams and/or sketches are difficult to understand or are not used.
Neatness and Organization	The work is presented in a neat, clear, organized fashion that is easy to read.	The work is presented in a neat and organized fashion that is usually easy to read.	The work is presented in an organized fashion but may be hard to read at times.	The work appears sloppy and unorganized. It is hard to know what information goes together.
Working with Others	Student was an engaged partner, listening to suggestions of others and working	Student was an engaged partner but had trouble listening to others and/or working cooperatively.	Student cooperated with others, but needed prompting to stay on-task.	Student did not work effectively with others.

	cooperatively throughout lesson.			
Presentation	The presentation is delivered entirely in said role with no missing components.	The presentation is delivered somewhat in said role with 1-2 components missing.	The presentation is delivered in a limited said role with 3-4 components missing.	The presentation is not delivered in said role with more than 4 components missing.

Task 3 : M&M's

Student Name: _____

CATEGORY	4	3	2	1
Mathematical Errors	90-100% of the steps and solutions have no mathematical errors.	Almost all (85-89%) of the steps and solutions have no mathematical errors.	Most (75-84%) of the steps and solutions have no mathematical errors.	More than 75% of the steps and solutions have mathematical errors.
Mathematical Terminology and Notation	Correct terminology and notation are always used, making it easy to understand what was done.	Correct terminology and notation are usually used, making it fairly easy to understand what was done.	Correct terminology and notation are used, but it is sometimes not easy to understand what was done.	There is little use, or a lot of inappropriate use, of terminology and notation.
Working with Others	Student was an engaged partner, listening to suggestions of others and working cooperatively throughout lesson.	Student was an engaged partner but had trouble listening to others and/or working cooperatively.	Student cooperated with others, but needed prompting to stay on-task.	Student did not work effectively with others.

Neatness and Organization	The work is presented in a neat, clear, organized fashion that is easy to read.	The work is presented in a neat and organized fashion that is usually easy to read.	The work is presented in an organized fashion but may be hard to read at times.	The work appears sloppy and unorganized. It is hard to know what information goes together.
Prediction	Students used data and their educated guesses were extremely close to the actual amount in next bag.	Students mostly used data and their educated guesses were somewhat close to the actual amount in next bag.	Students may have used data and their educated guesses were fairly close to the actual amount in next bag.	Students did not use data and their educated guesses were not close to the actual amount in next bag.