# Helping With Math

6th
Basic

7th
Advanced

USA
GRADES

Measures of Central Tendency

Suitable for students
aged 10-12

This pack is suitable for learners aged 10-12 years old or 6th to 7th graders (USA). The content covers fact files and relevant basic and advanced activities involving measures of central tendency.

- In statistics, the central tendency is considered as the descriptive summary of a data set or distribution.

- By calculating the single value from the dataset, it reflects the centre of the data distribution.

- The three measures of central tendency are mean, median, and mode.
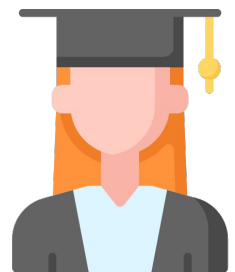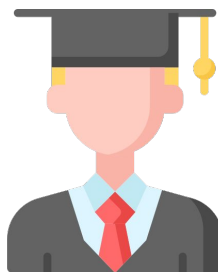
- Mean is the measure of central tendency that represents the average value of the dataset. It can be calculated as the sum of all the values in the dataset divided by the number of values.
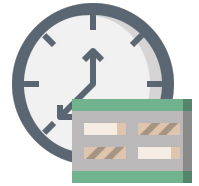
  x̄ = sum of all observations divided by the number of observations

THE MEAN

$$\overline{x}$$ ***Mean means...***

- a mathematical average of a group of two or more numerals.
- an arithmetical average
- the sum of the values of all observations or data points divided by the number of observations
- important information about the data set at hand
- a single number that can provide a lot of insights into the experiment and nature of the data
- the most commonly used measure of central tendency
- can be greatly affected by extreme values

In solving for mean of a given set of data...

1. Add all the scores/values. Arranging them is not necessary.
2. Divide the total of the scores/values by the number of cases (n).

   For example: What is the mean of the given set of data:
   3, 3, 5, 2, 7, 8, 10, 12, 10, 9?

   Solution: The number of cases is 10 (n = 10).
   3 + 3 + 5 + 2 + 7 + 8 + 10 + 12 + 10 + 9 = **69**
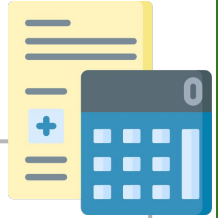   Then, 69 ÷ 10 = **6.9**

Thus, the average or mean of the given set of data is 6.9.

THE MEDIAN

$\tilde{x}$ ## *Median means...*

- middle value
- the positional value of the variable that splits the distribution into two equal parts.
- resulting to one part is made of all values greater than or equal to the median value and the other comprises all values less than or equal to it.
- the "middle" element given that the data set is arranged in order of the magnitude.
- determined by the position of different values. Unlike mean, median remains unaffected of extreme values.

In solving for median of a given set of data...

1. The median can be easily calculated by arranging the data from smallest to largest and locating the middle value.

   In the event that there are even numbers of data, there will be two observations which fall in the middle. The median in this case is computed as the average of the two middle values.

   For example: What is the median of the given set of data: 3, 3, 5, 2, 7, 8, 10, 12, 10, 9? (n = 10)

   Solution: Arrange first the values in ascending order.
   2, 3, 3, 5, 7, 9, 9, 10, 10, 12.

   the two middle values

   To determine the median, get the average of 7 and 9.
   (7+9) ÷ 2 = 16 ÷ 2 = 8
   Thus, **the median is 8.**

THE MODE

$\hat{x}$ *Mode means...*

- most typical value of a given set of data
- the value around which maximum concentration of items occurs
- "la Mode" in French which can be translated as the most fashionable values of a distribution, because it is repeated the highest number of times in the series.
- the most frequently observed data value.
  - A data is said to be unimodal if it has one mode only.
  - A data is said to be bimodal if it has two values of mode.
  - A data is multimodal if it has more than two values of mode.

In solving for mode of a given set of data...

1. To solve for mode, just pick the number with the most number of occurence. Unlike median, arranging the values is unnecessary.

   For example: What is the mode of the given set of data: 3, 3, 5, 2, 7, 8, 10, 12, 10, 9? (n = 10)

   Solution: 3 and 10 occurred twice. Thus the values of mode in this given set of data is 3 and 10. The distribution is bimodal.

PRACTICE EXERCISES

Solve for the measures of central tendency given the following set of values.

50	38	49	48	35	60	51
55	38	47	48	44	53	60
45	39	50	50	50	38	51

Mean:

Median:

Mode:

TABLE OF ACTIVITIES

Uh oh! Time is running and the deadline of Professor Ashton's task is just 15 minutes away from now. Hurry and complete the task below.

Modified TRUE or FALSE.

1.) Average is also known as the <u>mean</u>.

2.) In finding the <u>mode</u> of a data, you should arrange the date from highest to lowest or vice-versa.

3.) Mode is the number that occurred the <u>least</u> in a set of data.

4.) Median is finding the <u>middle</u> number.

5.) If you have two numbers in the middle, you should get the <u>difference</u> and divide it by two.

6.) The mean of 23, 56, 45, and 30 is <u>38.5</u>.

7.) The median of the set of data 18, 22, 19 26, and 35 is <u>19</u>.

8.) The mode/s of the given data 11, 10, 12, 12, 11 is/are <u>11 and 12</u>.

1.	2.
3.	4.
5.	6.
7.	8.

MRS. SMITH'S DILEMMA

Use your understanding of mean to answer the word problem below.

Mrs. Smith will rank her students' average grades for year-end awards. Help her to rank them by computing the average grades considering two decimal places.

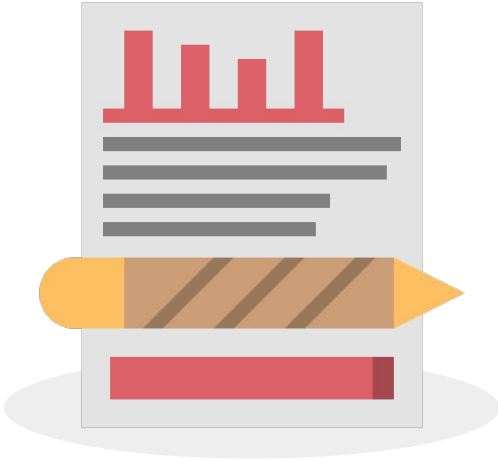| Name of Student	Rank
Paul - 90, 91, 89, 88, 92, 95, 90, 89	
George - 88, 96, 89, 97, 90, 92, 94, 91	
Megan - 87, 89, 92, 90, 88, 94, 93, 90	
Olivia - 90, 92, 91, 93, 94, 90, 89, 88	
James - 85, 86, 88, 94, 87, 95, 90, 91	
Emma - 90, 90, 90, 90, 90, 90, 90, 90	
Ava - 90, 91, 89, 92, 92, 93, 96, 93	
Michael - 90, 91, 90, 92, 93, 90, 91, 85	

Median is known as the value that divides the distribution into two 50%. For today's quiz, find the median of each set of data.

1.) 4, 6, 7, 3, 9, 5, 5, 4, 3

2.) 12, 14, 11, 15, 10, 20, 18

3.) 25, 29, 20, 25, 26, 21, 22, 20

4.) 34, 56, 45, 23, 60, 42

5.) 8, 9, 5, 17, 9, 6, 20, 1, 7, 18

6.) 100, 85, 125, 98, 154, 135

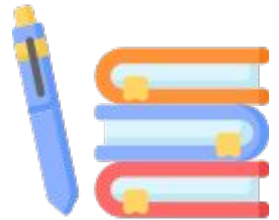| 1.	2.	3.
4.	5.	6.

THE MOST FREQUENT SCORE

One of the lessons that you need to review for the upcoming academic exam is about mode. Find the mode of each set of data.

1) 1, 2, 1, 3, 4, 3, 1, 2, 2, 1

2) 15, 20, 19, 15, 11, 16, 15

3) 30, 35, 45, 34, 30, 48, 50

4) 50, 51, 65, 67, 50, 65, 80

5) 200, 300, 200, 300, 100, 110

6) 100, 101, 102, 103, 104, 105, 106

Mrs. Clarkson wants to gauge the pre-understanding of her students about Measures of Central Tendency so she administered a diagnostic test. If you are one of her students, what would your answers be?

1.) What number would you divide by to calculate the mean of 13, 20, 8, 15 and 30?

A. 4   B. 5   C. 6   D. 7

2.) The mean of four numbers is 59. If three of the numbers are 50, 65, and 70, what is the fourth number?

A. 49   B. 50   C. 51   D. 62

3.) What is the term used to describe a data set with two modes?

A. Unimodal   C. Non-modal
B. Bimodal   D. Multimodal

4.) What is the mean of the following numbers?
16, 20, 40, 25, 39, 41, 29

A. 27   B. 28   C. 29   D. 30

5.) What is the median score achieved by a student who got the following scores on 8 Science long tests?
35, 45, 32, 38, 42, 40, 35, 48

A. 39   B. 40   C. 39 & 40   D. 38 & 40

6.) What is the the mode of the data in number 3?

A. 32   B. 35   C. 40   D. 42

Here are some common scenarios inside the academy. Use your understanding of mean, median, or mode to answer the following.

1.) Alexander spent $6, $5.50, $4, $3.7, and $7.5 for his school supplies in the past 5 months. What is his average expense for it?

2.) What is the average height of 6th grade boys in a class if the measurements of their height (in cm) are listed 150, 145, 152, 160, 149, 165, 155, 152, 158, and 163.

3.) In a school's canteen, the number of hamburgers being sold each day is listed below. Find the average number of hamburgers being sold in a week.

Monday	Tuesday	Wednesday	Thursday	Friday
76	85	77	82	81

4.) Ashley has a target average grade of 90% in her test results. She got 85, 88, 92, and 88 on her four tests. What grade should she get on her fifth test to achieve her target average grade?

5.) Jordan is one of the basketball players of his team for their school's intramurals. He had 7 games and got the following scores, 23, 18, 20, 15, 25, 20, and 18. What is his average point for the 7 games?

STUDENTS' RANKS

Below are some real-life scenarios where we can use median to solve the problem. Go and solve them.

1.) The following are the ages of the first 7 students enrolled in certain Junior High School: 17, 16, 14, 13, 14, 16, 15. Determine the median of the students' age.

2.) Justin is eating beside the small garden near the school's canteen. He decided to count the number of petals on 9 flowers and found these data: 5, 3, 4, 6, 3, 5, 5, 6, 3. What is the middle number of the data?

3.) The data below are the average grades of 9 students in a certain academy. Who is in the middle rank?

Student	A	B	C	D	E	F	G	H	I
Average	94	85	93	88	92	90	86	95	89

4.) Your teacher asked you to sit in the middle of the 17 seats per row in your classroom, in what seat would you have sit?

5.) You are arranging your books in a cubby hole of your classroom according to its length. The lengths (cm) of your books for each are listed below. What subject/s is/are in the center?

Geometry	14	Physics	15
English	16	Social Studies	14
Biology	18.5	Accounting	17
History	14.5	Computer	15.5

MODE ALL THE WAY

Use the concept of mode to answer the following scenarios.

1.) A school's glee club is electing its officers for the current academic year. Peter, James and John are nominated for the president position and the votes of 15 members are as follow:

Peter	John	John	John	Peter
Peter	James	Peter	James	John
John	James	John	Peter	James

2.) The aircon temperature (in degrees Celsius) inside the office of the university president for 15 days is listed below. What is the mode of the distribution?
20, 24, 20, 26, 22, 19, 26, 23, 24, 17, 20, 28, 24, 21, 18.

3.) In a school fair, James and George noticed that there are common colors of shirts that the students are wearing. Out of 15 students, 3 wear black, 5 wear red, 2, wear white, 4 wear blue and 1 wear pink. What is the most common color that students are wearing?

4.) The T-shirt sizes of the students in Mr. Johnson's class for class shirts are listed as follows: L, XL, XL, 2XL, M, S, S, M, 2XL, XL, L, S, XS, XL, M, S, XS, XL, L, M. What size has the most number?

5.) The computer laboratory of a certain school has 4 Samsung and 4 Asus computer units in room 1, 5 Dell and 2 LG units in room 2 and 10 Asus units in room 3. What brand has the highest number for all rooms?

For each common situation given in the academy, choose the most appropriate central tendency the can be applied. Explain your choice.
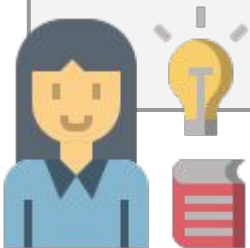
1. Best selling food in the school's canteen.

2. Identifying the valedictorian & salutatorian of the class.

3. Annual salary of all teachers in a certain university.

4. Rank 3 among the 5 highest students in class.

5. Determining your average school allowance in a month.

ENHANCING YOUR REASONING SKILLS

In the academy, reasoning skills are needed to be developed. Achieve that by answering the following word problems.

1.) Your teacher asks your section to line up according to height. What is the height of the student who will be in the middle of the line given the measurements below (in inches)?
5'5, 5'6, 5, 4'9, 5'2, 5'9, 5'5, 5'1, 5'8, 5'1, 5'7, 5'6, 5'4

2.) It is card viewing day at your school and you want to know whether you will be an honor student with a minimum general average of 92. Will you be an honor students if your grades are 92, 95, 85, 88, 86, 90, 93 and 94? Why or why not?

3.) The school supplies store near your school sells colored sticky notes. On the first day, there are 10 pads for each color which are pink, yellow and orange. On the third day, the store owner noticed that only 2 pads left for pink, 5 pads for yellow and 8 pads for orange. If you were the store owner:
   a.) Which of the three colors would you sell the most? Why?
   b.) Which among the measures of central tendency did you use to decide the color? Why?

4.) Find the average weekly expenses for your school supplies and snacks. Below is the list of your expenses for a week.
$6.5, $4, $5, $2.7, $5.8, $8, $3.9

5.) A school's canteen keeps more stock of chocolate drinks which has more sale. Which of the central tendency was used to determine the items which have more sale? Why?
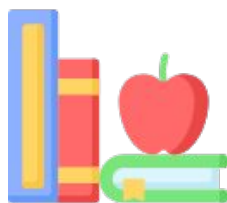
ANSWER GUIDE

Activity 1

1.) True   2.) median   3.) most   4.) True
5.) sum   6.) True   7.) 22   8.) True

Activity 2

Paul - 4   George - 2   Megan - 5   Olivia - 6
James - 8   Emma - 7   Ava - 1   Michael - 6

Activity 3

1.) 5   2.) 14   3.) 23.5
4.) 43.5   5.) 8.5   6.) 112.5

Activity 4

1.) 1   2.) 15   3.) 30
4.) 50   5.) 200 and 300   6.) no mode

Activity 5

1.) B   2.) C   3.) B   4.) D   5.) A   6.) B

ANSWER GUIDE

Activity 6

1.) 5.34   2.) 154.9   3.) 80.2
4.) 97   5.) 19.86

Activity 7

1.) 15   2.) 5   3.) Student F
4.) 9th seat 5.) Physics & Computer

Activity 8

1.) John   2.) 20 & 24   3.) Red
4.) XL   5.) Asus

Activity 9

1.) mode   2.) mean   3.) mean
4.) median   5.) mean

Activity 10

1.) 5'5
2.) No, because the average is only 90.375.
3.) Pink, it is color that sold the most.
4.) Mode, (answers may vary in explanation)
5.) $5.1
6.) Mode, (answers may vary in explanation)

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