

# Mean, Median, Mode and Range

*Intended for middle school students  
all the way to high school*

How are these forms of data  
analysis different?

How can I use them as a  
scientist?

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1. Mean
2. Median
3. Mode
4. Range

When conducting experiments, data should be collected. As a scientist, one of our most important tasks is analyzing the data we collect. There are many methods used to analyze data. Today we are going to focus on four ways.

## Mean:

*The average of a group of numbers is called the mean.*

Do not round the number.

Mean = Sum of data / # of data



What is the mean of the data below?

2, 4, 6, 8, 10, 12



You must add all the numbers together. Take the sum of the numbers and divide by how many numbers there are.

What is the mean of the data below?

2, 4, 6, 8, 10, 12

$$\text{Mean} = (2 + 4 + 6 + 8 + 10 + 12) \div 6$$

$$\text{Mean} = 42 \div 6$$

$$\text{Mean} = 7$$

# Mean

## ADVANTAGES & DISADVANTAGES

### • Advantages:

- Most popular measure in fields such as business, engineering and computer science.
- It is unique - there is only one answer.
- Useful when comparing sets of data.


### • Disadvantages:

- Affected by extreme values

## Median:

*The middle value, or the mean of the middle two values, when the data is arranged in numerical order. Think of a "median" being in the middle of a highway.*

11, 12, 13, 14, 15



In this set of numbers, 13 is the median. It is found directly in the middle of the other numbers.

What is the median for the set of #'s below?

1, 2, 3, 4, 5



What is the median for the set of #'s below?

1, 2, 3, 4, 5



The number 3 is right in the middle of the list of numbers. What would you do if there were an even set of numbers? Let's look at an example.

# How do I find the median for an even set of #'s?

5, 5, 10, 10, 10, 15, 15, 15, 20, 25

When dealing with a set of numbers that are even in number, you would average the 2 numbers in the middle together to find the median.

*Tip: Listing the data in a line is the easiest way to find the median.*

# How do I find the median for an even set of #'s?

~~5~~, ~~5~~, ~~10~~, ~~10~~, 10, 15, ~~15~~, ~~15~~, ~~20~~, ~~25~~

The numbers 10 and 15 both fall in the middle.

Average these two numbers to get the median.

$$\frac{10 + 15}{2} = 12.5$$

# Median

## ADVANTAGES & DISADVANTAGES

### • Advantages:

- Extreme values do not affect the median as strongly as they do the mean.
- Useful when comparing sets of data.
- It is unique - there is only one answer.

### • Disadvantages:

- Not as popular as mean.

## Mode:

*The number that appears the most.*

It is possible to have more than one mode, and it is possible to have no mode. If there is no mode-write "no mode", do not write zero (0) .



Can you find the mode in this  
number set?

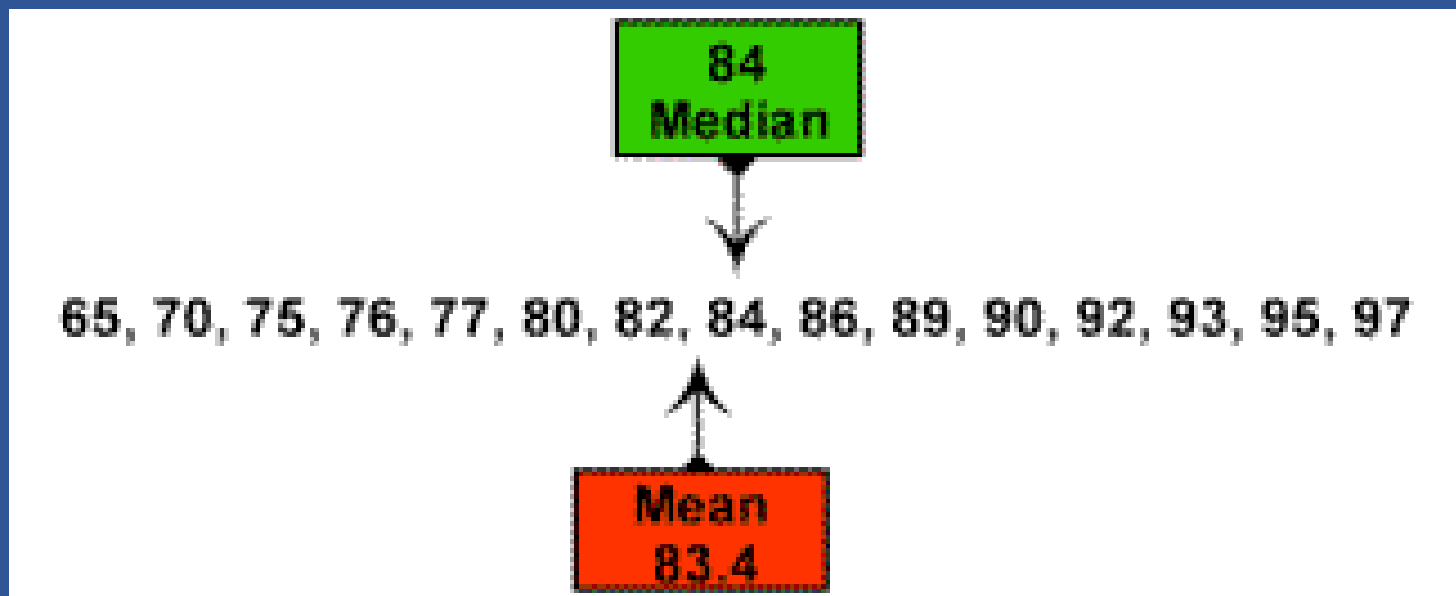
6, 7, 8, 10, 12, 14,  
11, 15, 14, 20

Can you find the mode in this  
number set?

6, 7, 8, 10, 12, 14,  
11, 15, 14, 20

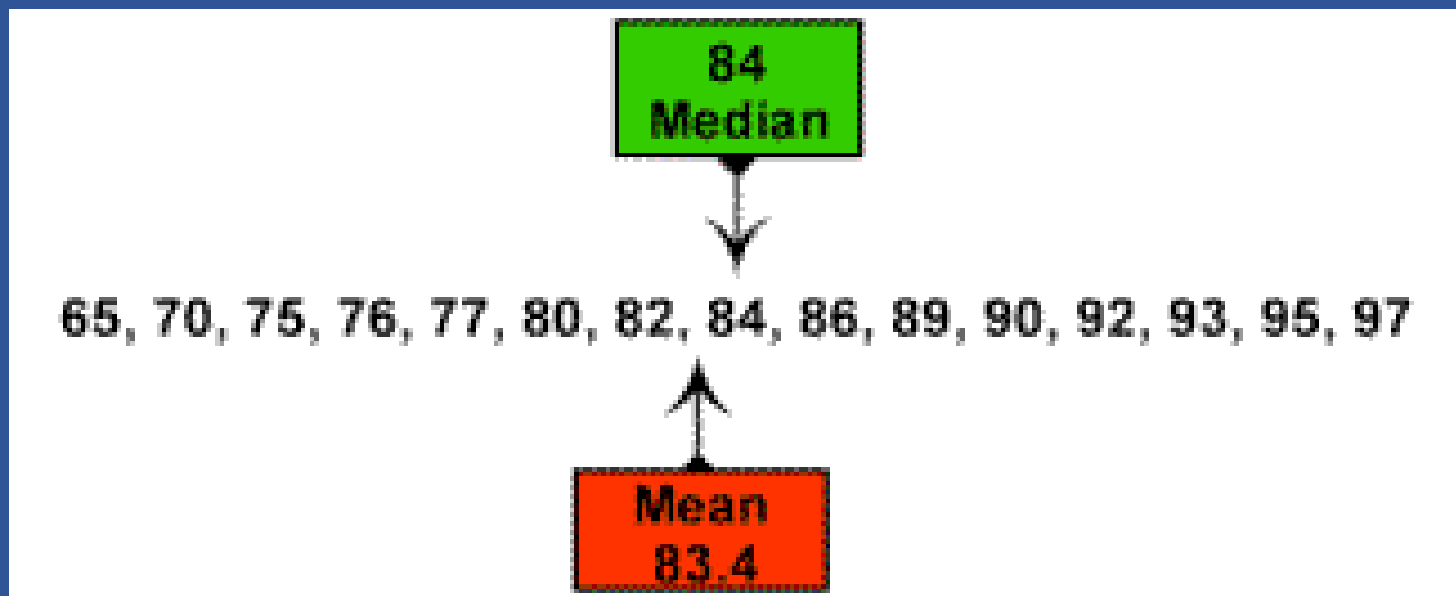
Yes, # 14 was repeated the  
most!

# What is the mode in this number series?





# What is the mode in this number series?



There is no mode.

# Mode

## ADVANTAGES & DISADVANTAGES

### • Advantages:

- Extreme values do not affect the mode.

### • Disadvantages:

- Not as popular as mean and median.
- *Not necessarily unique - may be more than one answer*
- When no values repeat in the data set, the mode is every value and is useless.
- *When there is more than one mode, it is difficult to interpret and/or compare.*

*Another important term to know is:*

**Range:**

The range is the difference between the least number and the greatest number.

Greatest value – Least value = Range

What is the range in this number series?

9, 2, 1, 6, 7

Greatest value – Least value = Range

Look at the formula.



What is the range in this number series?

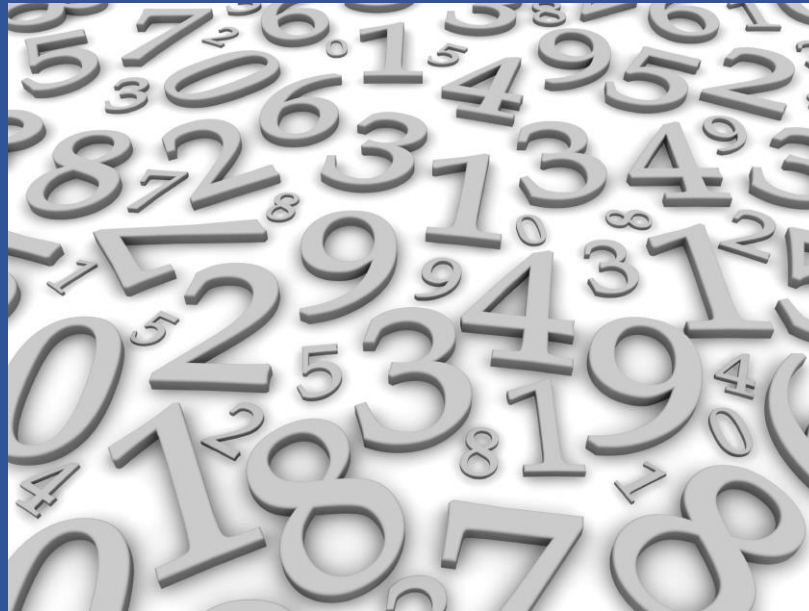
9, 2, 1, 6, 7

Greatest value – Least value = Range

$$9 - 1 = 8$$

*Can you find the mean,  
median, mode, and range for  
the following list of values:*

**13, 18, 13, 14, 13, 16, 14, 21, 13**



Let's find the mean:

13, 18, 13, 14, 13, 16, 14, 21, 13

**The *mean* is the usual average, so:**

$$(13 + 18 + 13 + 14 + 13 + 16 + 14 + 21 + 13) \div 9 = 15$$

Let's find the median:

13, 18, 13, 14, 13, 16, 14, 21, 13

The *median* is the middle value, so rewrite the list in numerical order:

~~13~~, ~~13~~, ~~13~~, ~~13~~, 14, 14, ~~16~~, ~~18~~, ~~21~~

The median is 14.



Let's find the mode:

13, 18, 13, 14, 13, 16, 14, 21, 13

The mode is the number that is repeated more often than any other.

13 is the mode.

Let's find the range:

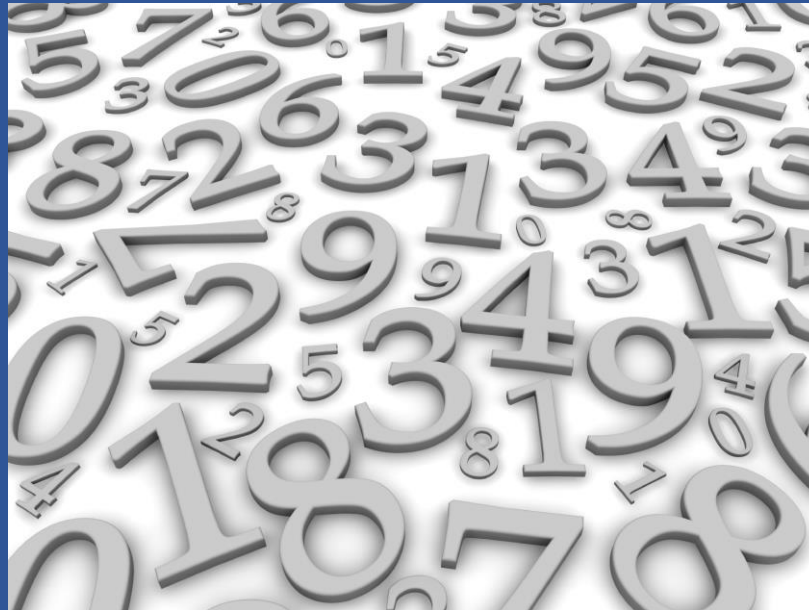
13, 18, 13, 14, 13, 16, 14, 21, 13

The largest value in the list is 21, and the smallest is 13, so the range is

$$21 - 13 = 8.$$

*Can you find the mean,  
median, mode, and range for  
the following list of values:*

**1, 2, 4, 7**



Let's find the mean:

1, 2, 4, 7

The *mean* is the usual average, so:

$$(1 + 2 + 4 + 7) \div 4 = 3.5$$

# Let's find the median:

1, 2, 4, 7

The median is the middle number. In this example, the numbers are already listed in numerical order. There is no "middle" number, because there is an even number in the set.

Let's find the median:

1, 2, 4, 7

In this case, the median is the mean (the usual average) of the middle two values:

$$(2 + 4) \div 2 = 6 \div 2 = 3$$

Let's find the mode:

1, 2, 4, 7

The mode is the number that is repeated most often, but all the numbers appear only once. *There is no mode.*

Let's find the range:

1, 2, 4, 7

The range is the difference between the greatest number and the smallest number.

The range is 6.

$$7 - 1 = 6$$



Scientists use all forms of data analysis. Each form can be useful if applied appropriately. However, it is important to understand that data can be presented to a reader in a misleading way without altering data. A scientist is human with their own bias. Learn how to read and decipher data for yourself. 😊

Check out our other learning  
resources! Happy Learning!

[thehomeschooldaily.com](http://thehomeschooldaily.com)

The fear of the Lord is the beginning of  
knowledge: but fools despise wisdom and  
instruction.

Proverbs 1:7