

# ALGEBRA 1: Week of May 18

- Go through the slides (notes) and work through the examples on a separate piece of paper.
- Do the given practice problems (again, on a separate piece of paper).
- Check your answers with the key given (last slide).
- Take a photo or scan in your work and submit it in Google Classroom. If you have questions or would like feedback on your work, add that as a comment with your submitted work.
- The other option for turn in is to send it in on Monday when the new packet is available.
- Check your school email/google calendar for online help sessions via Zoom.

Day 1: Slides 2-10  
Day 3: Slides 16-22

Day 2: Slides 11-15  
Answers on Slide 23

## Day 1: Lesson 4.3

# Completing Data Sets

Use statistics and problem solving to find missing numbers in data sets.

## Example 1

**Karina weighed ten different frogs and put the weights in order. She found her measures of center before her paper got splattered with mud. Find the missing weights.**

My frogs' weights:  
7.1, 7.2, 7.4,  
7.5, 8.7, 9.1, 9.1, 11.5

Mean = 8.23  
Median = 7.7  
Mode = 9.1

The current weights are:

\_\_\_, 7.1, 7.2, 7.4, 7.5, \_\_\_, 8.7, 9.1, 9.1, 11.5

## Example 1 Continued...

\*Start with the mode since it requires the least calculation. Because the mode is 9.1, no other number can show up more than once. In this situation, the mode does not help fill in the blank.

\*The median is 7.7. There are two middle numbers. These numbers must average to 7.7.

Write an equation to find the median.

$$\frac{7.5 + x}{2} = 7.7$$

Multiply both sides of the equation by 2.

$$2 \cdot \frac{7.5 + x}{2} = 7.7 \cdot 2$$

Subtract 7.5 from each side of the equation.

$$\begin{array}{r} 7.5 + x = 15.4 \\ -7.5 \quad -7.5 \\ \hline x = 7.9 \end{array}$$

One of the missing numbers is 7.9.

## Example 1 Continued...

Now we have this updated data set:

\_\_\_, 7.1, 7.2, 7.4, 7.5, 7.9, 8.7, 9.1, 9.1, 11.5

\*The mean is 8.23. There are 10 numbers in the data set so the sum of the values in the data set is 8.23 times 10.

$$8.23 \cdot 10 = 82.3$$

Subtract the known values from 82.3 to find the other missing value.

$$82.3 - 7.1 - 7.2 - 7.4 - 7.5 - 7.9 - 8.7 - 9.1 - 9.1 - 11.5 = 6.8$$

Katrina's two missing weights are 6.8 and 7.9.

## Example 2

Tony was given the following statistics about his seven test scores in geography class:

Range = 19, Mode = 83 and 84, Median = 84, Mean = 86.

He remembers his highest test score was a 97. What were his other test scores?

Tony has taken seven tests.     \_\_\_, \_\_\_, \_\_\_, \_\_\_, \_\_\_, \_\_\_, \_\_\_

His highest score was 97.       \_\_\_, \_\_\_, \_\_\_, \_\_\_, \_\_\_, \_\_\_, 97

The range is 19.                 Maximum - 19 = Minimum  
97 - 19 = 78  
78, \_\_\_, \_\_\_, \_\_\_, \_\_\_, \_\_\_, 97

The median is 84.               78, \_\_\_, \_\_\_, 84, \_\_\_, \_\_\_, 97

## Example 2 Continued...

Tony was given the following statistics about his seven test scores in geography class:

Range = 19, Mode = 83 and 84, Median = 84, Mean = 86.

He remembers his highest test score was a 97. What were his other test scores?

The data set has two modes: 83 and 84. There are five unknown values left in the data set so there must be two 83s, 78, 83, 83, 84, 84, \_\_\_, 97 and two 84s.

Place an 84 here since the median = 84.

The mean of the data set is 86.         Sum of Values = 86 · 7 = 602  
There are 7 numbers in the data set.

The last value can be found by subtracting all known values from 602.

## Example 2 Continued...

Tony was given the following statistics about his seven test scores in geography class:

Range = 19, Mode = 83 and 84, Median = 84, Mean = 86.

He remembers his highest test score was a 97. What were his other test scores?

The last value can be found by subtracting all known values from 602.

$$602 - 78 - 83 - 83 - 84 - 84 - 97 = 93$$

Tony's complete set of geography test scores is 78, 83, 83, 84, 84, 93 and 97.

## Day 1: 4.3 Practice Problems

1. Kylie works in a veterinarian's office. There were six cats in the clinic today. The heaviest cat weighed 19 pounds and she remembers the following statistics about the cats:

Mean = 12 Median = 13 Mode = 14 Range = 16

- What was the weight of the lightest cat in the clinic today? Explain how you know.
- What was the most common weight of the cats?
- What were the weights of the 3<sup>rd</sup> and 4<sup>th</sup> heaviest cats?
- What was the sum of the weights of the six cats?
- What were the weights of the six cats in Kylie's clinic today?

## Day 1: 4.3 Practice Problems

Use the partial data set and the statistic(s) provided to find the missing data piece(s).

2. 13, 11, 18, 8, 15, \_\_\_\_  
Median = 14  
Range = 13

3. 34, 29, 31, 32, \_\_\_\_  
Median = 31  
Range = 9

4. 53, 48, 39, 56, \_\_\_\_  
Mean = 48.8

5. 35, 19, 5, 30, 24, 30, 29, \_\_\_\_  
Median = 27

6. 16, 22, 20, \_\_\_\_, \_\_\_\_, \_\_\_\_  
Mean = 22 Median = 21  
Mode = 22 Range = 17

7. -8, 9, 23, 2, \_\_\_\_, \_\_\_\_, \_\_\_\_  
Mean = 3 Median = 2  
Mode = -8 Range = 35

## Day 1: 4.3 Practice Problems

8. The points scored by the high school football team in the last seven games have a mean of 20, a median of 21 and a mode of 27 points.

- Find a set of seven possible scores for the football team. Could there be more than one answer?
- The team scored all their points as combinations of touchdowns with extra point (7 points) and/or field goals (3 points). Using this information and the statistics above, find a set of seven possible scores for the football team. Can you find more than one answer?

End Day 1

Day 2:  
Lesson 4.4

## Effects of Changing Data

Understand how changes to data sets affect the mean, median and mode.

### Effects of Changing Data

If all numbers in a data set are increased or decreased by a constant amount, then all measures of center will increase or decrease by that same amount.

When both the high and low numbers are removed from a data set, the median does not change.

## Example 1

Use the data set 21, 26, 23, 42, 24, 23, 16. Describe the change to the mean and median when each number is increased by 5.

Find the current mean.  $\frac{21 + 26 + 23 + 42 + 24 + 23 + 16}{7} = \frac{175}{7} = 25$

Find the new mean.  $\frac{26 + 31 + 28 + 47 + 29 + 28 + 21}{7} = \frac{210}{7} = 30$

Find the current median. 16, 21, 23, 23, 24, 26, 42  
Median = 23

Find the new median. 21, 26, 28, 28, 29, 31, 47  
Median = 28

The mean and the median each increased by 5.

## Example 2

Use the data set 41, 50, 39, 39, 25, 46. Describe the change to the mean and median when the minimum and maximum numbers are removed from the data set.

Find the original mean.

$$\frac{41+50+39+39+25+46}{6} = \frac{240}{6} = 40$$

Find the new mean after removing the minimum and maximum.

$$\frac{41+39+39+46}{4} = \frac{165}{4} = 41.25$$

Find the original median.

25, 39, 39, 41, 46, 50  
Median = 40

Find the new median.

39, 39, 41, 46  
Median = 40

The median did not change. The mean increased by 1.25.

## Day 2: 4.4 Practice Problems

Find the mean and the median for each original data set. Then give the new mean and median after the indicated change is made.

1. Original: 21, 28, 33, 35, 43  
Change: Add 5 to each number

2. Original: 13, 15, 15, 16, 19, 24  
Change: Subtract 9 from each number

Mean = \_\_\_ Median = \_\_\_

Mean = \_\_\_ Median = \_\_\_

New Mean = \_\_\_ New Median = \_\_\_

New Mean = \_\_\_ New Median = \_\_\_

3. How did the changes in #1 and #2 above affect the mean and the median?

4. Original: 28, 35, 44, 48, 57, 58

5. Original: 88, 60, 55, 71, 72, 50, 52

Change: Remove the minimum and maximum

Change: Remove the minimum and maximum

Mean = \_\_\_ Median = \_\_\_

Mean = \_\_\_ Median = \_\_\_

New Mean = \_\_\_ New Median = \_\_\_

New Mean = \_\_\_ New Median = \_\_\_

6. Which measure of center (mean or median) was affected most by the changes in #4 and #5? How was the median affected by the changes?

## Day 2: 4.4 Practice Problems

7. Data set A has five values with a mean of 5. Data set B has ten values with a mean of 5. One more value is added to each data set to change the mean of each data set to 6.

- What value needs to be added to each data set?
  - Why does the value added to data set B have to be larger than the value added to data set A?
8. Consider the following data set: 9, 15, 22, 11, 2, 4
- Find the mean and median of the data set.
  - If the maximum value in the data set is doubled, what are the new mean and median?
  - Which value (mean or median) changed the most? Why?

End Day 2

### Day 3: Lesson 4.5

## Effects of Outliers on Data

Understand the effects of outliers on the mean and median of data sets.

### Vocabulary

#### Outlier

An extreme value that varies greatly from the other values in the data set.

## Effects of Outliers on Data

- When there is an outlier in a data set, the mean is typically affected the most.
- An outlier in a data set has more of an effect on the mean of a data set with only a few numbers than it does on a large data set.



### Good to Know!

One really large or really small number in a data set can greatly affect the statistics of the data set. For this reason, it is important to recognize outliers and take them into account when analyzing data.

## Example 1

Use the data set 20, 22, 25, 29, 30. An outlier, 54, is added to the data set. Describe the change to the mean and the median.

Find the original mean.

$$\frac{20+22+25+29+30}{5} = \frac{126}{5} = 25.2$$

Find the new mean after 54 is included in the data set.

$$\frac{20+22+25+29+30+54}{6} = \frac{180}{6} = 30$$

The mean increased by 4.8.

20, 22, 25, 29, 30  
Median = 25

Find the original median.

20, 22, 25, 29, 30, 54  
Median = 27

Find the new median.

