

# ALGEBRA 1: Week of May 26

- 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 2-8

Day 2: Slides 9-15

Day 3: Slides 16-23

Answers on Slide 24

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Day 1: Lesson 4.6

## Strengths and Limitations of Data

*Determine which measure of center best represents sets of data.*

### Example 1

**Which measure of center best represents each data set? Why?**

**a. the heights of eighth grade students**

The heights of students probably vary only slightly from person to person, with few outliers. The mean would likely represent the data set well.

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### Example 1 continued . . .

**Which measure of center best represents each data set? Why?**

**b. the shoe sizes of students in a class**

There are probably no outliers in this data set. Since shoe sizes come in half-size intervals, the mean may not represent the data well. The median or the mode would likely best represent this data.

**c. the number of people in each city in New York state**

Since there is one very large outlier (New York City with over 8 million people), that would greatly affect the mean. The median would be the best measure of center for this data set.

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### Example 2

Find the mean, median and mode of the data set. Determine which measure of center best represents each data set.

**a. 6, 9, 6, 7, 10, 3, 5, 10, 6, 9, 9, 8**

Mean:  $\frac{88}{12} = 7.\bar{3}$       Median: 7.5      Mode: 6, 9

This data has 2 modes. The mode is not the best measure of center to represent this data. The mean or the median represent the data well.

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### Example 2 Continued...

Find the mean, median and mode of the data set. Determine which measure of center best represents each data set.

**b. 7, 10, 7, 2, 9, 9, 10, 9, 7, 8, 8, 9**

Mean:  $\frac{95}{12} \approx 7.92$       Median: 8.5      Mode: 9

This data set has an outlier (2). Therefore, the mean is not the best measure of center. The median and the mode best represent the data.

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### Example 2 Continued...

Find the mean, median and mode of the data set. Determine which measure of center best represents each data set.

**c. 10, 10, 8, 10, 7, 10, 10, 9, 8, 10, 10, 10**

Mean:  $\frac{112}{12} = 9.\bar{3}$       Median: 10      Mode: 10

All three measures represents this data well. When there is a large number of values that are the same, the mode is a better choice. The mode of 10 may be the best representation of this data set.

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## Day 1: L4.6 Practice Problems:

1. Nick was looking for apartments in two different communities. The cost for various apartments in the two communities is shown below.  
 Community A: \$605, \$610, \$620, \$625, \$640, \$650  
 Community B: \$640, \$680, \$580, \$620, \$700, \$530
- Find the mean apartment price for each community. How do they compare?
  - Find the range of the apartment prices for each community.
  - Why is only comparing the means of the data sets misleading?

**Find the mean, median, and mode of each data set. State which measure of center best represents each data set. Explain your choice.**

2. 7, 7, 9, 13, 14, 15, 19      3. 85, 82, 85, 79, 43, 82
4. 18, 12, 18, 18, 18, 19, 18, 18      5. 48, 55, 47, 44, 49, 96, 46

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## Day 1: L4.6 Practice Problems:

**Which measure of center would best represent each data set? Explain your choice.**

- the height of the ten tallest mountains in Oregon
- the number of computers sold daily during one week at an electronics store
- the number of computers each student in your class has at home
- the number of daily visitors to the zoo during one week in July
- Mitch has the following scores on five tests this term:  
82, 82, 100, 85, 86
  - What are the measures of center for Mitch's scores?
  - What is misleading about his mean?
  - Which measure of center could be used to show that Mitch still has room for improvement? Explain.

**End Day 1**

### Day 2: Lesson 4.7

## Five-Number Summaries of Data

Target: Find the five-number summary of data sets. Find the interquartile range (IQR) of data sets.

### Vocabulary

**Five Number Summary:** Describes the spread of the numbers in a data set.

**1<sup>st</sup> Quartile:** Median of the lower half of the data.

**3<sup>rd</sup> Quartile:** Median of the upper half of the data.

**Interquartile Range (IQR):** The difference between the third quartile and first quartile in a set of data.

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## Five-Number Summary

- Minimum
- 1<sup>st</sup> Quartile (Q1)
- Median
- 3<sup>rd</sup> Quartile (Q3)
- Maximum

## Interquartile Range

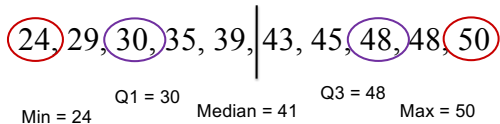
- The interquartile range (IQR) is the difference between the third quartile and the first quartile in a set of data.

$$\text{IQR} = \text{Q3} - \text{Q1}$$

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## Example 1

Find the five-number summary of the data set.

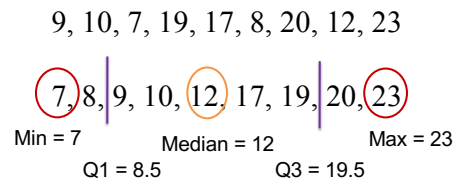


- Five-number summary: 24 ~ 30 ~ 41 ~ 48 ~ 50

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## Example 2

Find the five-number summary of the data set.



- Five-number summary: 7 ~ 8.5 ~ 12 ~ 19.5 ~ 23

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## Example 3

The following data lists the average points per game of members of Portland's Trail Blazers in 2006-2007.

2, 3.5, 3.8, 3.9, 4.8, 6.5, 7, 8.4, 8.9, 9, 12, 16.8, 23.6

Find the five-number summary for the data set.

- $2 \sim 3.85 \sim 7 \sim 10.5 \sim 23.6$

Find the range and the interquartile range of the averages.

- Range:  $23.6 - 2 = 21.6$
- IQR:  $10.5 - 3.85 = 6.65$

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## Day 2: L4.7 Practice Problems:

Find the five-number summary for each data set.

1. 21, 22, 25, 26, 30, 32, 35

2. -6, -2, 4, 5, 10, 13, 13, 15, 20

3. 65, 72, 78, 80, 84, 87, 91, 98

4. 20, 22, 30, 16, 18, 20, 16, 26, 27, 28

Given the five-number summaries, find the interquartile range (IQR) for each data set.

5.  $10 \sim 12 \sim 16 \sim 19 \sim 25$

6.  $66 \sim 79 \sim 89 \sim 92 \sim 100$

7.  $0 \sim 3 \sim 7 \sim 7 \sim 10$

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## Day 2: L4.7 Practice Problems:

Use the given information to complete the following ordered data sets.

8. 20, \_\_\_\_, 27, 30, 31, 31, \_\_\_\_  
Range = 14 IQR = 6

9. \_\_\_\_, 45, 47, 50, 51, \_\_\_\_, 56, 59  
Range = 18 IQR = 9

10. \_\_\_\_, 69, 75, 78, 80, \_\_\_\_, 91, \_\_\_\_, 99  
Range = 41 Q3 = 94 Mean = 81

11. \_\_\_\_, 73, \_\_\_\_, 74, \_\_\_\_, 81, \_\_\_\_, 96  
Five-Number Summary:  
 $71 \sim 73 \sim 77 \sim 83 \sim 96$

End Day 2

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## Day 3: Lesson 4.8

Use the IQR Method to find outliers in data sets.

## Finding Outliers

Good to Know!

## Vocabulary

**IQR Method**  
A method for determining outliers.

Since outliers can greatly affect the mean of a data set, it is helpful to be able to identify them. In Lesson 4.5, outliers were defined as values that vary greatly from most of the other values in a data set. This definition can cause disagreement about what qualifies as an outlier. Therefore, statisticians have numerous ways to determine whether a number is an outlier or not. The IQR Method is one of those methods.

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## IQR Method

1. Find the IQR of the data.
2. Multiply  $1.5 \cdot \text{IQR}$ .
3. Find the sum of  $Q3 + (1.5 \cdot \text{IQR})$ . This is the upper boundary. Any numbers above the upper boundary are outliers.
4. Find the difference of  $Q1 - (1.5 \cdot \text{IQR})$ . This is the lower boundary. Any numbers below the lower boundary are outliers.

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## Example 1

A class did a survey on how many different TV shows each student watched each week. The class put the results in order.

Number of TV Shows Watched Weekly:

1, 5, 5, 5, 5, 6, 7, 7, 7, 8, 9

Ian and Annika discussed whether there were any outliers.

Ian: "I think the number 1 is an outlier because it's quite a bit lower than the other numbers."

Annika: "I disagree. One is only four smaller than 5. The other numbers go all the way to 9. I don't think 1 is all that different from the others."

Both students make a good argument. Use the IQR method to settle Ian and Annika's dispute about whether or not any outliers exist in the "Number of TV Shows Watched" data set.

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## Example 1 Continued...

Use the IQR Method to settle Ian's and Annika's dispute about whether or not any outliers exist in the "Number of TV Shows Watched" data set.

Find the five number summary of the data set.

1, 5, 5, 5, 5, 6, 7, 7, 7, 8, 9  
 min Q1 median Q3 max

The five-number summary for the data set is

1 ~ 5 ~ 6 ~ 7 ~ 9.

Find the IQR of the data.  $IQR = Q3 - Q1 \rightarrow IQR = 7 - 5 = 2$

- Multiply 1.5 by the IQR.

$$1.5(2) = 3$$

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## Example 1 Continued...

1, 5, 5, 5, 5, 6, 7, 7, 7, 8, 9

- Find  $Q3 + (1.5 \cdot IQR)$ .  $7 + 3 = 10$
- There are no numbers greater than the upper boundary, 10, in the data set.
- Find  $Q1 - (1.5 \cdot IQR)$ .  $5 - 3 = 2$

Since 1 is below the lower boundary, 2, it is an outlier. Ian was correct.

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## Example 2

A data set has a Q1 value of 12 and a Q3 value of 19.  
 What are the upper and lower boundaries for outliers?

- Find the interquartile range (IQR) by subtracting Q1 from Q3.

$$IQR = Q3 - Q1 = 19 - 12 = 7$$

- Multiply 1.5 by the IQR.

$$1.5(7) = 10.5$$

- Find the upper boundary.

$$Q3 + 10.5 = 19 + 10.5 = 29.5$$

- Find the lower boundary.

$$Q1 - 10.5 = 12 - 10.5 = 1.5$$

- Any number in the data set higher than 29.5 or lower than 1.5 is considered an outlier.

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## Day 3: L4.8 Practice Problems:

Use the given Q1 and Q3 values to determine the upper and lower boundaries for outliers.

1. Q1 = 20 and Q3 = 28      2. Q1 = 44 and Q3 = 60
3. Q1 = 32 and Q3 = 38      4. Q1 = 12.8 and Q3 = 15.2
5. A data set has Q1 = 64 and Q3 = 74.
  - a. What are the upper and lower boundaries for outliers?
  - b. Would a value of 46 be considered an outlier? Explain.
  - c. Would a value of 88 be considered an outlier? Explain.

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## Day 3: L4.8 Practice Problems:

Use the IQR Method to determine if the following sets of data have any outliers. If so, state the outliers. If there are none, state "no outliers".

6. 10, 17, 19, 21, 21, 22, 25      7. 65, 74, 78, 84, 85, 100
8. 66, 78, 82, 83, 83, 85, 85, 91, 98      9. 17, 24, 26, 26, 26, 27, 31, 36
10. 77, 82, 80, 96, 83, 85, 70
11. 10.6, 12.4, 5, 9.8, 14, 10.4, 4.2, 11, 9.2, 15

12. Greg is wondering if his cat, Peaches, is overweight. He asked his veterinarian for information about the typical weight of cats. His veterinarian told him that the lower quartile (Q1) for a cat's weights is 14 pounds. The upper quartile (Q3) is 17 pounds. Peaches weighs 21 pounds. Is Peaches' weight an outlier?

End Day 3

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## Answer Page

Day 3:  
 1. 40 & 8      2. 84 & 20  
 3. 47 & 23      4. 18.8 & 9.2  
 5. a. 89 & 49  
 b. Yes, 46 is below lower boundary  
 c. No, 88 is below upper boundary  
 6. No outliers      7. No outliers  
 8. 66 is an outlier  
 9. 17 and 36 are outliers  
 10. No outliers      11. 4.2 is an outlier  
 12. No, Peaches is not an outlier

Day 2:  
 1. 21 ~ 22 ~ 22 ~ 26 ~ 32 ~ 35  
 2. ~6 ~ 10 ~ 10 ~ 14 ~ 20  
 3. 65 ~ 75 ~ 82 ~ 89 ~ 98  
 4. 16 ~ 18 ~ 21 ~ 27 ~ 30  
 5. 7      6. 13  
 7. 4      8. 25, 34  
 9. 41, 54, 10, 58, 82, 97  
 11. 71, 73, 80, 85

Day 1:  
 1. a. Comm A = \$625; Comm B = \$625 The means are the same b. Comm A = \$45; Comm B = \$170 c. The means might be the same; ranges could be very different.  
 2. Mean = 12; Median = 13; Mode = 7 No outliers so the mean may be best.  
 3. Mean = 76; Median = 82; Mode = 82, 85 One outlier, two modes; median would be best.  
 4. Mean = 17.375; Median = Mode = 18 Since 18 shows up a lot, median or mode would be best.  
 5. Mean = 55; Median = 48; Mode = None One outlier, no mode; median would be best.  
 6. Likely no outliers, so mean might be best.  
 7. Depending on whether there are outliers, the mean or median.  
 8. Mode or median. There may be an outlier.  
 9. Saturdays might be especially busy (an outlier) so the median might be the best.  
 10. a. Mean = 87; Median = 85; Mode = 82 b. Only one score (100, an outlier) above the mean. c. Mode. The score he had the most was his lowest score.

ALGEBRA: FINAL SLIDE for this week!

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