IM 9–12 MATH v.1

Unit 1
Sequences and Functions

ALGEBRA 1

Lesson 10

The Effect of Extremes

Illustrative Mathematics®

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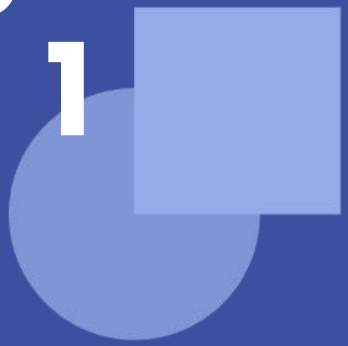
Learning Goal

Let's see how statistics change with the data.

Algebra 1



Battle Royale

Warm-up

Several video games are based on a genre called "Battle Royale" in which 100 players are on an island and they fight until only 1 player remains and is crowned the winner. This type of game can often be played in solo mode as individuals or in team mode in groups of 2.

1. What information would you use to determine the top players in each mode (solo and team)? Explain your reasoning.
2. One person claims that the best solo players play game A. Another person claims that game B has better solo players. How could you display data to help inform their discussion? Explain your reasoning.

Separated by Skew

1. Use technology to create a dot plot that represents the distribution of the data, then describe the shape of the distribution.

6	7	8	8	9	9	9	10
10	10	10	11	11	11	12	12
13	14						

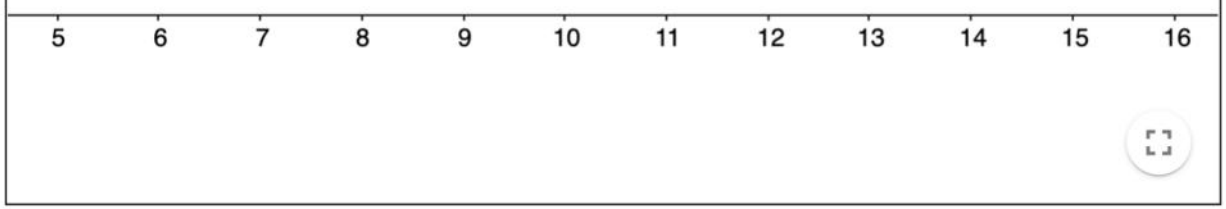
1. Find the mean and median of the data.
2. Find the mean and median of the data with 2 additional values included as described.
   a. Add 2 values to the original data set that are greater than 14.
   b. Add 2 values to the original data set that are less than 6.
   c. Add 1 value that is greater than 14 and 1 value that is less than 6 to the original data set.
   d. Add the two values, 50 and 100, to the original data set.

Separated by Skew

4. Share your work with your group. What do you notice is happening with the mean and median based on the additional values?
5. Change the values so that the distribution fits the description given to you by your teacher, then find the mean and median.
6. Find another group that created a distribution with a different description. Explain your work and listen to their explanation, then compare your measures of center.

data: {6, 7, 8, 8, 9, 9, 9, 10, 10, 10, 10, 11, 11, 11, 12, 12, 13, 14}

- [ ] dotplot
- [ ] plot mean
- [ ] plot median
- [ ] show statistics



Plots Matching Measures

Create a possible dot plot with at least 10 values for each of the conditions listed. Each dot plot must have at least 3 values that are different.

1. a distribution that has both mean and median of 10
2. a distribution that has both mean and median of -15
3. a distribution that has a median of 2.5 and a mean greater than the median
4. a distribution that has a median of 5 and a median greater than the mean

Plots Matching Measures

- For the first and second dot plot, what do the distribution shapes have in common? Why do we choose the mean as the more appropriate measure of center?
- What do the shapes of the dot plots have in common when the mean is greater than the mean?
- What information does the shape of the skewed distributions tell you about the median and mean?

The Effect of Extremes

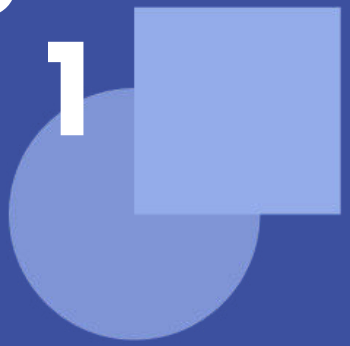
Lesson Synthesis

- Why is the median preferred to the mean for skewed data?
- When an extreme value is present, why is the median preferred to the mean?
- When data is symmetric or approximately symmetric, why is the mean preferred to the median?

- I can describe how an extreme value will affect the mean and median.
- I can use the shape of a distribution to compare the mean and median.

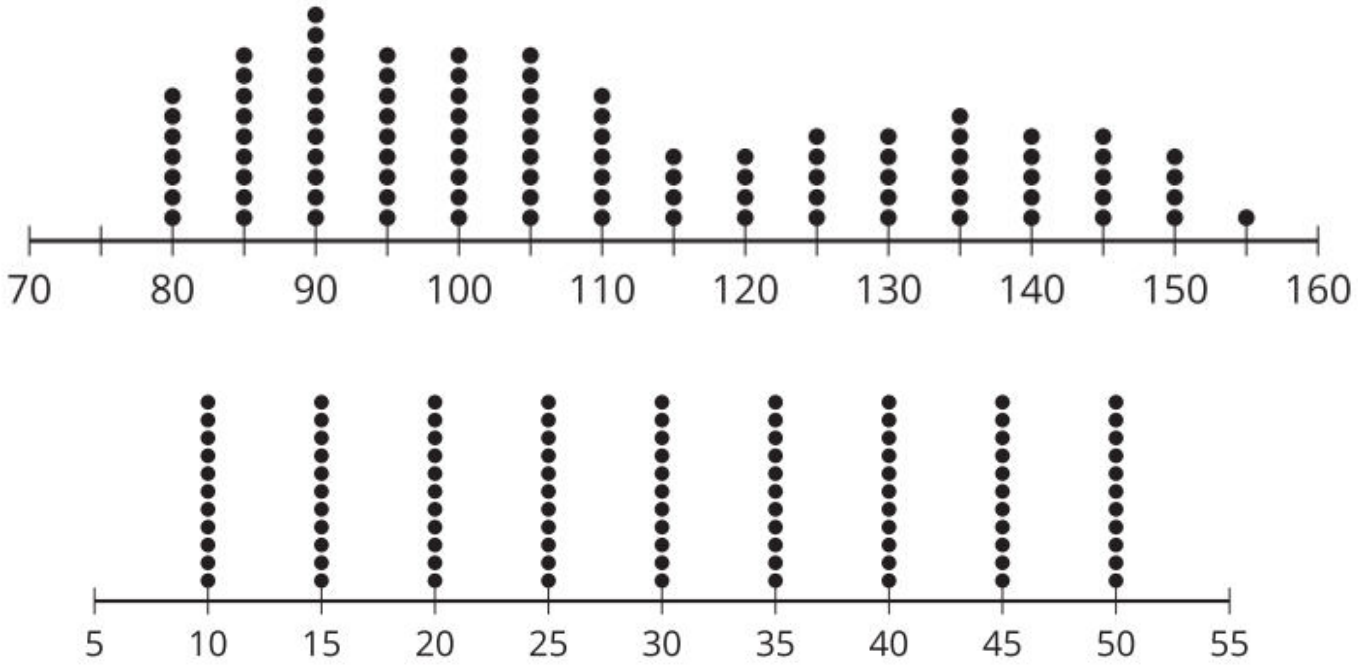
Learning Targets

Algebra 1



Cool-down

1. Is the mean greater than, less than, or equal to the median? Explain your reasoning.
2. Is the mean greater than, less than, or equal to the median? Explain your reasoning.



statistic

A quantity that is calculated from sample data, such as mean, median, or MAD (mean absolute deviation).