IM 9–12 MATH v.1

Unit 1
Sequences and Functions

ALGEBRA 1

Lesson 5

Calculating Measures of Center and Variability

Illustrative Mathematics®

Kendall Hunt

Learning Goal

Let's calculate measures of center and measures of variability and know which are most appropriate for the data.

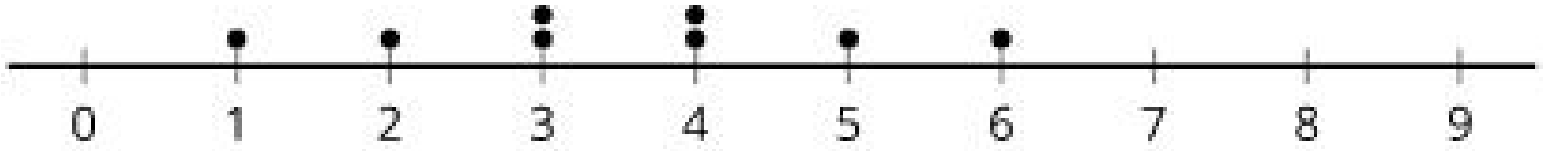
Algebra 1

Calculating Centers

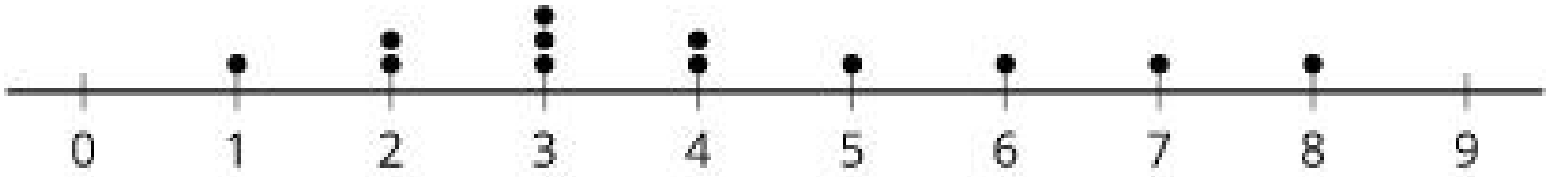
Warm-up

Decide if each situation is true or false. Explain your reasoning.

1. The mean can be found by adding all the numbers in a data set and dividing by the number of numbers in the data set.
2. The mean of the data in the dot plot is 4.



1. The median of the data set is 9 for the data: 4, 5, 9, 1, 10.
2. The median of the data in the dot plot is 3.5.



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Calculating Centers

Warm-up

- What does the mean tell you about the data?
- What does the median tell you about the data?

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Heartbeats: Part 1

The heart rates of eight high school students are listed in beats per minute:

72 75 81 76 76 77 79 78

1. What is the interquartile range?
2. How many values in the data set are:
   a. less than Q1?
   b. between Q1 and the median?
   c. between the median and Q3?
   d. greater than Q3?

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Heartbeats: Part 1

3. A pod of dolphins contains 800 dolphins of various ages and lengths. The median length of dolphins in this pod is 5.8 feet. What information does this tell you about the length of dolphins in this pod?
4. The same vocabulary test with 50 questions is given to 600 students from fifth to tenth grades and the number of correct responses is collected for each student in this group. The interquartile range is 40 correct responses. What information does this tell you about the number of correct responses for students taking this test?

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Heartbeats: Part 1

- What would a box plot look like for the results of the vocabulary test?
- What does the IQR tell you about a data set?
- How do the median and quartiles divide the data?
- How much of the data is between Q1 and Q3?

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Heartbeats: Part 2

data values	mean	deviation from mean (data value – mean)	absolute deviation |deviation|
1	5	-4	4
2	5	-3	3
3	5	-2	2
4	5	-1	1
5	5	0	0
6	5	1	1
7	5	2	2
12	5	7	7

This results in a MAD of 2.5 since $\frac{4+3+2+1+0+1+2+7}{8} = 2.5$

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Heartbeats: Part 2

1. Calculate the MAD using the same data from the previous activity by finding the average distance from each data value to the mean. You may find it helpful to organize your work by completing the table provided.

data values	mean	deviation from mean (data value - mean)	absolute deviation |deviation|
72			
75			
81			
76			
76			
77			
79			
78			

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Heartbeats: Part 2

MAD:

2. For another data set, all of the values are either 3 beats per minute above the mean or 3 beats per minute below the mean. Is that enough information to find the MAD for this data set? If so, find the MAD. If not, what other information is needed? Explain your reasoning.
3. Several pennies are placed along a meter stick and the position in centimeters of each penny is recorded. The mean position is the 50 centimeter mark and the MAD is 10 centimeters. What information does this tell you about the position of the pennies along the meter stick?

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Heartbeats: Part 2

- If you put pennies at 45, 35, and 70, where do you need to put a penny for the meter stick to balance at 50 cm? What is the MAD?

- If you put two pennies at 60, where do you need to put a penny to make the meter stick balance at 50 cm? What is the MAD?

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Calculating Measures of Center and Variability

Lesson Synthesis

- How do you calculate the IQR?
- How do you calculate the MAD?
- One data set has a greater IQR than another. What does this mean about the data in the first data set?

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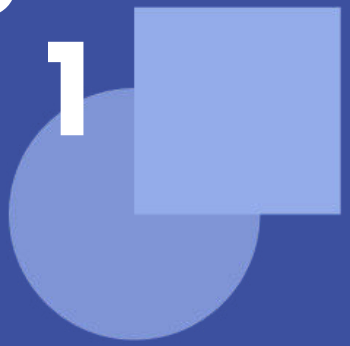
I can calculate mean absolute deviation, interquartile range, mean, and median for a set of data.

Learning Targets

Algebra 1



Calculating MAD and IQR

- 5
- 18
- 6
- 18
- 13

mean: 12

1. Find the mean absolute deviation for the data.
2. Find the interquartile range for the data.

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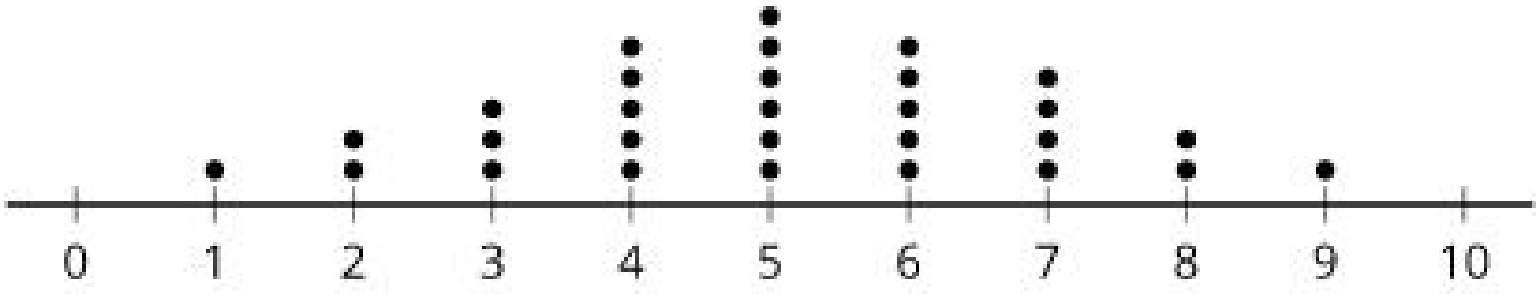
bell-shaped distribution

A distribution whose dot plot or histogram takes the form of a bell with most of the data clustered near the center and fewer points farther from the center.



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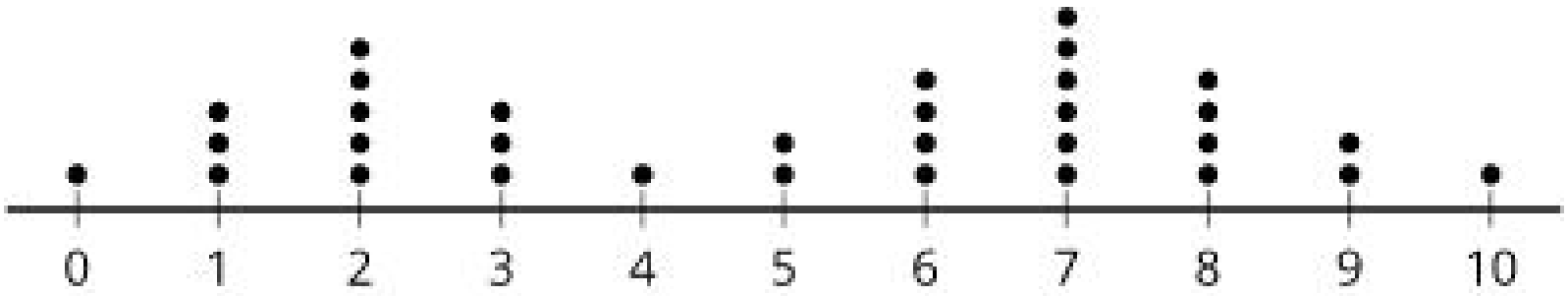
bimodal distribution

A distribution with two very common data values seen in a dot plot or histogram as distinct peaks. In the dot plot shown, the two common data values are 2 and 7,



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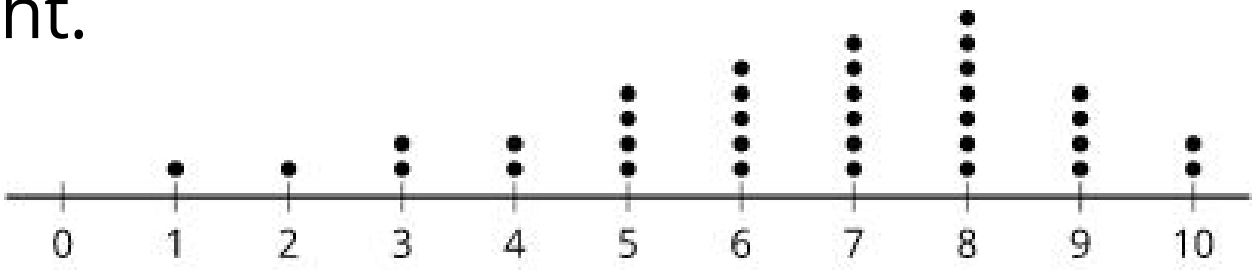
skewed distribution

A distribution where one side of the distribution has more values farther from the bulk of the data than the other side, so that the mean is not equal to the median. In the dot plot shown, the data values on the left, such as 1, 2, and 3, are further from the bulk of the data than the data values on the right.



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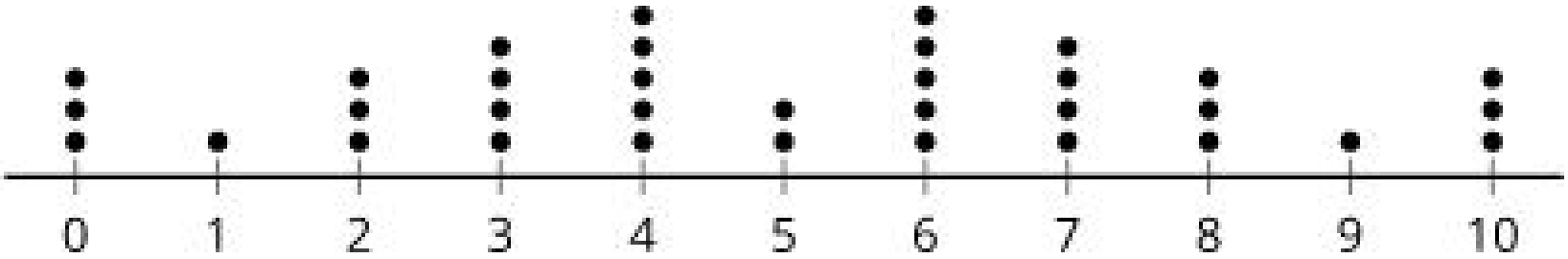
symmetric distribution

A distribution with a vertical line of symmetry in the center of the graphical representation, so that the mean is equal to the median. In the dot plot shown, the distribution is symmetric about the data value 5.



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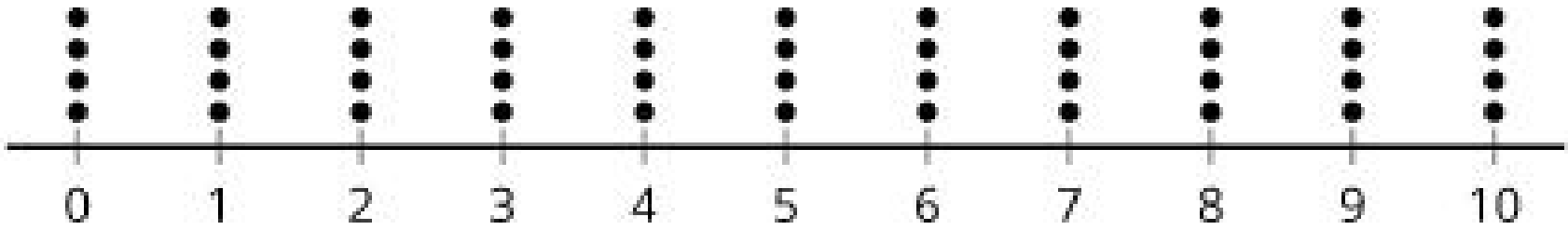
uniform distribution

A distribution which has the data values evenly distributed throughout the range of the data.



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