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Unit 6.8, Family Resource

Unit 8 Summary

Prior Learning	Math 6, Unit 8	Future Learning
Grades 3–5 • Fractions and decimals on a number line • Visualizing data using line plots • Calculating distances on a number line Math 6, Unit 3 • Calculating percentages	• Visualizing data • Measuring data: mean and MAD • Measuring data: median and IQR	Math 7, Unit 8 • Probability and sampling data Math 8, Unit 6 • Associations in bivariate data High School • Standard deviation and outliers

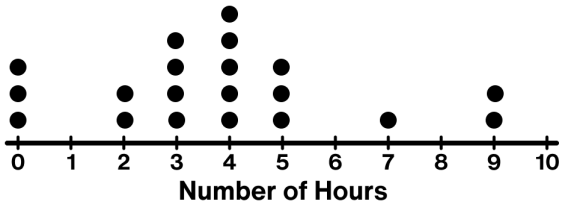
Visualizing Data

Asking questions and collecting data can help us make claims about a group.

Visualizing the data we collected can help us interpret the responses.

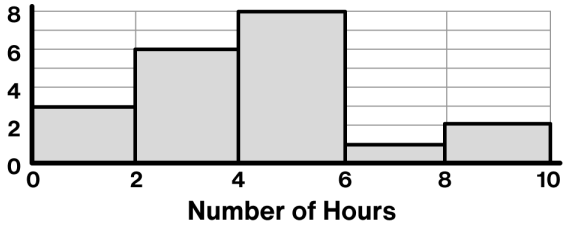
This *dot plot* and *histogram* show the number of hours a day that 20 adults spend on their phone.

Dot Plot



In a dot plot, each data point is represented by a dot above the number line.

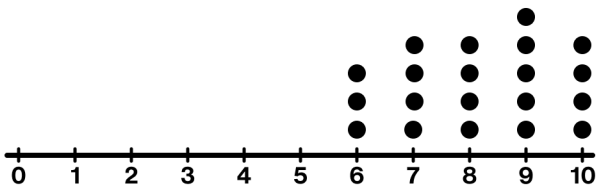
Histogram

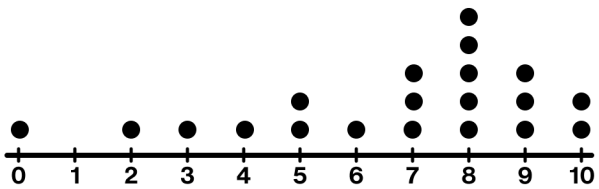


In a histogram, the data is grouped into bins. The height of each rectangle shows how many data points are in that bin.[1]

Visualizing the data can also help us describe its *shape, center,* and *spread*.

For example, the *centers* of these data sets are around 8 and the *spreads* are different.





[1]In this unit, data on the edges, such as 2, are sorted into the bin immediately to the right of it.

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This data set has a smaller spread.

This data set has a larger spread.

Mean and MAD

One way to measure the center of a data set is the *mean*, or the average.

The mean can be thought of as the equal share.

For example, the mean is the number of stickers five friends would get if they shared them equally.

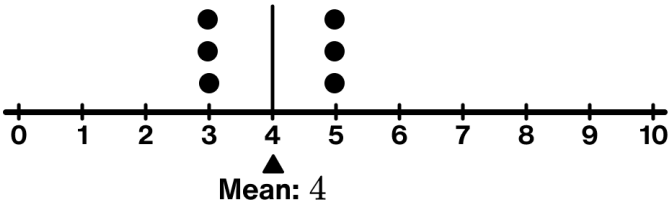
To calculate the mean, add the data and divide the total by the number of data points.

The mean of $7, 8, 10, 7,$ and 8 is:

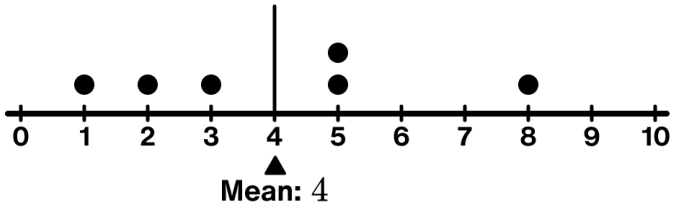
$$\frac{7+8+10+7+8}{5} = \frac{40}{5} \text{ or } 8$$

One way to measure the spread of a data set is the *mean absolute deviation (MAD)*.

The MAD is how far away the data is from the mean on average. The higher the MAD, the more spread out the data.



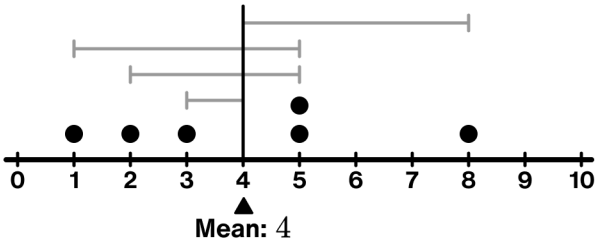
The MAD of this data set is 1.



The MAD of this data set is 2.

To calculate the MAD, first measure the distances between each data point and the mean (these are called *absolute deviations*). Then, calculate the mean of the absolute deviations.

This table shows the distances from each point to the mean.



Data Point	1	2	3	5	5	8
Absolute Deviation (distance from 4)	3	2	1	1	1	4

The MAD of this data is $\frac{3+2+1+1+1+4}{6} = \frac{12}{6}$ or 2.

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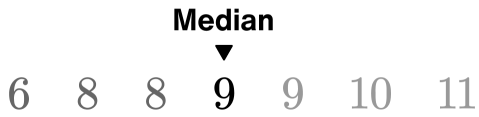
Median and IQR

The center of a data set can also be measured by the *median*.

The median is the middle value of a data set when the values are listed in order.

A student kept track of the number of hours they slept each night for a week. The median of this data is 9 hours because it is in the middle of the list.



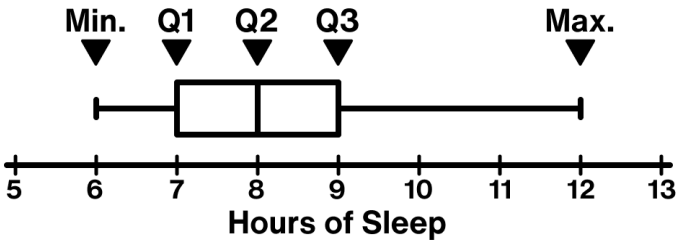
Quartiles (Q1, Q2, Q3) divide a data set into four sections.

- Quartile 1 is the median of the lower half of the data.
- Quartile 2 is the median of the entire data.
- Quartile 3 is the median of the upper half of the data.

This data set shows the number of hours 15 students slept on a school night. The first, second, and third quartiles are labeled.

The quartiles, along with the minimum and maximum values, can be used to create a *box plot*.

This box plot visualizes the number of hours each student slept on a school night.



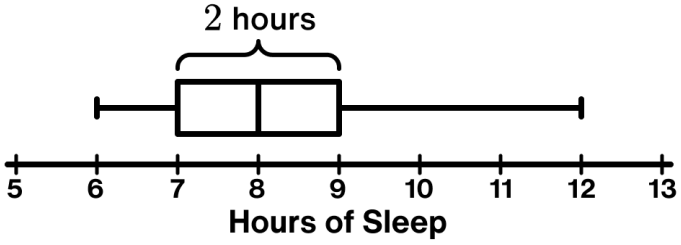
The spread of a data set can also be measured by the *interquartile range (IQR)*.

The IQR is the difference between Q1 and Q3.

It is where the middle half of the data lies.

The IQR of this data is 2 because $9 - 7 = 2$.

The middle half of the data lies within 2 hours.



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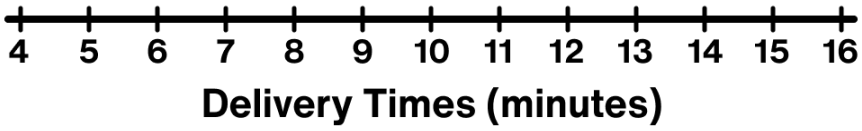
Try This at Home

Visualizing Data

The owner of a pizza shop wanted to know more about how long it took to deliver their pizzas. One day, they recorded the time, in minutes, of 10 pizza deliveries. They organized their data into a table.

5	7	10	16	9	12	9	10	11	9

1.1 Create a dot plot of the delivery times.



1.2 Which statement best describes the data set?

A. The center is around 3 and the spread is small.

B. The center is around 3 and the spread is large.

C. The center is around 9 and the spread is small.

D. The center is around 9 and the spread is large.

This histogram shows the delivery times for a restaurant in a day.

2.1 Dylan says that there were 5 deliveries that day.

Do you agree with Dylan?

2.2 How many deliveries were made in less than 10 minutes?

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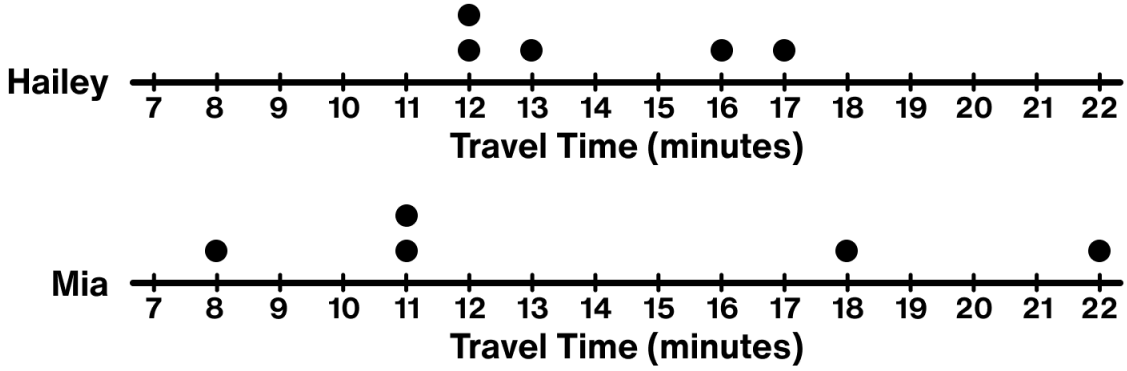
Hailey and Mia are curious about how long it takes them to travel to school. For one week, they decide to record their travel times. The dot plots show their data from the week.



Mean and MAD

3.1 What is the mean of Hailey's travel times?

3.2 What is the mean of Mia's travel times?

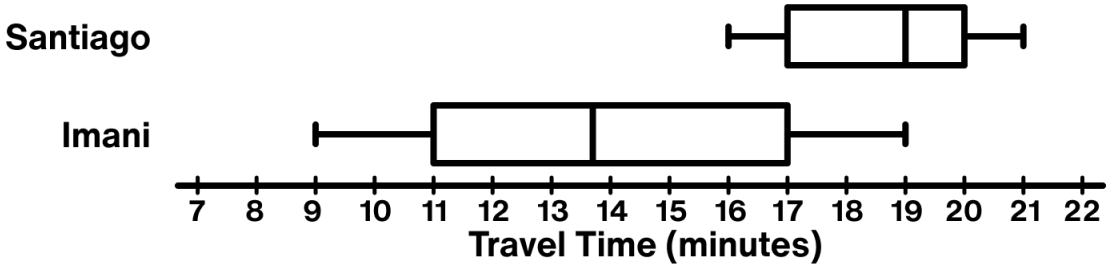
3.3 Without calculating, whose data set has a higher MAD? Explain your thinking.

Median and IQR

4.1 What is the median of Hailey's travel times?

4.2 What is the median of Mia's travel times?

Two new students recorded their travel times and visualized their data as box plots.



5.1 Label the first, second, and third quartiles of Santiago's box plot with Q1, Q2, and Q3.

5.2 What is the IQR of Santiago's data?

5.3 Who had a more consistent travel time to school? How do you know?

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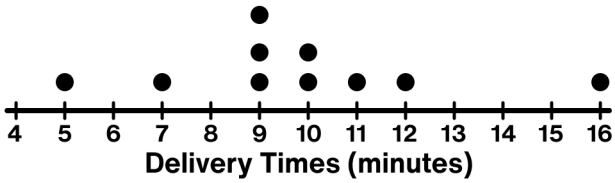
Solutions:

1.1



1.2 **D**

2.1 Disagree. *Explanations vary*. Dylan probably counted the number of bins. There were $2 + 6 + 8 + 5 + 1$ or 22 deliveries that day.

2.2 8 deliveries

3.1 14 minutes

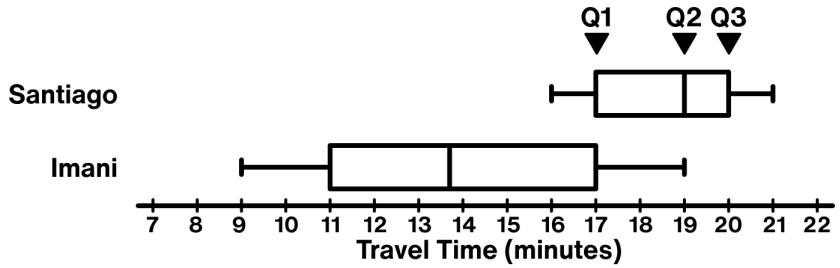
3.2 14 minutes

3.3 Mia. *Explanations vary*. Mia's data is more spread out.

4.1 13 minutes

4.2 11 minutes

5.1



5.2 3 minutes

5.3 Santiago. *Explanations vary*. Santiago's IQR is smaller than Imani's, which means that Santiago's data is closer together.