Chapter 9   May 15 & 16, 2014

LessonTarget

Students will be able to:
- Idenfy and ulize the key terms pertaining to stascal measures

Self-EvaluationRubric

Score	Description
4	I can teach other students how to idenfy and ulize the key terms pertaining to stascal measures
3	I can idenfy and ulize the key terms pertaining to stascal measures
2	I recognize how to idenfy and ulize the key terms pertaining to stascal measures
1	I do not know how to idenfy and ulize the key terms pertaining to stascal measures

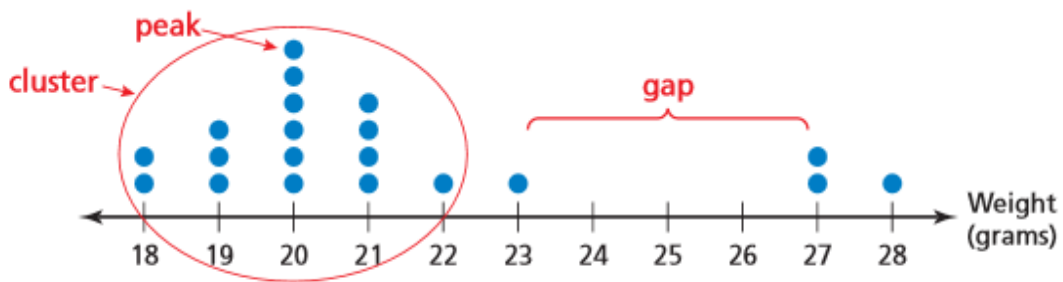**Lesson Target:** To be able to idenfy and ulize the key terms pertaining to stascal measures

9.1

StatisticalData

Statistics is the science of collecting, organizing, analyzing, and interpreting data. A **statistical question** is one for which you do not expect to get a single answer. Instead, you expect a variety of answers, and you are interested in the distribution and tendency of those answers.

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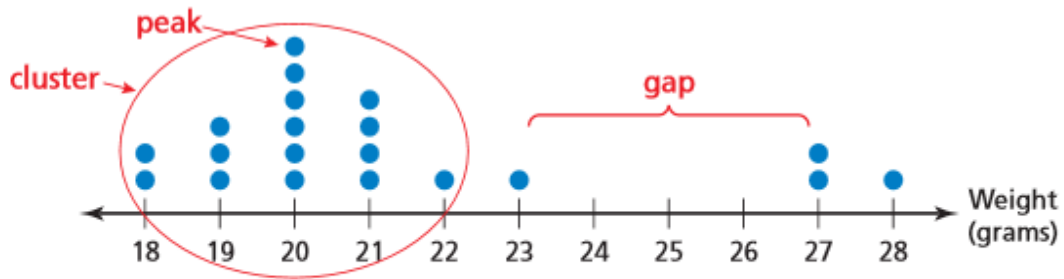
9.1

Cluster

Most of the data are clustered around 20. There is a peak at 20 and a gap between 23 and 27.

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9.1

Peak
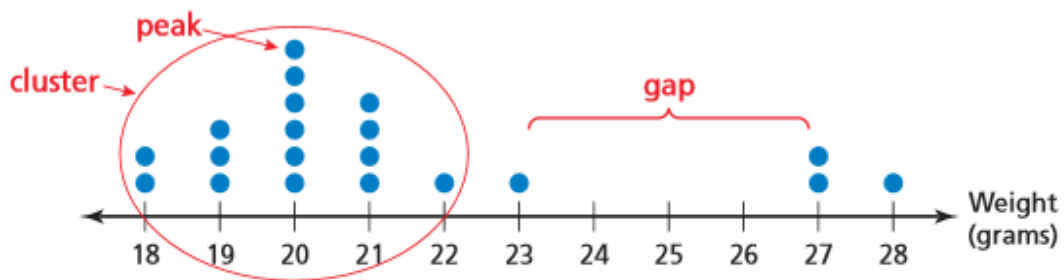

Most of the data are clustered around 20. There is a peak at 20 and a gap between 23 and 27.

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9.1

Gap

Most of the data are clustered around 20. There is a peak at 20 and a gap between 23 and 27.

9.2

Mean

Mean

Words   The <mark>mean</mark> of a data set is the sum of the data divided by the number of data values.

Numbers   **Data:** $8, 5, 6, 9$ **Mean:** $\dfrac{8 + 5 + 6 + 9}{4} = \dfrac{28}{4} = 7$

4 data values

9.3

Median

Median

Words   Order the data. For a set with an odd number of values, the
median is the middle value. For a set with an even number of
values, the **median** is the mean of the two middle values.

Numbers   **Data:** 5, 8, 9, 12, 14   The median is 9.

Data: 2, 3, 5, 7, 10, 11

The median is $\dfrac{5+7}{2}$, or 6.

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9.3

MeasureofCenter = mean median mode

A **measure of center** is a measure that describes the typical value of a data set. The mean is one type of measure of center. Here are two others.

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9.3

Mode

Mode

Words The **mode** of a data set is the value or values that occur most often. Data can have one mode, more than one mode, or no mode. When all values occur only once, there is no mode.

Numbers Data: 11, 13, 15, 15, 18, 21, 24, 24
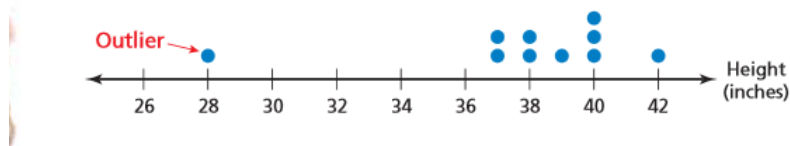
The modes are 15 and 24.

9.2-9.3

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Outlier

An **outlier** is a data value that is much greater or much less than the other values. When included in a data set, it can affect the mean.

a. Display the data in a dot plot.

The height of 28 inches is much less than the other heights. So, it is an outlier.

b. Mean with outlier:

$$\frac{40 + 37 + 39 + 40 + 42 + 38 + 38 + 37 + 28 + 40}{10} = \frac{379}{10}, \text{ or } 37.9$$

Mean without outlier:

$$\frac{40 + 37 + 39 + 40 + 42 + 38 + 38 + 37 + 40}{9} = \frac{351}{9}, \text{ or } 39$$

9.4

Range

A **measure of variation** is a measure that describes the distribution of a data set. A simple measure of variation to find is the *range*. The **range** of a data set is the difference between the greatest value and the least value.
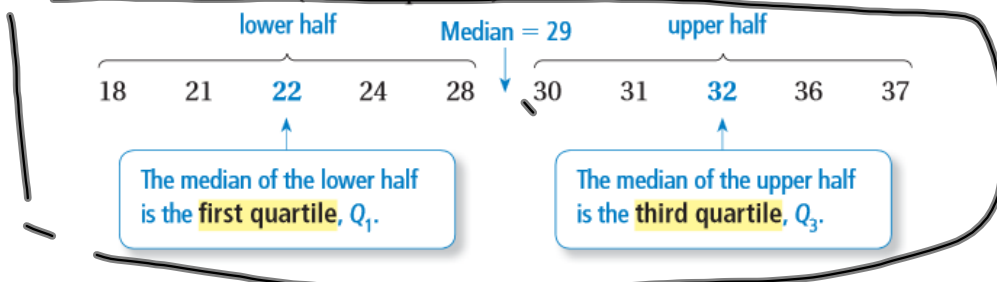
$$Q_3 - Q_1 = IQR$$
$$32 - 22 = IQR$$
$$10 = IQR$$

9.4

InterquartileRange

Quartiles

The **quartiles** of a data set divide the data into four equal parts. Recall that the median (second quartile) divides the data set into two halves.

	lower half				Median = 29		upper half		
18	21	**22**	24	28	30	31	**32**	36	37

The median of the lower half is the **first quartile**, Q_1.

The median of the upper half is the **third quartile**, Q_3.

Interquartile Range (IQR)

The difference between the third quartile and the first quartile is called the **interquartile range**. The IQR represents the range of the middle half of the data and is another measure of variation.

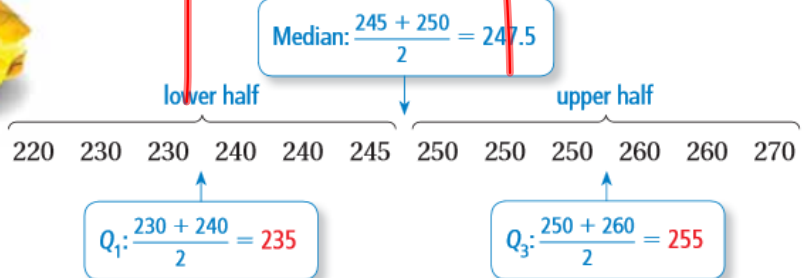| 18	21	**22**	24	28	30	31	**32**	36	37
		IQR =	Q_3	–	Q_1				
		=	32	–	22				
		=	10						

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9.4   InterquartileRange

EXAMPLE 2 — Finding the Interquartile Range

The dot plot shows the top speeds of 12 sports cars. Find and interpret the interquartile range of the data.

Speed (miles per hour)

220 225 230 235 240 245 250 255 260 265 270
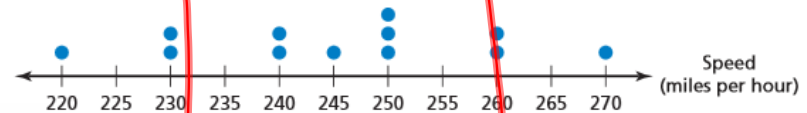
Order the speeds from slowest to fastest. Find the quartiles.

Median: $\dfrac{245 + 250}{2} = 247.5$

lower half   upper half

220   230   230   240   240   245   250   250   250   260   260   270

$Q_1: \dfrac{230 + 240}{2} = 235$ $Q_3: \dfrac{250 + 260}{2} = 255$

∴ So, the interquartile range is $255 - 235 = 20$. This means that the middle half of the speeds vary by no more than 20 miles per hour.

9.5

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MeanAbsoluteDeviation

Another measure of variation is the *mean absolute deviation*. The **mean absolute deviation** is an average of how much data values differ from the mean.

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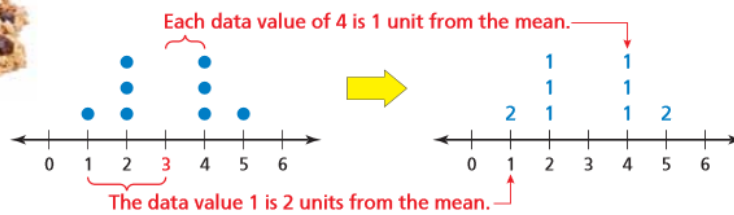
9.5

MeanAbsoluteDeviation

You record the numbers of raisins in 8 scoops of cereal. Find and interpret the mean absolute deviation of the data.

$$1, 2, 2, 2, 4, 4, 4, 5$$

Step 1: $\text{Mean} = \dfrac{1 + 2 + 2 + 2 + 4 + 4 + 4 + 5}{8} = \dfrac{24}{8} = 3$

Step 2:   You can use a dot plot to organize the data. Replace each dot with its distance from the mean.

Each data value of 4 is 1 unit from the mean.

The data value 1 is 2 units from the mean.

Step 3:   The sum of the distances is $2 + 1 + 1 + 1 + 1 + 1 + 1 + 2 = 10$.

Step 4:   The mean absolute deviation is $\dfrac{10}{8} = 1.25$.

So, the data values differ from the mean by an average of 1.25 raisins.