

Section 9.1: Introduction to Statistics TEACHER NOTES



Objective: Students will be able to recognize statistical questions and use dot plots to display numerical data.

Vocabulary:

Statistics: The science of collecting, organizing, analyzing, and interpreting data.

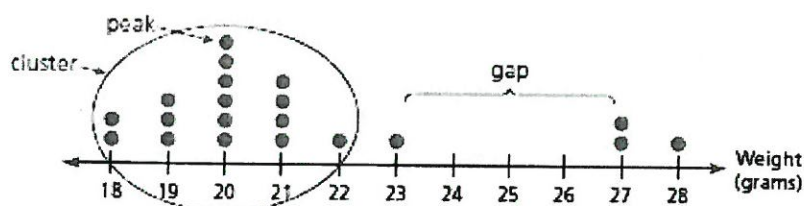
Statistical question: A question in which you do not expect to get a single answer. You should expect to receive a variety of answers and are interested in the distribution and tendency of those answers.

Example 1: You conduct a science experiment on mice. Your teacher asks you, "What is weight of a mouse?"

a.) Is this a statistical question? Explain.

Yes, because you will expect that the weight of the mice will vary.

b.) You weigh some mice and record the weights in the table. Display the data in a dot plot. Identify any clusters, peaks or gaps in the data.



Weights (grams)			
20	19	21	20
18	20	27	21
28	23	20	19
20	21	18	27
19	22	21	20

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

c.) Use the distribution of the data to answer the question: what do most mice weigh?

20 grams

Example 2: Determine whether the question asked is a statistical question. Explain.

a.) What is the eye color of the sixth grade students?

Statistical - there are many different answers.

b.) At what temperature does water freeze?

Not statistical - there is only one correct answer.

c.) How many letters are in the English alphabet?

Not statistical - there is only one correct answer.

d.) How many hours do sixth grade students use the Internet each week?

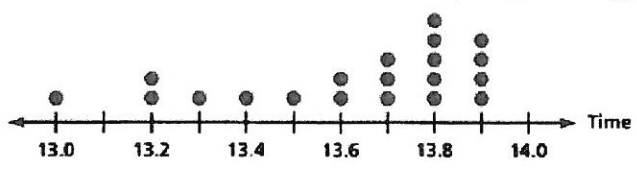
Statistical - there are many different answers.

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Example 3:

The dot plot shows the times of sixth grade students in a 100-meter race.

a.) How many students ran in the race?
20 students



b.) How could someone have collected this data?
You could time the students using a stopwatch

c.) What are the units?
It would be measured in seconds

d.) Write a statistical question that you can answer using the dot plot.

Example: How long does it take a sixth grade student to run 100 meters?

Section 9.2: Mean Teacher Notes



Objective: Students will be able to find the mean of a data set and compare and interpret the means.

Vocabulary:

mean - the sum of all data values divided by the number of data values (AVERAGE)

outlier - number that is much greater or much less than the other items in the data set

Example 1: The table shows the number of text messages sent by a group of friends over a week. What is the mean number of messages sent?

$$\frac{120+95+101+125+82+108+90}{7} = \frac{721}{7} = 103$$

Text Messages Sent

Mark: 120
 Laura: 95
 Stacy: 101
 Josh: 125
 Kevin: 82
 Maria: 108
 Manny: 90

Example 2: The table shows the heights of several Shetland ponies. Display the data in a dot plot.



40	37	39	40	42
38	38	37	28	40

a.) Identify the outlier.
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b.) Find the mean with the outlier.

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

c.) Find the mean without the outlier.

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

d.) Describe how the outlier affects the mean.

With the outlier, the mean is less than most of the actual heights of the ponies. The mean without the outlier is a better interpretation of the data.

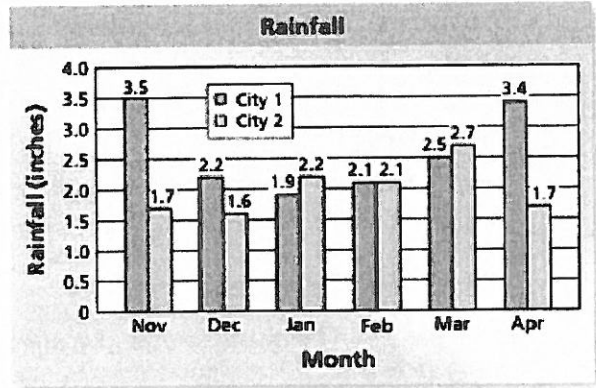
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Example 3: The double bar graph shows the monthly rainfall amounts for two cities over a six-month period. Compare the mean monthly rainfalls.

$$\text{City 1: } \frac{3.5+2.2+1.9+2.1+2.5+3.4}{6} = \frac{15.6}{6} = 2.6$$

$$\text{City 2: } \frac{1.7+1.6+2.2+2.1+2.7+1.7}{6} = \frac{12}{6} = 2$$

City 1 has more rain on average because 2.6 is larger than 2.





Section 9.3: Measures of Center Teacher Notes

Objective: Students will be able to understand the concept of measures of center and find the median and mode of data sets.

Vocabulary:

mean - the sum of all data values divided by the number of data values (AVERAGE)

median - middle number of data values when they are in order from least to greatest

mode - the data value that occurs most often

outlier - number that is much higher or lower than the other items in the data set

Example #1A

Find the mean, median, and mode of the sneaker prices.

$$\text{Mean: } \frac{20+20+31+37+45+48+65+122}{8} = \frac{388}{8} = 48.5$$

Median: 20, 20, 31, 37, 45, 48, 65, 122

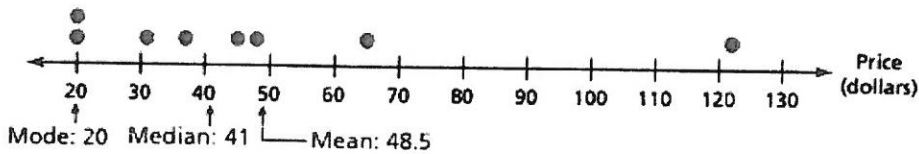
$$\frac{37+45}{2} = \frac{82}{2} = 41$$

Mode: 20



Example #1B

Which measure best represents the data? Use the dot plot of the data to help you answer.



The median best represents the data. The mode is less than most of the data and the mean is greater than most of the data.

Example #1C

Identify the outlier in Example 2A. Find the mean, median, and mode without the outlier. Which measure does the outlier affect the most?

The mean is affected the most.

	Mean	Median	Mode
With Outlier (Example 3)	48.5	41	20
Without Outlier	38	37	20

Example 2A

The prices of six video games at an online store are shown in the table. The price of each game increases by \$4.98 when a shipping charge is included. How does this increase affect the mean, median, and mode?

Video Game Prices		Video Game Prices with Shipping Charge	
\$53.42	\$35.69	\$58.40	\$40.67
\$18.99	\$25.13	\$23.97	\$30.11
\$27.97	\$53.42	\$32.95	\$58.40

	Mean	Median	Mode
Original Price	35.77	31.83	53.42
Price with Shipping Charge	40.75	36.81	58.4

Example #2B

How does this increase affect the mean, median, and mode?

Compare:

$$\text{Mean: } 40.75 - 35.77 = 4.98$$

$$\text{Median: } 36.81 - 31.83 = 4.98$$

$$\text{Mode: } 58.4 - 53.42 = 4.98$$

By increasing each video game price by \$4.98 for shipping, the mean, median and mode all increased by the same amount.

Section 9.4: Measures of Variation Teacher Notes



Objective: Students will be able to find the range, and interquartile range in a data set.

Vocabulary:

measures of variation - a measure that describes the distribution of a data set

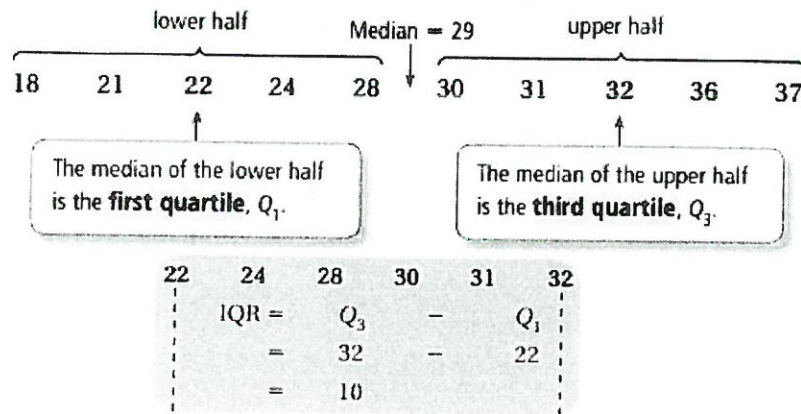
range - the difference between the greatest value and the least value

quartiles - divide the data into four equal parts

first quartile - the median of the lower half of the data

third quartile - the median of the upper half of the data

interquartile range - the difference between the third quartile and the first quartile



Example #1A: The table shows the lengths of several Burmese pythons captured for a study. Find and interpret the range of their lengths.

Find the least and greatest values: $18.5 - 5 = 13.5$ feet

This means that the lengths of the pythons vary by no more than 13.5 feet.

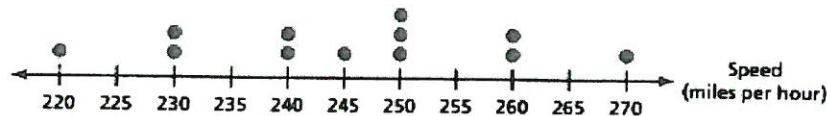
Lengths (feet)	
18.5	8
11	10
14	15.5
12.5	6.25
16.25	5

Example #1B: The ages of people in line for a roller coaster are 15, 17, 21, 32, 41, 39, 25, 52, 16, 39, 11, and 24. Find and interpret the range of their ages.

$52 - 11 = 41$, The ages of people in line vary by no more than 41 years.

Example #2:

Find the median, first quartile, third quartile, and interquartile range.

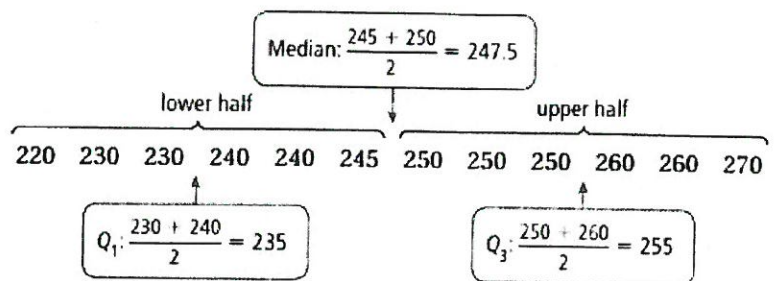


Median = 247.5

1st Quartile = 235

3rd Quartile = 255

Interquartile Range: $255 - 235 = 20$



Example #3

Find the median, first quartile, third quartile, and interquartile range.

5	8	10	1	7	6	15	8	6
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Write the numbers in order:

1, 5, 6, 6, 7, 8, 8, 10, 15

Median = 7

1st Quartile = 5.5

3rd Quartile = 9

Interquartile Range: $9 - 5.5 = 3.5$