Math Virtual Learning

Probability and Statistics

April 17, 2020

Probability and Statistics
Lesson: April 17, 2020
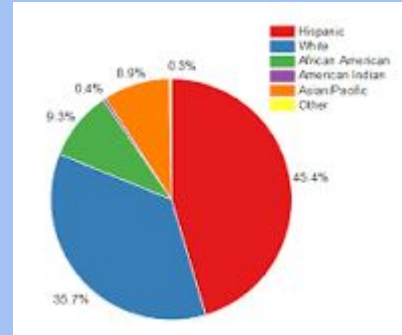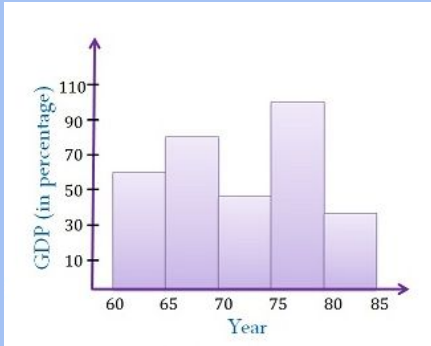
Objective/Learning Target:

Students will be able to calculate the standard deviation of a set of data, determine if the data set is normal and create a graphical representation of the data

Let's Get Started!

Name each of the types of data representations below.
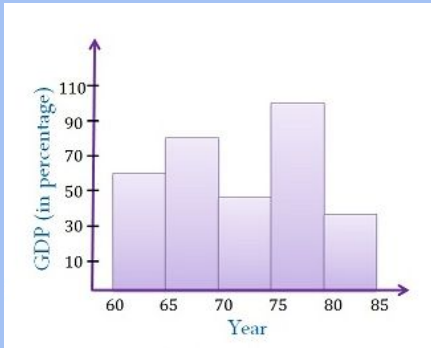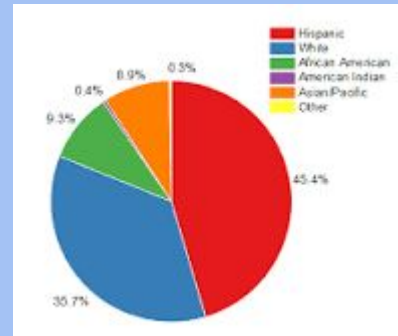
Let's Get Started!

Name each of the types of data representations below.

HISTOGRAM

CIRCLE/PIE GRAPH

STEM AND LEAF

stem	leaf
0	1, 1, 2, 2, 3, 4, 4, 4, 4, 5, 8
1	0, 0, 0, 1, 1, 3, 7, 9
2	5, 5, 7, 7, 8, 8, 9, 9
3	0, 1, 1, 1, 2, 2, 2, 4, 5
4	0, 4, 8, 9
5	2, 6, 7, 7, 8
6	3, 6

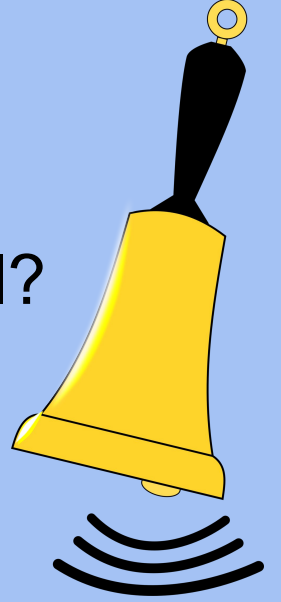Key: 6|3 = 63 years old

BOX AND WHISKER

Let's Get Started!

Why is it important to know if a data set is normal?

What does Standard Deviation tell us?

Let's Get Started!

Why is it important to know if a data set is normal?

If a data set is NOT normal, statistical calculations are not valid or reliable

What does Standard Deviation tell us?

How far the numbers are spread out from the mean
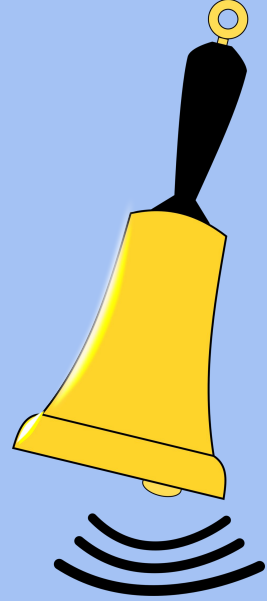
Standard Deviation by Hand Reminders
--6 Steps

✓ Find the Mean
✓ Subtract the mean from each data point
✓ Square all of the answers you got in Step 2
✓ Sum your answers from Step 3
✓ Divide your answer in Step 4 by n - 1
✓ Square root your answer in Step 5

Standard Deviation using Technology Reminders --6 Steps

✓ Go to the Desmos.com Calculator
✓ Click on the Keypad at the bottom left
✓ Click on Functions
✓ Click on Statistics
✓ Click on stdev (not stdevp)
✓ Type your data set in the parentheses

Is it Normal??? Reminders
--6 Steps

✓ Find the mean and standard deviation
✓ Find the interval for one standard deviation
  ○ Mean - Standard Deviation
  ○ Mean + Standard Deviation
✓ Count how many data points lie in that interval
✓ Divide your count by the number of total data points
✓ Is it 68% or higher? NORMAL
✓ Is it lower than 68%? NOT NORMAL

Histogram Reminders

✓ Create bins or intervals for your numbers
✓ Make sure each bin is equal in size
✓ The x axis is labeled with the bins
✓ The y axis is labeled with the frequency
✓ Make sure there are NO gaps between the bars that you draw

Box and Whisker Reminders

✓ Find the 5 number summary
   ○ Lowest Extreme
   ○ Lower (1st) Quartile
   ○ Median
   ○ Upper (3rd) Quartile
   ○ Highest Extreme
✓ Draw a number line
✓ The whisker ends are dots and are marked at the two extremes
✓ The box lines are the Lower Quartile, Median and Upper Quartile

Let's Analyze Some Data!

Total grade points (not GPA) are used for many things including class rank. Below are the total grade points earned by 26 Seniors.

100, 45, 80, 128, 110, 105, 95, 84, 107, 75, 101, 118, 105, 92, 85, 100, 88, 92, 108, 130, 76, 65, 55, 75, 63, 106

- **Find the mean and standard deviation of the data**
- **Is the data normal?**
- **Construct a Histogram**
- **Construct a Box and Whisker**

Data Set #1 Answers

Total grade points (not GPA) are used for many things including class rank. Below are the total grade points earned by 26 Seniors.

100, 45, 80, 128, 110, 105, 95, 84, 107, 75, 101, 118, 105, 92, 85, 100, 88, 92, 108, 130, 76, 65, 55, 75, 63, 106

● **Find the mean and standard deviation of the data**

MEAN = 91.84

STANDARD DEVIATION = 21.19

Data Set #1 Answers

Total grade points (not GPA) are used for many things including class rank. Below are the total grade points earned by 26 Seniors.

100, 45, 80, 128, 110, 105, 95, 84, 107, 75, 101, 118, 105, 92, 85, 100, 88, 92, 108, 130, 76, 65, 55, 75, 63, 106
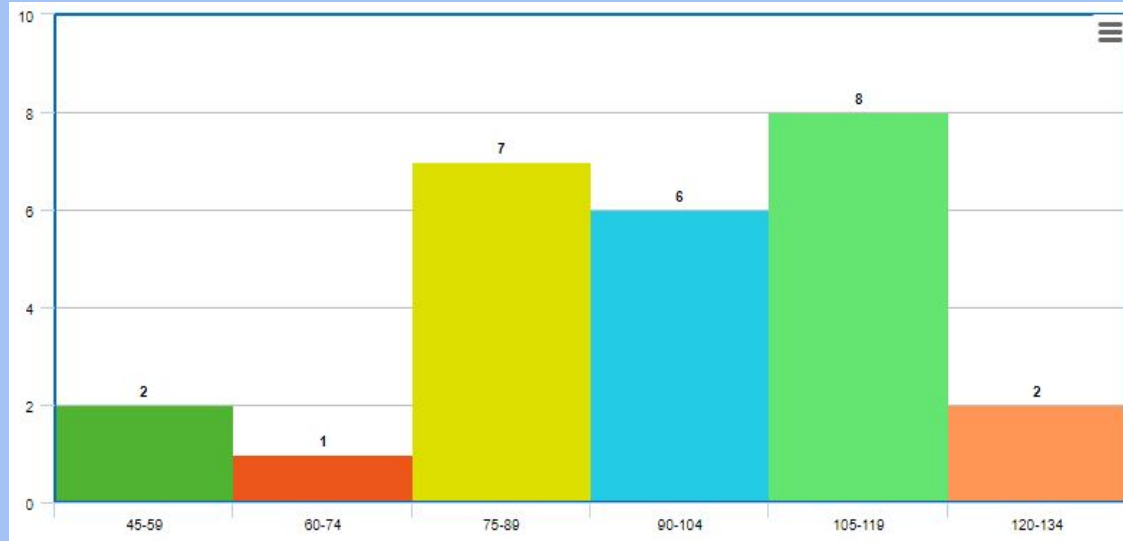
- **Is the data normal?**
  - **Interval is 70.65 - 113.03**
  - **19 data points are in the range which is 73%**
  - **Because 73% is higher than 68% -- the data is NORMAL**

Data Set #1 Answers

100, 45, 80, 128, 110, 105, 95, 84, 107, 75, 101, 118, 105, 92, 85, 100, 88, 92, 108, 130, 76, 65, 55, 75, 63, 106

- Construct a Histogram

45-59: ||
60-74: |
75-89: |||||||
90-104: ||||||
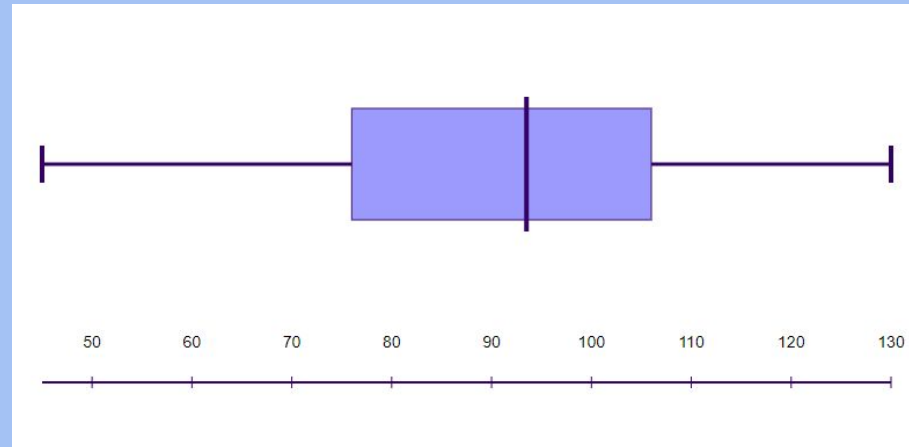105-119: ||||||||
120-134: ||

Data Set #1 Answers

100, 45, 80, 128, 110, 105, 95, 84, 107, 75, 101, 118, 105, 92, 85, 100, 88, 92, 108, 130, 76, 65, 55, 75, 63, 106

- **Construct a Box and Whisker**

  Lowest Extreme: 45
  Lower Quartile: 76
  Median: 93.5
  Upper Quartile: 106
  Highest Extreme: 130

Let's Analyze Some MORE Data!

A recent study was done on the number of times people check their watch/phone time in a given hour. Below are the results of 13 subjects.

0, 0, 26, 0, 1, 23, 25, 22, 0, 1, 1, 26, 0

- Find the mean and standard deviation of the data
- Construct a Histogram & Box and Whisker
- Use the Histogram & Box and Whisker to predict if the data is normal?
- Prove whether or not the data is normal

Data Set #2 Answers

A recent study was done on the number of times people check their watch/phone clock in a given hour. Below are the results of 13 subjects.

0, 0, 26, 0, 1, 23, 25, 22, 0, 1, 1, 26, 0

- **Find the mean and standard deviation of the data**

MEAN: 9.62

STANDARD DEVIATION: 12.22

Data Set #2 Answers
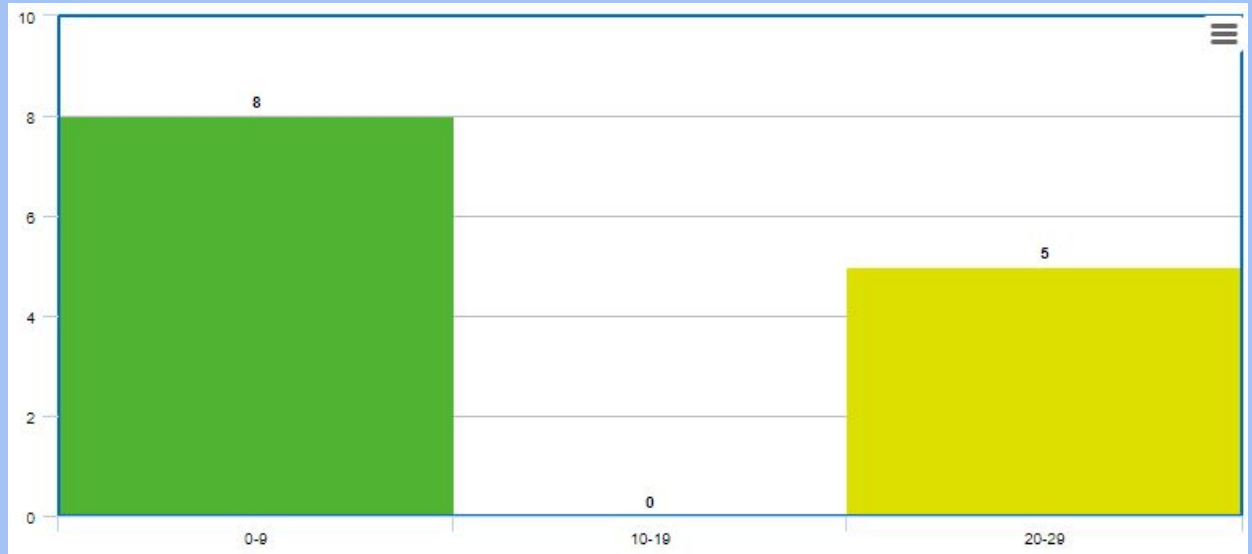
0, 0, 26, 0, 1, 23, 25, 22, 0, 1, 1, 26, 0

- **Construct a Histogram & Box and Whisker**

  0-9:   8

  10-19: 0

  20-29: 5

Data Set #2 Answers

0, 0, 26, 0, 1, 23, 25, 22, 0, 1, 1, 26, 0

- **Construct a Histogram & Box and Whisker**
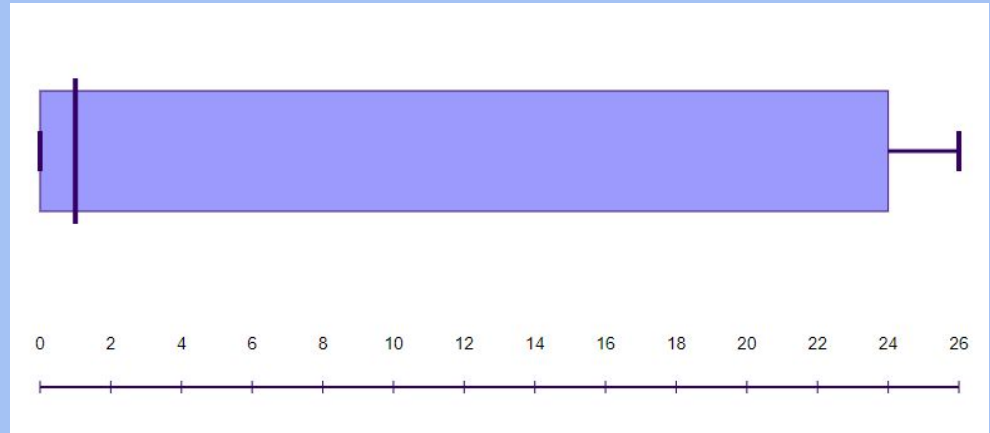
Lowest Extreme: 0

Lower Quartile: 0

Median: 1

Upper Quartile: 24

Upper Extreme: 26

Data Set #2 Answers

A recent study was done on the number of times people check their watch/phone time in a given hour. Below are the results of 13 subjects.

0, 0, 26, 0, 1, 23, 25, 22, 0, 1, 1, 26, 0

- **Use the Histogram & Box and Whisker to predict if the data is normal?**

  Does not look normal. Both graphs show bi-modal trends meaning that there is a lot of data on the sides, but not much in the middle

Data Set #2 Answers

A recent study was done on the number of times people check their watch/phone time in a given hour. Below are the results of 13 subjects.

0, 0, 26, 0, 1, 23, 25, 22, 0, 1, 1, 26, 0

- **Prove whether or not the data is normal**
  - **Interval is -2.6 to 21.84**
  - **8 of the data points are in that range which is 62%**
  - **Because 62% is lower than 68% -- the data is NOT NORMAL**