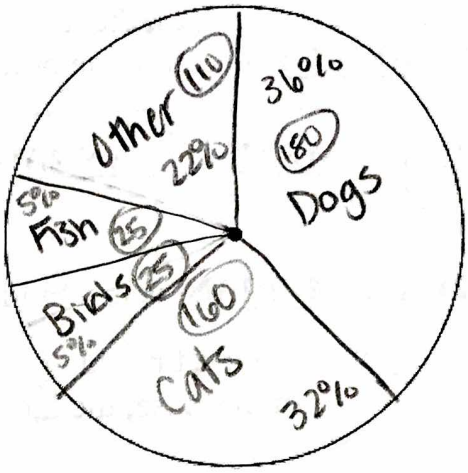
Review Lesson 76

1. Create a circle graph that represents the data below.

Kinds of Pets Owned by Families	
Pet	**Number of Families**
Dogs	180
Cats	160
Birds	25
Fish	25
*Other	110

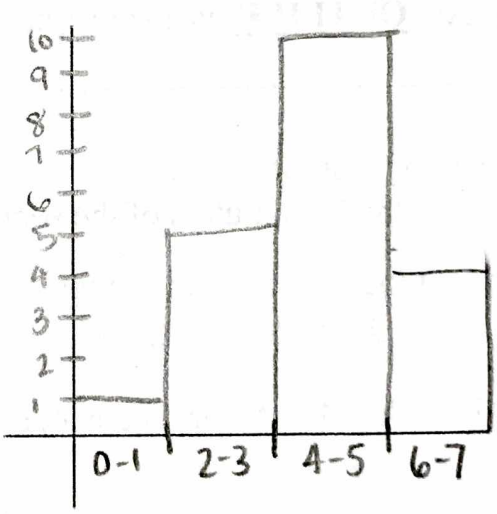
36%
32%
5%
5%
22%

500



2. Create a histogram that represents the data below.

Number of Free Throws	Frequency
0-1	1
2-3	5
4-5	10
6-7	4



Lesson #77
Measures of Central Tendency

Success Criteria: I can identify the different measures of central tendency. I can find all of the measures of central tendency given a set of data.

In a set of data values, the mean, median, and mode are all **MEASURES of CENTRAL TENDENCY** because one or more of these values can represent the "center" of the data.

(1) The **MEAN** (or **AVERAGE**) of a set of data is the sum of the data divided by the number of data values.

(2) The **MEDIAN** is the "middle" value in a set of data (AFTER they are listed in order).

Note: If the set has an even number of values, then there will be two middle values. In this case, the median is the average of these two middle values.

(3) The **MODE** of a set of data is the value (or values) that occur most often.

Examples: 3, 6, 8, 10, 11: NO MODE

4, 4, 9, 16, 16, 18: MODES are 4 and 16

5, 7, 7, 12, 15:MODE is 7

2, 2, 5, 5, 8, 8:NO MODE

(4) An **OUTLIER** is a value that is much greater than **or** much less than the other values.

Example #1:
The lengths (in minutes) of the songs on Jake's iPod are given in a stem and leaf plot.

Stem	Leaf
3.4	0 5
3.5	
3.6	1 5 7
3.7	2 8
4.9	2

Key: 3.4 | 0 = 3.40 minutes

(A) List the lengths of the songs.
3.4, 3.45, 3.61, 3.65, 3.67, 3.72, 3.78, 4.92

(B) Find the MEAN (or Average) song length.
3.775

(C) Find the MEDIAN song length.
3.66

(D) Find the MODE of the song lengths.
None

(E) There is one OUTLIER song length. Which is it?
4.92

(F) Answer the following question without doing any new calculations: If Jake deleted the outlier song, how do you think it would affect the mean (or Average) song length? Why?
The mean would be lower

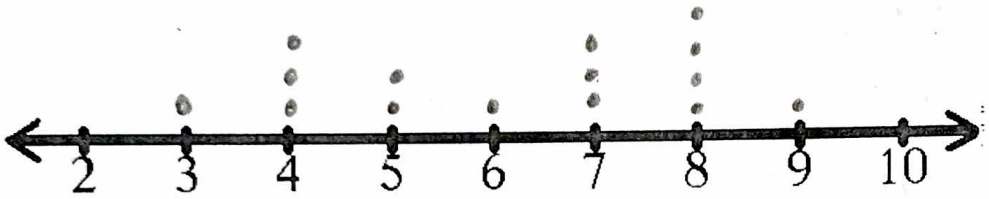
Example #2: The data below show the number of bananas per bunch in a shipment of bananas.

~~5~~, ~~8~~, ~~7~~, 9, ~~8~~, ~~4~~, ~~6~~, ~~4~~, ~~7~~, ~~5~~, ~~3~~, ~~7~~, ~~8~~, ~~4~~, ~~8~~

(A) List the data in order.

3,4,4,4,5,5,6,7,7,7,8,8,8,8,9

(B) Use the sorted data to make a "Dot Plot" of the data below.



(C) Find the mode of the number of bananas per bunch.

8

(D) Find the mean number of bananas per bunch.

$\frac{93}{15} = 6.2$

(E) Find the median number of bananas per bunch.

7

(F) The store manager is required to take away one banana from each bunch for testing. How does this affect the mean, median, and mode?

Mean, Median, & Mode would all go down by 1.

Success Criteria: Given the mean, I can find a missing piece of data.

Example #3: The mean of the set of values below is 4. Find the value of x.

5, 1, 6, 3, 4, x

$\frac{5+1+6+3+4+x}{6} = 4$

$\frac{19+x}{6} = 4$ $\quad 19+x = 24$

$\boxed{x=5}$

Complete Record and Practice Journal p. 320 #2, 3, 4, 5a,b

Lesson #78
Measures of Dispersion

Complete Record and Practice Journal Pages 321-322.

Success Criteria: I can put my data in order from least to greatest. I can find the range by hand. I can use my calculator to find the standard deviation.

The term **DISPERSION** refers to how things are spread out.
The more spread out they are, the more **DISPERSED** they are.

MEASURES of DISPERSION:

(1) The **RANGE** of a data set is the difference between the greatest value and the least value.

(2) The **STANDARD DEVIATION** of a data set is a value that measures how much a "typical" value in the set differs from the mean.

Note: A small standard deviation means that values are mostly clustered near the mean.

A large standard deviation means that values are mostly spread away from the mean.

On a Graphing Calculator:

1. To Enter the data values:

Press [STAT] and then under EDIT choose Edit.

Arrow all the way up to L1 and then press [CLEAR] and then press [ENTER].

Type in the values under L1, pressing [ENTER] after each value.

2. To find a Statistical Value:

**While on the home screen,

Press STAT and then arrow over to CALC and choose 1:1-Var Stats.
Hit ENTER to get back to the home screen.
Hit ENTER again on the home screen.
Scroll down through the list.

$\bar{x}$ **is the MEAN.**
σ_x **is the STANDARD DEVIATION**
MED is the median.

Example #1: The data below show the weights of the starting players for the Detroit Tigers and for the Detroit Lions (on offense) in the first game of their 2012 seasons.

Weights (in pounds) of Detroit Tigers	Weights (in pounds) of Detroit Lions
180, 184, 186, 209, 215, 223, 235, 239, 239, 270	198, 216, 231, 236, 255, 265, 295, 304, 311, 323, 325

(A) Find the mean for each set of data.

Detroit Tigers: 218

Detroit Lions: 269

(B) Find the standard deviation for each set of data.

Tiger Weights Standard Deviation = 27.59 Lion Weights Standard Deviation = 42.97

(C) Which team's player weights were more dispersed from their mean?

Lions

(D) Find the range of player weights for each team and then state which team had the higher range. Tigers: 90

Lions: 127

Lions had higher range

Example #2: Collect the ages of all the students in class. Find the mean, standard deviation, and range of males and females.

Ages:

	Males	Females
Mean		
Standard Deviation		
Range		

What can you conclude from the data?

Lesson #79
Box-and-Whisker Plots

Success Criteria: I can find the 5 important values needed to make a box and whisker plot by hand and with the calculator. I can create a box and whisker plot to model data. I can interpret a box and whisker plot.

Problem #1: Below is a list of the number of completed passes in the 20 games played by quarterback Eli Manning during his Super Bowl winning 2011-2012 season.

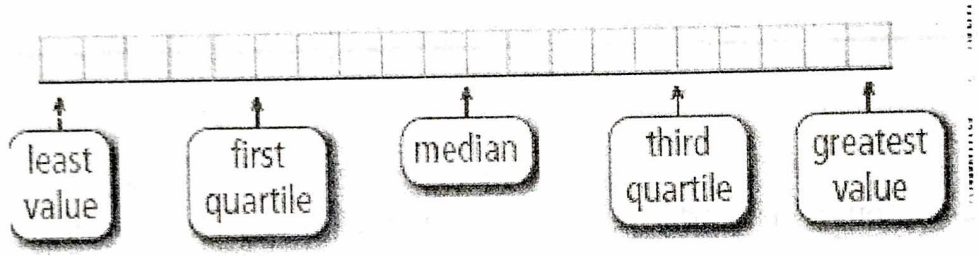
18, 18, 16, 27, 24, 21, 31, 20, 26, 18, 33, 23, 27, 23, 9, 24, 23, 21, 32, 30

(A) Order the data and write each value in a box on the grid below.

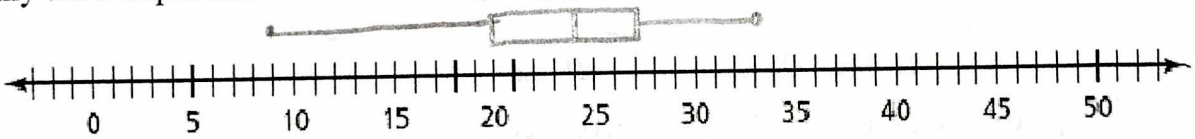
9	16	18	18	18	20	21	21	23	23	23	24	24	26	27	27	30	31	32	33

Least; 1st Qtr → 19; Median 23; 3rd Qtr → 27; Greatest

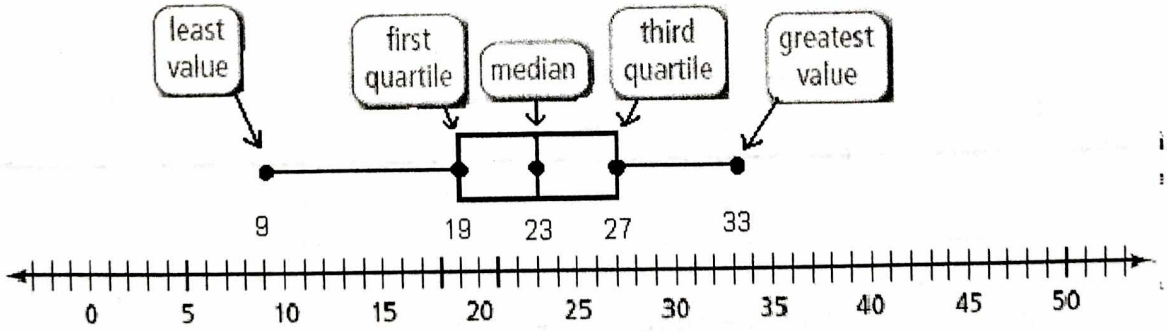
(B) Imagine folding the paper in half (along the median) and then in half again to divide the data into four **EQUAL** groups. Doing this would give you five important values for the data. **The location of these five important values are noted and labeled below.**



(C) Below is a number line drawn large enough to include all of the data values. Make a dotplot of only the 5 important values noted in part (B).



(D) We can then draw what is called a **Box-and-Whisker Plot** using these five values.



(E) Explain what the "box" tells you about the number of passes completed by Eli Manning in games he played in the 2011-2012 season. (Consider the number of values that fall within the "box")

Middle 50%

Box-and-Whisker Plot: (also called the **five-number summary**)

Displays a data set in four equal groups along a number line.

The five numbers that are used to make up the plot are:

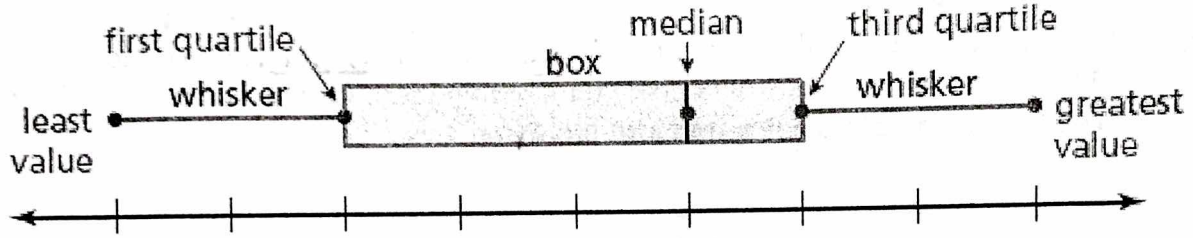
(1) The LEAST value (MINIMUM).

(2) The FIRST QUARTILE (which is the median of the lower half of data).

(3) The MEDIAN (SECOND QUARTILE).

(4) The THIRD QUARTILE (which is the median of the upper half of data).

(5) The GREATEST VALUE (MAXIMUM).



Notes:

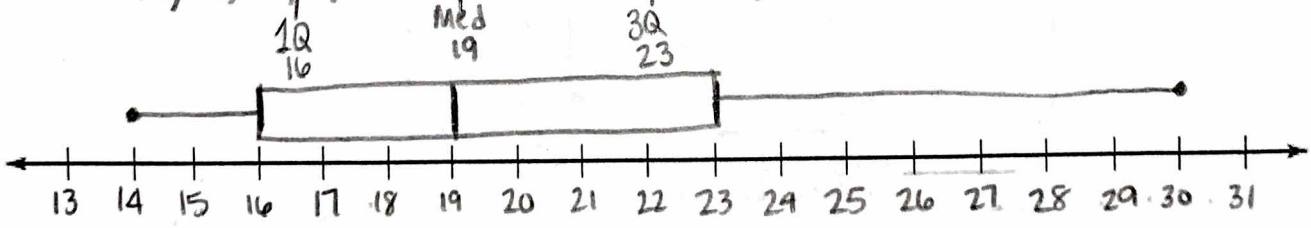
(A) Since there are four equal parts, each part contains 25% of the data values.

(B) The "box", also called the interquartile range, is made up of the middle HALF of the data values.

Example 1: During a tournament, a basketball player scores 14, 16, 20, 18, 22, 30, 16, 28, 24, 17, 20, and 18 points. Make a box-and-whisker plot of her data.

14, 15, 16, 16, 17, 18 | 20, 20, 22 | 24, 28, 30

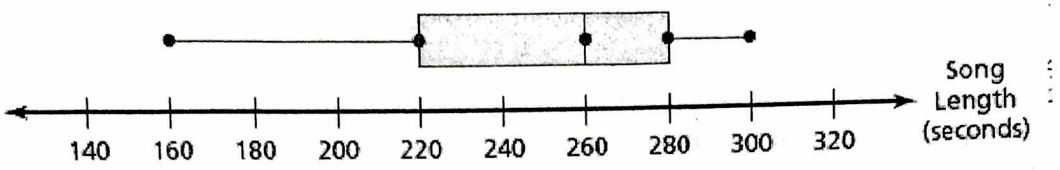
1Q 16 | Med 19 | 3Q 23



In what percentage of games did she have 18 points or less?

50%

Example 2: The box-and-whisker plot below represents the length of songs (in seconds) played by a rock band at a concert.



(A) Find and interpret the range of the data.

$300 - 160 = 140$

(B) Complete the following to describe the distribution of the data.

25% of the song lengths are between 160 and 220 seconds.

50% of the song lengths are between 220 and 280 seconds.

25% of the song lengths are between 280 and 300 seconds.

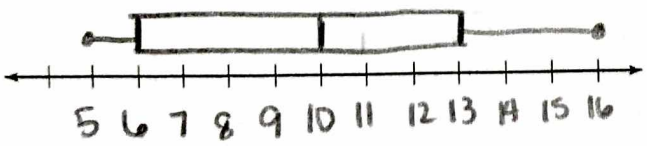
(C) Find and interpret the interquartile range (the length of the "box") of the data.

Example 3: Make a box-and-whisker plot for each set of data.

(A)

5, 6, 9, 10, 12, 13, 16

1Q Med 3Q

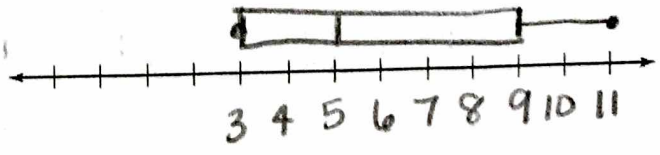


(B)

3, 3, 3, 4, 5, 7, 8, 10, 11

1Q Med 3Q

3 9



Lesson #79c
Box-and-Whisker Plots

Review

Dave and Jenny are looking for summer jobs for just a few hours each week. They talk to a few friends about their jobs.

One friend worked at McDonald's a few hours a week last summer and made the following dollar amounts (after taxes) each week: **52, 58, 45, 50, 62, 48, 52, 57, 53**

A second friend mowed a few lawns and trimmed trees and made the following dollar amounts each week: **52, 0, 103, 50, 150, 0, 0, 152, 110**

1. Find the mean, median, mode, range, and standard deviation for the McDonald's data.

Mean: 53 Median: 52 Mode: 52

Range: 17 Standard Deviation: 4.97

2. Find the mean, median, mode, range, and standard deviation for the lawn mowing data.

Mean: 68.6 Median: 52 Mode: 0

Range: 152 Standard Deviation: 58.9

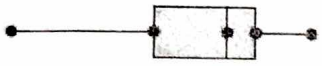
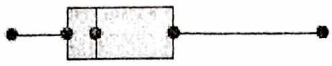
Dave owes his dad $400 for overcharges on a cell phone. Dave promised to pay him back $50 a week all summer. Which job would be the best for Dave? Explain.

McDonald's is more consistent

Jenny is trying to save up as much as possible to buy equipment in September for the soccer season. Which would be the best job for Jenny? Explain.

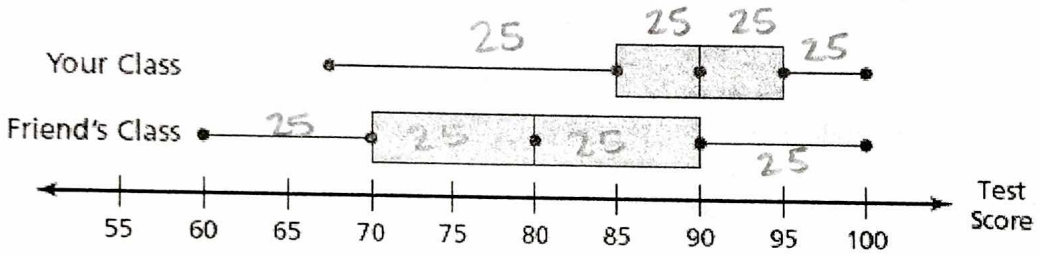
Mow lawns b/c she would make more money overall

The "Shape" of a Box-and-Whisker Plot:

Skewed left	*Symmetric*	*Skewed right*
		
• Left whisker longer than right whisker • Most data on the right	• Whiskers about same length • Median in the middle of the data	• Right whisker longer than left whisker • Most data on the left

**Box-and-whisker plots are also very useful when comparing the "shape" and "spread" of two or more sets of data.

Example 1: The box-and-whisker plots below represent the test scores for your class and a friend's class.



(A) Identify the shape (skewed left, symmetric, or skewed right) of each data distribution.

Your Class: Skewed left

Friend's Class: Symmetric

(B) What is the "interquartile range" (box-length)? Your class: 10

Friends class: 30

(C) Compare the two classes:

Both have max of 100%

Top 75% in your class is ≥85%

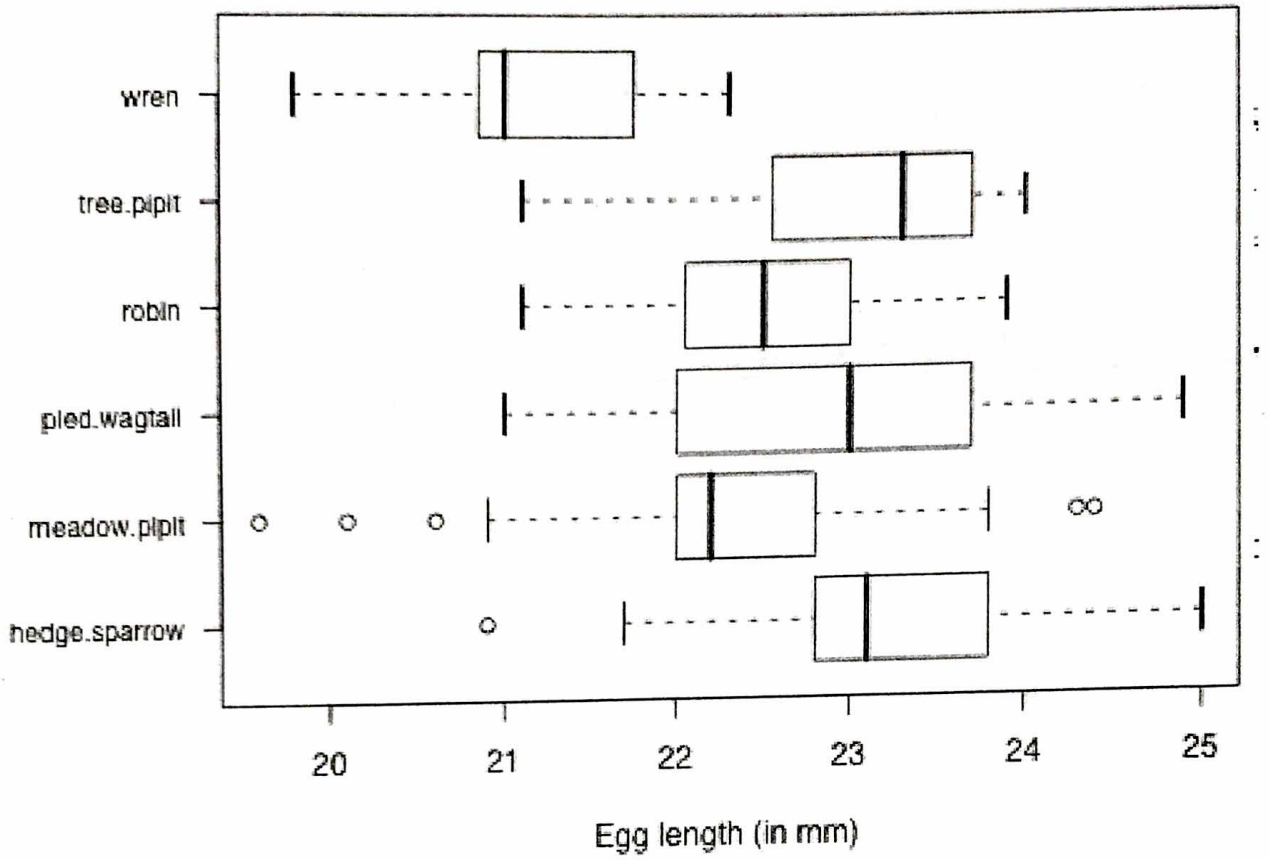
Top 50% in your friends class is ≥ 80%

(D) Which data set do you think has the greater standard deviation? Explain.

Friend's class

Example 2:

The following box plots show the distributions of egg length (in mm) for six different birds. The circles represent outliers.



(A) Based on these plots, state TRUE or FALSE for each of the following statements:

Statement #1: One-half of pied wagtail eggs were less than 23 mm in length.

True

Statement #2: The meadow pipit egg lengths are less spread out than the other eggs.

False

Statement #3: The biggest wren eggs are still smaller than 75% of tree pipit eggs.

True

Statement #4: Half of the pied wagtail eggs are longer than any of the wren eggs.

True

Statement #5: All of the robin eggs are bigger than all of the wren eggs.

False