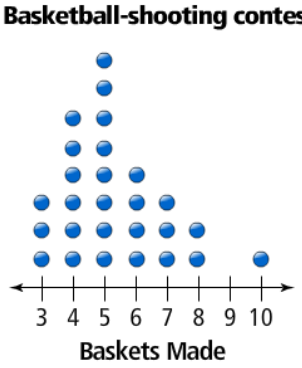
Name _____

Topic 13 Notes & Study Guide

Data Displays

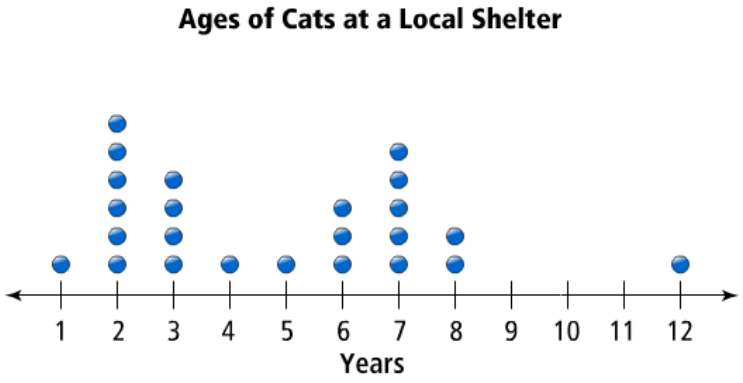
Key Words/Topic and Assignments	Information, Definitions, Solutions
13.1 Statistical Questions	
<u>New Terms</u>	
Statistics	The study of collecting, organizing, graphing, and analyzing data to draw conclusions about the real world.
Statistical Question	A question that investigates an aspect of the real world and can have variety in the responses.
Data	Pieces of information collected by asking questions, measuring, or making conclusions about the real world.
<u>Review Terms</u>	
<u>Today's Concept</u>	**Statistics** is an incredibly powerful field in mathematics. It is an incredibly powerful tool used by almost every organization in the world; including your class, your school, and at the business your parents work. Statistics can be manipulated to help people prove a particular point or point of view. It's very important to understand statistics so that other people can't intentionally, or unintentionally, take advantage of your ignorance. **Statistical questions** are questions that help investigate a part of your world and have more than one response. Examples of statistical questions include: What are the ages of the students in your class? What countries were the people who live on your street born? Examples of non-statistical questions: What is your name? How old are you? The difference between statistical questions and non-statistical questions is very subtle. If you ask, "How old are you?" that isn't statistical because there is only one answer. If you ask, "How old are the students in my class?", that is statistical because there will be more than one answer! The answers to statistical questions are called **data.** It is the data that is used to analyze, interpret, and use to make decisions, predictions, or to persuade others.

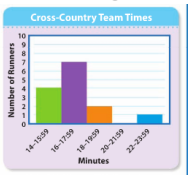
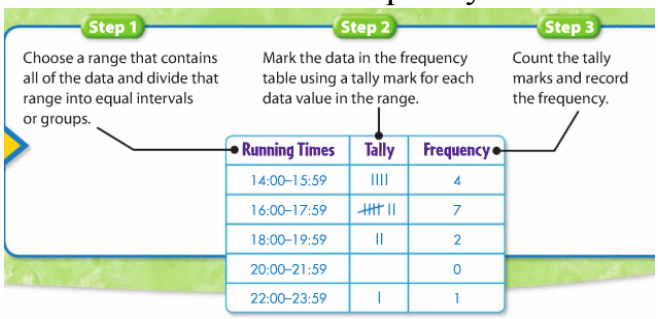
Key Words/Topic and Assignments	Information, Definitions, Solutions
13.2 Dot Plot	
<u>New Terms</u>	
Dot Plot	A statistical graph that shows the shape of a data set with stacked dots above each data value on a number line. Each dot represents one data value.
Frequency of a data set	Describes the number of times a specific value occurs in a data set. (ex. In the data set 1, 2, 3, 3, 4, 4, 4; 4 has a frequency of 3 because it occurs three times.)
Distribution of a data set	Describes the way that its data values are spread out over all possible values. This includes describing the frequencies of each data value. The shape of the data display shows the distribution of the set.
<u>Review Terms</u>	
Data	Pieces of information collected by asking questions, measuring, or making observations about the real world.
<u>Today's Concept</u>	There are many ways to graphically display data. A **dot plot** is a quick visual way to present data. Here is an example of a complete dot plot.  Each dot plot should have: 1. Collected data to help build the dot plot. 2. A title. 3. A number line with a **scale** that fits the data. 4. A label for the scale 5. Dots that match each piece of data in the **data set.** So in our example the **frequency** (how often the data value occurs) of 4s in the data set was 6. That is why there are 6 dots above the 6 in our number line.

Notice in the Basketball-shooting contest dot plot that no one made 9 baskets. 9 has a frequency of 0. Sometimes there are bigger gaps in the data set. **Data distributions** tell us how the collected data is spread out over all of the possible values. When the data isn't visually represented, it may be difficult to see the way data is clustered (close together), if there are gaps in the data, or if there are outliers (data that strays).

Outliers are data that is relatively, or very, far away from the rest of the data. For example, if everyone in your class is around 5 feet tall, except one student is 6 feet 6 inches. That very tall student is an outlier.

In the dot plot below there is a gap from 9-11 years old. The data has two large clusters. The first cluster is from 2-3 years old, and the second cluster is from 6-8 years old. One cat, the 12 year old, is an outlier (or stray value).

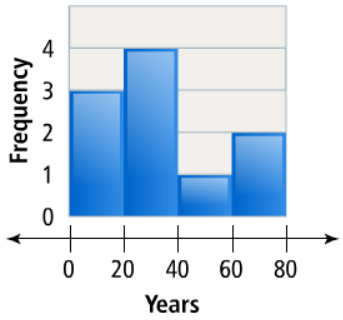


Key Words/Topic and Assignments	Information, Definitions, Solutions
13.3 Histograms **New Terms** **Histogram**  **Review Terms** **Today's Concept**	A statistical graph that shows the shape of a data set with vertical bars above intervals of values on a number line. The intervals are equal in size and do not overlap. The height of the bar shows the frequency of data within the interval. **Histograms** are a good way to display data graphically when your data is organized within ranges. Maybe your soccer team keeps track of goals scored all season long. Your coach wants to display the data collected graphically (visually). He keeps track of how many people scored between 0-3 goals, 4-7 goals, 8-11 goals, and 12-15 goals. Your coach isn't interested in having each score individually marked, so a histogram is ideal. Frequency tables and histograms are two more tools for organizing and interpreting data. The information from frequency tables can help you build histograms. Here's how to make a frequency table:  To use the information to make a histogram: **1. Put a title on the graph** **2. Use the frequency data to choose a scale/interval for the vertical axis (y-axis).** **3. Use the ranges from your frequency table as the intervals for the horizontal axis (x-axis).** **4. Graph the data by drawing a bar for each interval. Unlike a bar graph THERE ARE NO SPACES BETWEEN THE BARS!**

13.3 Histograms Continued	This is an example of a completed histogram:

Ages of Water Park Visitors

Data set: 21, 15, 78, 79, 24, 20, 6, 20, 16, 41



Key Words/Topic and Assignments	Information, Definitions, Solutions
13.4 Box Plots	
New Terms **Box Plot**	A statistical graph that shows the distribution of data set by marking five boundary points where data occur along a number line. Unlike a dot plot or histogram, a box plot does not show frequency.
Minimum	The least value in a data set.
Maximum	The greatest value in a data set.
Review Terms **Median**	
Today's Concept	**Box plots (also called Box-and-Whisker plots)** are another way to graphically represent data. A **box plot** highlights **5 boundary values.** When given a set of numerical data, place the data in numerical order from least to greatest. Once your data is organized in this manner, you can find the 5 boundary values. Here is your data: 5, 28, 32, 39, 45, 47, 56, 63, 74, 76, 80 Here are the 5 boundary values. **Minimum** –the least (smallest) data value in the set. 5 is the minimum data value. **Maximum -** the greatest (largest) data value in the set. 80 is the maximum data value. **Middle of the data set** –this is also known as the median. 47 is the middle value. **Middle of the lower half-**this is the median of the lower half of the data. The lower half of the data includes 5, 28, 32, 39, and 45. 32 is the middle value of the lower half.

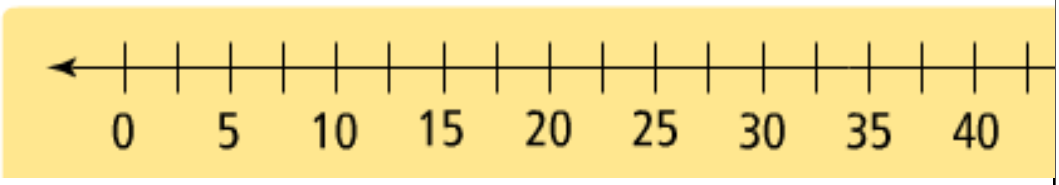
13.4 Box Plots Continued

Middle of the upper half-this is the median of the **upper** half of the data. The **upper** half of the data includes 56, 63, 74, 76, and 80. 74 is the middle value of the lower half.

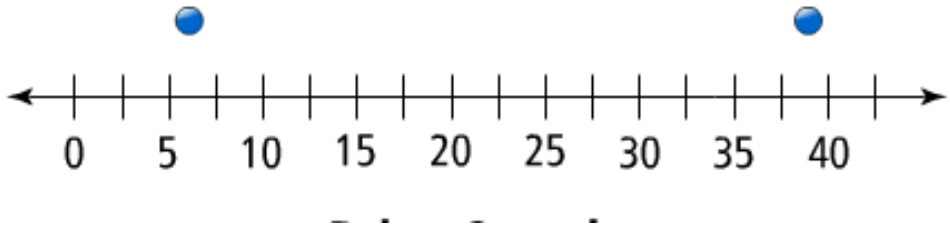
Follow these instructions to construct a box plot. Let's work with this data:

6, 17, 18, 21, 23, 29, 30, 32, 35, 37,

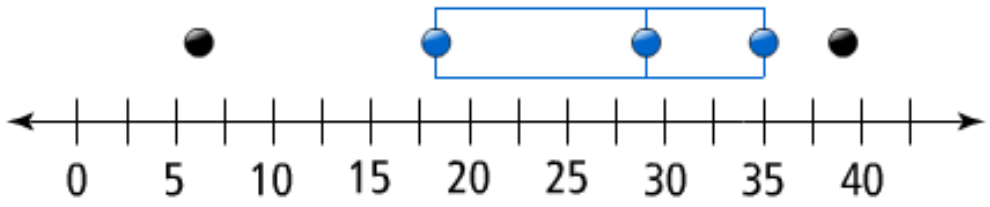
1. Based on the data draw a number line whose range includes all of the values. Pick an interval (scale) that makes sense for your data.



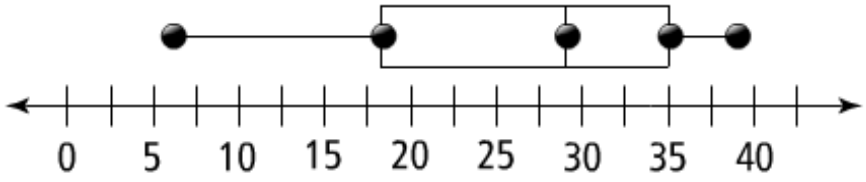
2. Place a dot above the numbers that represent the minimum and maximum values .



3. Now place a dot above the median of all of the data and dots above the upper and lower middle values. Then draw a box connecting the upper and lower values with a line that cuts through the median value of all the data.



4. Now draw the whiskers by connecting the minimum value and the middle lower half value with a line. Do the same with the maximum value and the middle upper half value.



	Each section above (each whisker and each half of the box) represents $1/4^{th}$ of the data. The length of each part of the box plot shows how spread out each quarter of the data is.