

Lesson 10.1& 10.2_(F'11)

Objectives: To make and read:

1. pictographs
2. line plots
3. stem and leaf plots
4. frequency tables
5. histograms
6. scatter plots
7. circle graphs

Visual illustrations are an important way to depict information from statistics. These visual illustrations are simply pictures that display data – which may then tell us a story about the data. In this section, we will be exploring the following visual depictions of information.

Pictographs, Line plots, Stem and Leaf Plots, Frequency Tables, Histograms, Scatter plots, Circle Graphs

Read *Principles and Standards* page 595

Even in the early grades students can deal with statistics. Young children want to know the most popular Wii game, the most popular color, etc

Data collected may be either **categorical** or **numerical**.

Categorical Data-data that represents characteristics of objects or individuals in groups such as male or female.

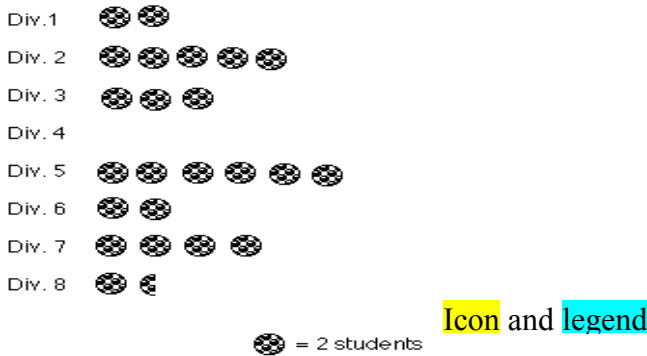
Numerical Data-data collected on numerical variables.

A graph is a picture that displays data.

Pictograph is a picture of a set of small figures or icons used to represent data and often to represent trends.

Show comparisons of outputs. Must include an **icon** and a **key(legend)**

Number of students who like chocolate chip cookies best



NOTE-Every graph must have a **title**, **icon** (symbol) and a **legend**. A **legend** tells what the symbol represents.

Disadvantage- part of an icon

Try this--Make a pictograph using the following:

Mrs. Cool has the following number of students in each class.
 Math - 30, English - 25, Science - 27, and Chemistry - 16. Let's make a pictograph of the data. Let ♀ represent 5 students.

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Line plot-no numerical values are lost in the graph

Cluster-is an isolated group of points

Gap- is a large space between points

Outlier - is a data point whose value is significantly greater or less than the other values.

Suppose thirty people live in an apartment building. These are the following ages:

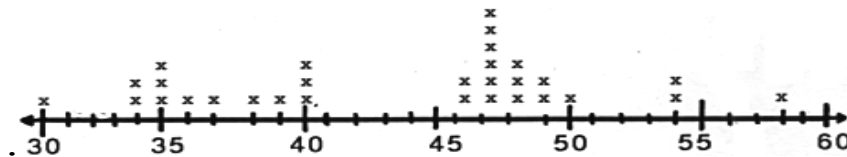
58, 30, 37, 36, 34, 49, 35, 40, 47, 47, 39, 54, 47, 48, 54, 50, 35, 40, 38, 47, 48, 34,
40, 46, 49, 47, 35, 48, 47, 46

Your first step should be: placing the values in numerical order.

30, 34, 34, 35, 35, 35, 36, 37, 38, 39, 40, 40, 40, 46, 46, 47, 47,
47, 47, 47, 47, 48, 48, 48, 49, 49, 50, 54, 54, 58

Now create your graph

Ages of apartment buildings residents

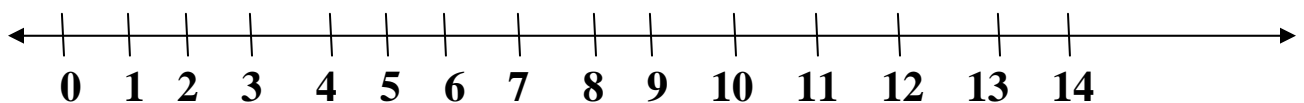


Now you try it:

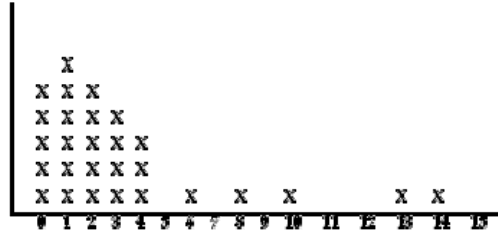
The number of pets in the second grade household is as follows:

0	1	2	3	4	6	8	10	13	14	0	0	0
1	1	1	1	1	2	2	2	2	3	3	3	4
4												

Make a line plot TITLE _____



Line plot - number of pets in each household



The numbers represent the number of pets, the x's represent households with that number of pets

Stem and leaf plot-(ordered) has stems and leafs and a legend

Another type of graph is the stem-and-leaf plot. It is closely related to the line plot except that the number line is usually vertical, and digits are used instead of x's.

For example: Here are the test scores of 26 4th. graders:

64, 82, 85, 99, 96, 81, 97, 80, 81, 80, 84, 87, 98, 75, 86, 88, 82, 78, 81, 86, 80, 50,
84, 88, 83, 82

Your steps should be:

1. place the numbers in order from least to greatest.
2. decide on the stems
3. List the stems in a column from least to greatest
4. use each piece of data to create the leaves to the right of the stems on the appropriate rows
5. if the plot is to be ordered, list the leaves in order from least to greatest
6. add a legend identifying the values represented by the stems and leaves
7. add a title explaining what the graph is about

Try this--The following are the grades on a quiz 12, 13, 21, 27, 33, 34, 35, 37, 41, 42, 42. Make a stem and leaf plot.

Answer

Stem	Leaf
1	2 3
2	1 7
3	3 4 5 7
4	1 2 2

3|3 represents a score of 33

Grouped Frequency table-each class must be of the same width. It shows how many times each piece of data appears.

Construct grouped frequency table for the following.

SCORES on EXAM 3

44, 46, 51, 56, 57, 61, 64, 65, 67, 69, 69, 70, 71, 73, 74, 75, 75, 79, 79, 81, 82, 84, 85, 85, 88, 89, 89, 92, 99, 100

Decide on the width of each class. Let's ours have a width of 10 and let's start with a lower limit of 41. That means are upper limit must be 50. This makes our width 10.

Scores on Exam 3	Tally	Frequency
41-50		
51-60		
61-70		
71-80		
81-90		
91-100		

SETTING UP A GROUPED FREQUENCY TABLE

To set up a grouped frequency table for a given set of data, sometimes you will be given the exact number and size of intervals to use and other times you will need to decide this for yourself. The following are instructions on creating a grouped frequency table so that it will accommodate all of your measurements:

1. Decide on the INTERVAL OR CLASS SIZE
 - a. Subtract the smallest data point from the largest data point
 - b. Divide this number by the number of classes or intervals you plan to have in your table
 - c. Round this UP to a convenient value. This is your INTERVAL SIZE.

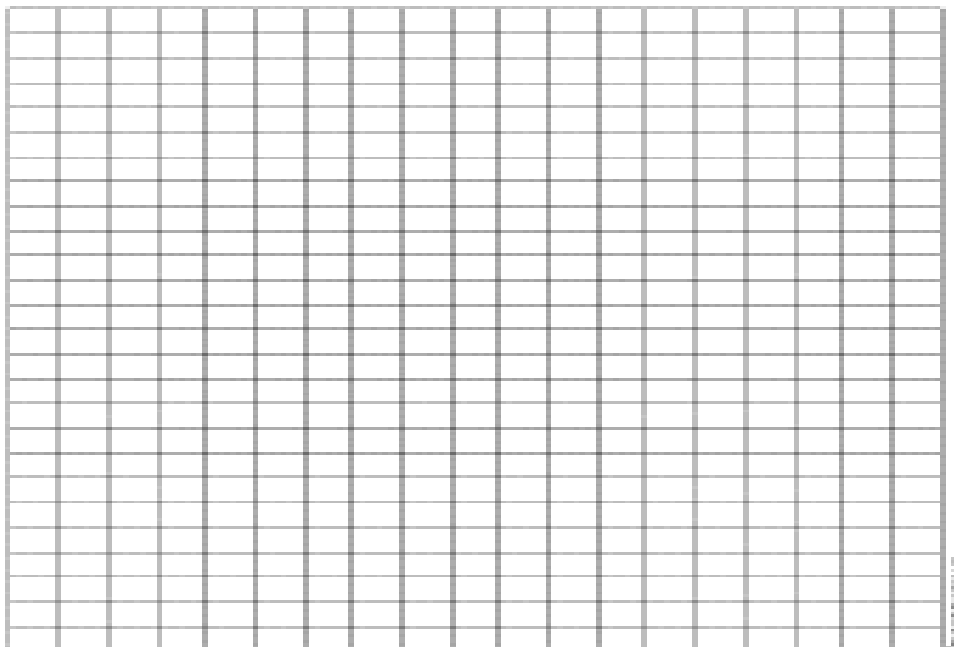
Histograms- adjoining rectangles

We can look at a graphical representation of this data as well using a histogram. If you turn a stem and leaf plot sideways, you can see how a histogram is formed. The advantage that the stem and leaf has over the histogram is that you can see each actually data point whereas on the histogram you can only see the number of occurrences of each outcome.

Let's use our frequency table above to draw a histogram.

Scores on Exam 3	Tally	Frequency
41-50		2
51-60		3
61-70		7
71-80		7
81-90		8
91-100		3

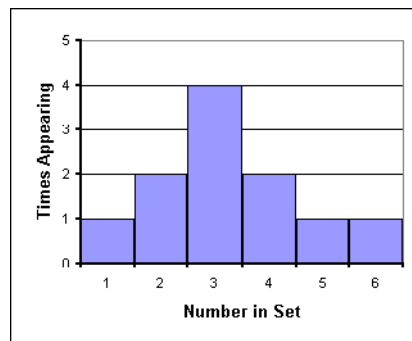
SCORES ON EXAM 3



Try this--Make a histogram using $\{1,2,2,3,3,3,3,4,4,5,6\}$



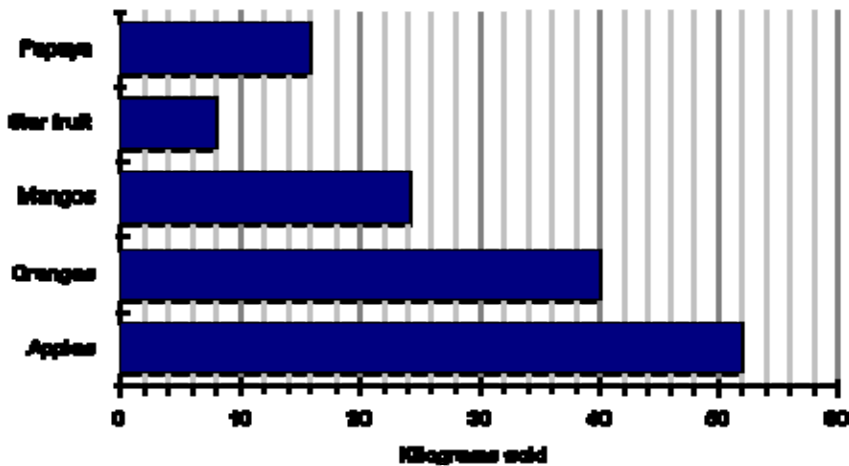
histogram



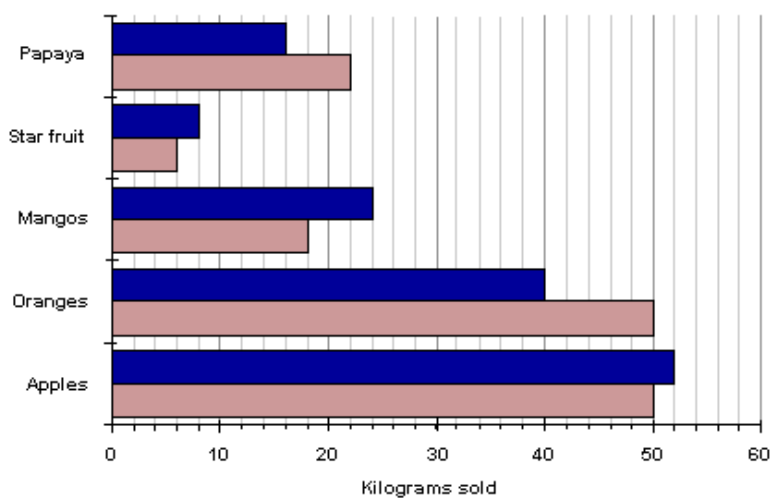
Bar graph-usually has spaces between the bars- useful for making direct visual comparisons over a period of time

The bar chart below shows the weight in kilograms of some fruit sold one day by a local market. We can see that 52 kg of apples were sold, 40 kg of oranges were sold, and 8 kg of star fruit were sold.

Weight of Fruit Sold



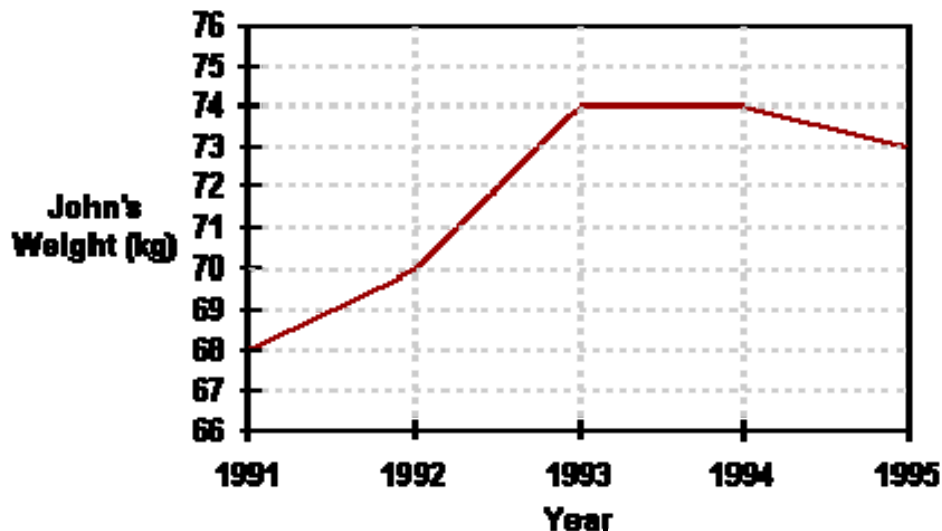
A double bar graph is similar to a regular bar graph, but gives 2 pieces of information for each item on the vertical axis, rather than just 1. The bar chart below shows the weight in kilograms of some fruit sold on two different days by a local market. This lets us compare the sales of each fruit over a 2 day period, not just the sales of one fruit compared to



another

Line graph-shows a trend of a variable over time A line graph is a way to summarize how two pieces of information are related and how they vary depending on one another. The numbers along a side of the line graph are called the scale.

: John's Weight



Scatterplots-show a relationship between two sets of data

Given two sets of data we can use a scatterplot to determine a relationship between the data sets. This is generally done using ordered pairs and after graphing we can observe the data and see if a correlation exists. The points might fall along a "trend line". We can then use this to make predictions, but we cannot use it to deduce any cause and effect relationship.

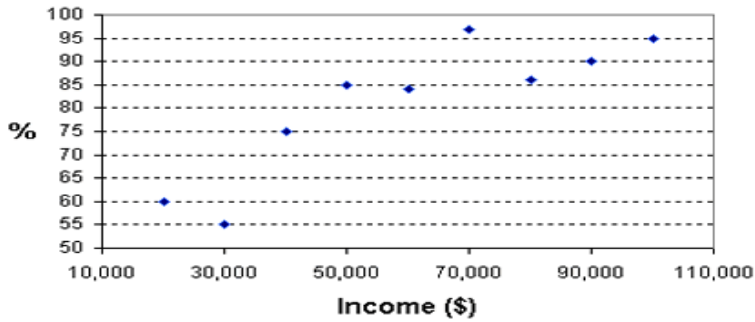
Trend line-used to make a prediction

Slopes up from left to right-positive correlation

Slopes downward from left to right –negative Correlation

The data points are plotted but not joined; the resulting pattern indicates the type and strength of the relationship between two or more variables (see Figure 1 below).

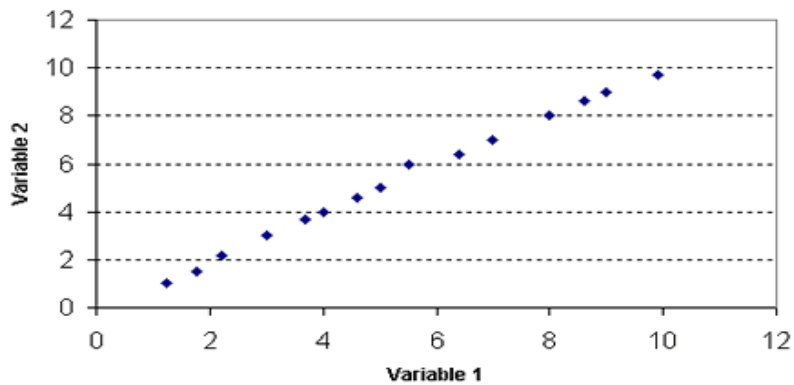
Figure 1. Car ownership in Anytowne, by household income



Data correlation

When the data points form a straight line on the graph, the linear relationship between the variables is stronger and the correlation is higher (Figure 1).

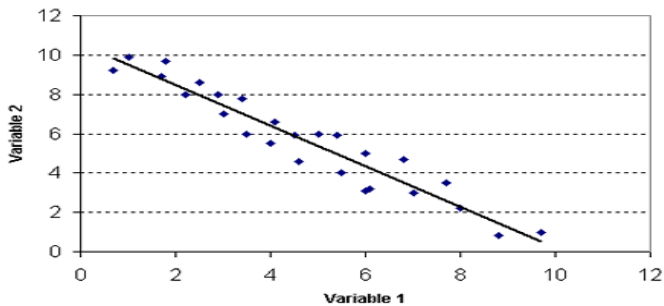
Figure 1. Strong linear relationship of variables



Negative or inverse relationships

If the points tend to cluster around a line that runs from the upper left to lower right of the graph, then the relationship between the two variables is negative or inverse (Figure 3).

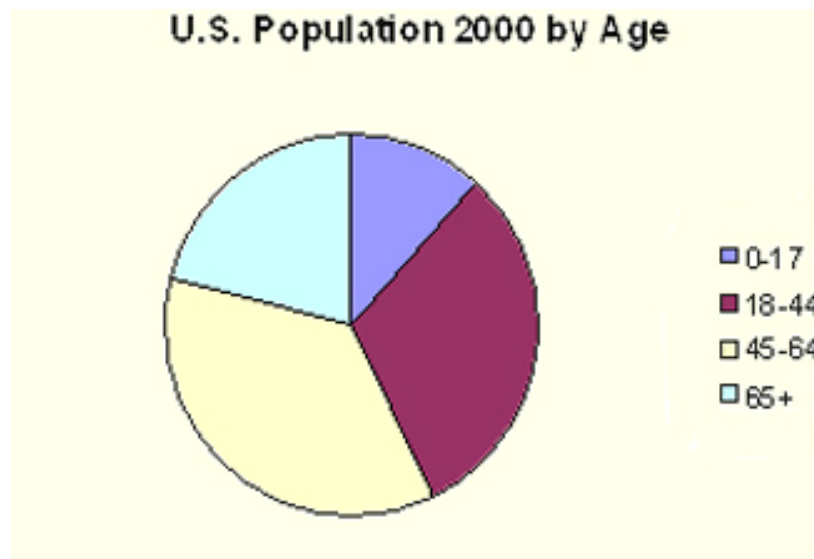
Figure 3. Negative or inverse relationships



Circle graph-comparing parts of a whole

Circle graphs, also known as pie charts, are the best type of graph for showing the relative proportions of different categories to each other and to the whole.

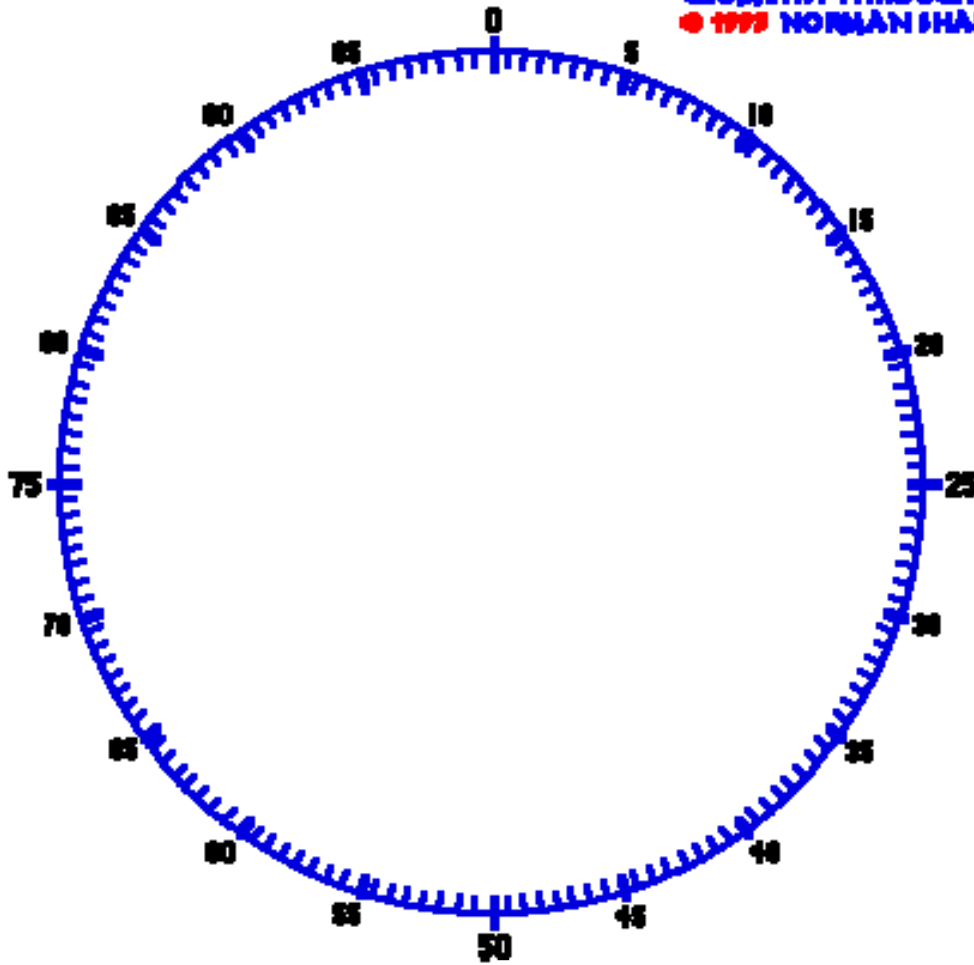
Circle graphs are used when exact quantities are less important than the relative sizes of the parts:



Source: U.S. Bureau of the Census, Projections of the Population of the United States by Age, Sex, and Race, 1995-2050 (1996).

Circle Graphs

GEOMETRY THROUGH ART
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This is a circular region partitioned into disjoint sections, with each section representing a part or percentage of the whole. The disadvantage is that circle graphs are more challenging to construct.

For instance, we are given the following information:

Of all hard rock miners interviewed

74% of them were white males ($360^\circ \times .74 = \underline{\hspace{2cm}}$)

19% were white females ($360^\circ \times \underline{\hspace{1cm}} = \underline{\hspace{2cm}}$)

6% were nonwhite males ($360^\circ \times \underline{\hspace{1cm}} = \underline{\hspace{2cm}}$)

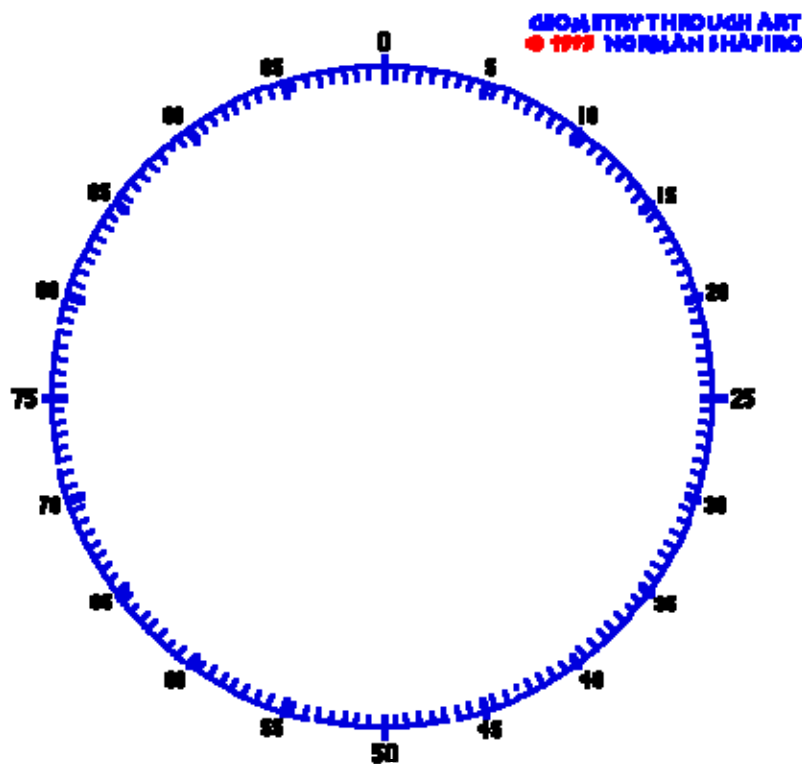
1% were nonwhite females ($360^\circ \times \underline{\hspace{1cm}} = \underline{\hspace{2cm}}$)

We then need to calculate the size of the interior angle of the circle for each group of miners. Then, using a protractor to we will construct each section of the circle.

Try this--Construct a circle graph to illustrate the distribution of medals during the 1996 Summer Olympics in Atlanta.

	Gold	Silver	Bronze
United States	44	32	25

Metal won by the US in the summer Olympics 1996



Class work

Homework Course Compass for 10.1& 10.2 page #A 611 21
page 610 #B 2, 4, 11 no book work from 10.2

