**UNIT E: DATA VISUALIZATION**

1. Why do we need to create charts?

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Prevent \_\_\_\_\_\_\_\_\_\_\_\_\_ data
2. Present many numbers in a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Make large data sets \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Encourage the eye to \_\_\_\_\_\_\_\_\_\_\_\_ different pieces of data
5. Reveal the data at \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, from a broad overview to the

fine structure

2. Bar and Column graphs:

1. **Bar chart** -- used for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on each other-also comparisons between unrelated variables.

2**. Other names***:* bar chart, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, Pareto diagram, histogram,

quartile graph, horizontal bar chart, stacked bar chart, joined bar chart

3. Bar graphs are a family of charts that display \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ by

means of a series of vertical rectangles.

4. [Bar graphs](http://www.netcharts.com/examples/serverexamples/bar-3Dsets.html) are frequently used to compare \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

or to show how one or more entireties vary over time.

5. Each column represents a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and a complete set of

columns makes up a data set.

6. Bar graphs generally have one linear scale on the vertical axis, and a category

or sequence scale (such as a time scale) along the horizontal axis. These charts

are useful when trying to compare \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ sets or categories

against each other.

1. A bar chart is a column chart \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; this is usually employed

when there are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and when the differences between

categories are larger.

1. For a column chart, the x-axis lists the different categories, and the height of

each category's column (with respect to the y-axis) shows the value.

1. A type of bar chart, the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_,** showsseveral sets of related data adding up to a whole with their columns stacked on top of each other.

a. The net result of this stacking should demonstrate some \_\_\_\_\_\_\_\_\_\_\_\_.

b. Stacking and grouping bars can also serve to show relationships

between data sets, helping the user to:

* Compare \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ at various points in time;
* Show how \_\_\_\_\_\_\_\_\_\_\_\_\_\_ between multiple items change with time;
* Look for \_\_\_\_\_\_\_\_\_\_\_\_\_or meaningful relationships between multiple data sets.

3. **Line (x-y) graph --** used for \_\_\_\_\_\_\_\_\_\_\_\_ variables and relationships \_\_\_\_\_\_\_\_\_\_.

1. Line charts are good for showing \_\_\_\_\_\_\_\_\_\_\_\_\_-of continuous data, usually

involving time.

2. An area chart is a line chart with the area between the line and the x-axis is

shaded.

4. **Pie** -- used for showing parts of a whole or \_\_\_\_\_\_\_\_\_\_\_\_\_.

1. Pie graphs compare the components of a set to each other and to the \_\_\_\_\_\_\_.
2. Pie graphs are a member of an entire family of \_\_\_\_\_\_\_\_\_\_\_ graphs.
3. The angle or the area of each slice (sometimes called a segment or wedge) is

the same percent of the total circle as the data it represents.

4. Pie graph data may be contiguous or simultaneous in *time* and may be linked

more by meaning than by physical proximity or sequence.

5. **Scatter plots --** used to get a \_\_\_\_\_\_\_\_\_\_\_\_ representation of the relationship or

correlation between two variables using the x-y graph method of plotting. Usually the

lines connecting the data points \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

6. **Histograms --** are bar charts that display \_\_\_\_\_\_\_\_\_\_\_\_- or relative frequencies in the

form of contiguous (touching) bars. Histograms can be used to see the \_\_\_\_\_\_\_\_\_\_\_ of

the distribution and to determine whether the data are distributed symmetrically.

**7. When to use Histograms or Bar Graphs?**

1. Histograms are "\_\_\_\_\_\_\_\_\_\_\_\_\_." There is one variable and data is sorted by

this variable by placing them into "boxes.”

1. The number of pieces of data in each box is counted. The height of the

rectangle drawn on top of each box is proportional to the number of pieces in

that box.

1. A bar graph has severalmeasurements of differentitems that are compared.

The main question a histogram answer is: "How many measurements are there

in each of the classes of measurements?" The main question a bar graph

answers is: "What is the measurement for each item?" Here are some

examples:

|  |  |
| --- | --- |
| **Situation** | **Bar Graph or Histogram?** |

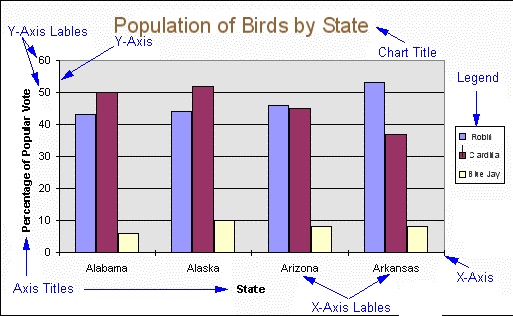
|  |  |
| --- | --- |
| We want to compare total income of five different people. | \_\_\_\_\_\_\_\_\_\_\_. Key question: What is the revenue for each person? |

|  |  |
| --- | --- |
| We have measured revenues of several people. We want to compare numbers of people that make from 0 to 10,000; from 10,000 to 20,000; from 20,000 to 30,000 and so on. | \_\_\_\_\_\_\_\_\_\_ Key question: How many people are in each class of revenues? |

|  |  |
| --- | --- |
| We want to compare heights of ten basketball players on a team. | \_\_\_\_\_\_\_\_\_\_\_\_ Key question: What is the height of each player? |

|  |  |
| --- | --- |
| We have measured several players. We want to compare numbers of players that are from 5-5.5 feet high; from 5.5-6; from 6-6.5 and so on. | \_\_\_\_\_\_\_\_\_\_\_\_ Key question: How many players are there in each class of heights? |

8. Recognize the different parts of a chart



1. \_\_\_\_\_\_\_\_\_\_\_\_-- The reference lines in a coordinate system. The X-axis is the horizontal reference, and the Y-axis is the vertical reference.

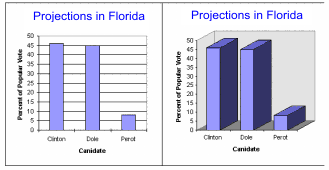
2. \_\_\_\_\_\_\_\_\_\_\_ -- Describes the data the chart is symbolizing.

3. \_\_\_\_\_\_\_\_\_\_\_ -- An explanatory list of symbols on a chart (needed when you graph multiple data sets).

4. \_\_\_\_\_\_\_\_\_\_\_\_-- Are needed for linking the chart to the information being displayed. If charted data has labels in the spreadsheet, the labels should be carried over to the chart.

9. Recognize the basic rules of chart construction

1. Use graph paper, a spreadsheet program, or graphing program such as \_\_\_\_\_\_\_
2. Decide on the \_\_\_\_\_\_\_\_\_\_\_\_ of chart or graph.
3. Determine the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to be plotted on each axis and make sure the scale is large enough to use at least half of the paper in both directions.
4. Plot the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_-or control variable on the x-axis. The dependent variable is plotted on the y-axis.
5. Label the \_\_\_\_\_\_\_\_\_\_\_\_and give units to those labels.
6. All graphs should have a \_\_\_\_\_\_\_\_\_\_\_\_. A good title that always works is "y" as a function of "x."
7. Most graphs should start at the \_\_\_\_\_\_\_\_\_\_\_\_(x = 0, y = 0). There are exceptions like graphing temperature. If the lowest temperature is 37o C start at 35 o C. This is because 0 o C is not the lowest temperature.
8. Number the x and y-axis with a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ numerical sequence or pattern starting with 0 to space out your data so it fills the entire graph. Use a ruler for straight lines.
9. If 2 or more lines are plotted on a graph, a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is necessary. A different hue or symbol should be used for each line.
10. The color of the background of the graph, and the lines on the graph should be clearly \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from each other.
11. The color of lines on a multi-line graph should be \_\_\_\_\_\_\_\_\_\_\_\_from each other.
12. General Advice
    1. Keep graphs \_\_\_\_\_\_\_\_ -- make the data do the talking. Don’t "liven" up you chart with extra colors, 3D, or pictures. Interesting data captures an audience’s attention more than any graphic or special printing effect could.
    2. Use \_\_\_\_\_\_\_\_\_\_\_\_ titles and labels -- let the audience think about what the data means, not what the data is or could be.
    3. Be\_\_\_\_\_\_\_\_\_\_\_\_with the axes -- Do not exchange scales or perspectives to gain a falsely perceived advantage.
13. 3D may not be a good idea because the data may appear \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, can be misinterpreted, or may be misleading. A demonstration of problematic 3D perspective: the chart on the left clearly shows that Clinton edged out Dole in Florida. When Excel shows this data in 3D format, it is impossible to clearly tell if anyone won or if it was a tie.



10. Review Chart:

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| --- | --- | --- | --- |
| Chart  /Graph | Usages | Examples |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Bar |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Column |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Pie |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Line |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Histogram |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Scatter |  |  |  |