Types of Graphs for Presenting and Analyzing Data

Graphs visually represent the relationship of data to their parameters. Organizing these data in a graphical manner helps to communicate it to audiences in various fields such as business or sports or in teaching.

Describing a Simple Plot of Data

- First, look at the abcissa (horizontal) values, and try to determine what they mean. It could be time, distance, mass or something else that is plotted on the X-axis. Next, check if the value of the parameter increases or decreases as you go to the right and the range of valued covered in the graph. Examine the units, too, to get a feel for the amount of time or distance (or whatever) that is being graphed.
- Second look at the overall range of variation of the ordinate (vertical) value or the Y axis. What does it represent, physically? Is it's range small or large, compared to the typical values? A curve that varies between 0 and 100 is probably telling you something different than one that varies between 99.999 and 100!

Describing a Simple Plot of Data

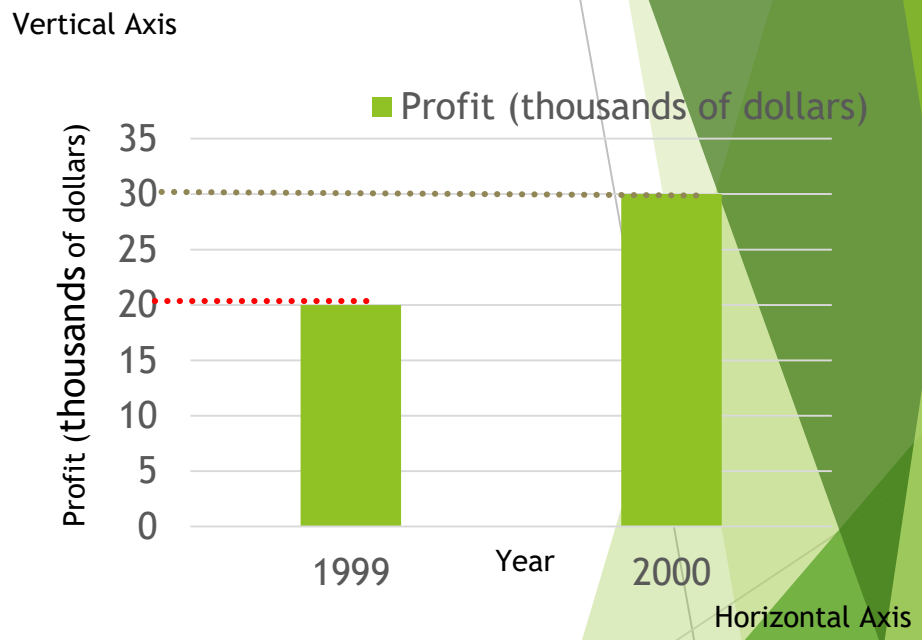
- Third, look at the shape of the curve:
  --Does the ordinate increase or decrease consistently with increasing abcissa value? If so, the curve is said to be 'monotonically' increasing or decreasing respectively. Even if it is somewhat variable, is there a general trend? Does it mostly increase or decrease with increasing abcissa value?
  --Does the curve have a series of peaks? If so, how many peaks occur? How wide are they, and how wide is the space between them? A curve might have sharp peaks separated by flat intervals, or broad peaks.
  --Does the curve have any sharp steps or jumps. If so, how many? How much does the ordinate change across the steps?
  --Does the overall appearance of the curve remind you of anything: a straight line, a bell curve, waves on the ocean; a staircase; a saw-tooth pattern; scallops, etc.?

Other Observations

--Does the curve have a series of peaks? If so, how many peaks occur? How wide are they, and how wide is the space between them? A curve might have sharp peaks separated by flat intervals, or broad peaks.
--Does the curve have any sharp steps or jumps. If so, how many? How much does the ordinate change across the steps?
--Does the overall appearance of the curve remind you of anything: a straight line, a bell curve, waves on the ocean; a staircase; a saw-tooth pattern; scallops, etc.?

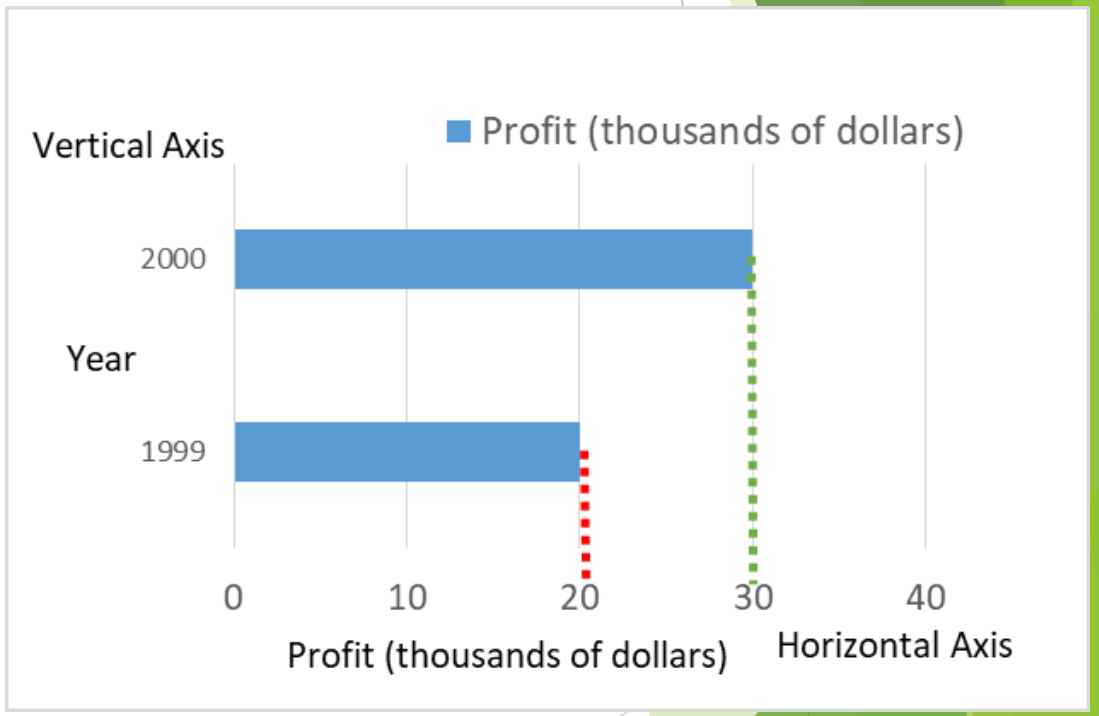
Bar Graph: Vertical Bar graph

- This gives a visual representation of data that has been collected.
- It has 2 axes: a horizontal axis (generally for independent variable) and a vertical axis (for dependent variable).
- The horizontal axis represents years and the vertical axis represents profit in thousands of dollars.
- Where the top of the bar corresponds to the value on the vertical axis for the dependent variable and the bottom of the bar corresponds to the year, the independent variable.
- The first bar on the left associates with the year 1999 AND a profit of $20,000. The red line shows how the top of the bar lines up with 20 on the vertical axis.
- The second bar from the left associates with the year 2000 and the profit of $30,000. The green line shows how the top of the bar lines up with 30 on the vertical axis.

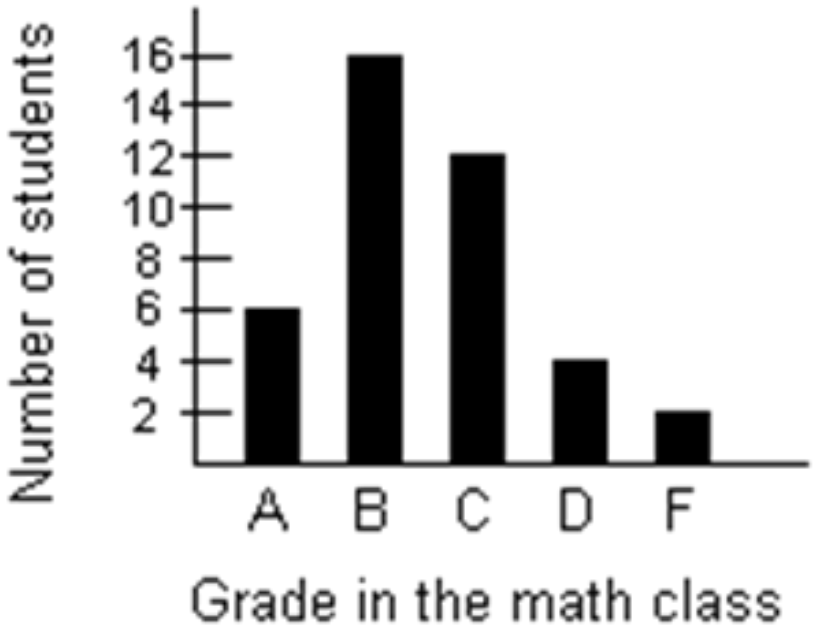


Bar Graph: Horizontal Bar graph

- If the bars are horizontal, match the right end of the bar with the horizontal axis found at the bottom of the overall graph to find the information the bar associates with on the horizontal axis.
- The left end of the bar associates with the information on the vertical axis.
- The vertical axis represents years and the horizontal axis represents profit in thousands of dollars.
- The first bar on the bottom associates with the year 1999 AND the profit of $20,000. The red line shows how the right end of the bar lines up with 20 on the horizontal axis.
- The second bar from the bottom associates with the year 2000 and the profit of $30,000. The green line shows how the right end of the bar lines up with 30 on the horizontal axis.
- Enter these data in an excel spreadsheet and plot both graphs



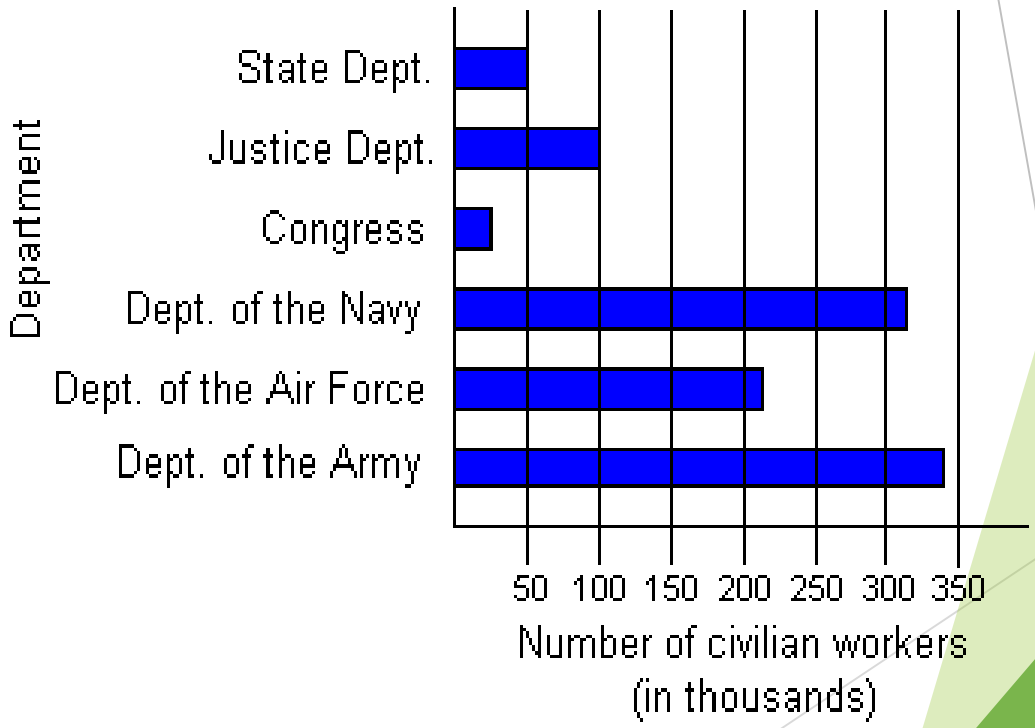
Example 1: The bar graph below shows the number of students in a math class that received the grades shown. Use this graph to answer questions 1a - 1d.



- 1a. Find the number of students who received an A.
- 1b. Find the number of students who received an F.
- 1c. Find the number of students who passed the course (D or higher).
- 1d. Which grade did the most students receive?
- Enter these data in an excel spreadsheet and plot graph

Example 2: The bar graph below shows the number of civilians holding various federal government jobs. Use the graph to answer questions 2a - 2d.

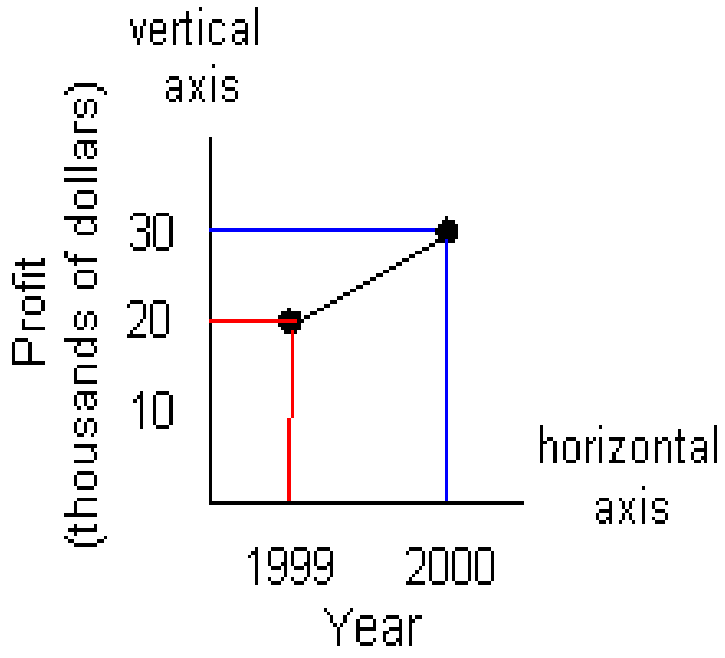
- 2a. About how many civilians work for Congress?
- 2b. About how many civilians work for the State Department?
- 2c. About how many civilians work for the armed forces (Navy, Air Force, and Army)?
- 2d. Which federal government job listed has the most civilian workers?
- Enter these data in an excel spreadsheet and answer above Qs.



Line Graph

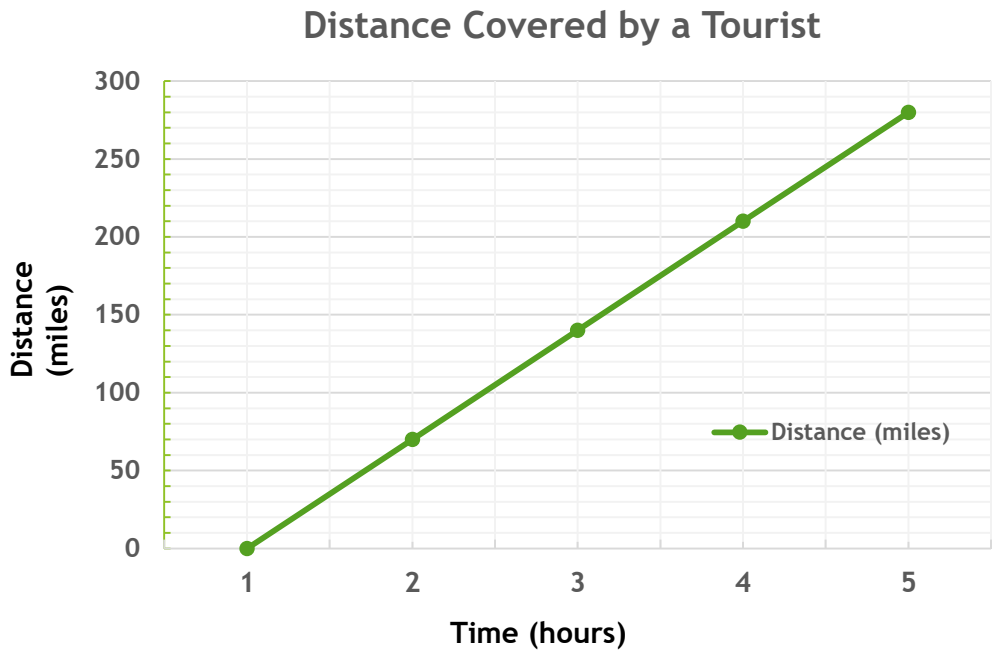
- A line graph is another way to give a visual representation of the relationship of data that has been collected.
- It is made up of a vertical and horizontal axis and a series of points that are connected by a line.
- Each point on the line matches up with a corresponding vertical axis and horizontal axis value on the graph.
- In some cases, you are giving a value from the horizontal axis and you need to find its corresponding value from the vertical axis. You find the point on the line that matches the given value from the horizontal axis and then match it up with its corresponding vertical axis value to find the value you are looking for. You would do the same type of process if you were given a vertical axis value and needed to find a horizontal axis value.

Example of a line graph



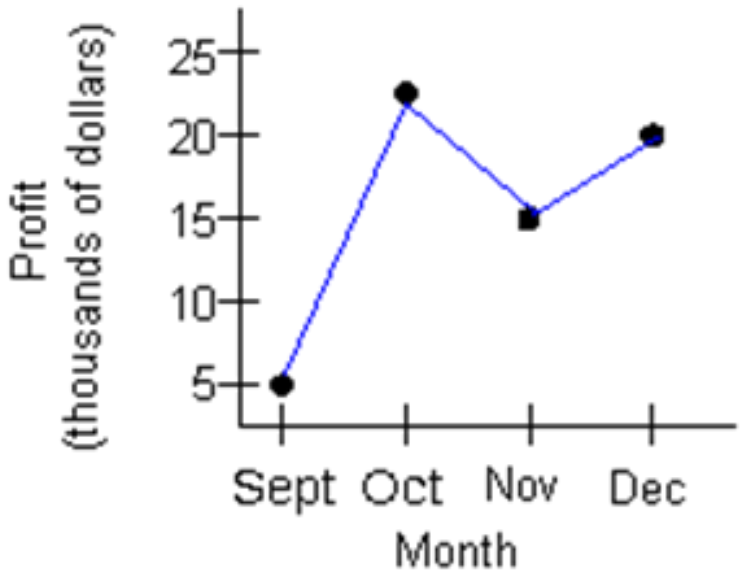
- Note that the horizontal axis represents years and the vertical axis represents profit in thousands of dollars.
- The first point on the left associates with the year 1999 AND the profit of $20,000. The red line shows how it lines up with 20 on the vertical axis and 1999 on the horizontal axis.
- The second point from the left associates with the year 2000 and the profit of $30,000. The blue line shows how it lines up with 30 on the vertical axis and 2000 on the horizontal axis.
- By joining the two points we are indicating a trend (slope) from one year to the next, so for instance the increase in profit from 1999 to 2000 was $10,000 or rate of profit change was +10,000/y

Example 3: The line graph below shows the distance traveled by a tourist going 70 mph down Mass Pike from 0 to 4 hours. Use the graph to answer questions 3a - 3b.



- 3a. How far has the tourist traveled after 3 hours?
- 3b. How long does it take the tourist to travel 140 miles?

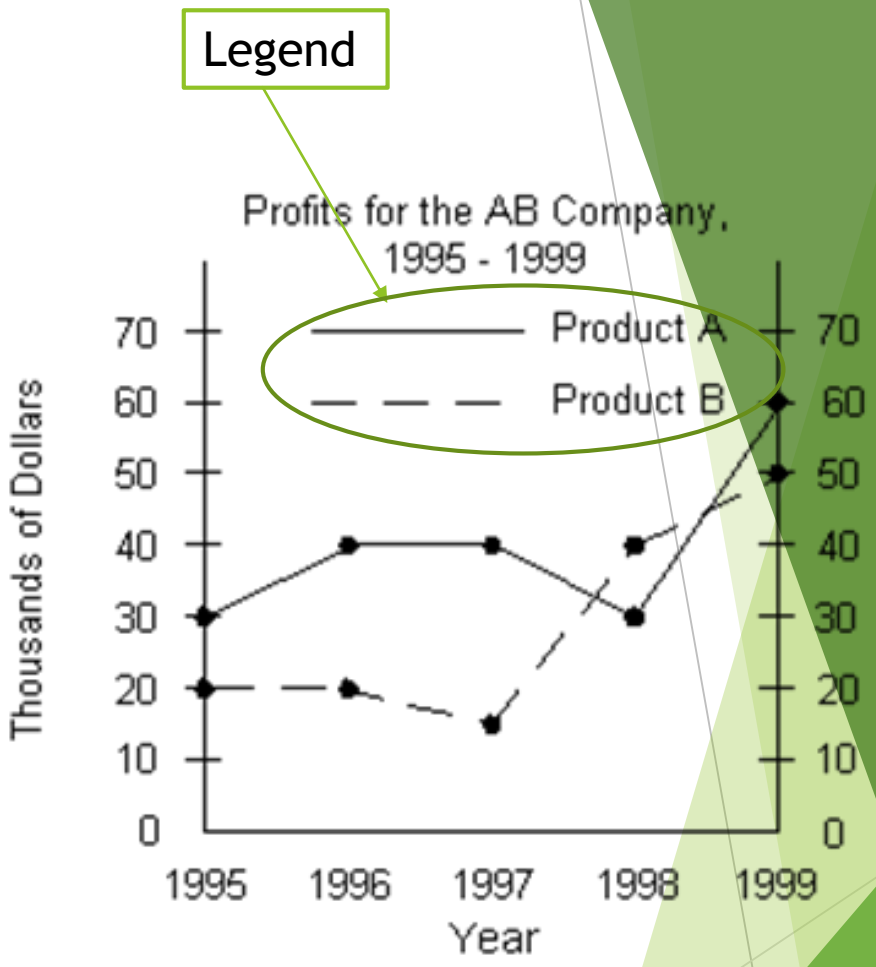
Example 4: The line graph below shows the profit a local candy company made over the months of September through December of last year. Use the graph to answer questions 4a - 4c.



- Enter these data in an excel spreadsheet to recreate this graph and answer the following:
- 4a. About how much was the profit in the month of October?
- 4b. Which month had the lowest profit?
- 4c. What is the difference between the profits of November and December?

Double Line Graph

- This is another way to give a visual representation of the relationship of data that has been collected.
- It is similar to a line graph but has two lines of data in the same frame.
- It is made up of two axes: vertical and horizontal and two series of points connected by a line (of different type or color for each).
- A legend is included to inform which line is for which series of data.
- Again, each data point on each line corresponds to a specific value on the vertical and horizontal axes.
- Given a value for one data point on one axis, the corresponding value for that point on the other axis can be found from the plot.



Example 5: The double line graph below shows the total enrollment of students in a local college from 1990 - 1995, broken down into part-time and full-time students. Use the graph to answer questions 5a - 5c.

- 5a. What was the full-time enrollment in 1992?
- 5b. For what year shown on the graph did the number of part-time students exceed the previous year's number of part-time students by the greatest number?
- 5c. What was the total enrollment from 1993 to 1995?