

1. For Susan Dean's spring pre-calculus class, scores for the first exam were as follows (smallest to largest):

33; 42; 49; 49; 53; 55; 55; 61; 63; 67; 68; 68; 69; 69; 72; 73; 74; 78; 80; 83; 88; 88; 88; 90; 92; 94; 94; 94; 94; 96; 100 Construct a Stem-and-Leaf Display.

The data are the distances (in kilometers) from a home to local supermarkets. Create a stemplot using the data:

1.1; 1.5; 2.3; 2.5; 2.7; 3.2; 3.3; 3.3; 3.5; 3.8; 4.0; 4.2; 4.5; 4.5; 4.7; 4.8; 5.5; 5.6; 6.5; 6.7; 12.3

Do the data seem to have any concentration of values?

Try

The miles per gallon rating for 30 cars are shown below (lowest to highest).

19, 19, 19, 20, 21, 21, 25, 25, 25, 26, 26, 28, 29, 31, 31, 32, 32, 33, 34, 35, 36, 37, 37, 38, 38, 38, 38, 41, 43,
43

Another type of graph that is useful for specific data values is a **line graph**. In the particular line graph, the **x-axis** (horizontal axis) consists of **data values** and the **y-axis** (vertical axis) consists of **frequency points**. The frequency points are connected using line segments.

Line Chart:

Example 1

In a survey, 40 mothers were asked how many times per week a teenager must be reminded to do his or her chores.

Number of times teenager is reminded	Frequency
0	2
1	5
2	8
3	14
4	7
5	4

Example 2

In a survey, 40 people were asked how many times per year they had their car in the shop for repairs. The results are shown in [Table 2.8](#). Construct a line graph.

Number of times in shop	Frequency
0	7
1	10
2	14
3	9

Table2.8

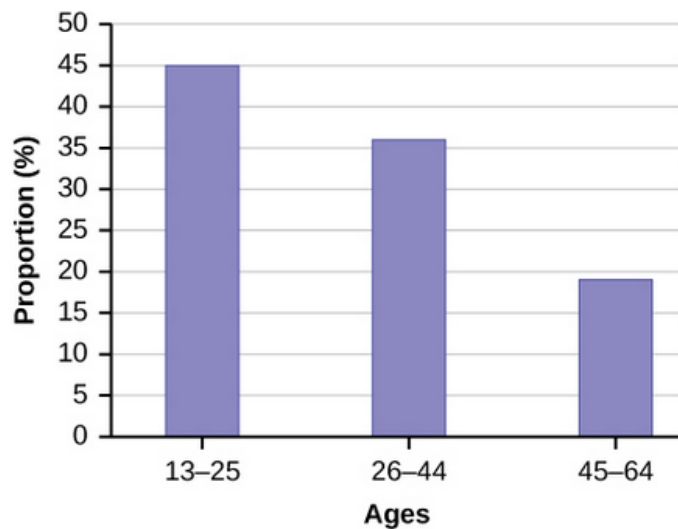
Bar graphs

Bar graphs consist of bars that are separated from each other. The bars can be rectangles or they can be rectangular boxes (used in three-dimensional plots), and they can be vertical or horizontal.

Example

By the end of 2011, Facebook had over 146 million users in the United States. Table shows three age groups, the number of users in each age group, and the proportion (%) of users in each age group. Construct a bar graph using this data.

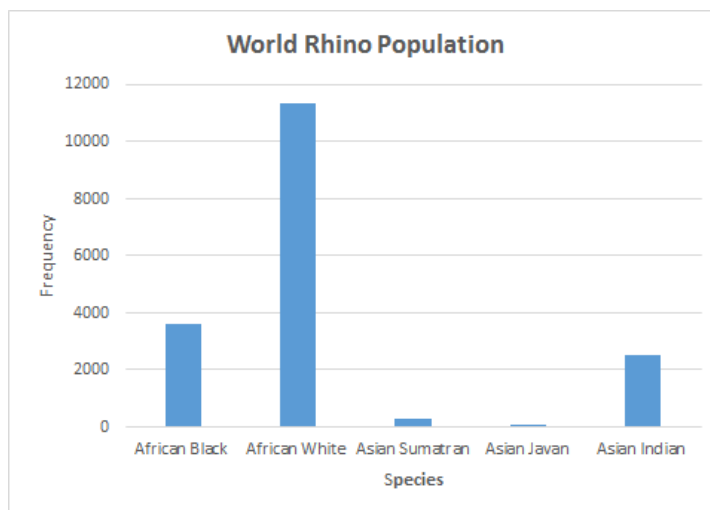
Age groups	Number of Facebook users	Proportion
13–25	65,082,280	45%
26–44	53,300,200	36%
45–64	27,885,100	19%



Example

The International Rhino Federation estimates that there are 17800 rhinoceroses living in the wild in Africa and Asia. A Breakdown of the number of rhinos of each species is reported in the accompanying table:

Rhino Species	Population Estimate
African Black	3610
African White	11330
Asian Sumatran	300
Asian Javan	60
Asian Indian	2500



1. What type of graph is displayed above?

Bar graph

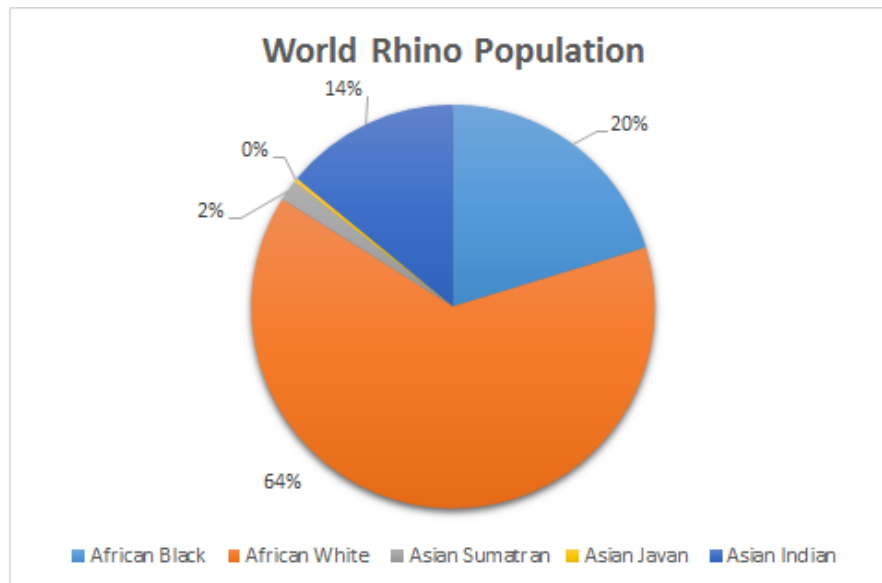
2. Is this a Pareto chart? If not, how would the above graph need to be changed in order to make it a Pareto chart?

No, This is not a Pareto Chart. It's not in decreasing order

3. What percentage of rhinos are Asian?

From Bar graph , we can not say exact % of data.

Example



1. What type of graph is displayed above?
2. Is it true that a majority of rhinos are African White? Explain.
3. What percentage of rhinos are Asian?

Section 2.2 Histograms and Time series graphs

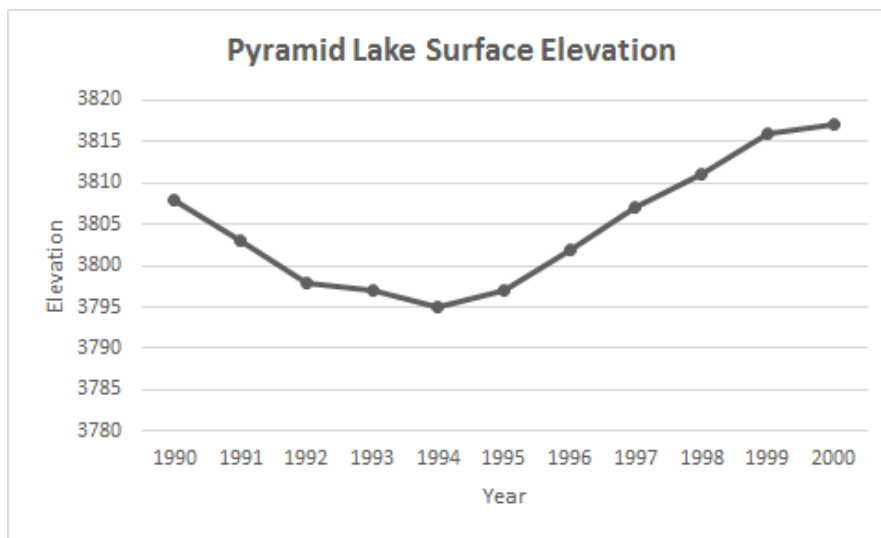
Time Series Graphs

A Time Series Graph displays measurements of the same individual over a period of time. For example, measuring the snowpack in the Sierras every few weeks in winter and spring.

Example

Pyramid Lake, Nevada, is described as the pride of the Paiute Indian Nation. It is a beautiful desert lake famous for very large trout. The elevation of the lake surface (feet above sea level) varies according to the annual flow of the Truckee River from Lake Tahoe. The U.S. geological Survey provided the following data:

Yr.	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
El.	3808	3803	3798	3797	3795	3797	3802	3807	3811	3816	3817



1. What type of graph is displayed above?

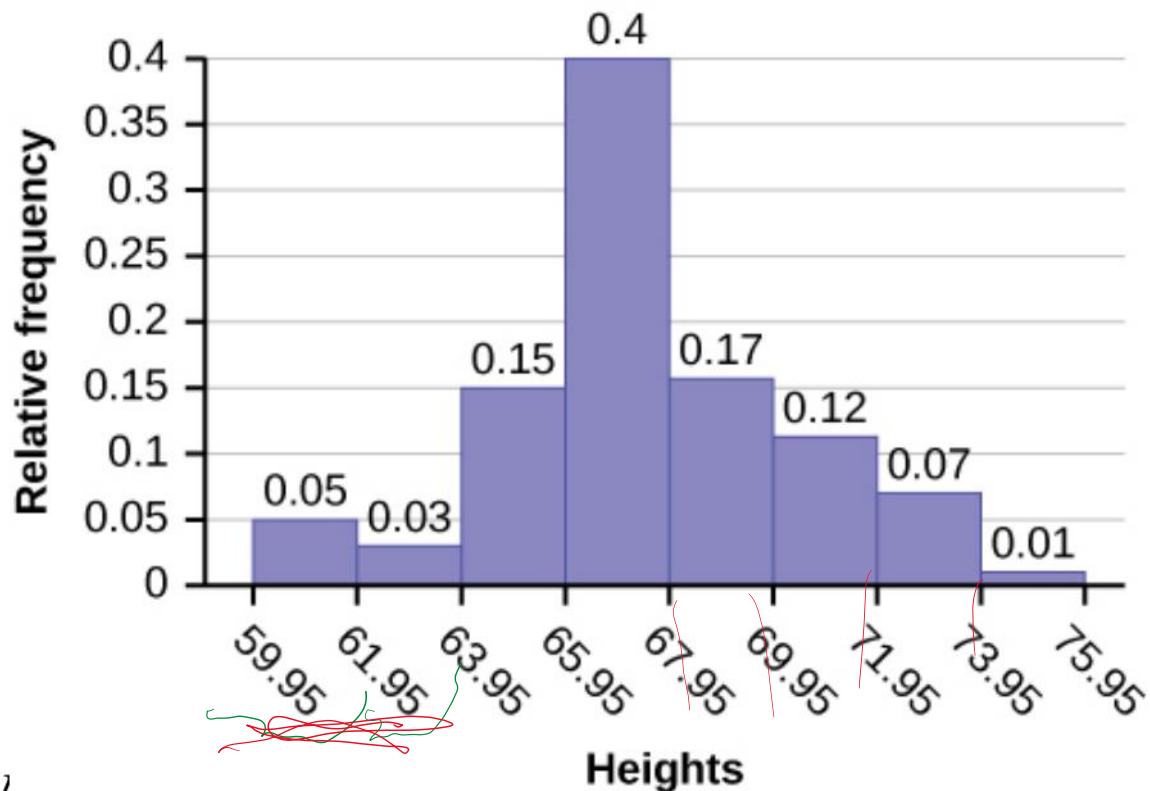
Time Series Graph

2. In the first part of the 1990's, is the lake surface elevation increasing or decreasing?
Decreasing

3. In the second part of the 1990's, is the lake surface elevation increasing or decreasing?
Increasing

Histogram:

- A histogram consists of contiguous (adjoining) boxes.
- The horizontal axis is labeled with what the data represents.
- The vertical axis is labeled either frequency or relative frequency (or percent frequency or probability).



- The histogram (like the stem plot) can give you the shape of the data, the center, and the spread of the data.
- One advantage of a histogram is that it can readily display large data sets.

Parts of Histogram

- Class Width: $\frac{\text{Highest Data value} - \text{Lowest data value}}{\text{Number of Classes}}$
- Lower Class Limits: lowest data value that can be in a class,
- Higher Class Limits: highest data value that can be in a class
- Class Boundaries: The boundaries of each class
- Frequency: Number of data values in each class
- Relative Frequency.
- Cumulative Frequency or Relative Cumulative Frequency
- Class Midpoints: The midpoint of a class is the average between it's Lower and Upper Boundaries or Lower and Upper Limits: $\frac{\text{Lower Limit} + \text{Upper Limit}}{2}$

$$\text{width} = \frac{\text{Highest data value} - \text{lowest data value}}{\text{No. of classes.}}$$

Constructing a Histogram

1 Determine class width

2 Create classes by finding lower and upper class limits. Each lower class limit is a class width higher than the last lower class limit. Each upper class limit is one class width higher than the last upper class limit.

3 The midpoints between one class's upper limit and the next class's lower limit is a class boundary.

Usually that is just adding .5 to the upper limit to get the upper boundary and subtracting .5 from the lower limit to get the lower boundary.

4 Order the data if not already done so, find each class frequency.

5 compute the midpoint in each class (use this to label each class.)

6 Draw the histogram.

Example:

Create a histogram with five classes for the following data: ~~24, 25, 25, 27, 27, 29, 30, 35, 35, 35, 36, 38, 38, 39, 39, 40, 40, 40, 45, 45, 45, 45, 47, 52, 52, 52, 58, 59, 59, 61, 61, 67, 68, 68, 68~~

24, 68

$$\text{width} = \frac{\text{Highest data value} - \text{lowest data value}}{\text{No. of classes}}$$

$$= \frac{68 - 24}{5} = 8.8 \approx 9 \text{ (always round up)}$$

Lower class limit	Upper class limit	Lower class boundary	Upper class boundary	Tally	Frequency
24 - 32		23.5	32.5		4
33 - 41		32.5	41.5		4
42 - 50		41.5	50.5		4
51 - 59		50.5	59.5		4
60 - 68		59.5	68.5		4

Example:

Create a histogram with five classes for the following data: 24, 25, 25, 27, 27, 29, 30, 35, 35, 35, 36, 38, 38, 39, 39, 40, 40, 40, 45, 45, 45, 45, 47, 52, 52, 52, 58, 59, 59, 61, 61, 67, 68, 68, 68

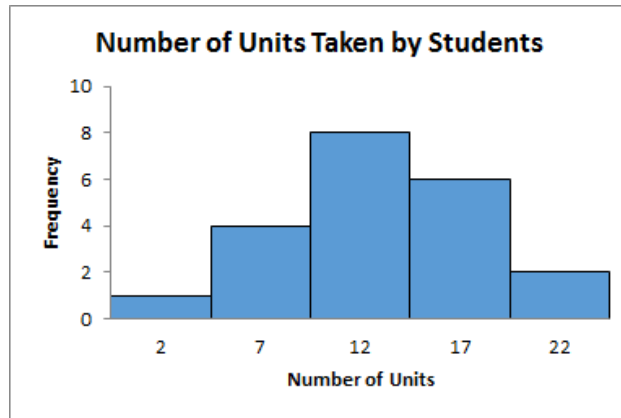


Basic Graph Shapes:

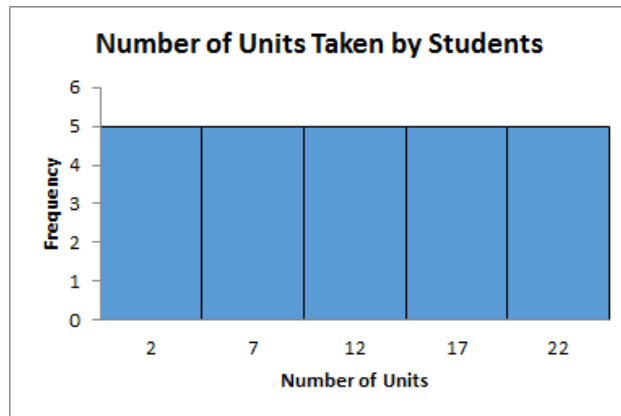
;-k

- Mound-shaped
- Uniform
- Skewed Right
- Skewed Left
- Bimodal

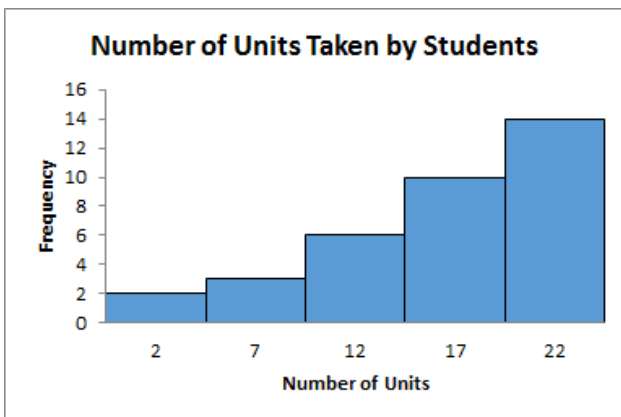
Basic Graph Shapes: Identify the following Histogram Graph shapes:



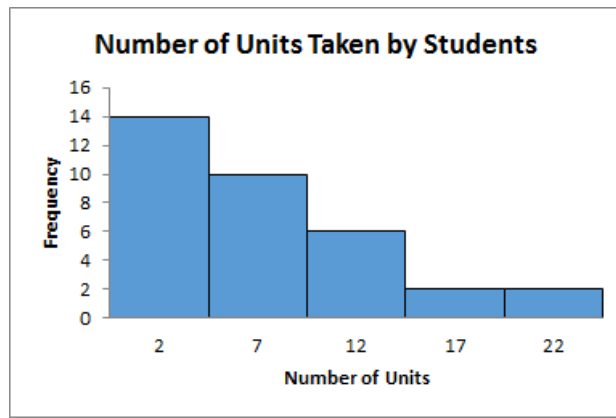
Mound shaped



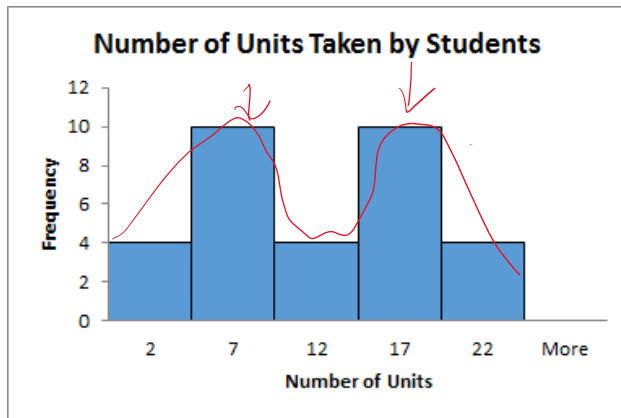
Uniform



left skewed

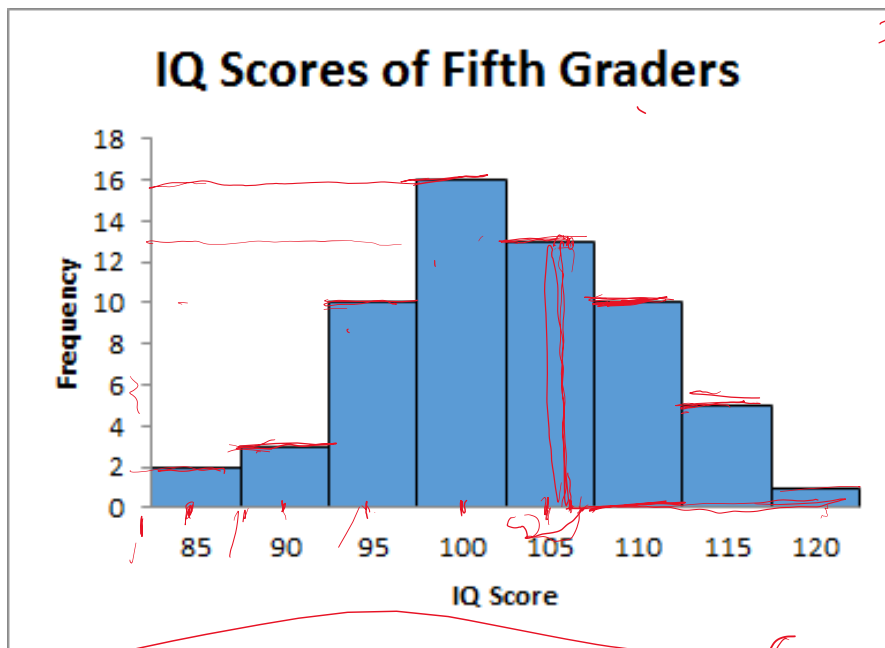


Right Skewed



Bimodal
because it has
two peaks.

multiple peaks, multimodal graph



≈ 50

$$2 + 3 + 10 + 16 + 13 + 10 + 5 + 1 = 60$$

Normal shaped

1. Describe the shape of the graph.

2. What percent of students have an IQ score of at least 108?

108 or higher than it

$$\frac{13 + 5 + 1}{50}$$

$$\frac{29}{60}$$

$$= 0.48$$

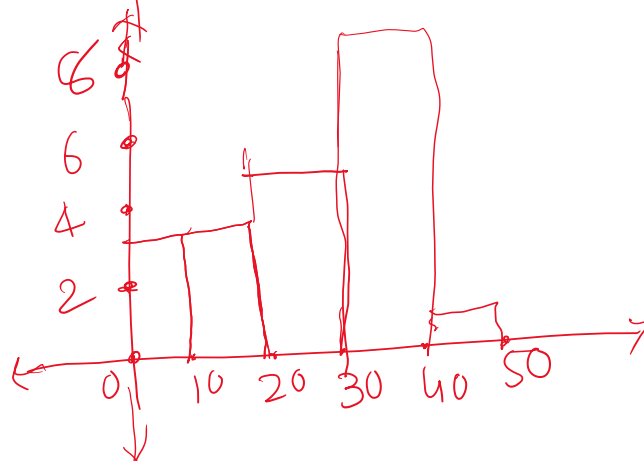
$$48\%$$

Try

Construct a Histogram with a class width of 10. Take your first class 0-9.

9	27	16	24	18
37	20	21	31	31
41	9	32	32	39
4	15	27	37	30

	Lower class limit	Upper class limit	Tally	Frequency
	0	9		3
+10	10	19		3
+10	20	29		5
+10	30	39		8
+10	40	49		1



Dot plot

A dot plot is a graph in which each observation is plotted as a dot at an appropriate place above a horizontal axis. Observations having equal values are stacked vertically.

To Construct a Dot plot

Step 1 Draw a horizontal axis that displays the possible values of the quantitative data.

Step 2 Record each observation by placing a dot over the appropriate value on the horizontal axis.

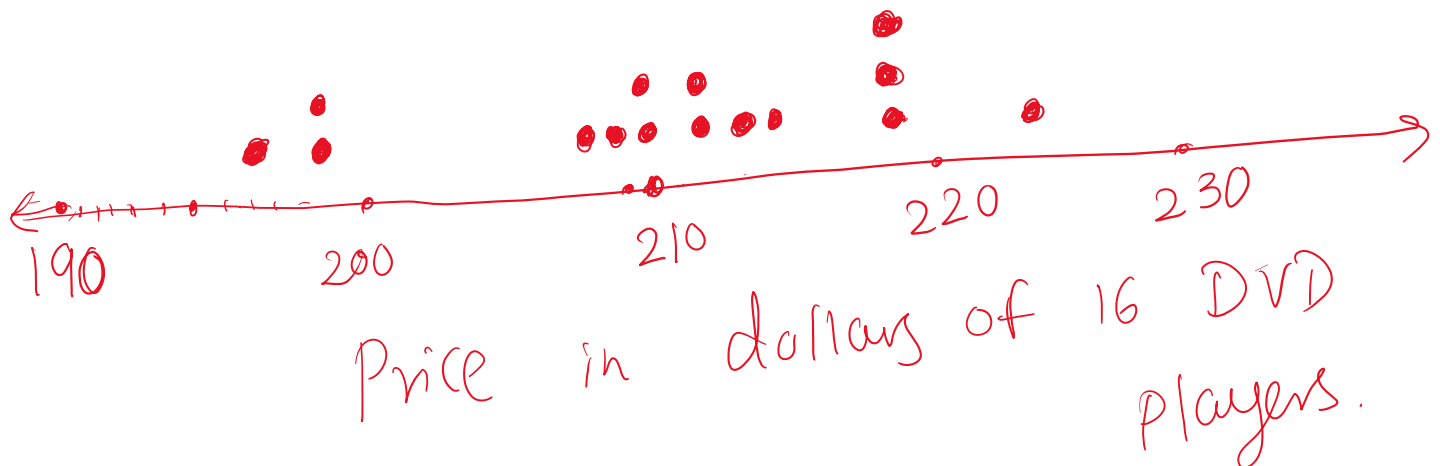
Step 3 Label the horizontal axis with the name of the variable.

Example:

One of Professor Weiss's sons wanted to add a new DVD player to his home theater system. He used the Internet to shop and went to price-watch.com. There he found 16 quotes on different brands and styles of DVD players. Table 2.11 lists the prices, in dollars. Construct a dot plot for these data.

Prices, in dollars, of 16 DVD players

210	219	214	197
224	219	199	199
208	209	215	199
212	212	219	210



Example:

The following data represent highway fuel consumption in miles per gallon (mpg) for a random sample of 50 models of cars. Each dot represents one car. Use the graph below to answer the questions.

1. The following is called a Dot Plot
2. Does this data set appear to have any outliers? Explain.

yes, 52 mpg

3. What percent of the cars have a fuel consumption of at least 30 mpg?

$$\frac{8}{50} = 16\%$$

30 or higher

