Section 3.1 – Shapes of Distributions

MDM4U
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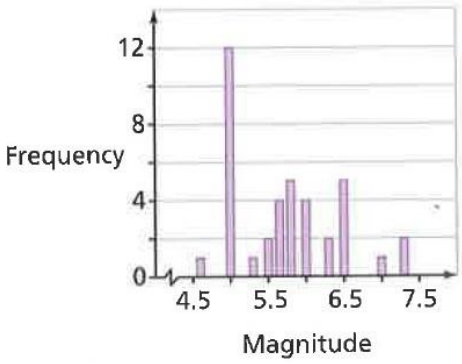
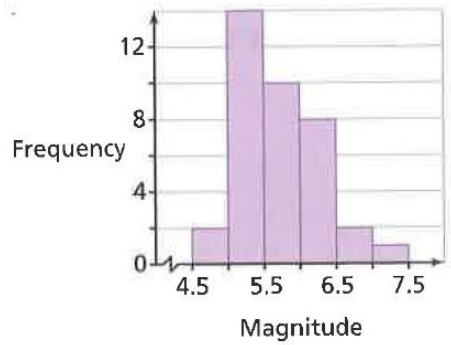
Part 1: Histogram Review

Example 1: Earthquakes are measured on a scale known as the Richter Scale. There data are a sample of earthquake magnitudes in Canada between 1960 and 1965.

5.0	5.0	6.4	5.0	6.0	5.6	6.5	6.5	5.0	5.5
6.4	7.2	5.0	5.7	5.6	5.0	5.0	5.0	5.0	5.7
5.0	7.0	5.5	5.2	4.6	6.3	7.2	6.0	5.4	5.8
6.0	5.7	6.5	5.0	5.7	5.0	5.6	6.0	5.6	6.2

What is wrong with how each of the following histograms display the above data?





Lets Make an Effective Histogram for the Data:

a) Determine the range of the data

b) Determine an appropriate bin (interval) width that will divide the data into 6 intervals.

> Note:
>
> Round your range UP to a value that can be divided easily.

c) Determine the first value of your first interval

We added ____ to 2.6 when we rounded our range, therefore we should subtract ____ from our smallest value ____; which makes our starting point ____.

However, some data will still fall on the border of the intervals, so we should add a decimal place by subtracting .05 from our starting point.

> **Note:**
>
> 1. If you have rounded your range up you should subtract half of the amount you rounded from the smallest value to evenly distribute the 'excess of your range'.
>
> **2. Make sure no data points lie on the border of two intervals. (Do this by subtracting .5 from a whole number, .05 from data with one decimal point, .005 from data with two decimal points and so on)**

d) Create a frequency table using your intervals

> Notice that the number one interval ends with, the next interval starts with the same number. This is because the data for a histogram is continuous!!!

Class Interval	Frequency

e) Create a histogram of the data

Part 2: The Shape of a Distribution

Step back from a histogram. What can you say about the distribution? When you describe a distribution, you should always comment about three things: its shape, center, and spread. In this lesson we will focus on shape.

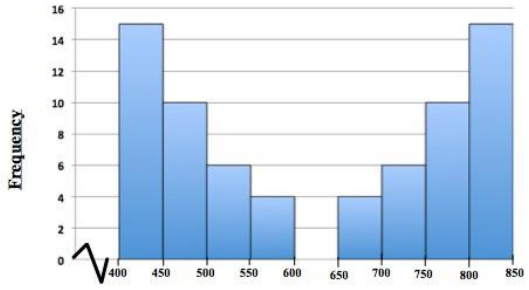
The mode of a histogram is an important characteristic that is often used in describing its shape. The mode of a histogram is the interval with the highest frequency. Does the histogram have a single peak, central peak, or several separated peaks? These peaks are called modes.

The shape of a distribution is generally described in one of four ways:

Note: *A graph is roughly symmetric if the right and left sides of the graph are approximately* _____ *of each other.*

1. U---Shaped Distribution

The scores from the game of spider solitaire form this type of distribution.



Score	400–449	450–499	500–549	550–599	600–649	650–699	700–749	750–799	800–849
Frequency	15	10	6	4	0	4	6	10	15

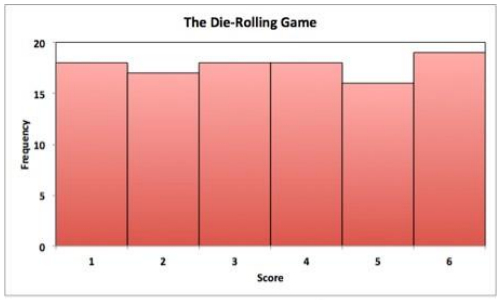
--- A U---shaped distribution occurs when there are _____ at either end of the range

--- Because it has two peaks, it can also be described as a _____ distribution

Can you think of another example of a frequency distribution that would be U---shaped (bimodal)?

2. Uniform Distribution

This is the distribution you would expect from an experiment such as rolling a single die.



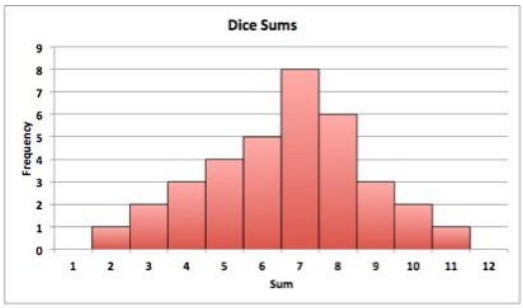
Score	1	2	3	4	5	6
Frequency	18	17	18	18	16	19

--- When each outcome has a _____ frequency, it is called a uniform distribution. The height of each bar is roughly _____.

--- Notice, there doesn't appear to be any one single mode.

3. Mound Shaped Distribution

Rolling a pair of dice and recording the sum results in this type of distribution.



Sum	2	3	4	5	6	7	8	9	10	11	12
Frequency	1	2	3	4	5	8	6	3	2	1	0

--- In this distribution, there is an interval with the greatest frequency _____, and the frequencies of all other intervals _____ on either side of that

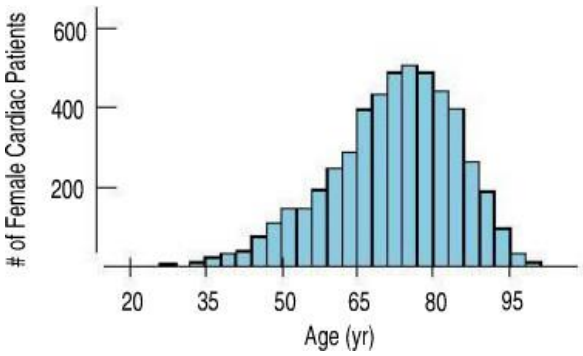
--- The frequency distribution takes on a mound (or bell) shape. It can also be described as _____ since it has one clear peak (mode).

Do you notice any similarities between the first 3 shapes of distributions?

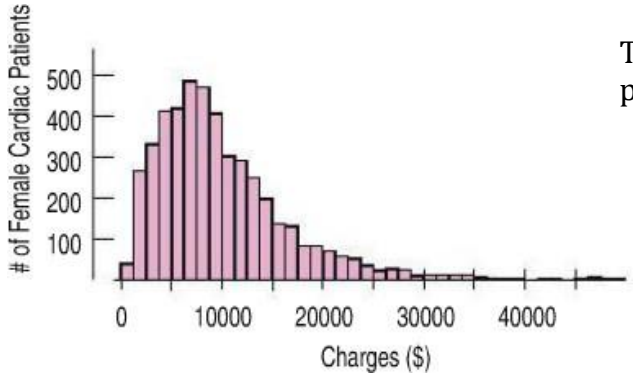
4. Skewed

The thinner ends of a distribution are called the tails. If one tail stretches out farther than the other, the histogram is said to be skewed to the side of the _____ tail.

Another way to say it is that the interval or group of intervals with the highest frequencies are near one end of the histogram. As a result, the distribution seems to tail off to the left or right.



This distribution of ages of female heart attack patients is _____ skewed.



This distribution of cost of treatment for heart attack patients is _____ skewed.

Tip: *If you get mixed up between left and right skewed……look at your toes!*

Why call it left or right skewed?