

## SECTION 2.1 – Organizing Qualitative Data

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**Frequency** – The number of times an observation occurs in a data set.

**Frequency distribution** – A **frequency distribution** lists each category of data and the number of occurrences for each category of data.

**Relative frequency** – The **relative frequency** is the proportion (or percent) of observations within a category and is found using the formula

$$\text{Relative frequency} = \frac{\text{frequency}}{\text{sum of all frequencies}}$$

**Relative frequency distribution** – A **relative frequency distribution** lists each category of data together with the relative frequency.

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### ☺ Class Activity & Exercise:

- 1) The data will be collected by each member of the class. Each student will write their birth month on the board. Construct a frequency distribution as well as a relative-frequency distribution.

*Frequency Distribution*

Month	Tally	Frequency
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		

*Relative Frequency Distribution*

Month	Tally	Frequency	Relative Frequency
January			
February			
March			
April			
May			
June			
July			
August			
September			
October			
November			
December			

Note: The ‘Tally’ column for the first table is optional and the ‘Tally’ and ‘Frequency’ columns for the second table are optional, yet helpful.

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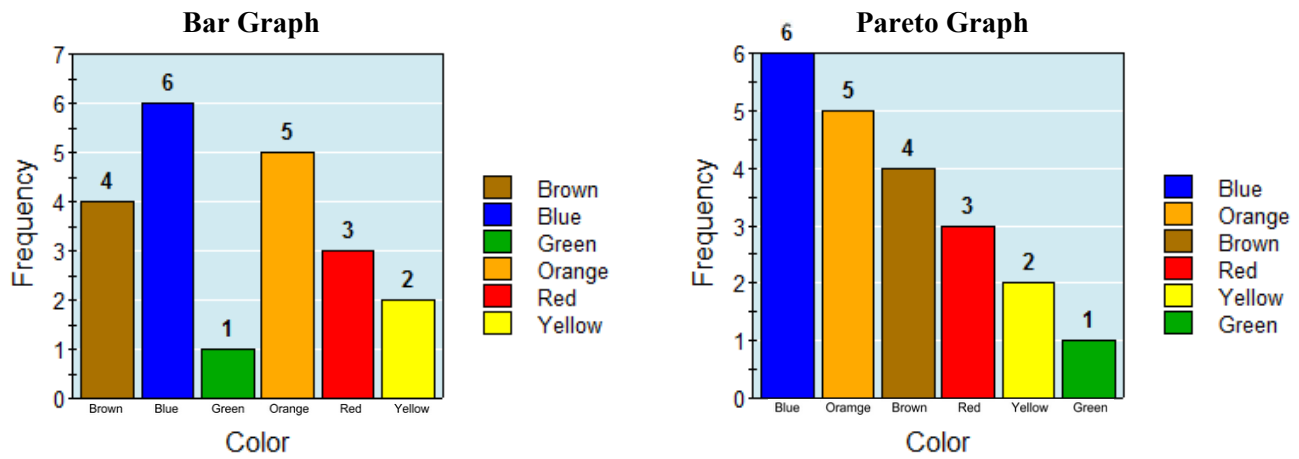
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**Bar graph** – A graph that is constructed by labeling each category of data on either the horizontal or vertical axis and the frequency or relative frequency of the category on the other axis. Rectangles of equal width are drawn for each category. The height of each rectangle represents the category’s frequency or relative frequency.

**Pareto chart** – A **Pareto chart** is a bar graph whose bars are drawn in decreasing order of frequency or relative frequency.

☺ **Example #1:**

A bag of peanut M&M’s were opened and the following colors with their respective quantities were present: 4 Brown, 6 Blue, 1 Green, 5 Orange, 3 Red, 2 Yellow. Construct both a bar graph and pareto graph for the data.



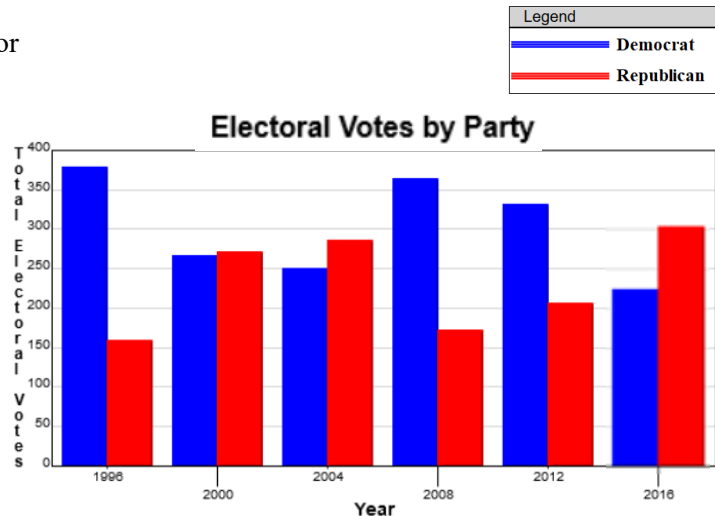
Note: In bar graphs, notice that the bars do not touch each other. If the bars are not separated from one another, then this is called a histogram, NOT a bar chart. Bar graphs use qualitative data, while histograms use quantitative data. Also, color legends are optional, yet needed, if the user decides to not display the data descriptors on the horizontal axis for vertical bars (or vertical axis for horizontal bars).

**Side-by-side bar graphs** – Bar graphs that compare the data for two (or more) independent variables.

☺ **Example #2:**

The table below provides the total electoral votes for the last six U.S. Presidential elections. Construct a Side-by-side bar graph for the data.

Year	Total Electoral Votes	
	Democrat	Republican
1996	379	159
2000	266	271
2004	251	286
2008	365	173
2012	332	206
2016	227	304



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**Pie chart** – A pie chart is a circle divided into sectors. Each sector represents a category of data. The area of each sector is proportional to the frequency of the category.

☺ **Example #3:**

As of June 14<sup>th</sup>, 2020, the cumulative number of confirmed cases of COVID -19 by age in Orange County, California is given in the frequency distribution below. Construct a pie chart for the distribution.

Source: <https://occcovid19.ochealthinfo.com/coronavirus-in-oc>

Subjects	Frequency
0–17	403
18–24	851
25–34	1614
35–44	1337
45–54	1512
55–64	1251
65–74	726
75–84	504
85+	373

First, find the total frequency. Next, calculate the percent of the circle of each slice.

$$0-17: \frac{403}{8571} \approx 4.7\%$$

$$18-24: \frac{851}{8571} \approx 9.9\%$$

$$25-34: \frac{1614}{8571} \approx 18.8\%$$

$$35-44: \frac{1337}{8571} \approx 15.6\%$$

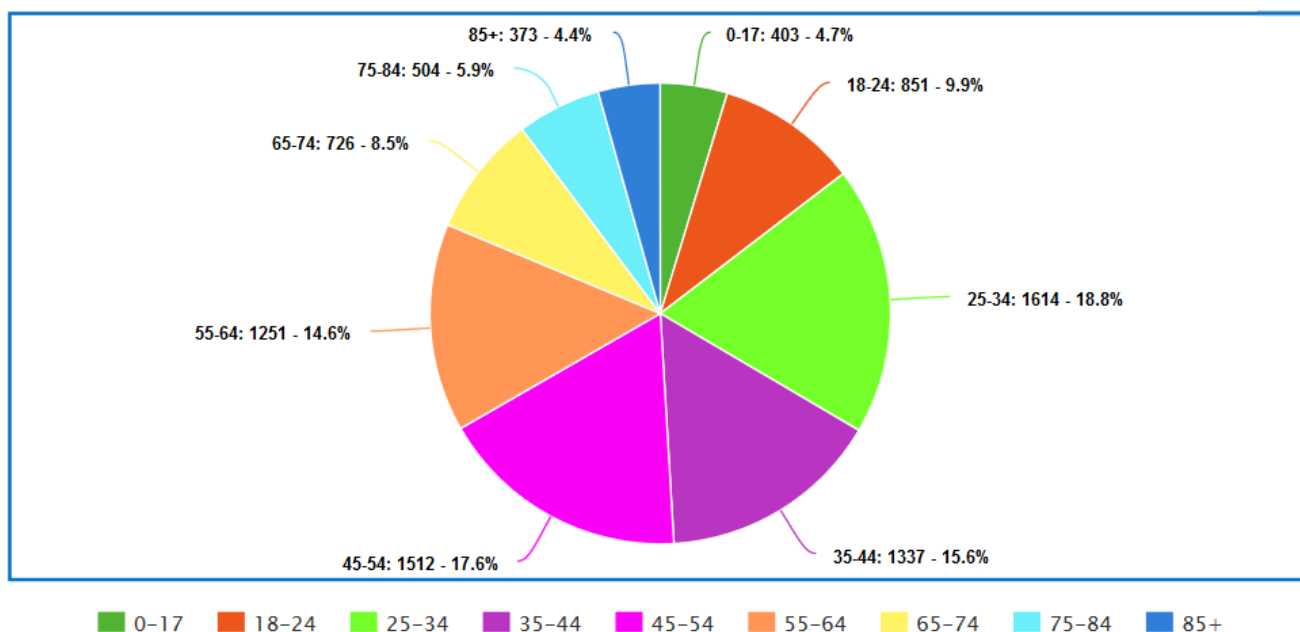
$$45-54: \frac{1512}{8571} \approx 17.6\%$$

$$55-64: \frac{1251}{8571} \approx 14.6\%$$

$$65-74: \frac{726}{8571} \approx 8.5\%$$

$$75-84: \frac{504}{8571} \approx 5.9\%$$

$$85+: \frac{373}{8571} \approx 4.4\%$$



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☺ **Exercises:**

- 2) **Blood Type.** A phlebotomist draws the blood of a random sample of 50 patients and determines their blood types as shown below. Construct a pie chart for the data.

O	O	A	A	O	O	A	A	O	A
B	O	B	A	O	O	A	O	AB	A
AB	B	A	B	AB	O	B	A	A	O
O	O	A	A	O	O	O	O	A	O
AB	O	A	B	A	O	A	O	A	O

