Chapter 2-Visualizing Data using Charts

DS 23 - Business Statistics

2.2 Bar Charts, Pie Charts, and Stem and Leaf Diagrams

Pie Charts

When you need to graph the percentage breakdown in categories. The percentages must total 100% or 1 if you are looking at decimal points.

View this video on how to construct a pie chart in Excel.

Bar Charts

When the percentages does not add up to 100% and the categories are qualitative data (ordinal or nominal) a Bar chart is a better chart to use to display the data.

View this video on how to construct a bar chart in Excel

Stem and leaf diagram

Suppose you wanted to create a stem and leaf diagram, this is an easy way to use all the data to create a visual representation of the data. It is similar to a horizontal bar chart and it uses all the data. First you must determine the stems for your chart and then each digit that is to the right of the stem number is considered a leaf.

2-23.

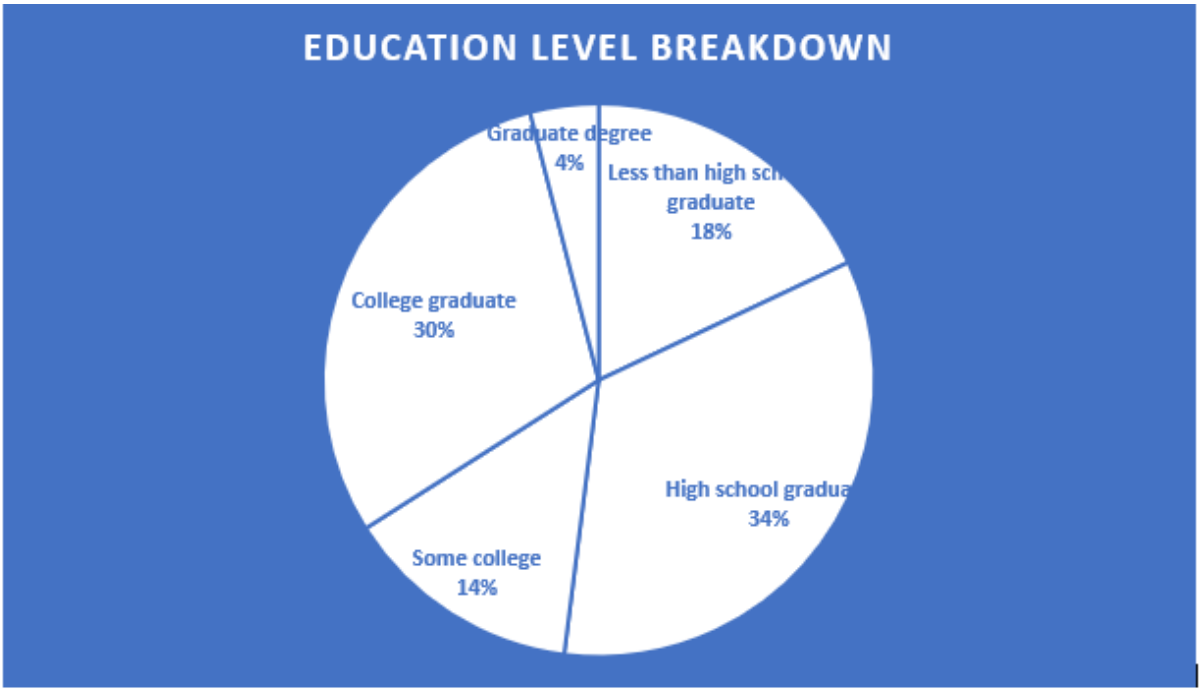
The following data reflect the percentages of employees with different levels of education:

Education Level	Percentage
Less than high school graduate	18
High school graduate	34
Some college	14
College graduate	30
Graduate degree	4
	Total=100

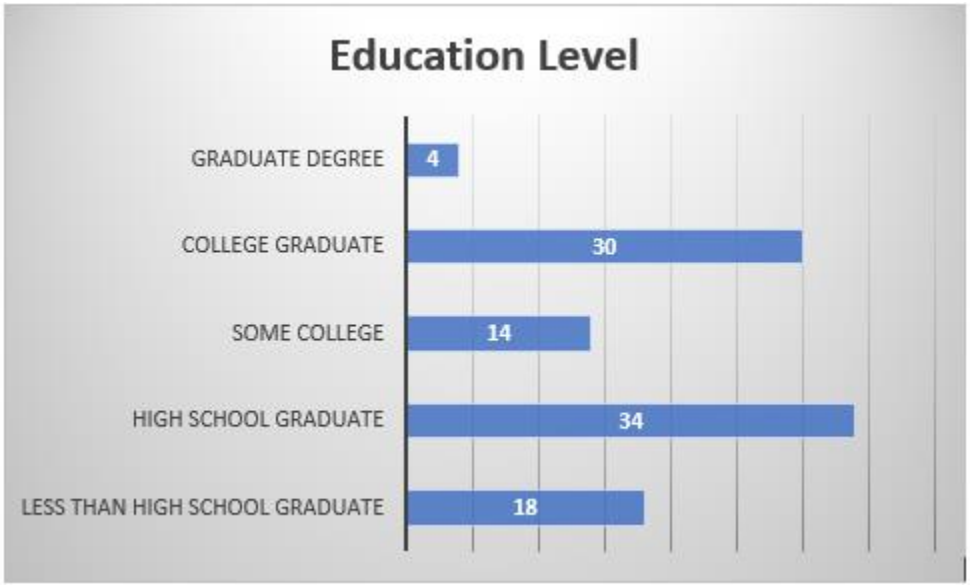
a. Develop a pie chart to illustrate these data.

Chapter 2-Visualizing Data using Charts

DS 23 - Business Statistics



b. Develop a horizontal bar chart to illustrate these data.



2-24. Given the following data, construct a stem and leaf diagram:

Column 1	Column 2	Column 3	Column 4
0.7	1.7	2.8	3.8
0.8	1.8	3.3	4.3
1.0	2.0	4.4	5.4

Chapter 2-Visualizing Data using Charts

DS 23 - Business Statistics

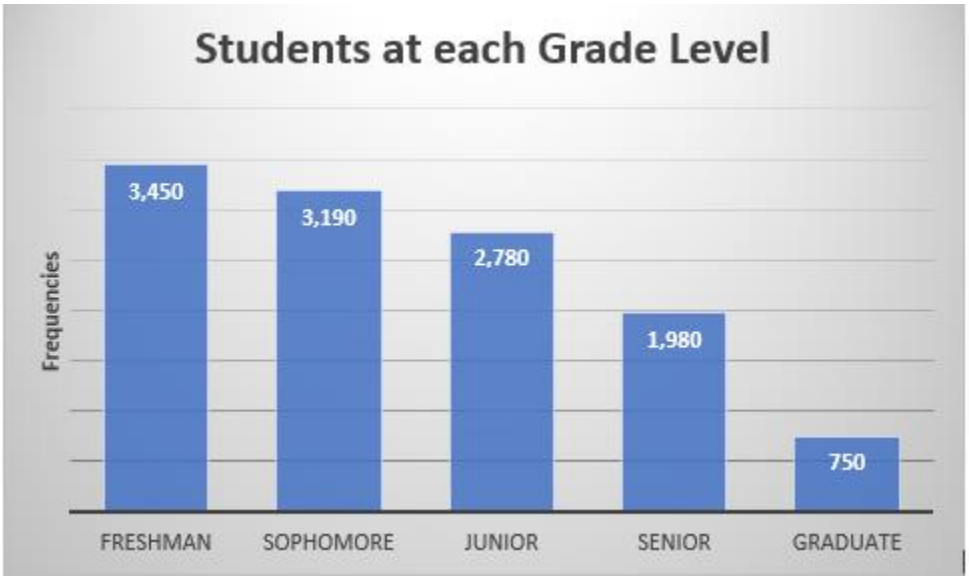
Column 1	Column 2	Column 3	Column 4
1.1	2.1	5.3	6.3
1.4	2.4	5.4	6.4
2.0	3.0		

Stem	Leaves
0	78
1	01478
2	00148
3	038
4	34
5	344
6	34

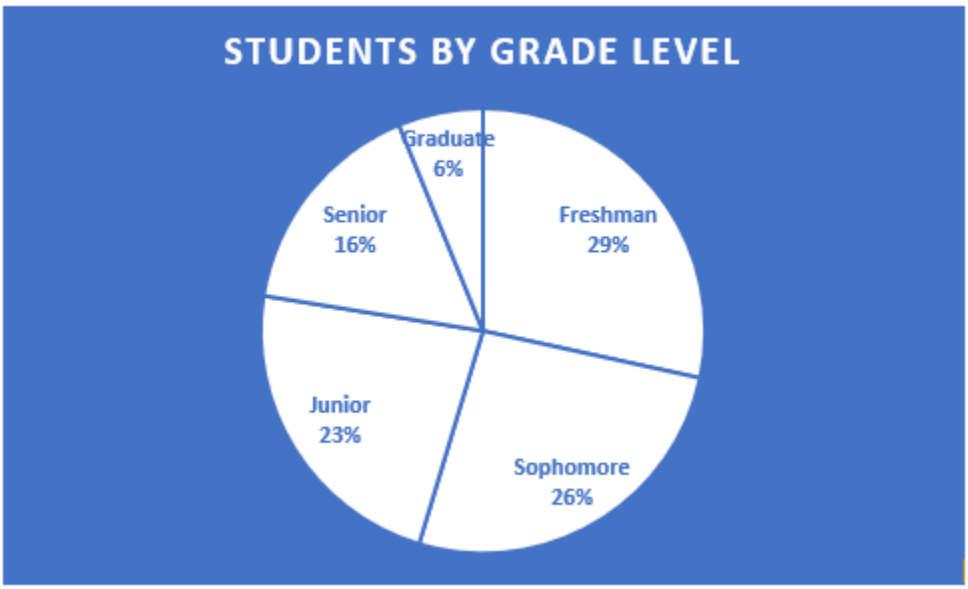
2-25. A university has the following number of students at each grade level:

Class	Count
Freshman	3,450
Sophomore	3,190
Junior	2,780
Senior	1,980
Graduate	750

a. Construct a bar chart that effectively displays these data.



b. Construct a pie chart to display these data.



c. Referring to the graphs constructed in parts a and b, indicate which you would favor as the more effective way of presenting these data. Discuss.

A case can be made for either a bar chart or pie chart. Pie charts are especially good at showing how the total is divided into parts. The bar chart is best to draw attention to specific results. In this case, a discussion might be centered on the possible attrition that takes place in the number of students between Freshman and Senior years.

23, 24, 25, 31, 35, 36, 38, 45, 46, 47, 48, 50, 51

2-31. At the March meeting of the board of directors for the Graystone Services Company, one of the regional managers put the following data into a PowerPoint presentation to illustrate the ratio of the number of units manufactured to the number of employees at each of Graystone's five manufacturing plants:

Chapter 2-Visualizing Data using Charts

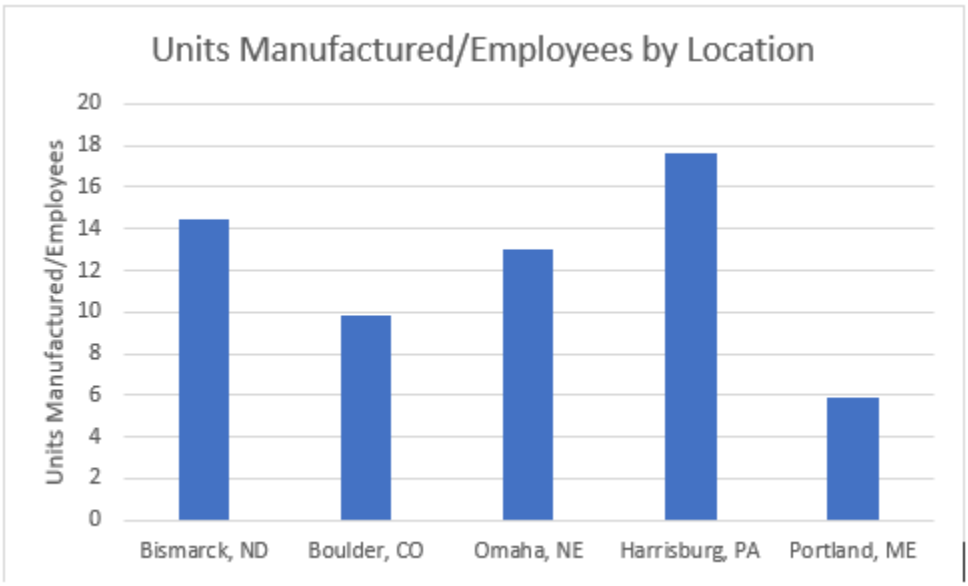
DS 23 - Business Statistics

Plant Location	Units Manufactured/Employees
Bismarck, ND	14.5
Boulder, CO	9.8
Omaha, NE	13.0
Harrisburg, PA	17.6
Portland, ME	5.9

a. Discuss whether a pie chart or a bar chart would be more appropriate to present these data graphically.

Since the values are not based on the whole of Graystone employees, a bar chart is a better graphic for this data.

b. Construct the chart you recommended in part a.



2-35. The 2014 Annual Report of the Procter & Gamble Company (see www.pginvestor.com) reported the following percentages for its five global business segments:

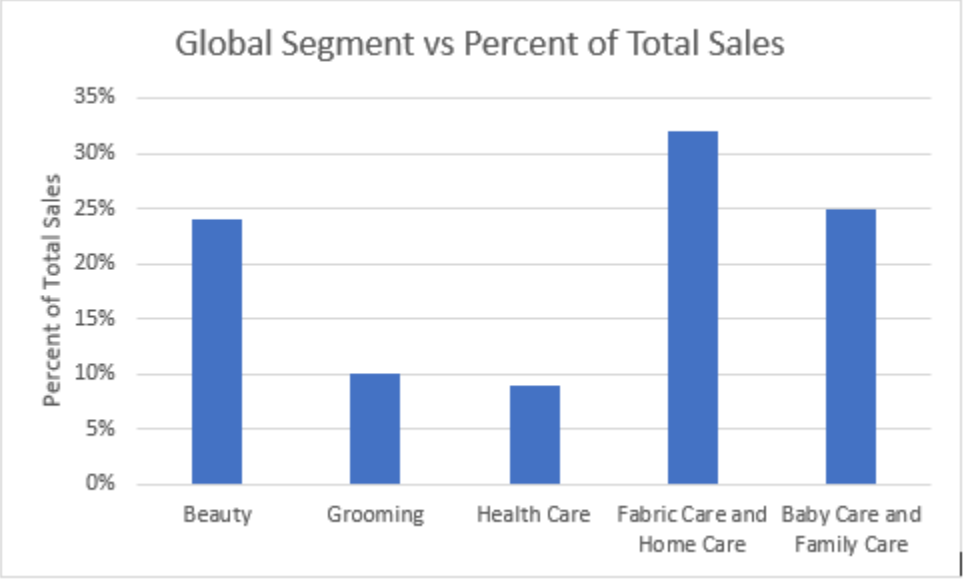
Global Segment	Percent of Total Sales
Beauty	24%
Grooming	10%
Health Care	9%
Fabric Care and Home Care	32%

Chapter 2-Visualizing Data using Charts

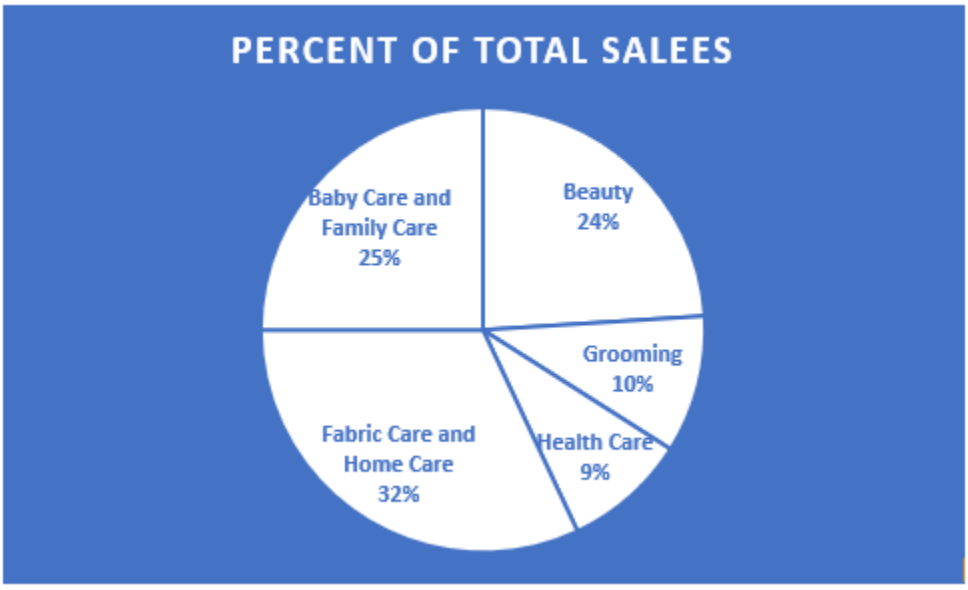
DS 23 - Business Statistics

Global Segment	Percent of Total Sales
Baby Care and Family Care	25%

a. Construct a bar chart that displays this information by global business segment.



b. Construct a pie chart that displays each global business segment's percentage of total global segment net sales.



Chapter 2-Visualizing Data using Charts

DS 23 - Business Statistics

2-36. A fast-food restaurant monitors its drive-thru service times electronically to ensure that its speed of service is meeting the company's goals. A sample of 28 drive-thru times was recently taken and is shown here:

Speed of Service (Time in Seconds)			
83	138	145	147
130	79	156	156
90	85	68	93
178	76	73	119
92	146	88	103
116	134	162	71
181	110	105	74

a. Construct a stem and leaf diagram of the speed of service times.

Stem	Leaves
6	8
7	13469
8	358
9	023
10	35
11	069
12	
13	048
14	567
15	66
16	2
17	8
18	1

b. What range of time might the restaurant say is the most frequent speed of service?

70 - 79

2-36.

A fast-food restaurant monitors its drive-thru service times electronically to ensure that its speed of service is meeting the company's goals. A sample of 28 drive-thru times was recently taken and is shown here:

Chapter 2-Visualizing Data using Charts

DS 23 - Business Statistics

Speed of Service (Time in Seconds)			
83	138	145	147
130	79	156	156
90	85	68	93
178	76	73	119
92	146	88	103
116	134	162	71
181	110	105	74

a. Construct a stem and leaf diagram of the speed of service times.

The first thing I would do is put the data in an Excel spreadsheet and sort it from smallest to largest.

Determine the stems. In this case, the stems would be 6 to 18 with the last digit being the leaves. The stem and leaf plot is as follows.

Stems	Leaves
6	8
7	13469
8	358
9	023
10	35
11	069
12	
13	048
14	567
15	66
16	2
17	8
18	1

b. What range of time might the restaurant say is the most frequent speed of service?

70 - 79

2-38

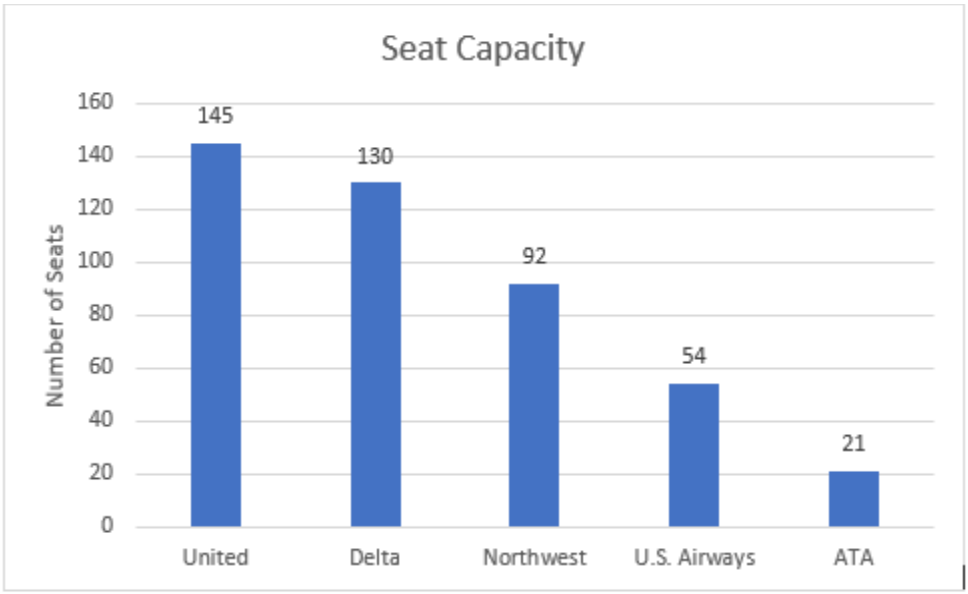
The following data represent the seat capacity for major airlines on an annual basis:

Airline Seat Capacity (in Billions)					
Airline	United	Delta	Northwest	U.S. Airways	ATA
Capacity	145	130	92	54	21

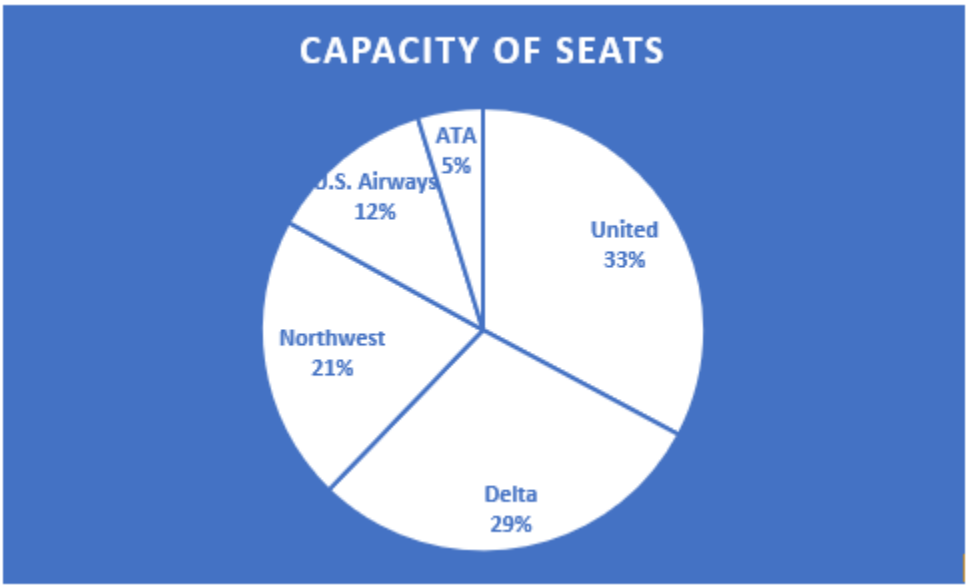
a. Construct a bar graph representing the seat capacity of the major airlines for the five airlines indicated.

Chapter 2-Visualizing Data using Charts

DS 23 - Business Statistics



b. Produce a pie chart exhibiting the percentage of the total seat capacity for the five major airlines.



2.3 Line Charts, Scatter Diagrams, and Pareto Charts

There are times when you will have a series of data points to visualize. Then that occurs you can use a line chart or scatter diagram to summarize your data.

Line Chart

If have equal distances for the x values and other values for y, a line chart is a good chart to use.

Chapter 2-Visualizing Data using Charts

DS 23 - Business Statistics

Scatter Diagrams

If your x values are not equal distance from each other, a scatter plot or diagram is a good visual graphic.

Pareto Charts

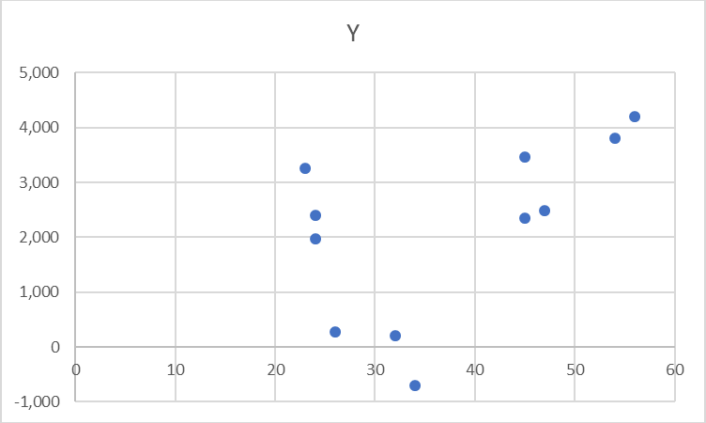
A Pareto Chart is a bar chart that has been arranged from largest y value to the smallest y value. When I want to know how groups compare to each other in terms of largest to smallest a pareto chart is a good visual measurement.

2-45.

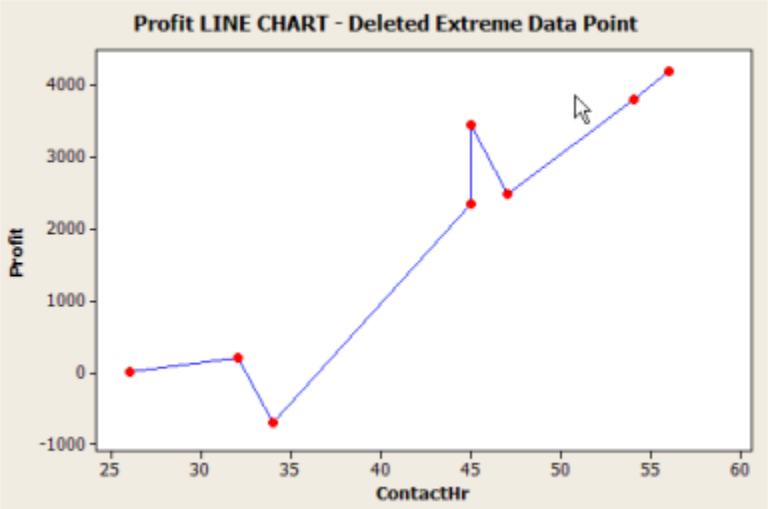
The following data represent 11 observations of two quantitative variables:
x = contact hours with client,
Y = profit generated from client

X	Y
45	2,345
56	4,200
26	278
54	3,811
24	2,406
23	3,250
34	−700
45	3,457
47	2,478
24	1,975
32	206

a. Construct a scatter diagram of the data. Indicate whether the diagram suggests a linear or nonlinear relationship between the dependent and independent variables.



b. Determine how much influence extreme data points will have on your perception of the relationship between the independent and dependent variables by deleting the three data points with the smallest *x* value. What appears to be the relationship between the dependent and independent variables?



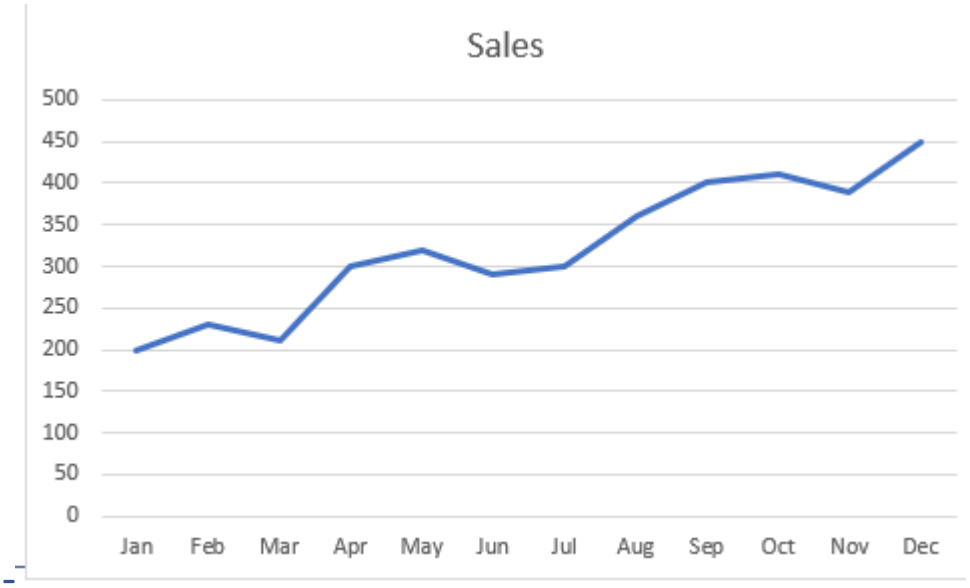
Having removed the extreme data points, the relationship between dependent and independent variables seems to be linear and positive.

2-46. You have the following sales data for the past 12 months. Develop a line graph for these data.

Month	Sales
Jan	200
Feb	230
Mar	210
Apr	300
May	320
Jun	290
Jul	300
Aug	360
Sep	400
Oct	410
Nov	390
Dec	450

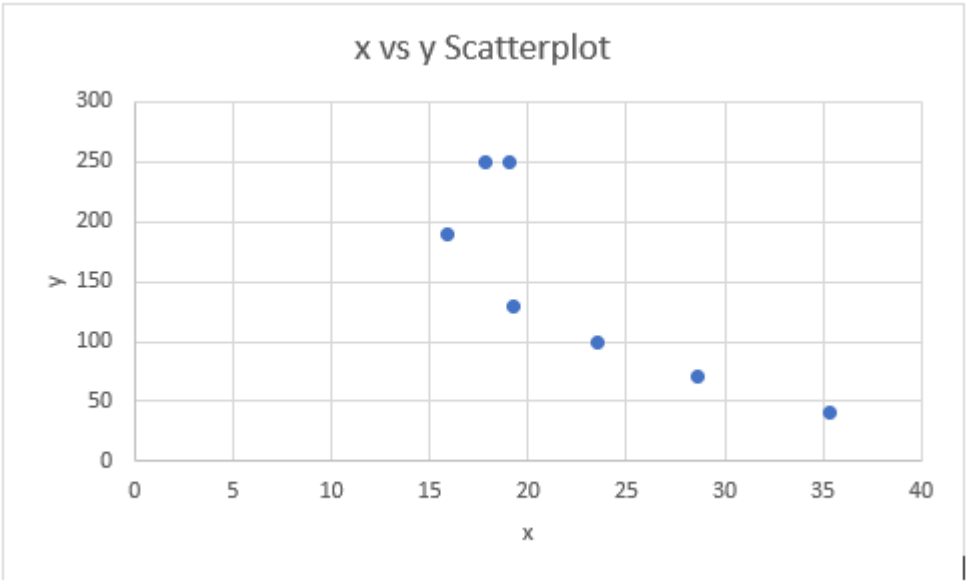
Chapter 2-Visualizing Data using Charts

DS 23 - Business Statistics



2-47. The following data have been selected for two variables, *y* and *x*. Construct a scatter diagram for these two variables and indicate what type of relationship, if any, appears to be present.

Make sure you list the x variable data on the left and the y variable data on the right. Then highlight the x and y values and click the Insert Tab.
Click on the Scatterplot icon to generate the scatterplot chart.



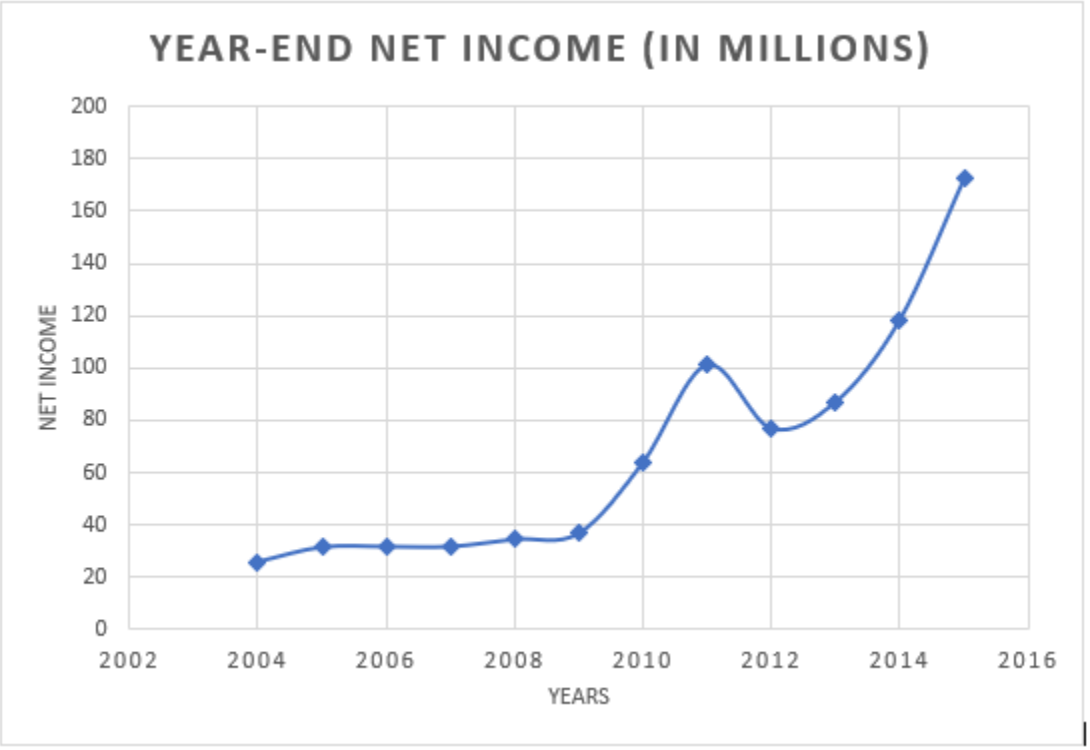
2-48. The year-end net income (in millions) for a company for the years 2004–2015 are shown below:

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Net Income	25.9	31.5	31.7	31.7	34.5	36.8	64	101.3	77	87.1	118.6	172.5

Chapter 2-Visualizing Data using Charts

DS 23 - Business Statistics

Develop a chart that effectively displays the income data over time.



2-50.

Amazon.com celebrated its 20th anniversary in July 2014. Its growth can be seen by examining its increasing sales volume (in $billions):

Year	Volume
2008	19.17
2009	24.51
2010	34.2
2011	48.08
2012	61.09
2013	74.45
2014	88.99

Source: 2014 Amazon Annual Report

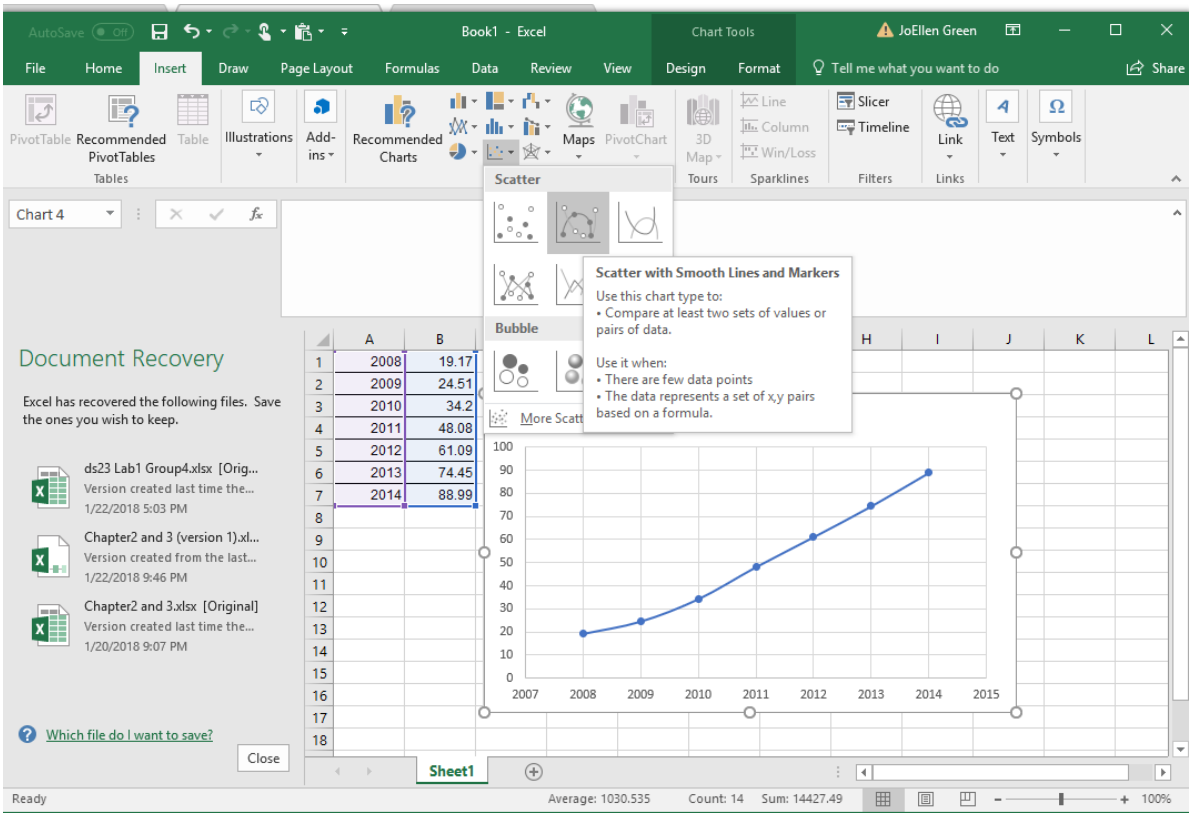
a. Construct a line plot for Amazon's sales.

Chapter 2-Visualizing Data using Charts

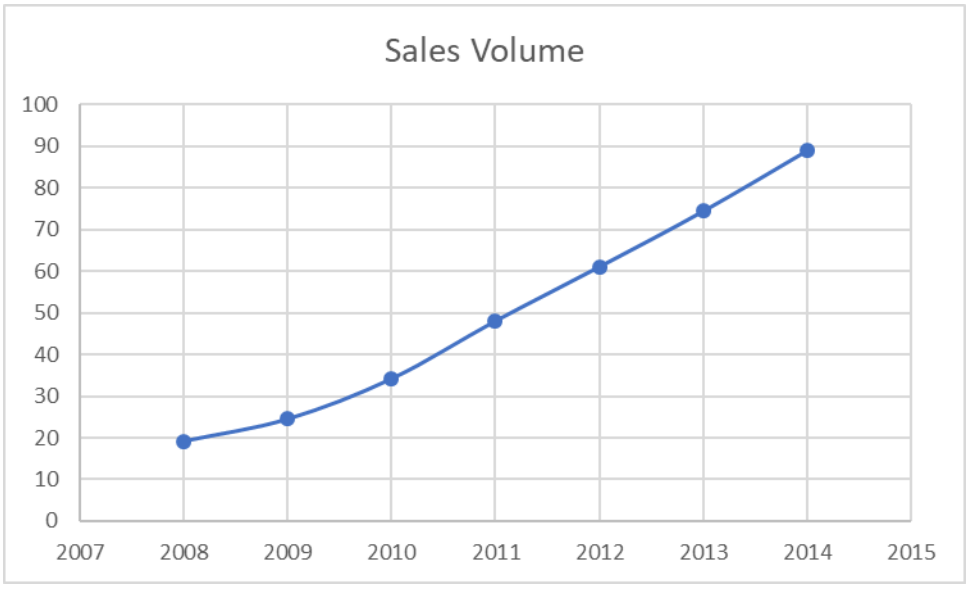
DS 23 - Business Statistics

Creating a Line Chart

1. Open the data in an Excel Spreadsheet
2. Highlight the data with x values on the left and y on the right.
3. Select the scatterplot icon



.



Similarly, you can plot data with unequal distances between the points. Use the instructions of a Line Chart to create a scatterplot.

b. Describe the type of relationship that exists between the years in business and Amazon's sales volume.

As the year increase the sales increases.

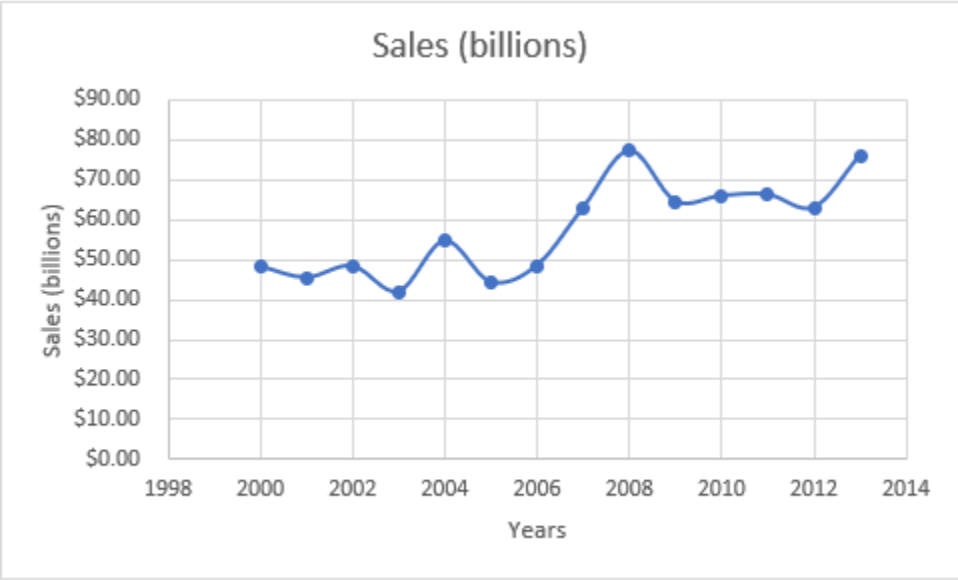
2-51. The following data show worldwide computer/video game sales:

Year	Sales (billions)
2000	$48.2
2001	$45.4
2002	$48.3
2003	$41.9
2004	$54.6
2005	$44.3
2006	$48.4
2007	$62.9
2008	$77.2
2009	$64.5
2010	$65.9
2011	$66.2
2012	$63.0
2013	$76.0

Source: http://vgsales.wikia.com/wiki/Video_game_industry
Construct a line chart showing these computer/video game sales data. Write a short statement describing the graph.

Chapter 2-Visualizing Data using Charts

DS 23 - Business Statistics



References

Groebner, D. F., Shannon, P. W., & Fry, P. C. (2018). *Business Statistics: A Decision-Making Approach* (10 ed.).

Boston: Pearson.