Chapter 02
Descriptive Statistics: Tabular and Graphical Methods

True / False Questions

1. A stem-and-leaf display is a graphical portrayal of a data set that shows the data set's overall pattern of variation.

   True False

2. The relative frequency is the frequency of a class divided by the total number of measurements.

   True False

3. A bar chart is a graphic that can be used to depict qualitative data.

   True False

4. Stem-and-leaf displays and dot plots are useful for detecting outliers.

   True False

5. A scatter plot can be used to identify outliers.

   True False

6. When looking at the shape of the distribution using a stem-and-leaf, a distribution is skewed to the right when the left tail is shorter than the right tail.

   True False

7. When we wish to summarize the proportion (or fraction) of items in a class, we use the frequency distribution for each class.

   True False

8. When establishing the classes for a frequency table, it is generally agreed that the more classes you use the better your frequency table will be.

   True False

9. The sample cumulative distribution function is nondecreasing.

   True False

10. A frequency table includes row and column percentages.

    True False

11. When constructing any graphical display that utilizes categorical data, classes that have frequencies of 5 percent or less are usually combined together into a single category.

    True False

12. In a Pareto chart, the bar for the "Other" category should be placed to the far left of the chart.

    True False

13. In the first step of setting up a Pareto chart, a frequency table should be constructed of the defects (or categories) in decreasing order of frequency.

    True False

14. It is possible to create different interpretations of the same graphical display by simply using different captions.

    True False

15. Beginning the vertical scale of a graph at a value different from zero can cause increases to look more dramatic.

    True False

16. A runs plot is a form of scatter plot.

    True False

17. The stem-and-leaf display is advantageous because it allows us to actually see the measurements in the data set.

    True False

18. Splitting the stems refers to assigning the same stem to two or more rows of the stem-and-leaf display.

    True False

19. When data are qualitative, the bars should never be separated by gaps.

    True False

20. Each stem of a stem-and-leaf display should be a single digit.

    True False

21. Leaves on a stem-and-leaf display should be rearranged so that they are in increasing order from left to right.

    True False

Multiple Choice Questions

22. A(n) _____ is a graph of a cumulative distribution.

A. Histogram
B. Scatter plot
C. Ogive plot
D. Pie chart

23. _____ can be used to study the relationship between two variables.

A. Cross-tabulation tables
B. Frequency tables
C. Cumulative frequency distributions
D. Dot plots

24. Row or column percentages can be found in

A. Frequency tables.
B. Relative frequency tables.
C. Cross-tabulation tables.
D. Cumulative frequency tables.

25. All of the following are used to describe quantitative data except the _____.

A. Histogram
B. Stem-and-leaf chart
C. Dot plot
D. Pie chart

26. An observation separated from the rest of the data is a(n) _____.

A. Absolute extreme
B. Outlier
C. Mode
D. Quartile

27. Which of the following graphs is for qualitative data?

A. Histogram
B. Bar chart
C. Ogive plot
D. Stem-and-leaf

28. A plot of the values of two variables is a _____ plot.

A. Runs
B. Scatter
C. Dot
D. Ogive

29. A Stem-and-leaf display is best used to _____.

A. Provide a point estimate of the variability of the data set
B. Provide a point estimate of the central tendency of the data set
C. Display the shape of the distribution
D. None of these

30. When grouping a large sample of measurements into classes, the _____ is a better tool than the _____.

A. Histogram, stem-and-leaf display
B. Box plot, histogram
C. Stem-and-leaf display, scatter plot
D. Scatter plot, box plot

31. A _____ displays the frequency of each group with qualitative data and a _____ displays the frequency of each group with quantitative data.

A. Histogram, stem-and-leaf display
B. Bar chart, histogram
C. Scatter plot, bar chart
D. Stem-and-leaf, pie chart

32. A _____ shows the relationship between two variables.

A. Stem-and-leaf
B. Bar chart
C. Histogram
D. Scatter plot
E. Pie chart

33. A _____ can be used to differentiate the "vital few" causes of quality problems from the "trivial many" causes of quality problems.

A. Histogram
B. Scatter plot
C. Pareto chart
D. Ogive plot
E. Stem-and-leaf display

34. _____ and _____ are used to describe qualitative (categorical) data.

A. Stem-and-leaf displays, scatter plots
B. Scatter plots, histograms
C. Box plots, bar charts
D. Bar charts, pie charts
E. Pie charts, histograms

35. Which one of the following graphical tools is used with quantitative data?

A. Bar chart
B. Histogram
C. Pie chart
D. Pareto chart

36. When developing a frequency distribution, the class (group) intervals should be _____.

A. Large
B. Small
C. Integer
D. Mutually exclusive
E. Equal

37. Which of the following graphical tools is not used to study the shapes of distributions?

A. Stem-and-leaf display
B. Scatter plot
C. Histogram
D. Dot plot

38. All of the following are used to describe qualitative data except the _____.

A. Bar chart
B. Pie chart
C. Histogram
D. Pareto chart

39. If there are 130 values in a data set, how many classes should be created for a frequency histogram?

A. 4
B. 5
C. 6
D. 7
E. 8

40. If there are 120 values in a data set, how many classes should be created for a frequency histogram?

A. 4
B. 5
C. 6
D. 7
E. 8

41. If there are 62 values in a data set, how many classes should be created for a frequency histogram?

A. 4
B. 5
C. 6
D. 7
E. 8

42. If there are 30 values in a data set, how many classes should be created for a frequency histogram?

A. 4

B. 5

C. 6

D. 7

E. 8

43. A CFO is looking at how much of a company's resources are spent on computing. He samples companies in the pharmaceutical industry and develops the following stem-and-leaf graph.

5	269
6	255568999
7	11224557789
8	001222458
9	02455679
10	1556
11	137
12	
13	255

What is the approximate shape of the distribution of the data?

A. Normal

B. Skewed to the right

C. Skewed to the left

D. Bimodal

E. Uniform

44. A CFO is looking at how much of a company's resources are spent on computing. He samples companies in the pharmaceutical industry and develops the following stem-and-leaf graph.

5	269
6	255568999
7	11224557789
8	001222458
9	02455679
10	1556
11	137
12	
13	255

What is the smallest percentage spent on R&D?

A. 5.9

B. 5.6

C. 5.2

D. 5.02

E. 50.2

45. A CFO is looking at how much of a company's resources are spent on computing. He samples companies in the pharmaceutical industry and develops the following stem-and-leaf graph.

5	269
6	255568999
7	11224557789
8	001222458
9	02455679
10	1556
11	137
12	
13	255

If you were creating a frequency histogram using these data, how many classes would you create?

A. 4

B. 5

C. 6

D. 7

E. 8

46. A CFO is looking at how much of a company's resources are spent on computing. He samples companies in the pharmaceutical industry and develops the following stem-and-leaf graph.

5	269
6	255568999
7	11224557789
8	001222458
9	02455679
10	1556
11	137
12	
13	255

What would be the class length used in creating a frequency histogram?

A. 1.4

B. 8.3

C. 1.2

D. 1.7

E. 0.9

47. A CFO is looking at how much of a company's resources are spent on computing. He samples companies in the pharmaceutical industry and develops the following stem-and-leaf graph.

5	269
6	255568999
7	11224557789
8	001222458
9	02455679
10	1556
11	137
12	
13	255

What would be the first class interval for the frequency histogram?

A. 5.2-6.5

B. 5.2-6.0

C. 5.0-6.0

D. 5.2-6.6

E. 5.2-6.4

48. The US local airport keeps track of the percentage of flights arriving within 15 minutes of their scheduled arrivals. The stem-and-leaf plot of the data for one year is below.

76	9
77	114
78	
79	07
80	88
81	2
82	1
83	88

How many flights were used in this plot?

A. 7

B. 9

C. 10

D. 11

E. 12

49. The US local airport keeps track of the percentage of flights arriving within 15 minutes of their scheduled arrivals. The stem-and-leaf plot of the data for one year is below.

76	9
77	114
78	
79	07
80	88
81	2
82	1
83	88

In developing a histogram of these data, how many classes would be used?

A. 4

B. 5

C. 6

D. 7

E. 8

50. The US local airport keeps track of the percentage of flights arriving within 15 minutes of their scheduled arrivals. The stem-and-leaf plot of the data for one year is below.

76	9
77	114
78	
79	07
80	88
81	2
82	1
83	88

What would be the class length for creating the frequency histogram?

A. 1.4

B. 0.8

C. 2.7

D. 1.7

E. 2.3

51. A company collected the ages from a random sample of its middle managers, with the resulting frequency distribution shown below.

Class Interval	Frequency
20 to < 25	8
25 to < 30	6
30 to < 35	5
35 to < 40	12
40 to < 45	15
45 to < 50	7

What would be the approximate shape of the relative frequency histogram?

A. Symmetrical

B. Uniform

C. Multiple peaks

D. Skewed to the left

E. Skewed to the right

52. A company collected the ages from a random sample of its middle managers, with the resulting frequency distribution shown below.

Class Interval	Frequency
20 to < 25	8
25 to < 30	6
30 to < 35	5
35 to < 40	12
40 to < 45	15
45 to < 50	7

What is the relative frequency for the largest interval?

A. .132

B. .226

C. .231

D. .283

E. .288

53. A company collected the ages from a random sample of its middle managers, with the resulting frequency distribution shown below.

Class Interval	Frequency
20 to < 25	8
25 to < 30	6
30 to < 35	5
35 to < 40	12
40 to < 45	15
45 to < 50	7

What is the midpoint of the third class interval?

A. 22.5

B. 27.5

C. 32.5

D. 37.5

E. 42.5

54. The general term for a graphical display of categorical data made up of vertical or horizontal bars is called a(n) _____.

A. Pie chart
B. Pareto chart
C. Bar chart
D. Ogive plot

55. A flaw possessed by a population or sample unit is _____.

A. Always random
B. A defect
C. Displayed by a dot plot
D. The cause for extreme skewness to the right

56. A graphical portrayal of a quantitative data set that divides the data into classes and gives the frequency of each class is a(n) _____.

A. Ogive plot
B. Dot plot
C. Histogram
D. Pareto chart
E. Bar chart

57. The number of measurements falling within a class interval is called the _____.

A. Frequency
B. Relative frequency
C. Leaf
D. Cumulative sum

58. A relative frequency curve having a long tail to the right is said to be _____.

A. Skewed to the left
B. Normal
C. A scatter plot
D. Skewed to the right

59. The percentage of measurements in a class is called the _____ of that class.

A. Frequency
B. Relative frequency
C. Leaf
D. Cumulative percentage

60. A histogram that tails out toward larger values is _____.

A. Skewed to the left
B. Normal
C. A scatter plot
D. Skewed to the right

61. A histogram that tails out toward smaller values is _____.

A. Skewed to the left
B. Normal
C. A scatter plot
D. Skewed to the right

62. A very simple graph that can be used to summarize a quantitative data set is called a(n) _____.

A. Runs plot
B. Ogive plot
C. Dot plot
D. Pie chart

63. An example of manipulating a graphical display to distort reality is _____.

A. Starting the axes at zero
B. Making the bars in a histogram equal widths
C. Stretching the axes
D. Starting the axes at zero and Stretching the axes

64. As a general rule, when creating a stem-and-leaf display, there should be _____ stem values.

A. Between 3 and 10
B. Between 1 and 100
C. No fewer than 20
D. Between 5 and 20

65. At the end of their final exam, 550 students answered an additional question in which they rated their instructor's teaching effectiveness, with the following results.

	Student's Rating of Instructor	
Student's Final Grade	Very or Somewhat Effective	Very or Somewhat Ineffective
A	190	85
B	75	120
C	20	17
D	9	18
F	1	15

What proportion of the students who rated their instructor as very or somewhat effective received a B or better in the class?

A. 0.345

B. 0.254

C. 0.482

D. 0.898

E. 0.644

66. At the end of their final exam, 550 students answered an additional question in which they rated their instructor's teaching effectiveness, with the following results.

	Student's Rating of Instructor	
Student's Final Grade	Very or Somewhat Effective	Very or Somewhat Ineffective
A	190	85
B	75	120
C	20	17
D	9	18
F	1	15

What proportion of all 550 students received less than a C?

A. 0.03

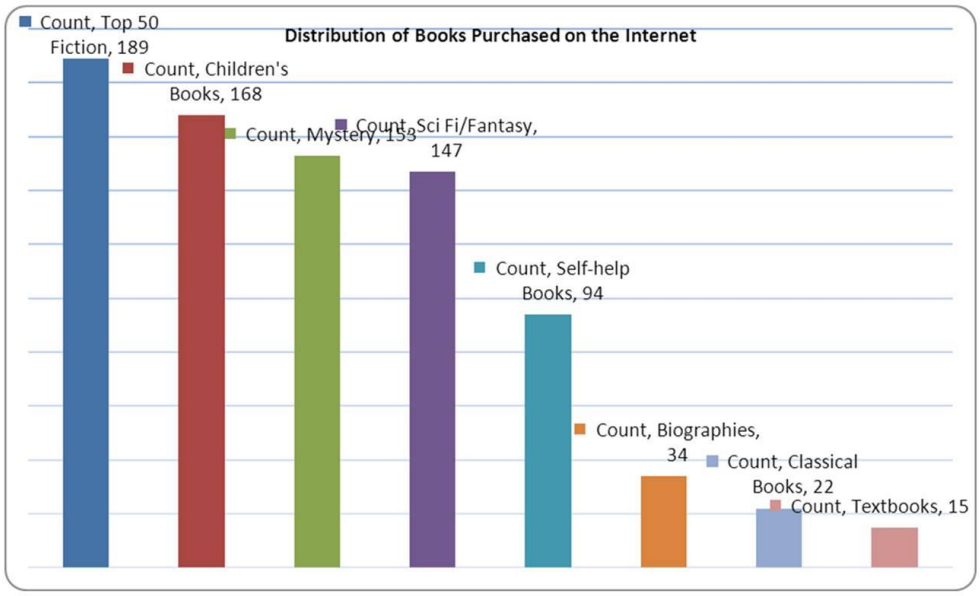
B. 0.06

C. 0.08

D. 0.13

E. 0.15

67. 822 customers were randomly selected from those who had recently bought a book over the Internet. The chart below shows the breakdown of the classification of the book type.



What percentage of the books purchased were either mystery or science fiction/fantasy?

A. 18.61

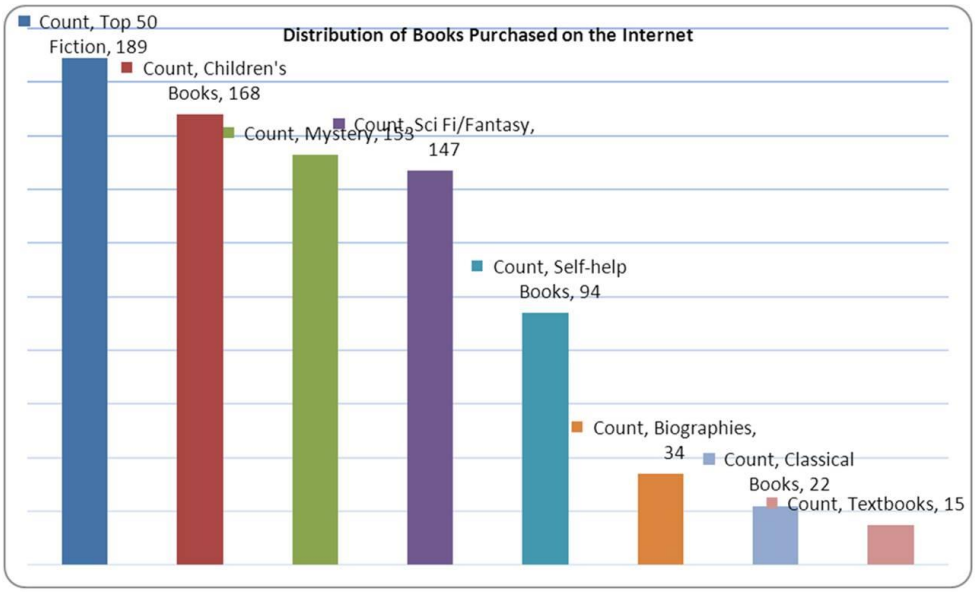
B. 36.50

C. 17.88

D. 24.33

E. 22.99

68. 822 customers were randomly selected from those who had recently bought a book over the Internet. The chart below shows the breakdown of the classification of the book type.



What percentage of the books purchased were self-help books?

A. 11.44

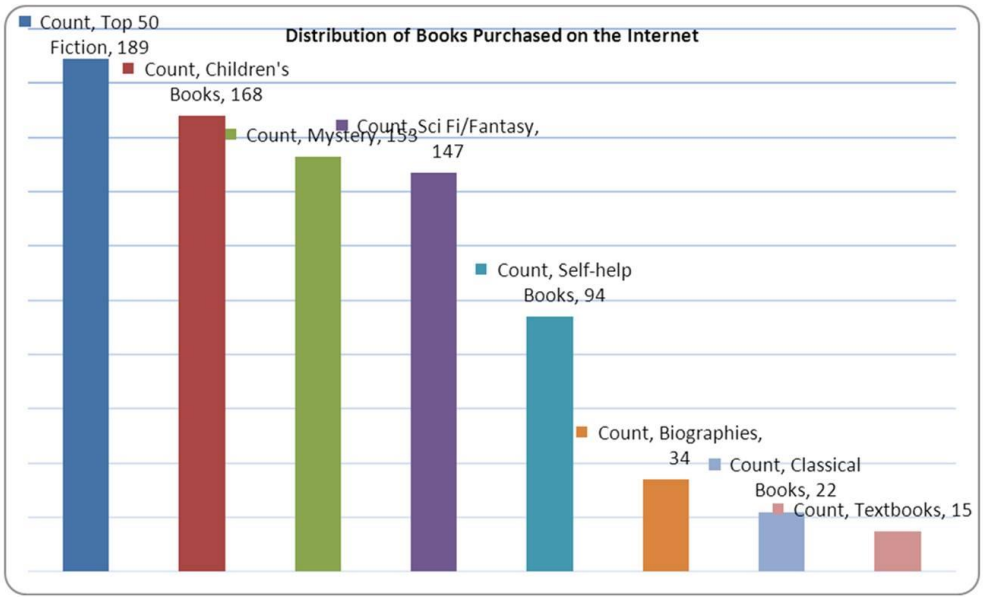
B. .1144

C. 1.82

D. 0.0182

E. 0.940

69. 822 customers were randomly selected from those who had recently bought a book over the Internet. The chart below shows the breakdown of the classification of the book type.



What percentage of the books were in the top two categories?

A. 22.99

B. 20.44

C. 4.50

D. 43.43

E. 0.4343

70. Using the following data, describe the shape of the data distribution.

1.	11.5	6.	13.7	11.	11.0	16.	14.5
2.	13.5	7.	14.0	12.	13.0	17.	15.5
3.	12.5	8.	12.0	13.	16.7	18.	13.0
4.	15.2	9.	12.7	14.	12.5	19.	18.2
5.	14.7	10.	12.5	15.	11.5	20.	11.7

A. Skewed to the left

B. Bimodal

C. Normal

D. Skewed to the right

71. Using the following data, what would be the range of the values of the stem in a stem-and-leaf display?

1.	11.5	6.	13.7	11.	11.0	16.	14.5
2.	13.5	7.	14.0	12.	13.0	17.	15.5
3.	12.5	8.	12.0	13.	16.7	18.	13.0
4.	15.2	9.	12.7	14.	12.5	19.	18.2
5.	14.7	10.	12.5	15.	11.5	20.	11.7

A. 11-17

B. 11-18

C. 10-18

D. 12-17

E. 12-18

72. Using the following data, what would be the leaf unit in a stem-and-leaf display?

1.	11.5	6.	13.7	11.	11	16.	14.5
2.	13.5	7.	14	12.	13	17.	15.5
3.	12.5	8.	12	13.	16.7	18.	13
4.	15.2	9.	12.7	14.	12.5	19.	18.2
5.	14.7	10.	12.5	15.	11.5	20.	11.7

A. 1.0

B. 10

C. .10

D. .01

E. .20

73. Consider the following data on distances traveled by people to visit the local amusement park and calculate the relative frequency for the shortest distance.

Distance	Frequency
1–8 miles	15
9–16 miles	12
17–24 miles	7
25–32 miles	5
33–40 miles	1

A. .375

B. .150

C. .500

D. .300

E. .333

74. Consider the following data on distances traveled by people to visit the local amusement park and calculate the relative frequency for the distances over 24 miles.

Distance	Frequency
1–8 miles	15
9–16 miles	12
17–24 miles	7
25–32 miles	5
33–40 miles	1

A. .375

B. .150

C. .125

D. .025

E. .325

75. The following is a partial relative frequency distribution of grades in an introductory statistics course.

Grade	Relative Frequency
A	.22
B	?
C	.18
D	.17
F	.06

Find the relative frequency for the B grade.

A. .78

B. .27

C. .65

D. .37

E. .47

76. The following is a relative frequency distribution of grades in an introductory statistics course.

Grade	Relative Frequency
A	.22
B	.37
C	.18
D	.17
F	.06

If this was the distribution of 200 students, find the frequency for the highest two grades.

A. 44

B. 118

C. 59

D. 74

E. 35

77. The following is a relative frequency distribution of grades in an introductory statistics course.

Grade	Relative Frequency
A	.22
B	.37
C	.18
D	.17
F	.06

If this was the distribution of 200 students, find the frequency of failures.

A. 12

B. 6

C. 23

D. 46

E. 3

78. The following is a relative frequency distribution of grades in an introductory statistics course.

Grade	Relative Frequency
A	.22
B	.37
C	.18
D	.17
F	.06

If we wish to depict these data using a pie chart, find how many degrees should be assigned to the highest grade of A.

A. 61.1

B. 22.0

C. 79.2

D. 90.0

E. 212.40

79. Recently an advertising company called 200 people and asked them to identify the company that was in an ad running nationwide. The following results were obtained.

	Female	Male	Total
Correctly recalled the company	66	50	116
Incorrectly recalled the company	44	40	84
Total	110	90	200

What percentage of those surveyed were female and could not recall the company?

A. 40.0

B. 22.0

C. 52.4

D. 66.7

E. 37.9

80. Recently an advertising company called 200 people and asked them to identify the company that was in an ad running nationwide. The following results were obtained.

	Female	Male	Total
Correctly recalled the company	66	50	116
Incorrectly recalled the company	44	40	84
Total	110	90	200

What percentage of those surveyed could not correctly recall the company?

A. 58.00

B. 56.89

C. 55.00

D. 43.10

E. 42.00

81. A local electronics retailer recently conducted a study on purchasers of large screen televisions. The study recorded the type of television and the credit account balance of the customer at the time of purchase. They obtained the following results.

Credit Balance	Standard TV	LCD	Plasma	Projection
Under $200	10	16	40	5
$200–$800	8	12	24	15
Over $800	16	12	16	30
Total	34	40	80	50

What percentage of purchases were plasma televisions by customers with the smallest credit balances?

A. 50.00

B. 39.20

C. 56.30

D. 34.80

E. 19.60

82. A local electronics retailer recently conducted a study on purchasers of large screen televisions. The study recorded the type of television and the credit account balance of the customer at the time of purchase. They obtained the following results.

Credit Balance	Standard TV	LCD	Plasma	Projection
Under $200	10	16	40	5
$200–$800	8	12	24	15
Over $800	16	12	16	30
Total	34	40	80	50

What percentage of the customers had the highest credit balances and purchased an LCD television?

A. 36.30
B. 5.90
C. 19.60
D. 56.30
E. 16.20

83. The number of weekly sales calls by a sample of 25 pharmaceutical salespersons is below.

24, 56, 43, 35, 37, 27, 29, 44, 34, 28, 33, 28, 46, 31, 38, 41, 48, 38, 27, 29, 37, 33, 31, 40, 50

How many classes should be used in the construction of a histogram?

A. 4
B. 6
C. 10
D. 5
E. 2

84. The number of weekly sales calls by a sample of 25 pharmaceutical salespersons is below.

    24, 56, 43, 35, 37, 27, 29, 44, 34, 28, 33, 28, 46, 31, 38, 41, 48, 38, 27, 29, 37, 33, 31, 40, 50

    What is the shape of the distribution of the data?

    A. Skewed with tail to the right
    B. Skewed with tail to the left
    C. Normal
    D. Bimodal

85. The number of items rejected daily by a manufacturer because of defects for the last 30 days are:

    20, 21, 8, 17, 22, 19, 18, 19, 14, 17, 11, 6, 21, 25, 4, 19, 9, 12, 16, 16, 10, 28, 24, 6, 21, 20, 25, 5, 17, 8

    How many classes should be used in constructing a histogram?

    A. 6
    B. 5
    C. 7
    D. 4
    E. 8

Essay Questions

86. The number of weekly sales calls by a sample of 25 pharmaceutical salespersons is below.

24, 56, 43, 35, 37, 27, 29, 44, 34, 28, 33, 28, 46, 31, 38, 41, 48, 38, 27, 29, 37, 33, 31, 40, 50

Construct an ogive plot.

87. The number of items rejected daily by a manufacturer because of defects for the last 30 days are:

20, 21, 8, 17, 22, 19, 18, 19, 14, 17, 11, 6, 21, 25, 4, 19, 9, 12, 16, 16, 10, 28, 24, 6, 21, 20, 25, 5, 17, 8

Complete this frequency table for these data.

	Frequency	Rel Freq	Cum Freq
$4 < 9$			
$9 < 14$			
$14 < 19$			
$19 < 24$			
$24 < 29$			

88. The number of items rejected daily by a manufacturer because of defects for the last 30 days are:

20, 21, 8, 17, 22, 19, 18, 19, 14, 17, 11, 6, 21, 25, 4, 19, 9, 12, 16, 16, 10, 28, 24, 6, 21, 20, 25, 5, 17, 8

Construct a stem-and-leaf plot.

89. The number of items rejected daily by a manufacturer because of defects for the last 30 days are:

20, 21, 8, 17, 22, 19, 18, 19, 14, 17, 11, 6, 21, 25, 4, 19, 9, 12, 16, 16, 10, 28, 24, 6, 21, 20, 25, 5, 17, 8

Construct an ogive plot.

90. Consider the following data.

1.	11.5	6.	13.7	11.	11.0	16.	14.5
2.	13.5	7.	14.0	12.	13.0	17.	15.5
3.	12.5	8.	12.0	13.	16.7	18.	13.0
4.	15.2	9.	12.7	14.	12.5	19.	18.2
5.	14.7	10.	12.5	15.	11.5	20.	11.7

Create a stem-and-leaf display for the sample.

91. Consider the following data on distances traveled by people to visit the local amusement park.

Distance	Frequency
1–8 miles	15
9–16 miles	12
17–24 miles	7
25–32 miles	5
33–40 miles	1

Construct an ogive plot that corresponds to the frequency table.

92. The following is a relative frequency distribution of grades in an introductory statistics course.

Grade	Relative Frequency
A	.22
B	.37
C	.18
D	.17
F	.06

If this was the distribution of 200 students, give the frequency distribution for this data.

93. The following is a relative frequency distribution of grades in an introductory statistics course.

Grade	Relative Frequency
A	.22
B	.37
C	.18
D	.17
F	.06

Construct a percent frequency bar chart for this data.

94. The following is a relative frequency distribution of grades in an introductory statistics course.

Grade	Relative Frequency
A	.22
B	.37
C	.18
D	.17
F	.06

If we wish to depict these data using a pie chart, find how many degrees (out of 360 degrees) should be assigned to each grade.

95. Fill in the missing components of the following frequency distribution constructed for a sample size of 50.

Class	Frequency	Rel Frequency	Cum Rel Freq
____ < 7.95			0.12
____ < 8.05			0.48
8.05 < _____		0.24	
____ < 8.25		0.10	
8.25 < _____			

96. Recently an advertising company called 200 people and asked them to identify the company that was in an ad running nationwide. They obtained the following results.

	Female	Male	Total
Correctly recalled the company	66	50	116
Incorrectly recalled the company	44	40	84
Total	110	90	200

Construct a table of row percentages.

97. Recently an advertising company called 200 people and asked them to identify the company that was in an ad running nationwide. They obtained the following results.

	Female	Male	Total
Correctly recalled the company	66	50	116
Incorrectly recalled the company	44	40	84
Total	110	90	200

Construct a table of column percentages.

98. A local electronics retailer recently conducted a study on purchasers of large screen televisions. The study recorded the type of television and the credit account balance of the customer at the time of purchase. They obtained the following results.

Credit Balance	Standard TV	LCD	Plasma	Projection
Under $200	10	16	40	5
$200–$800	8	12	24	15
Over $800	16	12	16	30
Total	34	40	80	50

Construct a table of row percentages.

99. A local electronics retailer recently conducted a study on purchasers of large screen televisions. The study recorded the type of television and the credit account balance of the customer at the time of purchase. They obtained the following results.

Credit Balance	Standard TV	LCD	Plasma	Projection
Under $200	10	16	40	5
$200–$800	8	12	24	15
Over $800	16	12	16	30
Total	34	40	80	50

Construct a table of column percentages.

100. Math test anxiety can be found throughout the general population. A study of 116 seniors at a local high school was conducted. The following table was produced from the data. Complete the missing parts.

Score Range	Frequency	Rel Frequency	Cum Freq Dist
Very anxious 37–50		0.19	
Anxious/tense 33–36	8		0.26
Some mild anxiety 27–32			
Generally relaxed 20–26	24		0.67
Very relaxed 10–19		0.33	

101. The number of weekly sales calls by a sample of 25 pharmaceutical salespersons is below.

24, 56, 43, 35, 37, 27, 29, 44, 34, 28, 33, 28, 46, 31, 38, 41, 48, 38, 27, 29, 37, 33, 31, 40, 50

Construct a histogram.

102. The number of weekly sales calls by a sample of 25 pharmaceutical salespersons is below.

24, 56, 43, 35, 37, 27, 29, 44, 34, 28, 33, 28, 46, 31, 38, 41, 48, 38, 27, 29, 37, 33, 31, 40, 50

Construct a stem-and-leaf plot.

103. The number of weekly sales calls by a sample of 25 pharmaceutical salespersons is below.

24, 56, 43, 35, 37, 27, 29, 44, 34, 28, 33, 28, 46, 31, 38, 41, 48, 38, 27, 29, 37, 33, 31, 40, 50

Construct a frequency polygon.

104. The following table lists the types of customer complaint calls on satellite TV service during the first two months after installation.

No signal detected	20%
Can't receive local channels	14%
Missing channels	21%
Intermittent reception	8%
Remote control problems	25%
Other issues	12%

Construct a Pareto chart.

105. The following data consist of the number of sick days taken by the 100 employees at a small manufacturing company for the past 18 months. Construct a dot plot of these data and describe the distribution.

5, 1, 4, 8, 0, 6, 3, 5, 3, 4, 7, 15, 5, 8, 2, 1, 5, 4

Chapter 02 Descriptive Statistics: Tabular and Graphical Methods Answer Key

True / False Questions

1. A stem-and-leaf display is a graphical portrayal of a data set that shows the data set's overall pattern of variation.

   TRUE

   AACSB: Reflective Thinking
   Blooms: Remember
   Difficulty: 2 Medium
   Learning Objective: 02-05 Construct and interpret stem-and-leaf displays.
   Topic: Stem-and-Leaf

2. The relative frequency is the frequency of a class divided by the total number of measurements.

   TRUE

   AACSB: Reflective Thinking
   Blooms: Remember
   Difficulty: 2 Medium
   Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
   Topic: Histogram

3. A bar chart is a graphic that can be used to depict qualitative data.

   TRUE

   AACSB: Reflective Thinking
   Blooms: Remember
   Difficulty: 1 Easy
   Learning Objective: 02-01 Summarize qualitative data by using frequency distributions; bar charts; and pie charts.
   Topic: Bar Chart

4. Stem-and-leaf displays and dot plots are useful for detecting outliers.

TRUE

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-04 Construct and interpret dot plots.
Learning Objective: 02-05 Construct and interpret stem-and-leaf displays.
Topic: Stem-and-Leaf

5. A scatter plot can be used to identify outliers.

FALSE

A scatter plot is used to identify the relationship between two variables.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-07 Examine the relationships between variables by using scatter plots.
Topic: Scatter Plot

6. When looking at the shape of the distribution using a stem-and-leaf, a distribution is skewed to the right when the left tail is shorter than the right tail.

TRUE

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-05 Construct and interpret stem-and-leaf displays.
Topic: Stem-and-Leaf

7. When we wish to summarize the proportion (or fraction) of items in a class, we use the frequency distribution for each class.

FALSE

This is the definition for relative frequency. Frequency distribution shows actual counts of items in a class.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Histogram

8. When establishing the classes for a frequency table, it is generally agreed that the more classes you use the better your frequency table will be.

FALSE

Classes should be determined by the number of data measurements.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 1 Easy
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Histogram

9. The sample cumulative distribution function is nondecreasing.

TRUE

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Graphing Quantitative Data

10. A frequency table includes row and column percentages.

FALSE

Frequency tables include frequencies, relative frequency, and percent frequency. Cross-tabulation tables include row and column percentages.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-01 Summarize qualitative data by using frequency distributions; bar charts; and pie charts.
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Frequency Distribution

11. When constructing any graphical display that utilizes categorical data, classes that have frequencies of 5 percent or less are usually combined together into a single category.

TRUE

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-02 Construct and interpret Pareto charts.
Topic: Pareto Chart

12. In a Pareto chart, the bar for the "Other" category should be placed to the far left of the chart.

FALSE

The bar to the far left of the Pareto chart will be the category with the highest frequency.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 1 Easy
Learning Objective: 02-02 Construct and interpret Pareto charts.
Topic: Pareto Chart

13. In the first step of setting up a Pareto chart, a frequency table should be constructed of the defects (or categories) in decreasing order of frequency.

TRUE

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-02 Construct and interpret Pareto charts.
Topic: Pareto Chart

14. It is possible to create different interpretations of the same graphical display by simply using different captions.

TRUE

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-08 Recognize misleading graphs and charts.
Topic: Misleading Graphs

15. Beginning the vertical scale of a graph at a value different from zero can cause increases to look more dramatic.

TRUE

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-08 Recognize misleading graphs and charts.
Topic: Misleading Graphs

16. A runs plot is a form of scatter plot.

TRUE

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 1 Easy
Learning Objective: 02-07 Examine the relationships between variables by using scatter plots.
Topic: Scatter Plot

17. The stem-and-leaf display is advantageous because it allows us to actually see the measurements in the data set.

TRUE

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 1 Easy
Learning Objective: 02-05 Construct and interpret stem-and-leaf displays.
Topic: Stem-and-Leaf

18. Splitting the stems refers to assigning the same stem to two or more rows of the stem-and-leaf display.

TRUE

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-05 Construct and interpret stem-and-leaf displays.
Topic: Stem-and-Leaf

19. When data are qualitative, the bars should never be separated by gaps.

FALSE

Bar graphs for qualitative data are displayed with a gap between each category.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-01 Summarize qualitative data by using frequency distributions; bar charts; and pie charts.
Topic: Qualitative Data

20. Each stem of a stem-and-leaf display should be a single digit.

FALSE

Leaves on the stem-and-leaf are a single digit.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-05 Construct and interpret stem-and-leaf displays.
Topic: Stem-and-Leaf

21. Leaves on a stem-and-leaf display should be rearranged so that they are in increasing order from left to right.

TRUE

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-05 Construct and interpret stem-and-leaf displays.
Topic: Stem-and-Leaf

Multiple Choice Questions

22. A(n) _____ is a graph of a cumulative distribution.

A. Histogram
B. Scatter plot
C. Ogive plot
D. Pie chart

An ogive is a graph of the cumulative frequency of the class or the cumulative relative frequencies or the cumulative percent frequencies.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Graphing Quantitative Data

23. _____ can be used to study the relationship between two variables.

A. Cross-tabulation tables
B. Frequency tables
C. Cumulative frequency distributions
D. Dot plots

Frequency distributions and dot plots only use one variable. To study the relationship between two variables, you need to use either cross-tabulation tables or scatter plots.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 1 Easy
Learning Objective: 02-06 Examine the relationship between variables by using cross-tabulation tables.
Topic: Cross-tabulation

24. Row or column percentages can be found in

A. Frequency tables.
B. Relative frequency tables.
C. Cross-tabulation tables.
D. Cumulative frequency tables.

Cross-tabulation tables show the relationship between two variables using rows and column percentages.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-06 Examine the relationship between variables by using cross-tabulation tables.
Topic: Cross-tabulation

25. All of the following are used to describe quantitative data except the _____.

A. Histogram
B. Stem-and-leaf chart
C. Dot plot
D. Pie chart

Pie charts are used only for categorical or qualitative data.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Graphing Quantitative Data

26. An observation separated from the rest of the data is a(n) _____.

A. Absolute extreme
B. Outlier
C. Mode
D. Quartile

Outliers are identified as measurements that are widely separated from the other data measurements.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 1 Easy
Learning Objective: 02-05 Construct and interpret stem-and-leaf displays.
Topic: Stem-and-Leaf

27. Which of the following graphs is for qualitative data?

A. Histogram
B. Bar chart
C. Ogive plot
D. Stem-and-leaf

Histogram, stem-and-leaf, and frequency (ogive) graphs display quantitative data.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-01 Summarize qualitative data by using frequency distributions; bar charts; and pie charts.
Topic: Graphing Qualitative Data

28. A plot of the values of two variables is a _____ plot.

A. Runs
B. Scatter
C. Dot
D. Ogive

Scatter plots display the relationship between two variables.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-07 Examine the relationships between variables by using scatter plots.
Topic: Scatter Plot

29. A Stem-and-leaf display is best used to _____.

A. Provide a point estimate of the variability of the data set
B. Provide a point estimate of the central tendency of the data set
C. Display the shape of the distribution
D. None of these

It is more difficult to find central tendency and variability using a stem-and-leaf display. It is easy to visualize the shape of the distribution using stem-and-leaf.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-05 Construct and interpret stem-and-leaf displays.
Topic: Stem-and-Leaf

30. When grouping a large sample of measurements into classes, the _____ is a better tool than the _____.

A. Histogram, stem-and-leaf display
B. Box plot, histogram
C. Stem-and-leaf display, scatter plot
D. Scatter plot, box plot

A box plot does not easily group measurements into classes; a scatter plot is for looking at the relationship between two variables.

AACSB: Reflective Thinking
Blooms: Understand
Difficulty: 3 Hard
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Graphing Quantitative Data

31. A _____ displays the frequency of each group with qualitative data and a _____ displays the frequency of each group with quantitative data.

A. Histogram, stem-and-leaf display
B. Bar chart, histogram
C. Scatter plot, bar chart
D. Stem-and-leaf, pie chart

The histogram and stem-and-leaf are used to graphically display quantitative data; a scatter plot is used for displaying the relationship between two variables.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-01 Summarize qualitative data by using frequency distributions; bar charts; and pie charts.
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Graph

32. A _____ shows the relationship between two variables.

A. Stem-and-leaf
B. Bar chart
C. Histogram
D. Scatter plot
E. Pie chart

Pie charts and bar charts are used for a single qualitative variable; stem-and-leaf charts and histograms are used for displaying a single quantitative variable.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-07 Examine the relationships between variables by using scatter plots.
Topic: Scatter Plot

33. A _____ can be used to differentiate the "vital few" causes of quality problems from the "trivial many" causes of quality problems.

A. Histogram
B. Scatter plot
C. Pareto chart
D. Ogive plot
E. Stem-and-leaf display

A pareto chart is a specialized bar chart to look at the frequency of categories; a scatter plot is for displaying the relationship between two variables; a histogram, stem-and-leaf, and ogive plot are used to display quantitative data.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-02 Construct and interpret Pareto charts.
Topic: Graphing Qualitative Data

34. _____ and _____ are used to describe qualitative (categorical) data.

A. Stem-and-leaf displays, scatter plots
B. Scatter plots, histograms
C. Box plots, bar charts
D. Bar charts, pie charts
E. Pie charts, histograms

Stem-and-leaf displays, box plots, and histograms are used for quantitative data; scatter plots are for displaying the relationship between two variables.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-01 Summarize qualitative data by using frequency distributions; bar charts; and pie charts.
Topic: Graphing Qualitative Data

35. Which one of the following graphical tools is used with quantitative data?

A. Bar chart
B. Histogram
C. Pie chart
D. Pareto chart

Pie charts, Pareto charts, and bar charts are used with categorical/qualitative data.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Graphing Quantitative Data

36. When developing a frequency distribution, the class (group) intervals should be _____.

A. Large
B. Small
C. Integer
D. Mutually exclusive
E. Equal

There is no definitive size of intervals for classes, and intervals can be fractional. The number of classes can result in the final class having a different interval size than the previous ones.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 3 Hard
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Histogram

37. Which of the following graphical tools is not used to study the shapes of distributions?

A. Stem-and-leaf display
B. Scatter plot
C. Histogram
D. Dot plot

Scatter plots are used to display the relationship between two variables.

AACSB: Reflective Thinking
Blooms: Understand
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Graphing Quantitative Data

38. All of the following are used to describe qualitative data except the _____.

A. Bar chart
B. Pie chart
C. Histogram
D. Pareto chart

Histograms are used for quantitative data.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-01 Summarize qualitative data by using frequency distributions; bar charts; and pie charts.
Topic: Graphing Qualitative Data

39. If there are 130 values in a data set, how many classes should be created for a frequency histogram?

A. 4
B. 5
C. 6
D. 7
E. 8

2^k, where k = number of classes and 2^k is the closest value larger than 130. $2^7 = 128$; $2^8 = 256$.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Histogram

40. If there are 120 values in a data set, how many classes should be created for a frequency histogram?

A. 4
B. 5
C. 6
D. 7
E. 8

2^k, where k = number of classes and 2^k is the closest value larger than 120. $2^7 = 128$.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Histogram

41. If there are 62 values in a data set, how many classes should be created for a frequency histogram?

A. 4
B. 5
C. 6
D. 7
E. 8

2^k, where k = number of classes and 2^k is the closest value larger than 62. $2^6 = 64$.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Histogram

42. If there are 30 values in a data set, how many classes should be created for a frequency histogram?

A. 4
B. 5
C. 6
D. 7
E. 8

2^k, where k = number of classes and 2^k is the closest value larger than 30. $2^5 = 32$.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Histogram

43. A CFO is looking at how much of a company's resources are spent on computing. He samples companies in the pharmaceutical industry and develops the following stem-and-leaf graph.

5	269
6	255568999
7	11224557789
8	001222458
9	02455679
10	1556
11	137
12	
13	255

What is the approximate shape of the distribution of the data?

A. Normal
B. Skewed to the right
C. Skewed to the left
D. Bimodal
E. Uniform

With outliers at the stem of 13 and the majority of the data grouped around stems 6, 7, and 8, the shape is skewed with the outliers to the right.

AACSB: Analytic
Blooms: Analyze
Difficulty: 2 Medium
Learning Objective: 02-05 Construct and interpret stem-and-leaf displays.
Topic: Stem-and-Leaf

44. A CFO is looking at how much of a company's resources are spent on computing. He samples companies in the pharmaceutical industry and develops the following stem-and-leaf graph.

5	269
6	255568999
7	11224557789
8	001222458
9	02455679
10	1556
11	137
12	
13	255

What is the smallest percentage spent on R&D?

A. 5.9
B. 5.6
C. 5.2
D. 5.02
E. 50.2

The smallest value displayed in the graph is 5.2%.

AACSB: Reflective Thinking
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-05 Construct and interpret stem-and-leaf displays.
Topic: Stem-and-Leaf

45. A CFO is looking at how much of a company's resources are spent on computing. He samples companies in the pharmaceutical industry and develops the following stem-and-leaf graph.

5	269
6	255568999
7	11224557789
8	001222458
9	02455679
10	1556
11	137
12	
13	255

If you were creating a frequency histogram using these data, how many classes would you create?

A. 4
B. 5
C. 6
D. 7
E. 8

There are 50 data measurements. 2^k, where k = number of classes and 2^k is the closest value larger than 50. $2^6 = 64$.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Histogram

46. A CFO is looking at how much of a company's resources are spent on computing. He samples companies in the pharmaceutical industry and develops the following stem-and-leaf graph.

5	269
6	255568999
7	11224557789
8	001222458
9	02455679
10	1556
11	137
12	
13	255

What would be the class length used in creating a frequency histogram?

A. 1.4
B. 8.3
C. 1.2
D. 1.7
E. 0.9

There are 50 data measurements. 2^k, where k = number of classes and 2^k is the closest value larger than 50. $2^6 = 64$, so 6 classes. Class length = (Max value - Min value)/6 = (13.5 - 5.2)/6. Length = 1.38, rounded to 1.4.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Histogram

47. A CFO is looking at how much of a company's resources are spent on computing. He samples companies in the pharmaceutical industry and develops the following stem-and-leaf graph.

5	269
6	255568999
7	11224557789
8	001222458
9	02455679
10	1556
11	137
12	
13	255

What would be the first class interval for the frequency histogram?

A. 5.2-6.5
B. 5.2-6.0
C. 5.0-6.0
D. 5.2-6.6
E. 5.2-6.4

There are 50 data measurements. 2^k, where k = number of classes and 2^k is the closest value larger than 50. $2^6 = 64$, so 6 classes. Class length = (Max value - Min value)/6 = (13.5 - 5.2)/6. Length = 1.38, rounded to 1.4. The boundary for the first nonoverlapping interval is the smallest measurement and the sum of the first measurement and the length (5.2 + 1.38 = 6.58). So the first interval will contain the values 5.2 - 6.5.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Histogram

48. The US local airport keeps track of the percentage of flights arriving within 15 minutes of their scheduled arrivals. The stem-and-leaf plot of the data for one year is below.

76	9
77	114
78	
79	07
80	88
81	2
82	1
83	88

How many flights were used in this plot?

A. 7
B. 9
C. 10
D. 11
E. 12

Count of measurements is 12.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-05 Construct and interpret stem-and-leaf displays.
Topic: Stem-and-Leaf

49. The US local airport keeps track of the percentage of flights arriving within 15 minutes of their scheduled arrivals. The stem-and-leaf plot of the data for one year is below.

76	9
77	114
78	
79	07
80	88
81	2
82	1
83	88

In developing a histogram of these data, how many classes would be used?

A. 4
B. 5
C. 6
D. 7
E. 8

Number of measurements = 12; $2^4 = 16$; classes = 4.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Histogram

50. The US local airport keeps track of the percentage of flights arriving within 15 minutes of their scheduled arrivals. The stem-and-leaf plot of the data for one year is below.

76	9
77	114
78	
79	07
80	88
81	2
82	1
83	88

What would be the class length for creating the frequency histogram?

A. 1.4
B. 0.8
C. 2.7
D. 1.7
E. 2.3

Measurements = 12; classes = 4; class length = (83.8 - 76.9)/4 = 1.725, rounded to 1.7

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Histogram

51. A company collected the ages from a random sample of its middle managers, with the resulting frequency distribution shown below.

Class Interval	Frequency
20 to < 25	8
25 to < 30	6
30 to < 35	5
35 to < 40	12
40 to < 45	15
45 to < 50	7

What would be the approximate shape of the relative frequency histogram?

A. Symmetrical
B. Uniform
C. Multiple peaks
D. Skewed to the left
E. Skewed to the right

The majority of data lie to the right side of the distribution; the tail of the smaller number of measurements extends to the left, so the graph is skewed with a tail to the left.

AACSB: Reflective Thinking
Blooms: Understand
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Histogram

52. A company collected the ages from a random sample of its middle managers, with the resulting frequency distribution shown below.

Class Interval	Frequency
20 to < 25	8
25 to < 30	6
30 to < 35	5
35 to < 40	12
40 to < 45	15
45 to < 50	7

What is the relative frequency for the largest interval?

A. .132
B. .226
C. .231
D. .283
E. .288

Measurements = 53; largest interval has 15 measurements. 15/53 = .283.

AACSB: Analytic
Blooms: Apply
Difficulty: 3 Hard
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Histogram

53. A company collected the ages from a random sample of its middle managers, with the resulting frequency distribution shown below.

Class Interval	Frequency
20 to < 25	8
25 to < 30	6
30 to < 35	5
35 to < 40	12
40 to < 45	15
45 to < 50	7

What is the midpoint of the third class interval?

A. 22.5
B. 27.5
C. 32.5
D. 37.5
E. 42.5

The midpoint is calculated as halfway between the boundaries of the class. The third class interval is 30 to 35, which yields a midpoint of 32.5.

AACSB: Analytic
Blooms: Apply
Difficulty: 3 Hard
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Histogram

54. The general term for a graphical display of categorical data made up of vertical or horizontal bars is called a(n) _____.

A. Pie chart
B. Pareto chart
C. Bar chart
D. Ogive plot

An ogive plot is based on quantitative data, a Pareto chart is a specialized bar chart, and a pie chart is a circular graphical display.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-01 Summarize qualitative data by using frequency distributions; bar charts; and pie charts.
Topic: Graphing Qualitative Data

55. A flaw possessed by a population or sample unit is _____.

A. Always random
B. A defect
C. Displayed by a dot plot
D. The cause for extreme skewness to the right

By definition, a defect is a flaw in a population or sample element.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-02 Construct and interpret Pareto charts.
Topic: Graphing Qualitative Data

56. A graphical portrayal of a quantitative data set that divides the data into classes and gives the frequency of each class is a(n) _____.

A. Ogive plot
B. Dot plot
C. Histogram
D. Pareto chart
E. Bar chart

Pareto and bar charts are used for qualitative data, a dot plot displays individual data points, and an ogive plot is a curved display of the cumulative distribution of the data.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Histogram

57. The number of measurements falling within a class interval is called the _____.

A. Frequency
B. Relative frequency
C. Leaf
D. Cumulative sum

By definition, frequency is the number of measurements. Relative frequency is proportional. A leaf is not a count but part of a graphical display, and the cumulative sum is not a count.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Histogram

58. A relative frequency curve having a long tail to the right is said to be _____.

A. Skewed to the left
B. Normal
C. A scatter plot
D. Skewed to the right

A scatter plot is a graphical display of the relationship between two variables; a normal curve is bell-shaped with even distribution on both sides of the high point of the curve. The long tail direction defines the skewness of the graph, in this case skewed to the right.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Graphing Quantitative Data

59. The percentage of measurements in a class is called the _____ of that class.

A. Frequency
B. Relative frequency
C. Leaf
D. Cumulative percentage

By definition, frequency is the number of measurements. Relative frequency is proportional. A leaf and the cumulative sum are not counts of measurements or percentages.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Histogram

60. A histogram that tails out toward larger values is _____.

A. Skewed to the left
B. Normal
C. A scatter plot
D. Skewed to the right

Larger values are to the right of the center part of the graph, resulting in a tail to the right. Thus, the graph is skewed to the right.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Histogram

61. A histogram that tails out toward smaller values is _____.

A. Skewed to the left
B. Normal
C. A scatter plot
D. Skewed to the right

Smaller values are to the left of the center part of the graph, resulting in a tail to the left. Thus, the graph is skewed to the left.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Histogram

62. A very simple graph that can be used to summarize a quantitative data set is called a(n) _____.

A. Runs plot
B. Ogive plot
C. Dot plot
D. Pie chart

A runs plot is used for time series data; a pie chart is used for qualitative data; an ogive plot is a specialized graph of the cumulative distribution of data measurements. A dot plot is a simple graphical display of data measurements.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-04 Construct and interpret dot plots.
Topic: Dot Plot

63. An example of manipulating a graphical display to distort reality is _____.

A. Starting the axes at zero
B. Making the bars in a histogram equal widths
C. Stretching the axes
D. Starting the axes at zero and Stretching the axes

Starting the axes at zero is the appropriate method of graphical display, as is making the bars in a histogram equal widths.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-08 Recognize misleading graphs and charts.
Topic: Misleading Graphs

64. As a general rule, when creating a stem-and-leaf display, there should be _____ stem values.

A. Between 3 and 10
B. Between 1 and 100
C. No fewer than 20
D. Between 5 and 20

By definition, there should be between 5 and 20 stems to enable a reasonable display of the shape of the distribution.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: 2 Medium
Learning Objective: 02-05 Construct and interpret stem-and-leaf displays.
Topic: Stem-and-Leaf

65. At the end of their final exam, 550 students answered an additional question in which they rated their instructor's teaching effectiveness, with the following results.

	Student's Rating of Instructor	
Student's Final Grade	Very or Somewhat Effective	Very or Somewhat Ineffective
A	190	85
B	75	120
C	20	17
D	9	18
F	1	15

What proportion of the students who rated their instructor as very or somewhat effective received a B or better in the class?

A. 0.345
B. 0.254
C. 0.482
D. 0.898
E. 0.644

295 students rated their instructor as very or somewhat effective; (75 + 190) = 265 had a B or better; 265/295 = .898.

AACSB: Analytic
Blooms: Apply
Difficulty: 3 Hard
Learning Objective: 02-06 Examine the relationship between variables by using cross-tabulation tables.
Topic: Cross-tabulation

66. At the end of their final exam, 550 students answered an additional question in which they rated their instructor's teaching effectiveness, with the following results.

	Student's Rating of Instructor	
Student's Final Grade	Very or Somewhat Effective	Very or Somewhat Ineffective
A	190	85
B	75	120
C	20	17
D	9	18
F	1	15

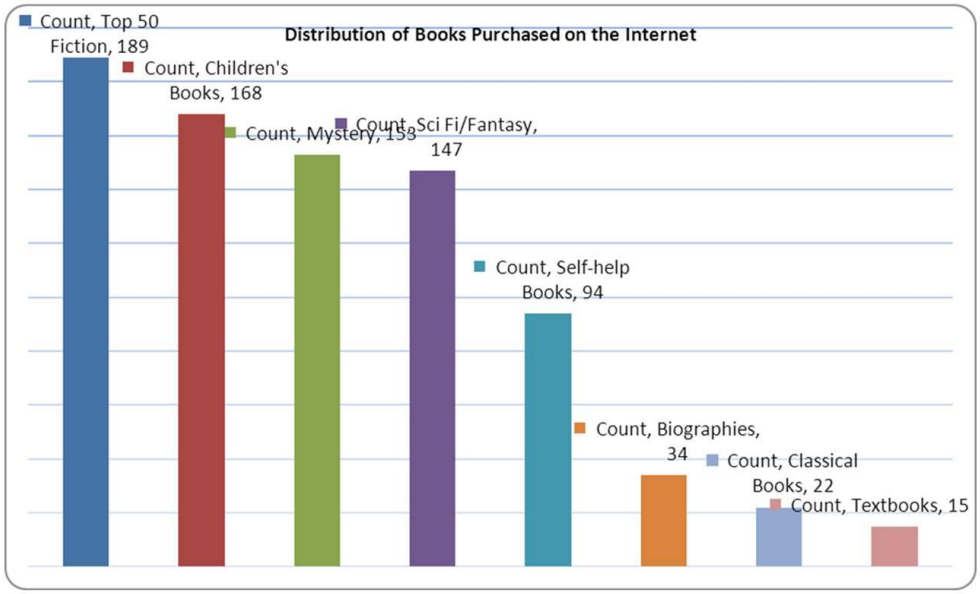
What proportion of all 550 students received less than a C?

A. 0.03
B. 0.06
C. 0.08
D. 0.13
E. 0.15

43 received less than a C; 43/550 = .078 = .08.

AACSB: Analytic
Blooms: Apply
Difficulty: 3 Hard
Learning Objective: 02-06 Examine the relationship between variables by using cross-tabulation tables.
Topic: Cross-tabulation

67. 822 customers were randomly selected from those who had recently bought a book over the Internet. The chart below shows the breakdown of the classification of the book type.



What percentage of the books purchased were either mystery or science fiction/fantasy?

A. 18.61

B. 36.50

C. 17.88

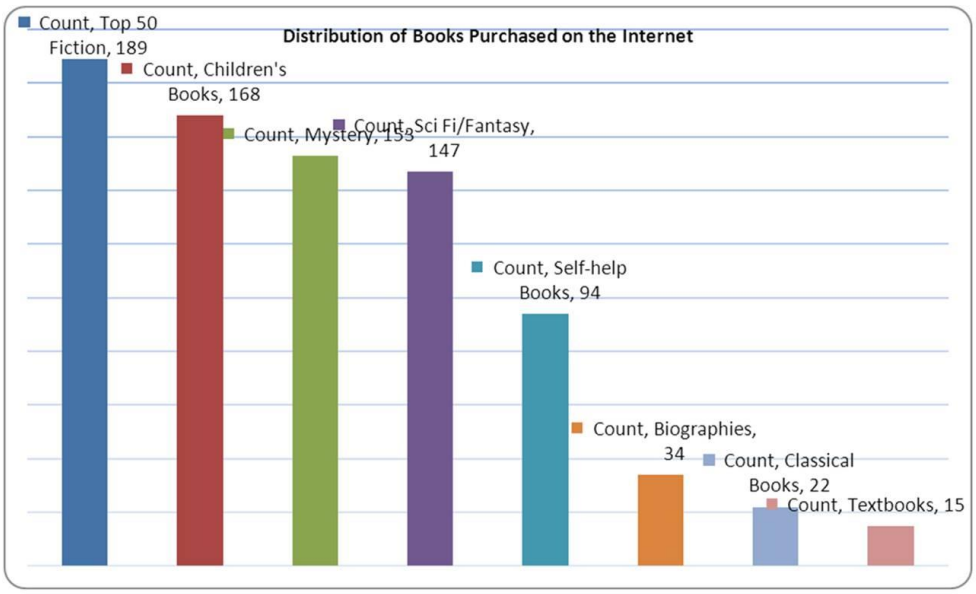
D. 24.33

E. 22.99

300 mystery or science fiction/fantasy books purchased; 300/822 = 36.5%.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-01 Summarize qualitative data by using frequency distributions; bar charts; and pie charts.
Topic: Graphing Qualitative Data

68. 822 customers were randomly selected from those who had recently bought a book over the Internet. The chart below shows the breakdown of the classification of the book type.



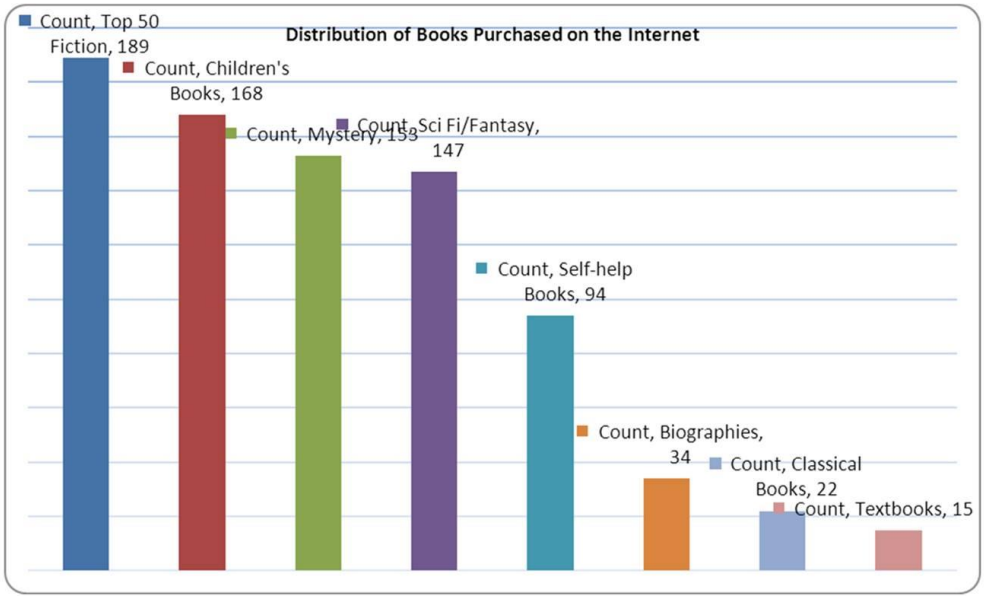
What percentage of the books purchased were self-help books?

A. 11.44
B. .1144
C. 1.82
D. 0.0182
E. 0.940

94/822 = 11.44%

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-01 Summarize qualitative data by using frequency distributions; bar charts; and pie charts.
Topic: Graphing Qualitative Data

69. 822 customers were randomly selected from those who had recently bought a book over the Internet. The chart below shows the breakdown of the classification of the book type.



What percentage of the books were in the top two categories?

A. 22.99
B. 20.44
C. 4.50
D. 43.43
E. 0.4343

189 + 168 = 357 in the top two categories; 357/822 = 43.43% of the total purchased.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-01 Summarize qualitative data by using frequency distributions; bar charts; and pie charts.
Topic: Graphing Qualitative Data

70. Using the following data, describe the shape of the data distribution.

1.	11.5	6.	13.7	11.	11.0	16.	14.5
2.	13.5	7.	14.0	12.	13.0	17.	15.5
3.	12.5	8.	12.0	13.	16.7	18.	13.0
4.	15.2	9.	12.7	14.	12.5	19.	18.2
5.	14.7	10.	12.5	15.	11.5	20.	11.7

A. Skewed to the left

B. Bimodal

C. Normal

D. Skewed to the right

Create a stem-and-leaf graph. The stem would be 11,12,13,14,15,16,17,18; leaves would be the tenth on each data measurement:

STEM	LEAF
11	0557
12	05557
13	0057
14	057
15	25
16	7
17	
18	2

The graphical display shows that it is skewed to the right.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Summarizing Quantitative Data

71. Using the following data, what would be the range of the values of the stem in a stem-and-leaf display?

1.	11.5	6.	13.7	11.	11.0	16.	14.5
2.	13.5	7.	14.0	12.	13.0	17.	15.5
3.	12.5	8.	12.0	13.	16.7	18.	13.0
4.	15.2	9.	12.7	14.	12.5	19.	18.2
5.	14.7	10.	12.5	15.	11.5	20.	11.7

A. 11-17

B. 11-18

C. 10-18

D. 12-17

E. 12-18

Create a stem-and-leaf graph. The stem would be 11,12,13,14,15,16,17,18; leaves would be the tenth on each data measurement:

STEM	LEAF
11	0557
12	05557
13	0057
14	057
15	25
16	7
17	
18	2

The graphical display shows that it is skewed to the right.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-05 Construct and interpret stem-and-leaf displays.
Topic: Stem-and-Leaf

72. Using the following data, what would be the leaf unit in a stem-and-leaf display?

1.	11.5	6.	13.7	11.	11	16.	14.5
2.	13.5	7.	14	12.	13	17.	15.5
3.	12.5	8.	12	13.	16.7	18.	13
4.	15.2	9.	12.7	14.	12.5	19.	18.2
5.	14.7	10.	12.5	15.	11.5	20.	11.7

A. 1.0

B. 10

C. .10

D. .01

E. .20

Create a stem-and-leaf graph. The stem would be 11,12,13,14,15,16,17,18; leaves would be the tenth on each data measurement.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-05 Construct and interpret stem-and-leaf displays.
Topic: Stem-and-Leaf

73. Consider the following data on distances traveled by people to visit the local amusement park and calculate the relative frequency for the shortest distance.

Distance	Frequency
1–8 miles	15
9–16 miles	12
17–24 miles	7
25–32 miles	5
33–40 miles	1

A. .375
B. .150
C. .500
D. .300
E. .333

Total of 40 measurements: 15/40 = .375.

AACSB: Analytic
Blooms: Apply
Difficulty: 1 Easy
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Histogram

74. Consider the following data on distances traveled by people to visit the local amusement park and calculate the relative frequency for the distances over 24 miles.

Distance	Frequency
1–8 miles	15
9–16 miles	12
17–24 miles	7
25–32 miles	5
33–40 miles	1

A. .375

B. .150

C. .125

D. .025

E. .325

(5 + 1) = 6 over 24 miles; 6/40 = .15.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Histogram

75. The following is a partial relative frequency distribution of grades in an introductory statistics course.

Grade	Relative Frequency
A	.22
B	?
C	.18
D	.17
F	.06

Find the relative frequency for the B grade.

A. .78
B. .27
C. .65
D. .37
E. .47

1.00 - (.22 + .18 + .17 + .06) = 1.00 - .63 = .37

AACSB: Analytic
Blooms: Apply
Difficulty: 1 Easy
Learning Objective: 02-01 Summarize qualitative data by using frequency distributions; bar charts; and pie charts.
Topic: Graphing Qualitative Data

76. The following is a relative frequency distribution of grades in an introductory statistics course.

Grade	Relative Frequency
A	.22
B	.37
C	.18
D	.17
F	.06

If this was the distribution of 200 students, find the frequency for the highest two grades.

A. 44

B. 118

C. 59

D. 74

E. 35

(.22 + .37) = .59. 59% of 200 = 118.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-01 Summarize qualitative data by using frequency distributions; bar charts; and pie charts.
Topic: Graphing Qualitative Data

77. The following is a relative frequency distribution of grades in an introductory statistics course.

Grade	Relative Frequency
A	.22
B	.37
C	.18
D	.17
F	.06

If this was the distribution of 200 students, find the frequency of failures.

A. 12
B. 6
C. 23
D. 46
E. 3

The frequency is .06. The frequency of failures is 6% of 200 = 12.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-01 Summarize qualitative data by using frequency distributions; bar charts; and pie charts.
Topic: Graphing Qualitative Data

78. The following is a relative frequency distribution of grades in an introductory statistics course.

Grade	Relative Frequency
A	.22
B	.37
C	.18
D	.17
F	.06

If we wish to depict these data using a pie chart, find how many degrees should be assigned to the highest grade of A.

A. 61.1
B. 22.0
C. 79.2
D. 90.0
E. 212.40

A's are 22% of total; 360° in a circle: 22% of 360 = 79.2°.

AACSB: Analytic
Blooms: Apply
Difficulty: 3 Hard
Learning Objective: 02-01 Summarize qualitative data by using frequency distributions; bar charts; and pie charts.
Topic: Qualitative Data

79. Recently an advertising company called 200 people and asked them to identify the company that was in an ad running nationwide. The following results were obtained.

	Female	Male	Total
Correctly recalled the company	66	50	116
Incorrectly recalled the company	44	40	84
Total	110	90	200

What percentage of those surveyed were female and could not recall the company?

A. 40.0
B. 22.0
C. 52.4
D. 66.7
E. 37.9

Out of 200 people, 44 were female and could not recall the company; 44/200 = 22%.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-06 Examine the relationship between variables by using cross-tabulation tables.
Topic: Cross-tabulation

80. Recently an advertising company called 200 people and asked them to identify the company that was in an ad running nationwide. The following results were obtained.

	Female	Male	Total
Correctly recalled the company	66	50	116
Incorrectly recalled the company	44	40	84
Total	110	90	200

What percentage of those surveyed could not correctly recall the company?

A. 58.00
B. 56.89
C. 55.00
D. 43.10
E. 42.00

84 of 200 could not recall the company; 84/200 = 42%.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-06 Examine the relationship between variables by using cross-tabulation tables.
Topic: Cross-tabulation

81. A local electronics retailer recently conducted a study on purchasers of large screen televisions. The study recorded the type of television and the credit account balance of the customer at the time of purchase. They obtained the following results.

Credit Balance	Standard TV	LCD	Plasma	Projection
Under $200	10	16	40	5
$200–$800	8	12	24	15
Over $800	16	12	16	30
Total	34	40	80	50

What percentage of purchases were plasma televisions by customers with the smallest credit balances?

A. 50.00
B. 39.20
C. 56.30
D. 34.80
E. 19.60

40 of 204 total purchases; 40/204 = 19.6%

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-06 Examine the relationship between variables by using cross-tabulation tables.
Topic: Cross-tabulation

82. A local electronics retailer recently conducted a study on purchasers of large screen televisions. The study recorded the type of television and the credit account balance of the customer at the time of purchase. They obtained the following results.

Credit Balance	Standard TV	LCD	Plasma	Projection
Under $200	10	16	40	5
$200–$800	8	12	24	15
Over $800	16	12	16	30
Total	34	40	80	50

What percentage of the customers had the highest credit balances and purchased an LCD television?

A. 36.30

B. 5.90

C. 19.60

D. 56.30

E. 16.20

12 out of 204 = 5.9%.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-06 Examine the relationship between variables by using cross-tabulation tables.
Topic: Cross-tabulation

83. The number of weekly sales calls by a sample of 25 pharmaceutical salespersons is below.

24, 56, 43, 35, 37, 27, 29, 44, 34, 28, 33, 28, 46, 31, 38, 41, 48, 38, 27, 29, 37, 33, 31, 40, 50

How many classes should be used in the construction of a histogram?

A. 4
B. 6
C. 10
D. 5
E. 2

Classes are determined by the value of k, where 2^k yields a value that is closest to the sample size and is also larger than the sample size. k = 5, so $2^5 = 32$.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Histogram

84. The number of weekly sales calls by a sample of 25 pharmaceutical salespersons is below.

24, 56, 43, 35, 37, 27, 29, 44, 34, 28, 33, 28, 46, 31, 38, 41, 48, 38, 27, 29, 37, 33, 31, 40, 50

What is the shape of the distribution of the data?

A. Skewed with tail to the right
B. Skewed with tail to the left
C. Normal
D. Bimodal

Create a frequency table that can be used to observe the shape of the distribution.

Classes	Frequency	Rel Freq
24 < 31	7	0.28
31 < 38	8	0.32
38 < 45	6	0.24
45 < 52	3	0.12
52 < 57	1	0.04

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Summarizing Quantitative Data

85. The number of items rejected daily by a manufacturer because of defects for the last 30 days are:

20, 21, 8, 17, 22, 19, 18, 19, 14, 17, 11, 6, 21, 25, 4, 19, 9, 12, 16, 16, 10, 28, 24, 6, 21, 20, 25, 5, 17, 8

How many classes should be used in constructing a histogram?

A. 6
B. 5
C. 7
D. 4
E. 8

Number of classes = k, where $2^k > 30$. So k = 5.

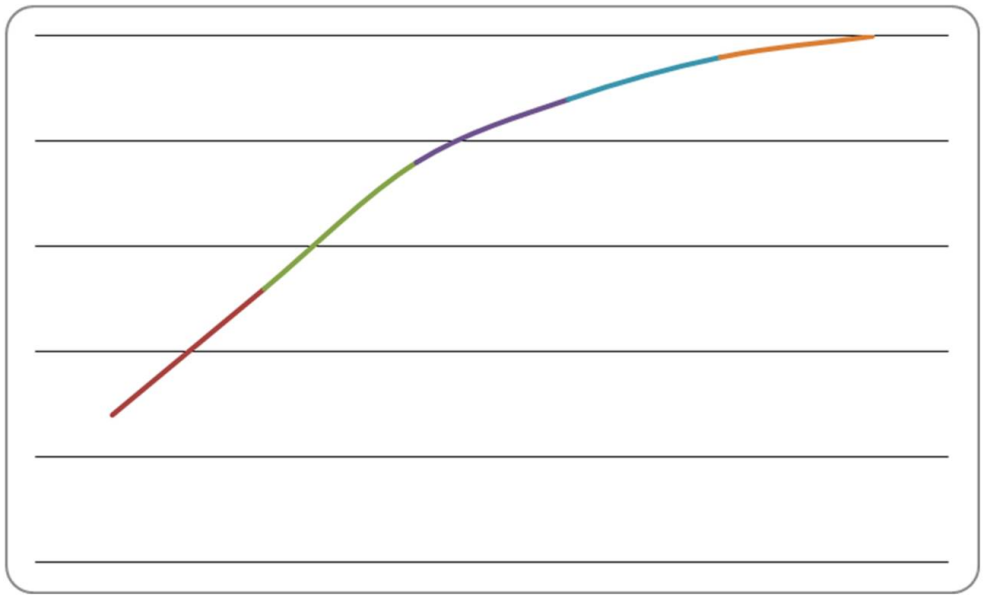
AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Histogram

Essay Questions

86. The number of weekly sales calls by a sample of 25 pharmaceutical salespersons is below.

24, 56, 43, 35, 37, 27, 29, 44, 34, 28, 33, 28, 46, 31, 38, 41, 48, 38, 27, 29, 37, 33, 31, 40, 50

Construct an ogive plot.



Feedback: Create a frequency table with cumulative relative frequency and then construct the graph using the cumulative frequency points.

Classes	Frequency	Rel Freq	Cum Rel Freq
24 < 31	7	0.28	0.28
31 < 38	8	0.32	0.60
38 < 45	6	0.24	0.84
45 < 52	3	0.12	0.96
52 < 57	1	0.04	1.00

AACSB: Analytic
Blooms: Apply
Difficulty: 3 Hard
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Graphing Quantitative Data

87. The number of items rejected daily by a manufacturer because of defects for the last 30 days are:

20, 21, 8, 17, 22, 19, 18, 19, 14, 17, 11, 6, 21, 25, 4, 19, 9, 12, 16, 16, 10, 28, 24, 6, 21, 20, 25, 5, 17, 8

Complete this frequency table for these data.

	Frequency	Rel Freq	Cum Freq
$4 < 9$			
$9 < 14$			
$14 < 19$			
$19 < 24$			
$24 < 29$			

	Frequency	Rel Freq	Cum Freq
$4 < 9$	6	.2	.2
$9 < 14$	4	.133	.333
$14 < 19$	7	.233	.5607
$19 < 24$	9	.30	.8607
$24 < 29$	4	.133	1.00

Feedback: Using the given classes, frequency = number of rejected items in each class, relative frequency = frequency/30, and cumulative frequency = sum of successive class relative frequencies.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Histogram

88. The number of items rejected daily by a manufacturer because of defects for the last 30 days are:

20, 21, 8, 17, 22, 19, 18, 19, 14, 17, 11, 6, 21, 25, 4, 19, 9, 12, 16, 16, 10, 28, 24, 6, 21, 20, 25, 5, 17, 8

Construct a stem-and-leaf plot.

```
Stem-and-leaf of Rejected Items
N = 30
Leaf Unit = 1.0

 2    0  45
 4    0  66
 7    0  889
 8    1  1
 9    1  2
 10   1  4
 14   1  6777
(4)   1  8999
 12   2  000111
 6    2  2
 5    2  455
 2    2  6
 1    2  9
```

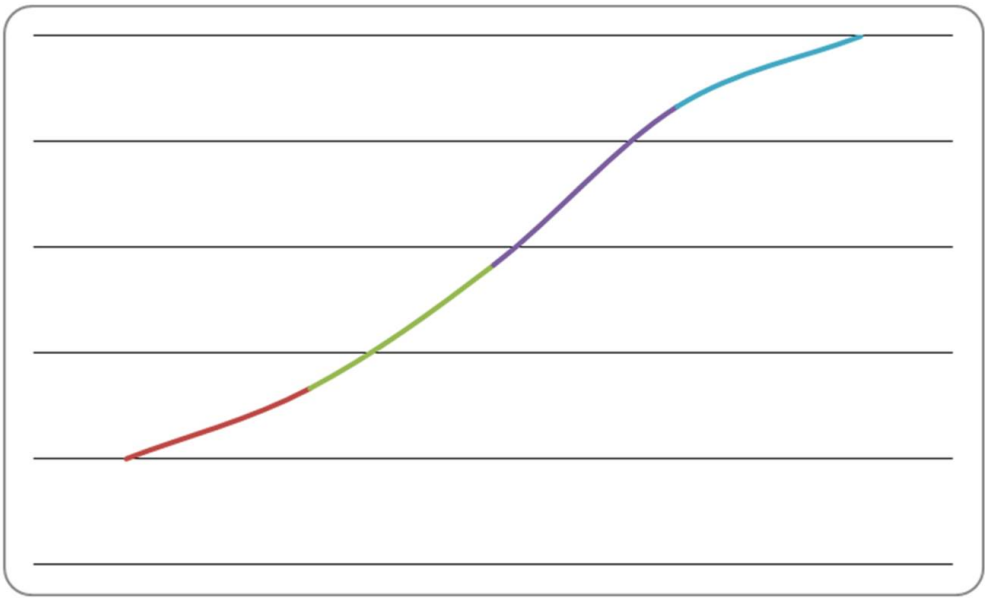
Feedback: Stem should be the 10s unit. Construct by splitting stems, since the range of values is only 5-28 and there should be approximately 10 stems. When splitting the stem, consider the number of values in the split stems. Leaf unit should be the ones unit.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-05 Construct and interpret stem-and-leaf displays.
Topic: Stem-and-Leaf

89. The number of items rejected daily by a manufacturer because of defects for the last 30 days are:

20, 21, 8, 17, 22, 19, 18, 19, 14, 17, 11, 6, 21, 25, 4, 19, 9, 12, 16, 16, 10, 28, 24, 6, 21, 20, 25, 5, 17, 8

Construct an ogive plot.



Feedback: Construct a frequency table (5 classes) with cumulative relative frequency.

Classes	Frequency	Rel Freq	Cum Rel Freq
4 < 9	6	0.20	0.20
9 < 14	4	0.13	0.33
14 < 19	7	0.23	0.57
19 < 24	9	0.30	0.87
24 < 29	4	0.13	1.00

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Graphing Quantitative Data

90. Consider the following data.

1.	11.5	6.	13.7	11.	11.0	16.	14.5
2.	13.5	7.	14.0	12.	13.0	17.	15.5
3.	12.5	8.	12.0	13.	16.7	18.	13.0
4.	15.2	9.	12.7	14.	12.5	19.	18.2
5.	14.7	10.	12.5	15.	11.5	20.	11.7

Create a stem-and-leaf display for the sample.

Stem-and-leaf of C1, N = 20, Leaf Unit = 0.10

4	11	0557
9	12	05557
(4)	13	0057
7	14	057
4	15	25
2	16	7
1	17	
1	18	2

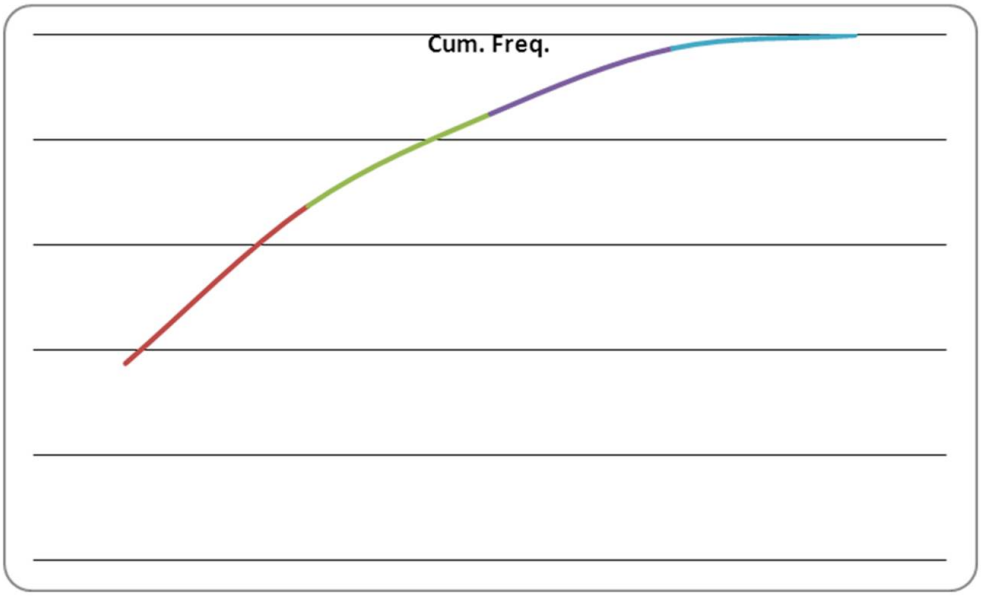
Feedback: Stems should be from 11 to 18; leaves are the tenth unit.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-05 Construct and interpret stem-and-leaf displays.
Topic: Stem-and-Leaf

91. Consider the following data on distances traveled by people to visit the local amusement park.

Distance	Frequency
1–8 miles	15
9–16 miles	12
17–24 miles	7
25–32 miles	5
33–40 miles	1

Construct an ogive plot that corresponds to the frequency table.



Feedback: Calculate the relative frequency for each class (15/40, 12/40, 7/40, 5/40, 1/40; or .375, .30, .175, .125, and .025) and then the cumulative frequency (.375, .675, .850, .975, 1.00).

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Graphing Quantitative Data

92. The following is a relative frequency distribution of grades in an introductory statistics course.

Grade	Relative Frequency
A	.22
B	.37
C	.18
D	.17
F	.06

If this was the distribution of 200 students, give the frequency distribution for this data.

Grade	Frequency
A	44
B	74
C	36
D	34
F	12

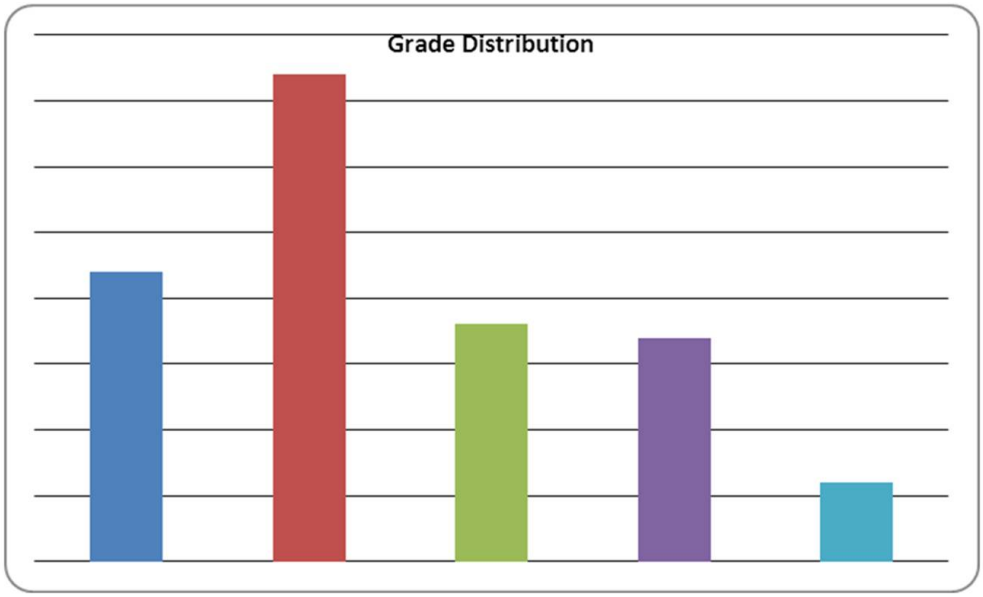
Feedback: Convert from proportion (relative frequency) to frequency by multiplying each relative frequency by 200 (e.g., .22 × 400 = 44 for grade A).

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-01 Summarize qualitative data by using frequency distributions; bar charts; and pie charts.
Topic: Graphing Qualitative Data

93. The following is a relative frequency distribution of grades in an introductory statistics course.

Grade	Relative Frequency
A	.22
B	.37
C	.18
D	.17
F	.06

Construct a percent frequency bar chart for this data.



Feedback: Each grade category is displayed as a bar on a proportion bar chart.

AACSB: Analytic
Blooms: Apply
Difficulty: 1 Easy
Learning Objective: 02-01 Summarize qualitative data by using frequency distributions; bar charts; and pie charts.
Topic: Graphing Qualitative Data

94. The following is a relative frequency distribution of grades in an introductory statistics course.

Grade	Relative Frequency
A	.22
B	.37
C	.18
D	.17
F	.06

If we wish to depict these data using a pie chart, find how many degrees (out of 360 degrees) should be assigned to each grade.

Grade	Circle Degrees
A	.22 × 360 = 79.2
B	.37 × 360 = 133.2
C	.18 × 360 = 64.8
D	.17 × 360 = 61.2
F	.06 × 360 = 21.6

Feedback: Each proportion (relative frequency) is considered that portion of a circle's 360 degrees. Multiple the relative frequency (proportion) by 360 to convert to actual circle degrees (e.g., grade A: .22 × 360 = 79.2 degrees).

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-01 Summarize qualitative data by using frequency distributions; bar charts; and pie charts.
Topic: Qualitative Data

95. Fill in the missing components of the following frequency distribution constructed for a sample size of 50.

Class	Frequency	Rel Frequency	Cum Rel Freq
____ < 7.95			0.12
____ < 8.05			0.48
8.05 < _____		0.24	
____ < 8.25		0.10	
8.25 < _____			

Class	Frequency	Rel Frequency	Cum Rel Freq
7.85 < 7.95	6	0.12	0.12
7.95 < 8.05	18	0.36	0.48
8.05 < 8.15	12	0.24	0.72
8.15 < 8.25	5	0.10	0.82
8.25 < 8.35	9	0.18	1.00

Feedback: Work each row to generate the missing frequency and/or relative frequency given a sample size of 50. For example, first class: cum rel freq = rel freq = x/50 = 0.12, so x = 6. Complete the class interval by recognizing that the second class beginning boundary is the end of the first interval's boundary and using the class length calculated in the second class (0.10) to apply to all other classes.

AACSB: Analytic
Blooms: Apply
Difficulty: 3 Hard
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Histogram

96. Recently an advertising company called 200 people and asked them to identify the company that was in an ad running nationwide. They obtained the following results.

	Female	Male	Total
Correctly recalled the company	66	50	116
Incorrectly recalled the company	44	40	84
Total	110	90	200

Construct a table of row percentages.

	Female	Male
Correctly recalled	66/116 = 0.569	50/116 = 0.431
Incorrectly recalled	44/84 = 0.524	40/84 = 0.476

Feedback: Row percentages are calculated by dividing each part of the row by the total of the row. For example, Female and correctly recalled = 66, which yields a row percentage of 66/116 = 0.569.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-06 Examine the relationship between variables by using cross-tabulation tables.
Topic: Cross-tabulation

97. Recently an advertising company called 200 people and asked them to identify the company that was in an ad running nationwide. They obtained the following results.

	Female	Male	Total
Correctly recalled the company	66	50	116
Incorrectly recalled the company	44	40	84
Total	110	90	200

Construct a table of column percentages.

	Female	Male
Correctly recalled	66/110 = 0.6	50/90 = 0.556
Incorrectly recalled	44/110 = 0.4	40/90 = 0.444

Feedback: Column percentages are calculated by dividing each part of the column by the total of the column. For example, Female and correctly recalled = 66, which yields a column percentage of 66/110 = 0.60.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-06 Examine the relationship between variables by using cross-tabulation tables.
Topic: Cross-tabulation

98. A local electronics retailer recently conducted a study on purchasers of large screen televisions. The study recorded the type of television and the credit account balance of the customer at the time of purchase. They obtained the following results.

Credit Balance	Standard TV	LCD	Plasma	Projection
Under $200	10	16	40	5
$200–$800	8	12	24	15
Over $800	16	12	16	30
Total	34	40	80	50

Construct a table of row percentages.

Credit Balance	Standard TV	LCD	Plasma	Projection
Under $200	10/71 = 0.141	16/71 = 0.225	40/71 = 0.563	5/71 = 0.070
$200–$800	8/59 = 0.136	12/59 = 0.203	24/59 = 0.407	15/59 = 0.254
Over $800	16/74 = 0.216	12/74 = 0.162	16/74 = 0.216	30/74 = 0.405

Feedback: Row percentages are calculated by dividing each part of the row by the total of the row. Need to calculate the totals for each row (under $200 = 71; $200-$800 = 59; over $800 = 74). For example, credit balance under $200 and LCD TV = 16, which yields row percentage 16/71 = 0.225.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-06 Examine the relationship between variables by using cross-tabulation tables.
Topic: Cross-tabulation

99. A local electronics retailer recently conducted a study on purchasers of large screen televisions. The study recorded the type of television and the credit account balance of the customer at the time of purchase. They obtained the following results.

Credit Balance	Standard TV	LCD	Plasma	Projection
Under $200	10	16	40	5
$200–$800	8	12	24	15
Over $800	16	12	16	30
Total	34	40	80	50

Construct a table of column percentages.

Credit Balance	Standard TV	LCD	Plasma	Projection
Under $200	10/34 = 0.294	16/40 = 0.4	40/80 = 0.5	5.50 = 0.1
$200–$800	8/34 = 0.235	12/40 = 0.3	24/80 = 0.3	15/50 = 0.3
Over $800	16/34 = 0.471	12/40 = 0.3	16/80 = 0.2	30/50 = 0.6

Feedback: Column percentages calculated by dividing each part of the column by the total of the column. For example, credit balance under $200 and LCD TV = 16 yields row percentage 16/40 = 0.40.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-06 Examine the relationship between variables by using cross-tabulation tables.
Topic: Cross-tabulation

100. Math test anxiety can be found throughout the general population. A study of 116 seniors at a local high school was conducted. The following table was produced from the data. Complete the missing parts.

Score Range	Frequency	Rel Frequency	Cum Freq Dist
Very anxious 37–50		0.19	
Anxious/tense 33–36	8		0.26
Some mild anxiety 27–32			
Generally relaxed 20–26	24		0.67
Very relaxed 10–19		0.33	

Score Range	Frequency	Rel Frequency	Cum Freq Dist
Very anxious 37–50	22	0.19	0.19
Anxious/tense 33–36	8	0.07	0.26
Some mild anxiety 27–32	24	0.207	0.467
Generally relaxed 20–26	24	0.207	0.674
Very relaxed 10–19	38	0.33	1.00

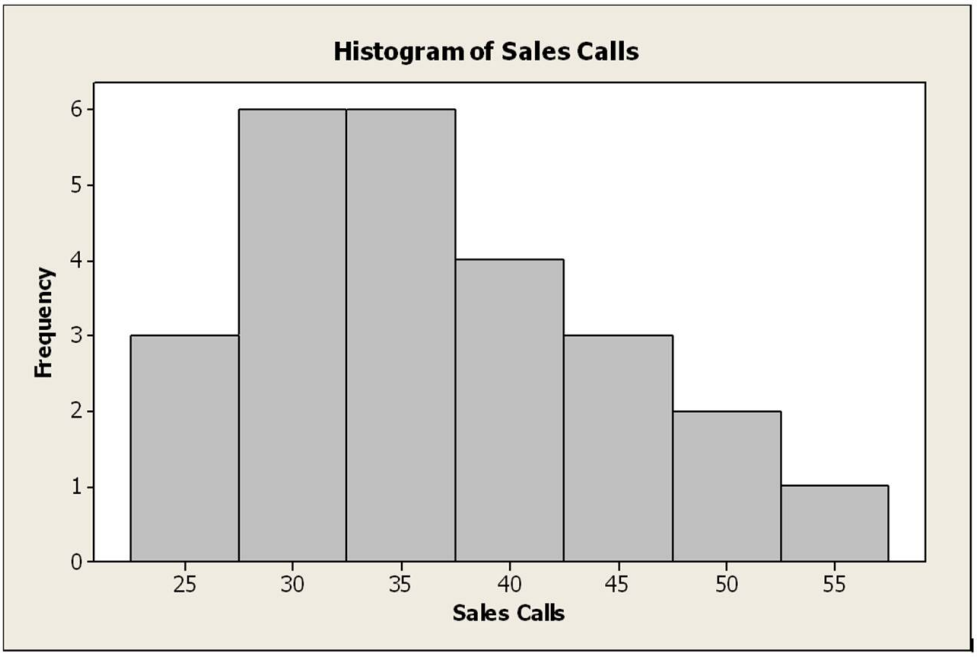
Feedback: Work each row to generate the missing frequency and/or relative frequency given a sample size of 116. For example, first class cum freq = rel freq = x/116 = 0.19, so x = 22. Use the definition of cumulative frequency, which is the sum of the class relative frequency and the previous class cumulative frequency (for example, "generally relaxed" relative frequency = 24/116 = .207, which with a cumulative frequency of .67 gives the previous class of "some mild anxiety" a cumulative frequency of .47).

AACSB: Analytic
Blooms: Apply
Difficulty: 3 Hard
Learning Objective: 02-01 Summarize qualitative data by using frequency distributions; bar charts; and pie charts.
Topic: Qualitative Data

101. The number of weekly sales calls by a sample of 25 pharmaceutical salespersons is below.

24, 56, 43, 35, 37, 27, 29, 44, 34, 28, 33, 28, 46, 31, 38, 41, 48, 38, 27, 29, 37, 33, 31, 40, 50

Construct a histogram.



Feedback: Construct a frequency table. You can use five to seven classes, depending on your choice and calculation of length as a whole integer.

Classes - Midpoint	Frequency
25	3
30	6
35	6
40	4
45	3
50	2
55	1

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and

ogives.
Topic: Histogram

102. The number of weekly sales calls by a sample of 25 pharmaceutical salespersons is below.

24, 56, 43, 35, 37, 27, 29, 44, 34, 28, 33, 28, 46, 31, 38, 41, 48, 38, 27, 29, 37, 33, 31, 40, 50

Construct a stem-and-leaf plot.

```
Stem-and-leaf of Sales Calls
N = 25
Leaf Unit = 1.0

 1   2  4
 7   2  778899
 12  3  11334
(5)  3  57788
 8   4  0134
 4   4  68
 2   5  0
 1   5  6
```

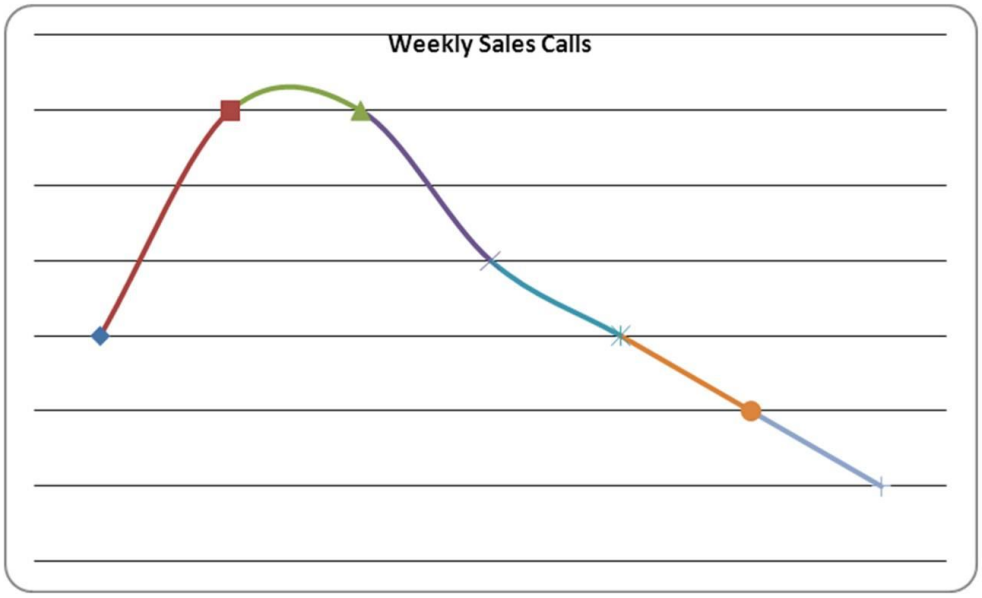
Feedback: The stem should be split and consist of 20, 30, 40, and 50. Leaves are the single units for the number of sales calls (e.g., 20 stem: leaves = 4, 7, 7, 8, 8, 9, 9).

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-05 Construct and interpret stem-and-leaf displays.
Topic: Stem-and-Leaf

103. The number of weekly sales calls by a sample of 25 pharmaceutical salespersons is below.

24, 56, 43, 35, 37, 27, 29, 44, 34, 28, 33, 28, 46, 31, 38, 41, 48, 38, 27, 29, 37, 33, 31, 40, 50

Construct a frequency polygon.



Feedback: The frequency polygon is the line connecting the height (frequency) of the midpoint of each class. Construct a frequency table.

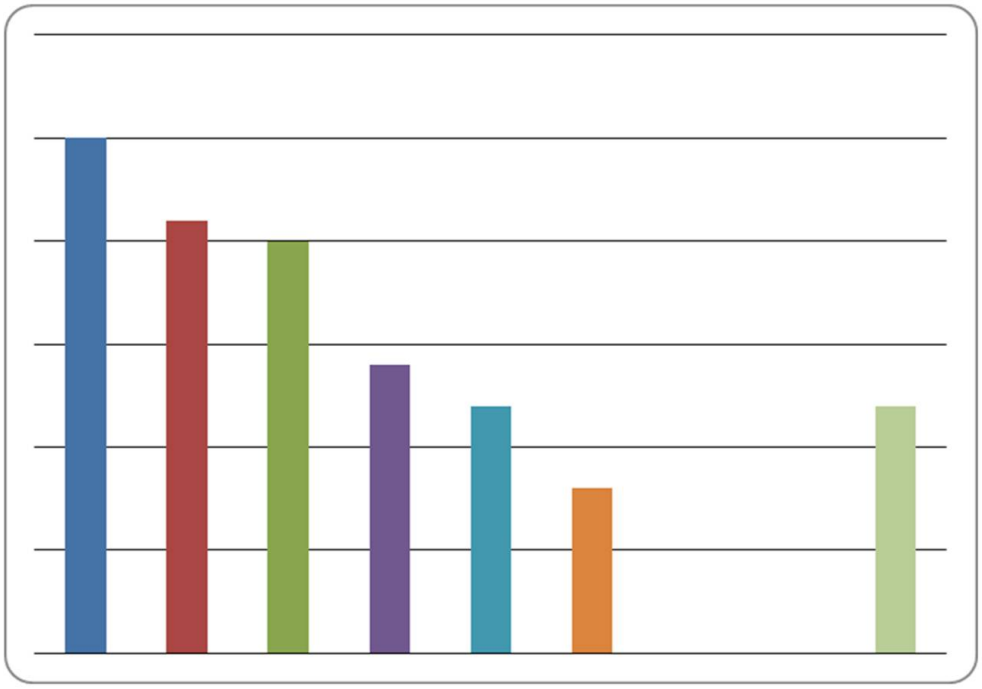
Classes - Midpoint	Frequency
25	3
30	6
35	6
40	4
45	3
50	2
55	1

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative data by using frequency distributions; histograms; frequency polygons; and ogives.
Topic: Frequency Polygon

104. The following table lists the types of customer complaint calls on satellite TV service during the first two months after installation.

No signal detected	20%
Can't receive local channels	14%
Missing channels	21%
Intermittent reception	8%
Remote control problems	25%
Other issues	12%

Construct a Pareto chart.



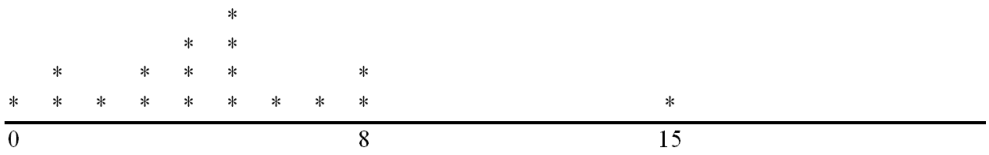
Feedback: A Pareto chart is a specialization of the bar chart used for categorical variables. The largest percentage value is charted at the far left, and each problem percentage is graphed in decreasing order. When showing "other" issues, always place that bar to the right because it includes an accumlation of various reasons.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium

Learning Objective: 02-02 Construct and interpret Pareto charts.
Topic: Pareto Chart

105. The following data consist of the number of sick days taken by the 100 employees at a small manufacturing company for the past 18 months. Construct a dot plot of these data and describe the distribution.

5, 1, 4, 8, 0, 6, 3, 5, 3, 4, 7, 15, 5, 8, 2, 1, 5, 4



Data are skewed to the right with one outlier. Over half of the data lie in the 4-5 day range.

Feedback: A dot plot is constructed as a number line with minimum to maximum values (0 to 15). Individual values are shown along the line as points (dots). With an outlier at the maximum value, the shape has a tail to the right.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-04 Construct and interpret dot plots.
Topic: Dot Plot