Chapter 2 - Frequency Distributions and Graphs

1. Which of the following does not need to be done when constructing a frequency distribution?
   A) select the number of classes desired
   B) find the range
   C) make the class width an even number
   D) use classes that are mutually exclusive
   Ans: C   Difficulty: Easy   Section: 2.1

2. The lower class limit represents the smallest data value that can be included in the class.
   Ans: True   Difficulty: Moderate   Section: 2.1

3. When data are collected in original form, they are called _____.
   Ans: raw data
   Difficulty: Easy   Section: 2.1

4. The _____ of a specific class is the number of data values contained in it.
   Ans: frequency
   Difficulty: Easy   Section: 2.1

5. If a frequency distribution had class boundaries of 132.5–147.5, what would be the class width?
   Ans: 15
   Difficulty: Moderate   Section: 2.1

6. For the class 5 - 20, the upper class limit is
   A) 4.5   B) 5   C) 20   D) 20.5
   Ans: C   Difficulty: Easy   Section: 2.1

7. What are the boundaries of the class 11-17?
   A) 10.5 and 17.5   B) 8 and 20   C) 11 and 17   D) 6
   Ans: A   Difficulty: Easy   Section: 2.1

8. In an ungrouped frequency distribution of the average age of high school graduates, what would be the boundaries for the class of graduates who were reported to be 18 years old?
   A) 17–19 years old   C) 17.6 – 18.5 years old
   B) 17.5 – 18.5 years old   D) 17.6 – 19.5 years old
   Ans: B   Difficulty: Easy   Section: 2.1

9. What is the midpoint of the class 6-10 ?
   A) 8.5   B) 8   C) 5   D) 4
   Ans: B   Difficulty: Easy   Section: 2.1

10. Greg wants to construct a frequency distribution for the political affiliation of the employees at Owen's Hardware Store. What type of distribution would be best?
    A) ungrouped   B) grouped   C) categorical   D) cumulative
    Ans: C   Difficulty: Easy   Section: 2.1

11. What is the lower class limit of the class 13–17?
    A) 15   B) 17   C) 13   D) 12.5
    Ans: C   Difficulty: Moderate   Section: 2.1

12. What is the midpoint of the class 15–18 ?
    A) 1.5   B) 16.5   C) 3   D) 16
    Ans: B   Difficulty: Easy   Section: 2.1

13. What is the upper class boundary of the class 23–35 ?
    A) 35   B) 7.5   C) 35.5   D) 7
    Ans: C   Difficulty: Moderate   Section: 2.1

14. If the limits for a class were 20–38, the boundaries would be 19.5–38.5.
    Ans: True   Difficulty: Easy   Section: 2.1

15. For grouped frequency distributions, the _____ is obtained by adding the lower and upper limits and dividing by 2.
    Ans: class midpoint
    Difficulty: Easy   Section: 2.1

16. What is the lower class limit in the class 9-13 ?
    A) 9   B) 11   C) 9.5   D) 8.5
    Ans: A   Difficulty: Moderate   Section: 2.1

17. Which of the following pairs of class limits would be appropriate for grouping the numbers 9, 12, 7, and 14 ?
    A)   6-10 and 10-14   C)   7-9 and 10-14
    B)   7-9 and 12-14   D)   7-10 and 11-14
    Ans: D   Difficulty: Moderate   Section: 2.1

18. Thirty students recorded the colors of their eyes, choosing from the colors brown, blue, green, hazel, and black. This data can be appropriately summarized in a(n)_____ .
    A)   open-ended distribution   C)   grouped frequency distribution
    B)   categorical frequency distribution   D)   upper boundary
    Ans: B   Difficulty: Moderate   Section: 2.1

19. What are the boundaries of the class 1.87–3.43 ?
    A) 1.82–3.48   B) 1.87–3.43   C) 1.879–3.439   D) 1.865–3.435
    Ans: D   Difficulty: Moderate   Section: 2.1

20. For the class 16.3–23.8, the width is 8.5.
    Ans: False   Difficulty: Easy   Section: 2.1

21. When the range is large, and classes that are several units in width are needed, a
    _____ frequency distribution is used.
    Ans: grouped
    Difficulty: Moderate   Section: 2.1

22. The cumulative frequency for a class is the sum of the frequencies of the classes less than
   and equal to the upper boundary of the specific class.
    Ans: True   Difficulty: Easy   Section: 2.1

23. A recent statistics exam yielded the following 25 scores. Construct a grouped frequency
   distribution with the class limits shown below.
             61 83 77 58 65
             53 86 61 65 96
             81 83 46 73 81
             76 90 73 98 57
             76 74 49 82 99

Class Limits	Tally	Frequency
41-50		
51-60		
61-70		
71-80		
81-90		
91-100		

   A)

Class Limits	Frequency
41-50	2
51-60	3
61-70	4
71-80	6
81-90	7
91-100	3

B)

Class Limits	Frequency
41-50	2
51-60	2
61-70	5
71-80	6
81-90	7
91-100	3

C)

Class Limits	Frequency
41-50	2
51-60	3
61-70	5
71-80	5
81-90	6
91-100	4

D)

Class Limits	Frequency
41-50	3
51-60	2
61-70	4
71-80	7
81-90	6
91-100	3

Ans: A   Difficulty: Easy   Section: 2.1

24. Construct a frequency polygon from the following frequency distribution.

Temperature	Frequency
28.5–31.5	1
31.5–34.5	3
34.5–37.5	6
37.5–40.5	10
40.5–43.5	8
43.5–46.5	7

Ans:
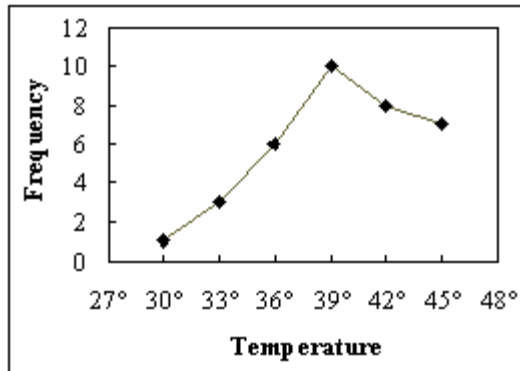
Difficulty: Moderate   Section: 2.2

25. A recent statistics exam yielded the following 10 scores. Construct a frequency polygon distribution using the class limits shown below.
    80, 99, 77, 67, 93, 71, 76, 86, 79, 71

Class Limits	Midpoints	Tally	Frequency
61-70			
71-80			
81-90			
91-100			

A)

B)

C)
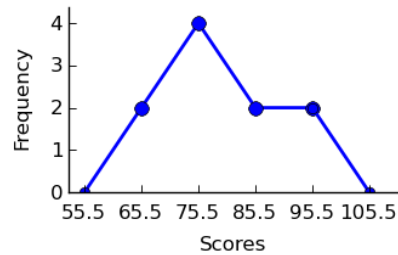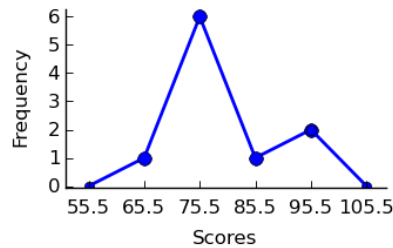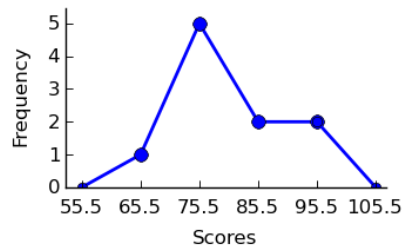
D)
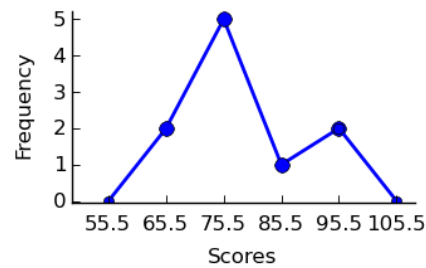
Ans: B   Difficulty: Moderate   Section: 2.2

26. Find the class with the least number of data values.
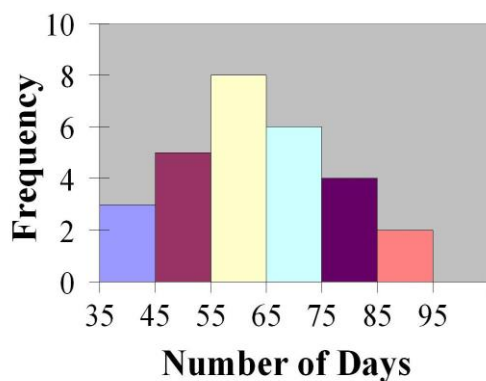
A) 55-65   B) 65-75   C) 75-85   D) 85-95
Ans: D   Difficulty: Easy   Section: 2.2

27. Find the class with the greatest number of data values.
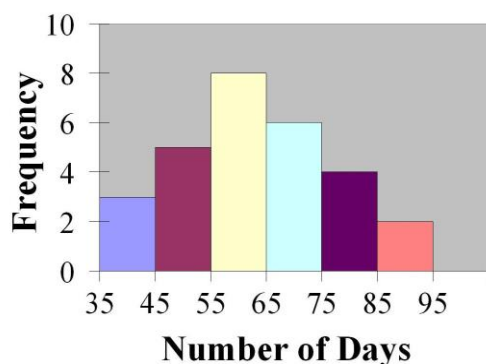
A) 55-65   B) 65-75   C) 75-85   D) 85-95
Ans: A   Difficulty: Easy   Section: 2.2

28. An ogive is also called a cumulative frequency graph.
    Ans: True   Difficulty: Easy   Section: 2.2

29. The three most commonly used graphs in research are the histogram, the _____,
    and the cumulative frequency graph (ogive).
    Ans: frequency polygon
    Difficulty: Easy   Section: 2.2

30. Which of the following could be a cumulative frequency graph?
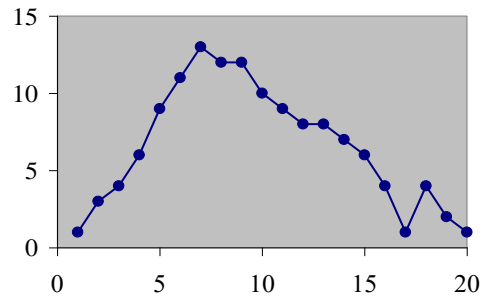
A)

B)

C)

D)
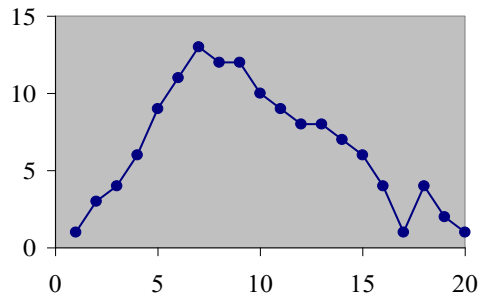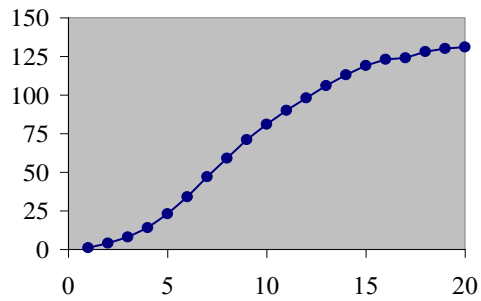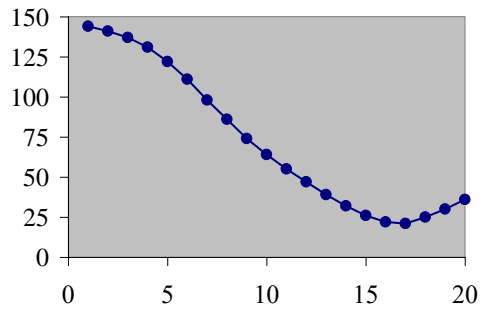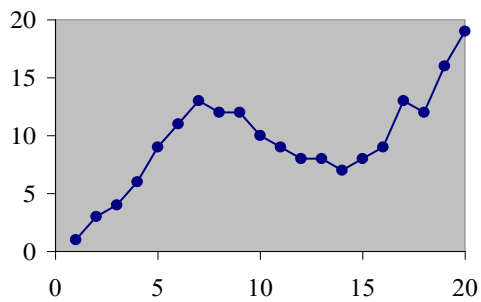
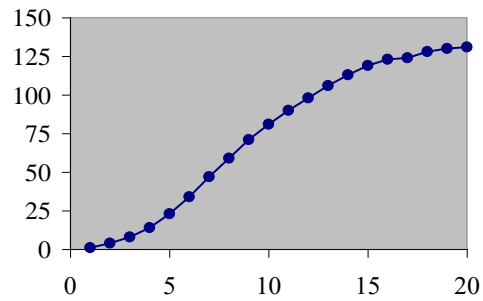
Ans: B   Difficulty: Easy   Section: 2.2

31. Which of the following could be an ogive?
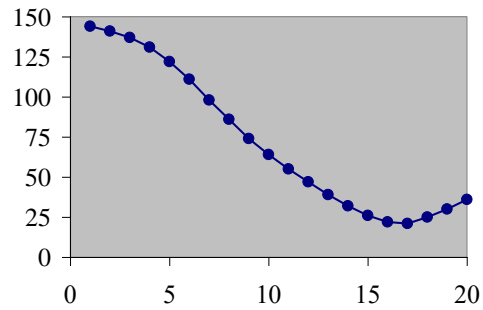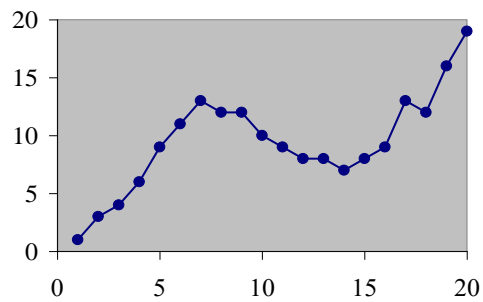   A)

   B)

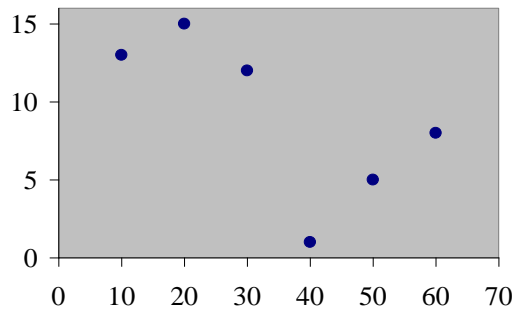

   C)

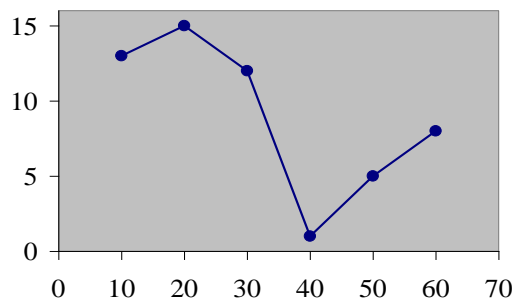
   D)

   Ans: B   Difficulty: Easy   Section: 2.2

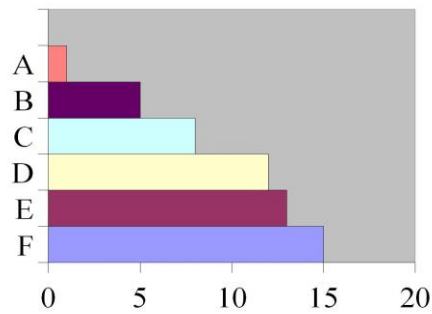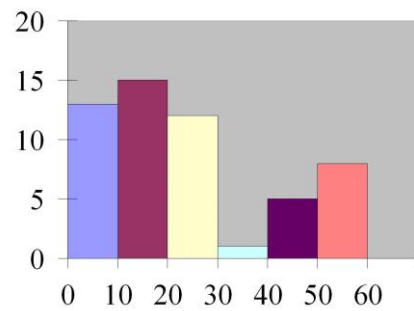32. Which of the following is a histogram?

A)

B)

C)

D)

Ans: D   Difficulty: Easy   Section: 2.2

33. The frequency polygon and the histogram are two different ways to represent the same data set.
    Ans: True   Difficulty: Easy   Section: 2.2

34. For a given data set, the ogive and the frequency polygon will have the same overall shape.
    Ans: False   Difficulty: Easy   Section: 2.2

35. Using the ogive shown below, what is the cumulative frequency of data values less than or equal to 16 ?
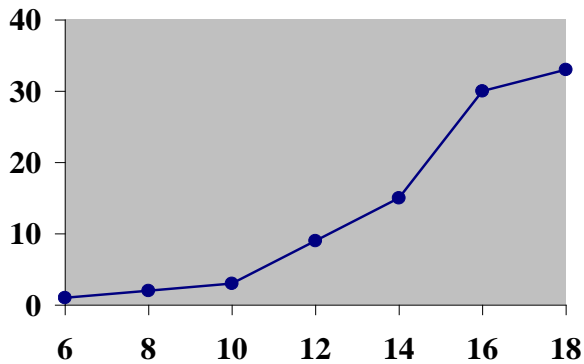
    A) 66   B) 60   C) 30   D) 20
    Ans: C   Difficulty: Difficult   Section: 2.2

36. Graphs that show distributions using proportions instead of raw data as frequencies are called
    A)   relative frequency graphs.   C)   histograms.
    B)   ogive graphs.   D)   frequency polygons.
    Ans: A   Difficulty: Easy   Section: 2.2

37. Which type of graph represents the data by using vertical bars of various heights to indicate frequencies?
    A) ogive   B) frequency polygon   C) histogram   D) cumulative frequency
    Ans: C   Difficulty: Easy   Section: 2.2

38. The frequency polygon is a graph that displays the data by using lines that connect points plotted for the frequencies at the midpoints of the classes.
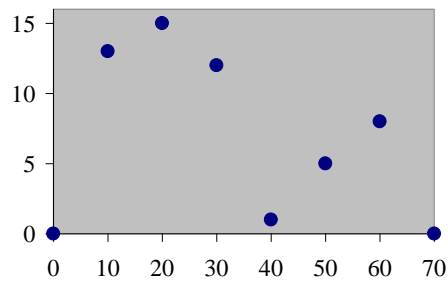   Ans: True   Difficulty: Easy   Section: 2.2

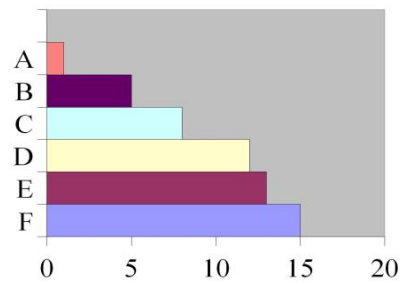39. A histogram is a graph that represents the cumulative frequencies for the classes in a frequency distribution.
    Ans: False   Difficulty: Moderate   Section: 2.2

40. Which of the following is a frequency polygon?
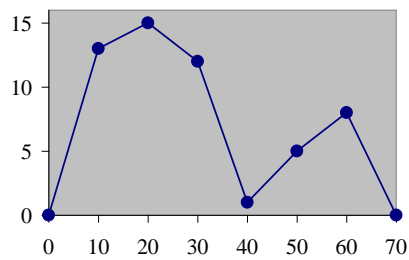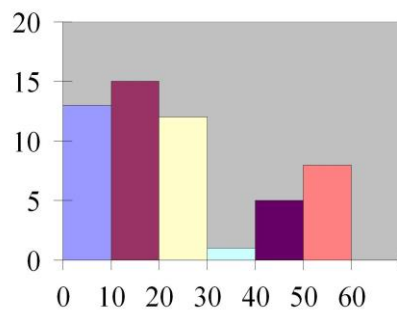   A)

    B)
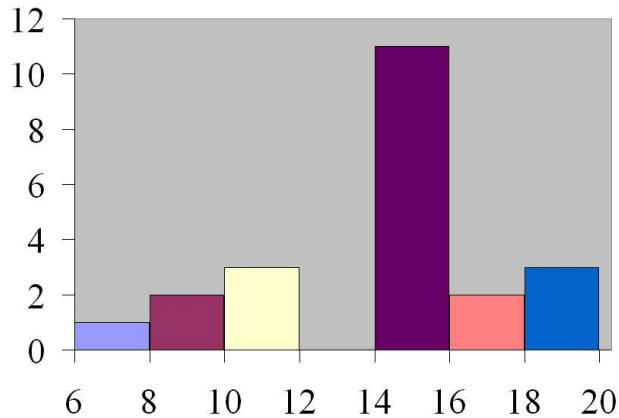
    C)

    D)

    Ans: C   Difficulty: Moderate   Section: 2.2

41. How many values are in the data set whose histogram is shown below ?

A) 6   B) 22   C) 76   D) 72
Ans: B   Difficulty: Moderate   Section: 2.2

42. Given the following frequency distribution, how many pieces of data were less than 28.5?

Class Boundaries	Frequencies
13.5–18.5	4
18.5–23.5	9
23.5–28.5	12
28.5–33.5	15
33.5–38.5	17

A) 12   B) 13   C) 25   D) 44
Ans: C   Difficulty: Moderate   Section: 2.2

43. If the graph of a frequency distribution has a peak and the data tapers off more slowly to the right and more quickly to the left, the distribution is said to be _____.
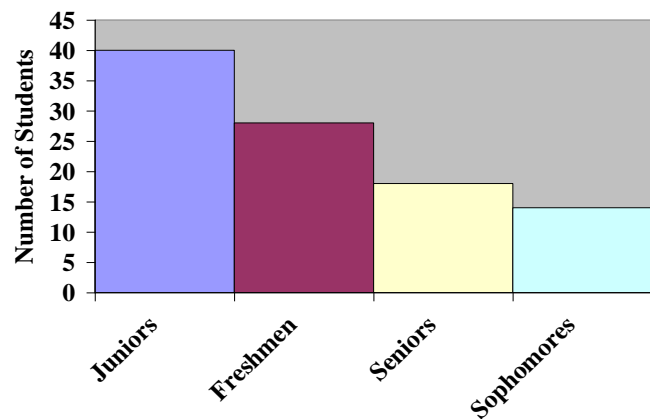Ans: right-skewed
Difficulty: Moderate   Section: 2.2

44. Construct a Pareto chart for the following distribution:

Year in School	Number of Students
Freshmen	28
Sophomores	14
Juniors	40
Seniors	18

Ans:

Difficulty: Moderate   Section: 2.3

45. Construct a Pareto chart for the following distribution:

Major	**Number of Students**
Business	49
Science	15
Engineering	41
Social Sciences	8
Liberal Arts	33
Education	22

Ans:
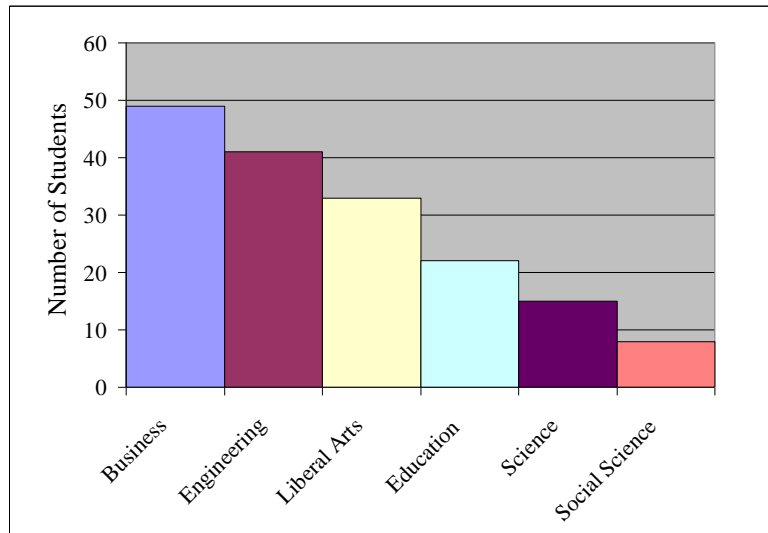
Difficulty: Moderate   Section: 2.3

46. A local fundraiser wants to graphically display the contributions he has received over the past five years. Construct a time series graph for the following data.

Year	Contributions
1996	$550
1997	$700
1998	$800
1999	$1050
2000	$1200

Ans:

Difficulty: Moderate   Section: 2.3

47. The following information shows the colors of cars preferred by customers. Draw a pie graph and indicate how many degrees that black represents in a pie graph?

Colors	Number
Red	50
Black	60
White	30
Green	20
Blue	40

Ans:
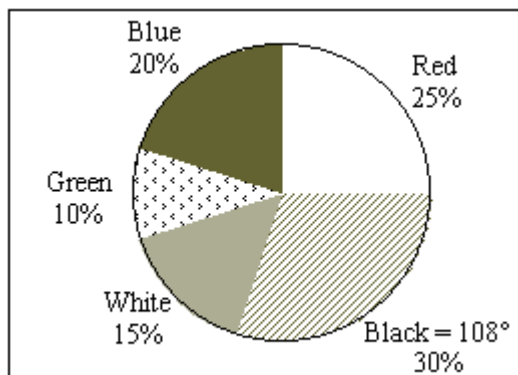
Difficulty: Moderate   Section: 2.3

48. Construct a pie chart for the following distribution:

Year in School	Number of Students
Freshmen	28
Sophomores	14
Juniors	40
Seniors	18

Ans:

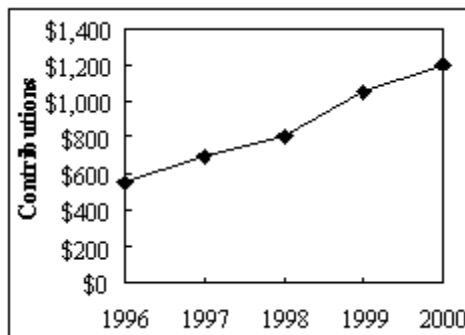Difficulty: Moderate   Section: 2.3

49. Construct a pie chart for the following distribution:
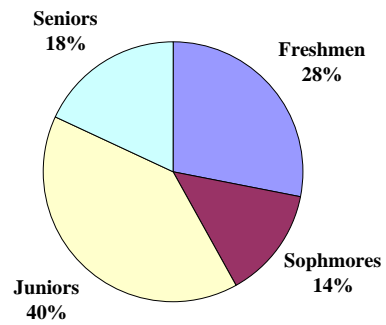
Major	Number of Students
Business	160
Science	45
Engineering	75
Social Sciences	50
Liberal Arts	60
Education	110

Ans:
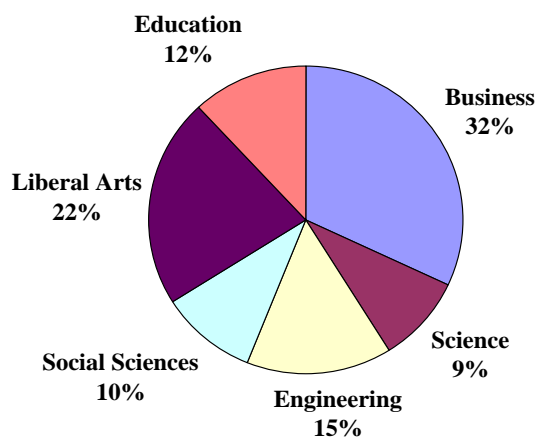
Difficulty: Difficult   Section: 2.3

50. Karen is constructing a pie graph to represent the number of hours her classmates do homework each day. She found that 8 of 24 classmates did homework for three hours each day. In her pie graph, this would represent how many degrees?
A) 135°   B) 45°   C) 120°   D) 240°
Ans: C   Difficulty: Moderate   Section: 2.3

51. Construct a pie graph using the following data from a local bakery.

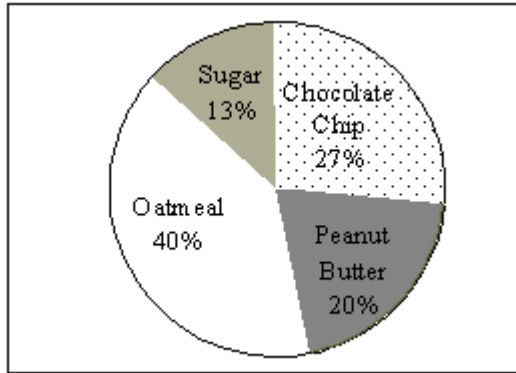| Cookie Types	Number Sold
Chocolate Chip	20
Peanut Butter	15
Oatmeal	30
Sugar	10

Ans:

Difficulty: Moderate   Section: 2.3

52. A weatherman records the amount of rain that fell in Portland, Oregon each day for a year. What type of graph should he use to show how rainfall changes during the year ?
A) pie graph   B) pictograph   C) time series graph   D) Pareto chart
Ans: C   Difficulty: Easy   Section: 2.3

53. A time series graph represents data that occur over a specific time period.
Ans: True   Difficulty: Easy   Section: 2.3

54. A Pareto chart does not have which of the following properties?
A)   frequencies displayed by the heights of vertical bars
B)   frequencies arranged from highest to lowest
C)   quantitative variable on the horizontal axis
D)   classes of data are categorical
Ans: C   Difficulty: Easy   Section: 2.3

55. A pie graph is not useful in showing which of the following characteristics of a data set?
A)   frequency changes over time
B)   relative frequencies for each category in the distribution
C)   categories that make up the largest proportions of the total
D)   categories that make up the smallest proportions of the total
Ans: A   Difficulty: Easy   Section: 2.3

56. A time series graph is useful for which of the following purposes?
    A)   representing relative frequencies of categories at a specific time
    B)   representing the cumulative frequencies of the data at a specific time
    C)   representing the frequencies of the data, sorted from largest to smallest
    D)   representing the changing frequencies of a data category over a period time
    Ans: D   Difficulty: Easy   Section: 2.3

57. A time series graph is useful for detecting trends that occur over the period of time.
    Ans: True   Difficulty: Easy   Section: 2.3

58. Which graph should be used to represent the frequencies with which certain courses are taken at Highlands Middle School?
    A) Pareto chart   B) time series graph   C) pie graph   D) pictograph
    Ans: A   Difficulty: Moderate   Section: 2.3

59. A pie graph would best represent the number of inches of rain that has fallen in Ohio each day for the past 2 months.
    Ans: False   Difficulty: Moderate   Section: 2.3

60. The percentages of white, wheat, and rye bread sold at a supermarket each week is best shown using a _____ graph.
    Ans: pie
    Difficulty: Moderate   Section: 2.3

61. A _____ graph would most appropriately represent the number of students that were enrolled in Statistics for each of the past ten years.
    Ans: time series
    Difficulty: Moderate   Section: 2.3

62. The scores on a recent statistics exam are shown below. Construct a stem and leaf plot for the data.
            98, 73, 64, 69, 86, 89, 77, 86, 91, 73
    Ans: 6 | 4 9
          7 | 3 3 7
          8 | 6 6 9
          9 | 1 8
    Difficulty: Moderate   Section: 2.3

63. Given the following two sets of data, draw a back-to-back stem and leaf plot.
    A - 12, 22, 22, 24, 34, 31, 26, 35, 27, 39, 49, 10
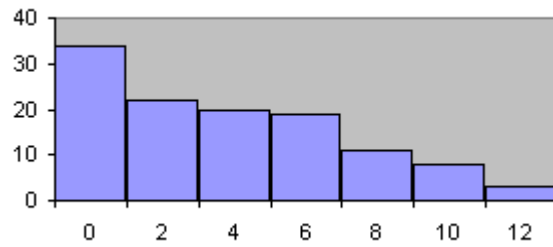   B - 45, 36, 23, 16, 37, 28, 18, 13, 10, 23, 30, 31
    Ans:

```
        2, 0 | 1 | 0, 3, 6, 8
  7, 6, 4, 2, 2 | 2 | 3, 3, 8
     9, 5, 4, 1 | 3 | 0, 1, 6, 7
             9 | 4 | 5
```
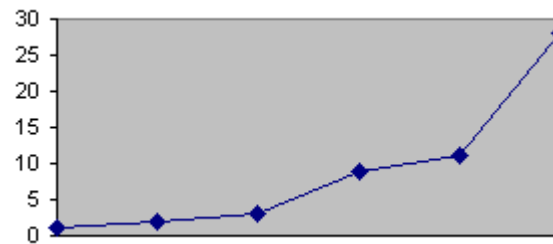
Difficulty: Moderate   Section: 2.3

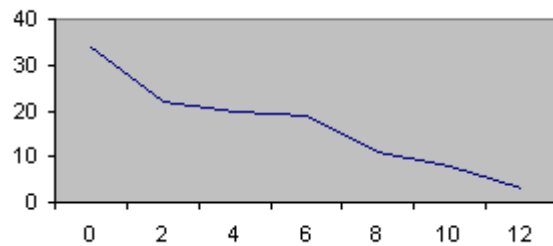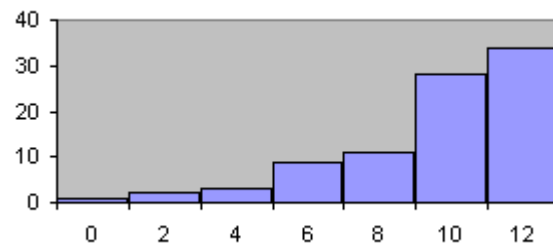64. Which of the following is a Pareto chart?

A)

B)

C)

D)

Ans: A   Difficulty: Easy   Section: 2.3

65. A stem and leaf plot has the advantage over a grouped frequency distribution of retaining the actual data while still showing them in graphical form.
Ans: True   Difficulty: Moderate   Section: 2.3

66. An automobile dealer wants to construct a pie graph to represent types of cars sold in July. He sold 72 cars, 16 of which were convertibles. How many degrees should be used for the convertibles section ?
    A) 60°   B) 80°   C) 100°   D) 50°
    Ans: B   Difficulty: Moderate   Section: 2.3

67. If a data set showing types of pizza ordered at a particular restaurant indicates 24 out of 72 orders were for pepperoni pizza, how many degrees would be needed to represent pepperoni pizza in a pie chart?
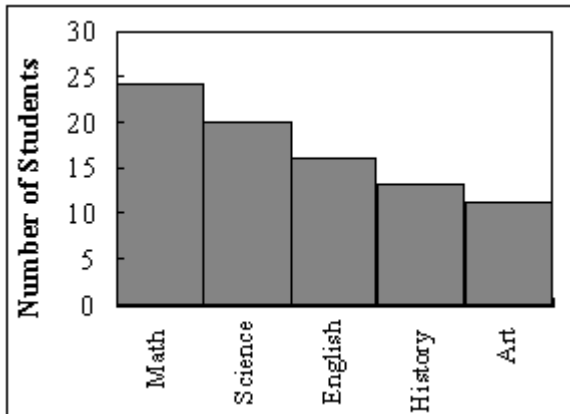   A) 90°   B) 120°   C) 60°   D) 150°
    Ans: B   Difficulty: Easy   Section: 2.3

68. A Pareto chart is useful for showing percentages of the total at different times.
    Ans: False   Difficulty: Easy   Section: 2.3

69. What type of graph is the figure below?

    A) Pareto chart   B) pictograph   C) ogive   D) pie graph
    Ans: A   Difficulty: Easy   Section: 2.3

70. Graphs give a visual representation that may enable readers to analyze and interpret data more easily than simply looking at tables of numbers.
    Ans: True   Difficulty: Easy   Section: 2.3

71. When making Pareto charts, data should be arranged _____ according to frequency.
    A)   from smallest to largest   C)   from largest to smallest
    B)   with increasing time   D)   clockwise
    Ans: C   Difficulty: Moderate   Section: 2.3

72. A Pareto chart arranges data from largest to smallest according to frequencies.
   Ans: True   Difficulty: Easy   Section: 2.3

73. When two sets of data collected over specific periods of time are compared on the same graph using two lines, it is called a compound time series graph.
    Ans: True   Difficulty: Moderate   Section: 2.3

74. The two variables in a scatter plot are called the
    A)   independent variable and dependent variable.
    B)   relative frequency and relative proportion.
    C)   spread and pattern.
    D)   lines and points.
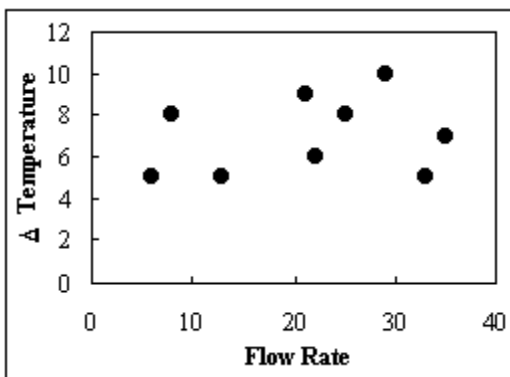   Ans: A   Difficulty: Easy   Section: 2.4

75. Determine the type of relationship shown in the figure below.
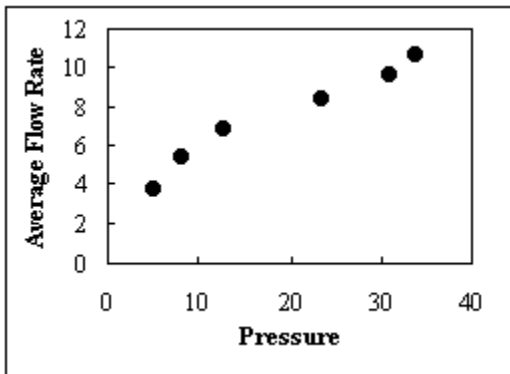
    A) positive   B) negative   C) multiple   D) There is no relationship.
    Ans: A   Difficulty: Moderate   Section: 2.4

76. Daniel Wiseman, a scientist for Gres-Trans Corp., wants to determine if the flow rate of a particular material changes with different changes in temperature. The data is plotted in the figure below. What type of relationship exists between the flow rate and the change in temperature?

    A) negative   B) positive   C) There is no relationship.   D) curvilinear
    Ans: C   Difficulty: Moderate   Section: 2.4

77. A positive relationship exists when both variables increase or decrease at the same time.
    Ans: True   Difficulty: Easy   Section: 2.4

78. In a _____ relationship, as one variable increases, the other variable decreases, and vice versa.
    Ans: negative
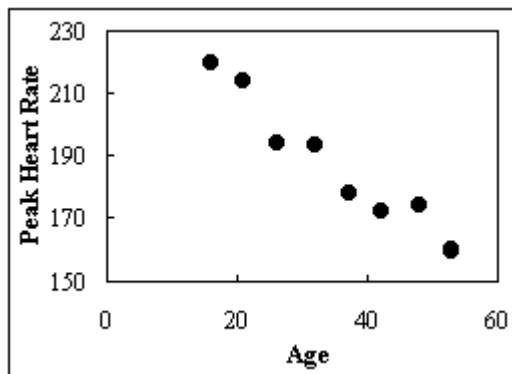   Difficulty: Easy   Section: 2.4

79. A study was conducted to determine if there was a linear relationship between a person's age and his/her peak heart rate.
        a. Draw the scatter plot for the variables.
        b. Give a brief explanation of the type of relationship.

| Age	Peak Heart Rate
16	220
26	194
32	193
37	178
42	172
53	160
48	174
21	214

    Ans: a.

        b. There appears to be a negative relationship between age and peak heart rate.
    Difficulty: Easy   Section: 2.4

80. An experiment is carried out to determine the relationship between the average speed (rpm) and power (hp) of a mixer. Draw the scatter plot for the variables.

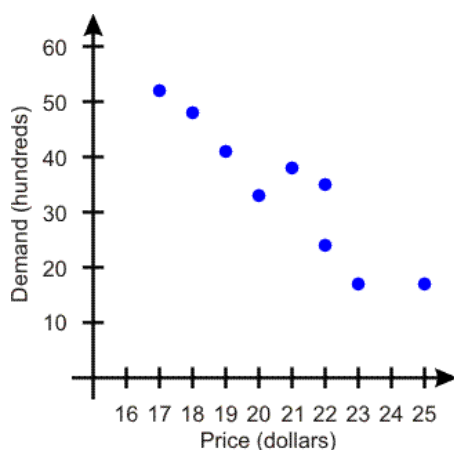| Average Speed	Power
325.0	1.10
348.9	1.40
312.9	1.07
230.0	0.25
269.2	0.64
305.0	0.93

Ans:
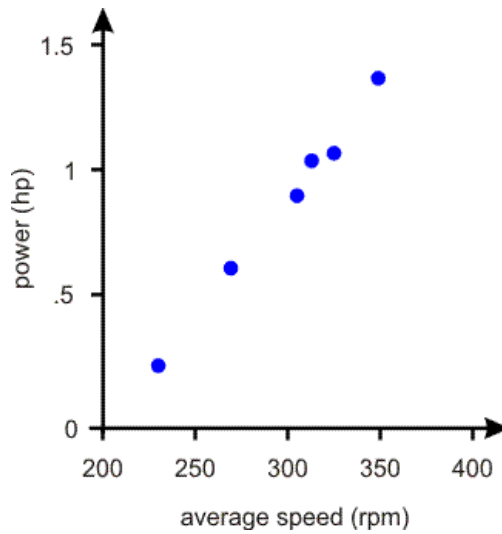
Difficulty: Moderate   Section: 2.4

81. Draw a scatter plot for the following data that show the demand for a product (in hundreds) and its price (in dollars) charged in nine different cities.

Price	Demand
23	17
18	48
19	41
21	38
20	33
25	17
22	35
17	52
22	24

Ans:

Difficulty: Moderate   Section: 2.4