

**7.1 Line Graphs**

**Answers**

1. B The points associated with continuous data are joined, because all the fraction and decimal values between two consecutive points are meaningful.
2. B The variable is quantitative, because it represents a number.
3. A The points that represent discrete data are not joined, because the values between two consecutive points are not meaningful.
4. Answer:

**TABLE 7.1:**

Variable	Quantitative	Qualitative	Discrete	Continuous
Men’s favorite TV shows		<i>x</i>		
Salaries of baseball players	<i>x</i>			<i>x</i>
Number of children in a family	<i>x</i>		<i>x</i>	
Favorite color of cars		<i>x</i>		
Number of hours worked weekly	<i>x</i>			<i>x</i>

5. For more than 20 days of advertising on Walton’s Web Ads, Plan A would be the best plan to use.
6. From the graph, you can see that Plan A intersects Plan B at (20, 70). This means that for 20 days of advertising on Walton’s Web Ads, both Plan A and Plan B would cost \$70.00. To advertise for more than 10 days but less than 20 days, Plan B would be the best plan to use.
7. From the graph, you can see that Plan B intersects Plan C at (10, 50). This means that for 10 days of advertising on Walton’s Web Ads, both Plan B and Plan C would cost \$50.00. To advertise for less than 10 days, Plan C would be the best plan to use.
8. B The time to run depends upon the fitness level of the runner.
9. The fitness level of the runner would be on the *x*-axis.
10. The time it takes to run the 100 yard dash would be on the *y*-axis.

**7.2 Broken – Line Graphs**

**Answers**

1. B A broken-line graph shows change over time with a series of straight lines that have no single defined slope.
2. The total distance traveled on the bike ride was  $24 + 24 = 48$  miles.
3. The fastest speed traveled by the bike was miles per hour.
4. The slowest speed traveled by the bike was miles per hour.

4. The slowest speed traveled by the bike was miles per hour.
5. The bicyclist stopped for  $2 - 1.5 = 0.5$  hours, or 30 minutes.
6. The return trip took  $4 - 2 = 2$  hours.
7. Bob is getting closer to the post office from 12:30 pm to 1:00 pm, from 2:30 pm to 3:30 pm, and from 5:00 pm to 6:00 pm.
8. Bob is getting farther away from the post office from 1:00 pm to 2:30 pm and from 3:30 pm to 5:00 pm.
9. Bob traveled a total distance of  $2 + 3 + 7 + 3 + 2 = 17$  kilometers.
10. Bob's average speed was approximately kilometers per hour.

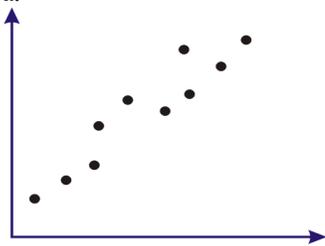
## 7.3 Scatter Plots

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### Answers

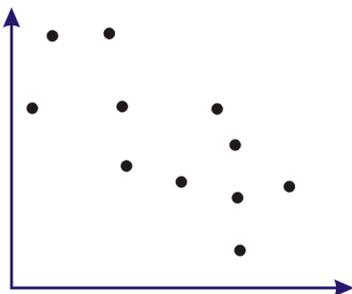
1. C The correlation of data on a scatter plot that consists of few points that are not bunched together is considered to be weak.
2. C The term used to denote the relationship between 2 data sets is *correlation*.

3. a.



**Strong, positive correlation**

b.



**No correlation**

c.

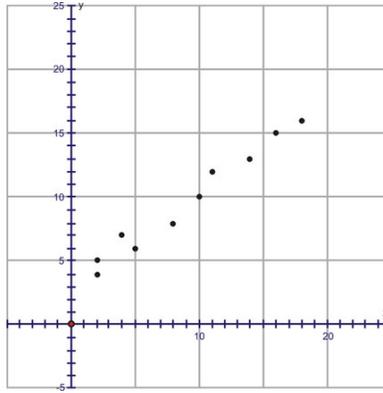


**Strong, negative correlation**

**Strong, negative correlation**

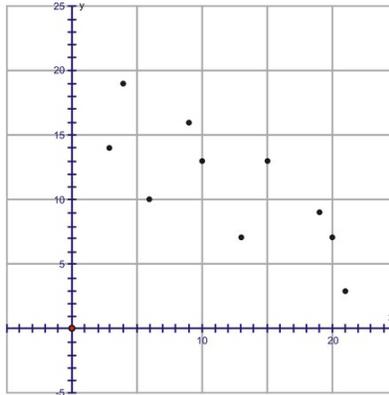
4. a.

**Strong Positive Correlation**



b.

**Weak Negative Correlation**



5. There is a strong positive correlation between the prices of the 2 stocks.
6. If the price of stock A is \$12.00, the price of stock B can be expected to be around \$43.00.
7. If the price of stock B is \$47.75, the price of stock A can be expected to be around \$14.50.
8. There is a strong negative correlation between hours of exercise per week and resting heart rate.
9. If a 30-year-old male exercises 2 hours per week, he can be expected to have a resting heart rate of about 72 beats per minute.
10. If a 30-year-old male has a resting heart rate of 65 beats per minute, he can be expected to exercise about 3.5 hours per week.

## 7.4 Linear Regression Equations

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### Answers

1. D The line of best fit can be calculated with the TI-83 by using linear regression to provide an equation for the straight line in the form  $y = ax + b$ .
2. The linear regression equation is approximately  $y = -13.64x + 81$ .
3. The correlation coefficient is  $-0.9782659134$ , while the coefficient of determination is  $0.9570041973$ . The linear regression equation is a good fit for the data.

4. The approximate value of  $y$  when  $x = 3$  can be calculated as follows:

$$\begin{aligned}y &= -13.64x + 81 \\y &= -13.64(3) + 81 \\y &= -40.92 + 81 \\y &= 40.08\end{aligned}$$

5. The linear regression equation is approximately  $y = 0.41x + 15.1$ .

6. The correlation coefficient is 0.9982743732, while the coefficient of determination is 0.9965517241. The linear regression equation is a very good fit for the data.

7. The approximate value of  $y$  when  $x = 10$  can be calculated as follows:

$$\begin{aligned}y &= 0.41x + 15.1 \\y &= 0.41(10) + 15.1 \\y &= 4.1 + 15.1 \\y &= 19.2\end{aligned}$$

8. The linear regression equation is approximately  $y = 1.11x - 10.1$ .

9. The correlation coefficient is 0.9171758199, while the coefficient of determination is 0.8412114846. The linear regression equation is a moderately good fit, but not a great fit, for the data.

10. The approximate value of  $x$  when  $y = 8$  can be calculated as follows:

$$\begin{aligned}y &= 1.11x - 10.1 \\8 &= 1.11x - 10.1 \\8 + 10.1 &= 1.11x - 10.1 + 10.1 \\18.1 &= 1.11x \\x &= 16.3\end{aligned}$$

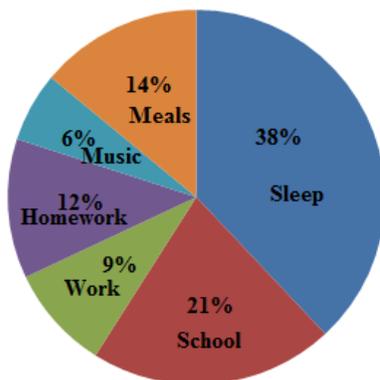
## 7.5 Pie Charts

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### Answers

1. D The number of students is 9 out of 25: .

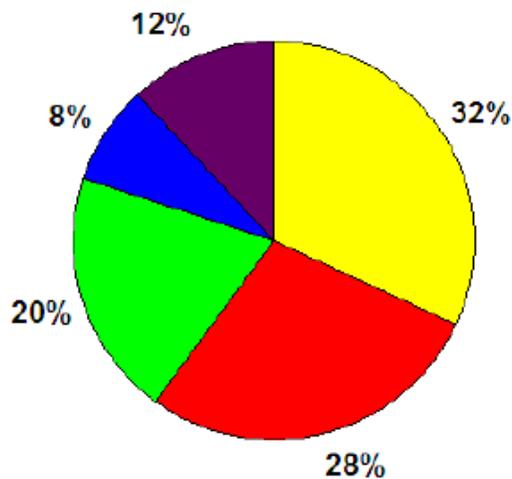
2. The answers to this question will vary, but here is an example of one possible solution:



3. Answers will vary. One possible answer is that pie charts are helpful for interpreting data because they show the size of each category of data in relation to the other categories.

because they show the size of each category of data in relation to the other categories.

4. The parts of the pie chart are displayed with degrees, but they should be shown with percentages.
5. The number of students who have soccer as a favorite sport can be calculated as follows:
6. The number of students who have hockey as a favorite sport can be calculated as follows:
7. The number of students who have basketball as a favorite sport can be calculated as follows:
8. The number of students who have baseball as a favorite sport can be calculated as follows:
9. The number of students who have football as a favorite sport can be calculated as follows:
10. Answer:



## 7.6

### Stem – and Leaf Plots



### Answers

1. D The number of students is 7 out of 25:
2. Answer:

Stem	Leaf
3	9
4	5, 6, 6, 6, 7, 7, 8
5	1, 2, 4, 5, 7, 9
6	0, 1, 5, 6, 6, 9
7	0, 4

From the stem and leaf plot, some information that is known is the following:

- The youngest Prime Minister was 39 when he was sworn into office.
  - The oldest Prime Minister to be sworn into office was 74.
  - The mode of the ages of the Prime Ministers when they were sworn into office was 46.
  - The median age of the Prime Ministers when they were sworn into office was 54.5.
3. The mode of the data set is 56.
  4. There are 41 data values, so the median is the value in the 21st position. Therefore, the median is 61.
  5. The minimum of the data set is 10.
  6. The maximum of the data set is 99.
  7. The mode of the data set is 40.
  8. There are 40 data values, so the median is the average of the values in the 20th and 21st positions. Therefore, the median is
  9. 24 of the data values are greater than 40.
  10. The percentage of the data values that are less than 40 is

## 7.7 Bar Graphs

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### Answers

1. Joey has the most money in the bank.
2. Jean has the least money in the bank.
3. There are 4 bars that are below the line that represents \$800, so 4 people have less than \$800 in the bank.
4. The tourists would most like to visit China.
5. The tourists would least like to visit France.
6. There are 2 bars that are above the line that represents 25 tourists, so 2 countries were the most desired destination for more than 25 tourists.
7. The most popular superhero was Spider Man.
8. The least popular superhero was Iron Man.
9. 38 students had a favorite superhero of Wonder Woman.
10. The percentage of students who had a favorite superhero of Wonder Woman can be calculated as follows: .

## 7.8 Histograms

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### Answers

1. C, By definition, a distribution that has two peaks is bimodal.

2. There were  $3 + 2 + 6 + 1 + 1 + 4 + 0 + 5 + 2 = 24$  fish caught.
3. There were  $4 + 0 + 5 + 2 = 11$  fish caught that were over 35 cm in length.
4. There were  $3 + 2 + 6 = 11$  fish caught that were between 20 cm and 29 cm in length.
5. There is a blank space because no fish were caught that were between 38 cm and 41 cm.
6. There are  $3 + 4 + 6 + 6 + 9 + 8 + 5 + 1 = 42$  students in the class.
7. There are  $5 + 1 = 6$  students who have a height over 60 inches.
8. There are  $6 + 9 + 8 + 5 = 28$  students who have a height between 54 and 62 inches.
9. The distribution has only one peak, so the data is unimodal.
10. Answer:

**TABLE 7.2:**

Bin	Frequency
[50-60)	9
[60-70)	5
[70-80)	6
[80-90)	3
[90-100)	1

## 7.9 Applications of Histograms

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### Answers

1. The bin size for the histogram is 10.
2. The bin with the highest frequency is [40-50).
3. The bins with the lowest frequency are [20-30) and [80-90).
4. The total number of data values represented by the histogram can be calculated as follows:  $3 + 6 + 14 + 6 + 9 + 9 + 3 = 50$

5. The percentage of the data values are in the bin [60-70) can be calculated as follows:
  
6. The bin size for the histogram is 5.
  
7. The bin with the highest frequency is [30-35).
  
8. The bin with the lowest frequency is [10-15).
  
9. The total number of data values represented by the histogram can be calculated as follows:  $11 + 12 + 7 + 17 + 14 + 18 + 21 = 100$
  
10. The percentage of data values that are in the bin [15-20) can be calculated as follows:

## 7.10 Frequency Polygons

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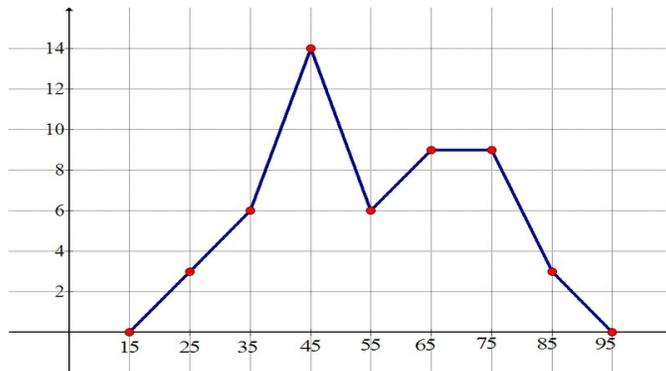
### Answers

1. D By definition, a frequency polygon is a graph that uses lines to join the midpoints of the classes.
  
2. A Add the values and divide by 2:
  
3. a. There were  $5 + 9 + 14 + 18 + 12 + 8 + 4 = 70$  players who played the sport.  
 b. The most common weight was between 82.5 kg and 87.5 kg.  
 c. Answers will vary. One possible answer is that the sport they were playing may have been rugby.  
 d. The weights of 55 kg and 105 kg are the weights that are one unit below and one unit above the beginning and end points of the data set.  
 e. There are no weights recorded for 72.5 kg to 77.5 kg and for 77.5 kg to 82.5 kg.
  
4. The bin size of the histogram on which the frequency polygon is based is 10.
  
5. The point (40, 18) has the largest  $y$ -coordinate, so the bin that had the highest frequency was [35, 45).
  
6. Other than the points on the ends, the point (20, 4) has the smallest  $y$ -coordinate, so the bin that had the lowest frequency was [15, 25).\
  
7. The point (50, 9) represents the bin [45, 55), so to find the number of data points that had a value below 55, just add the  $y$ -coordinates of (20, 4), (30, 12), (40, 18), and (50, 9) to get  $4 + 12 + 18 + 9 = 43$ . Since there were  $4+12+18+9+7 = 50$  data points in all, the percentage of the data that had a value below 55 can be calculated as follows:
  
8. 9 points would be connected to form the corresponding frequency polygon.

9. The points are (11, 0), (15, 0), (25, 0), (35, 0), (45, 10), (55, 0), (65, 0), (75, 0), (85, 0), (95, 0)

9. The points would be (15, 0), (25, 3), (35, 6), (45, 14), (55, 6), (65, 9), (75, 9), (85, 3), and (95, 0).

10. The frequency polygon would appear as follows:



## 7.11 Box – and – Whisker Plots

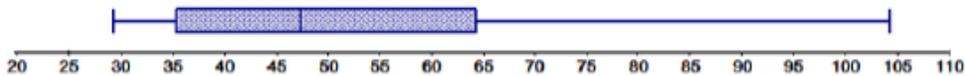
### Answers

- B The five-number summary consists of the minimum value,  $Q_1$ , the median,  $Q_3$  and the maximum value.
- C The box contains 50% of the data, and each whisker contains 25% of the data.
- B The horizontal lines on either side of the box of a box-and-whisker plot are called whiskers.
- A If the median is located to the left of the center of the box, the distribution is positively skewed.
- D The two horizontal lines of the box-and-whisker plot join  $Q_1$  and  $Q_3$ .
- The five-number summaries are as follows:

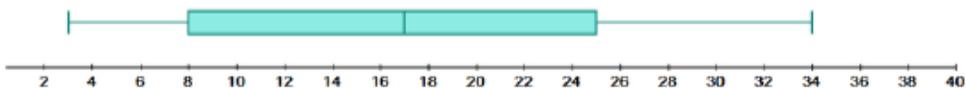
  - Min. Value  $\rightarrow$  60,  $Q_1 \rightarrow$  68, Med  $\rightarrow$  72.5,  $Q_3 \rightarrow$  77, Max. Value  $\rightarrow$  83
  - Min. Value  $\rightarrow$  3,  $Q_1 \rightarrow$  5.5, Med  $\rightarrow$  9,  $Q_3 \rightarrow$  11.5, Max. Value  $\rightarrow$  15
- The five-number summaries are as follows:

  - Min. Value  $\rightarrow$  4,  $Q_1 \rightarrow$  8, Med  $\rightarrow$  13,  $Q_3 \rightarrow$  16, Max. Value  $\rightarrow$  20. The median is located to the right of the center of the box, which tells you that the distribution is negatively skewed.
  - Min. Value  $\rightarrow$  175,  $Q_1 \rightarrow$  275, Med  $\rightarrow$  450,  $Q_3 \rightarrow$  525, Max. Value  $\rightarrow$  625. The median is located to the right of the center of the box, which tells you that the distribution is negatively skewed.

8.

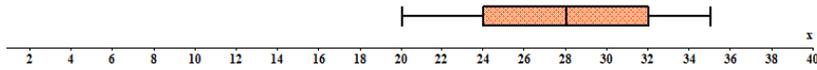


9.



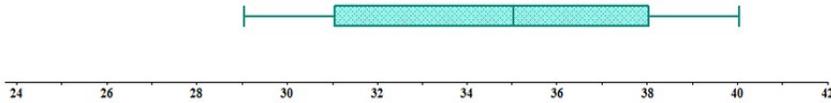
The right whisker is longer than the left whisker, which indicates that the distribution is positively skewed.

10.



The left whisker is longer than the right whisker, which indicates that the distribution is negatively skewed.

11.



The median is located to the right of the center of the box, which indicates that the distribution is negatively skewed.

12.

The median is located to the right of the center of the box, which indicates that the distribution is negatively skewed.

13. Answers:

a.

25, 33, 55, 32, 17, 19, 15, 18, 21

15, 17, 18, 19, 21, 25, 32, 33, 55

15,  $\boxed{17, 18}$ , 19,  $\boxed{21}$ , 25,  $\boxed{32, 33}$ , 55

$$Q_1 = \frac{17 + 18}{2} = \frac{35}{2} = 17.5 \quad Q_3 = \frac{32 + 33}{2} = \frac{55}{2} = 27.5$$

$$Q_3 - Q_1 = 27.5 - 17.5 = 10.0$$

$$(10.0)(1.5) = 15.0$$

$$Q_1 - 15.0 = 17.5 - 15.0 = 2.5 \quad Q_3 + 15.0 = 27.5 + 15.0 = 42.5$$

There are no values below 2.5. The value of 55 is above 42.5, and is, therefore, an outlier.

b.

149, 123, 126, 122, 129, 120

120, 122, 123, 126, 129, 149

120,  $\boxed{122}$ , 123, 126,  $\boxed{129}$ , 149

$$Q_1 = 122 \quad Q_3 = 129$$

$Q_3 - Q_1 = 129 - 122 = 7.0(7.0)(1.5) = 10.5$   
 $Q_1 - 10.5 = 122 - 10.5 = 111.5$     $Q_3 + 10.5 = 129 + 10.5 = 139.5$   
There are no values below 111.5. The value of 149 is above 139.5, and is, therefore, an outlier.

## 7.12 Applications of Box – and – Whisker Plots

### Answers

- The values for the five-number summary are as follows:
  - Min. Value  $\rightarrow$  11,  $Q_1 \rightarrow$  14, Med  $\rightarrow$  19.5,  $Q_3 \rightarrow$  24, Max. Value  $\rightarrow$  26
  - Answers will vary for the data set that could produce the box-and-whisker plot, but one possible data set is as follows: 11, 12, 14, 15, 19, 20, 21, 24, 25, 26
- The values for the five-number summary are as follows:
  - Min. Value  $\rightarrow$  70,  $Q_1 \rightarrow$  72, Med  $\rightarrow$  80,  $Q_3 \rightarrow$  89, Max. Value  $\rightarrow$  99
  - Answers will vary for the data set that could produce the box-and-whisker plot, but one possible data set is as follows: 70, 72, 76, 80, 82, 89, 99
- The values for the five-number summary are as follows:
  - Min. Value  $\rightarrow$  2,  $Q_1 \rightarrow$  6, Med  $\rightarrow$  11,  $Q_3 \rightarrow$  12, Max. Value  $\rightarrow$  15
  - Answers will vary for the data set that could produce the box-and-whisker plot, but one possible data set is as follows: 2, 3, 6, 7, 9, 11, 11, 12, 13, 15
- The values for the five-number summary are as follows:
  - Min. Value  $\rightarrow$  44,  $Q_1 \rightarrow$  49, Med  $\rightarrow$  50,  $Q_3 \rightarrow$  50, Max. Value  $\rightarrow$  52
  - Answers will vary for the data set that could produce the box-and-whisker plot, but one possible data set is as follows: 44, 49, 49, 49, 50, 50, 50, 50, 51, 52
- The values for the five-number summary are as follows:
  - Min. Value  $\rightarrow$  5,  $Q_1 \rightarrow$  19.5, Med  $\rightarrow$  48.5,  $Q_3 \rightarrow$  76.5, Max. Value  $\rightarrow$  94
  - Answers will vary for the data set that could produce the box-and-whisker plot, but one possible data set is as follows: 5, 11, 16, 23, 30, 42, 55, 73, 74, 79, 85, 94
- The values for the five-number summary are as follows:
  - Min. Value  $\rightarrow$  9,  $Q_1 \rightarrow$  19.5, Med  $\rightarrow$  21.5,  $Q_3 \rightarrow$  27.5, Max. Value  $\rightarrow$  29
  - Answers will vary for the data set that could produce the box-and-whisker plot, but one possible data set is as follows: 9, 19, 20, 21, 22, 26, 29, 29
- The values for the five-number summary are as follows:
  - Min. Value  $\rightarrow$  51,  $Q_1 \rightarrow$  55.5, Med  $\rightarrow$  60,  $Q_3 \rightarrow$  66.5, Max. Value  $\rightarrow$  69
  - Answers will vary for the data set that could produce the box-and-whisker plot, but one possible data set is as follows: 51, 55, 56, 56, 60, 62, 65, 68, 69
- The values for the five-number summary are as follows:
  - Min. Value  $\rightarrow$  104,  $Q_1 \rightarrow$  111, Med  $\rightarrow$  156,  $Q_3 \rightarrow$  182, Max. Value  $\rightarrow$  193
  - Answers will vary for the data set that could produce the box-and-whisker plot, but one possible data set is as follows: 104, 111, 146, 156, 167, 182, 193
- The values for the five-number summary are as follows:

9. The values for the five-number summary are as follows.

- Min. Value  $\rightarrow$  16,  $Q1 \rightarrow$  21, Med  $\rightarrow$  21,  $Q3 \rightarrow$  25, Max. Value  $\rightarrow$  28
- Answers will vary for the data set that could produce the box-and-whisker plot, but one possible data set is as follows: 16, 21, 21, 21, 21, 21, 21, 21, 21, 23, 25, 25, 25, 26, 27, 28

10. The values for the five-number summary are as follows:

- Min. Value  $\rightarrow$  80,  $Q1 \rightarrow$  81.5, Med  $\rightarrow$  90,  $Q3 \rightarrow$  91.5, Max. Value  $\rightarrow$  93
- Answers will vary for the data set that could produce the box-and-whisker plot, but one possible data set is as follows: 80, 81, 82, 83, 90, 90, 91, 92, 93