

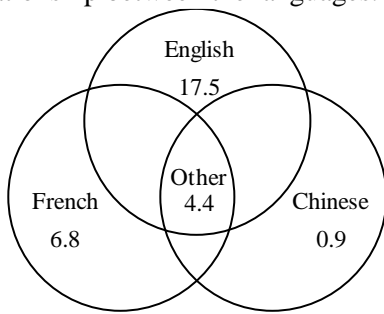
**Multiple Choice**

Identify the choice that best completes the statement or answers the question.

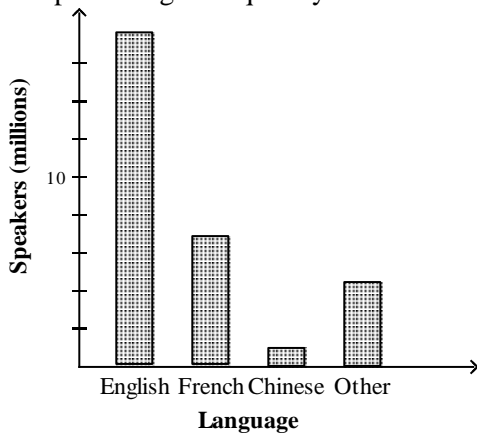
1. Choose the graph that best represents the data. Explain why you chose that type of graph.

Languages Spoken at Home in Canada (2001 Census)	
Language	Speakers (millions)
English	17.5
French	6.8
Chinese	0.9
Other	4.4

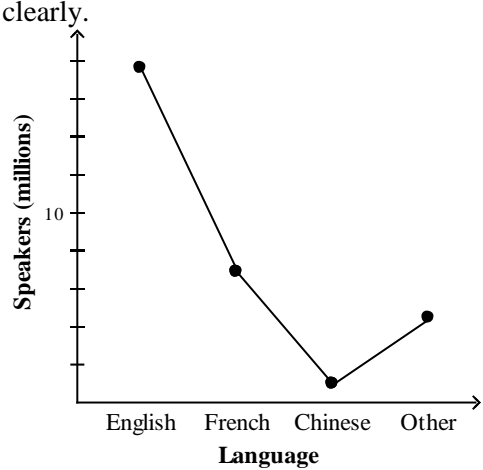
a. A Venn diagram is best because it shows the relationship between the languages.



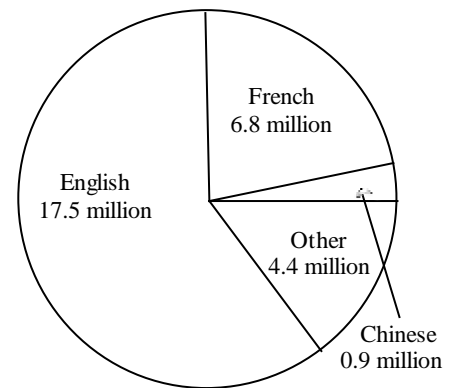
b. A bar graph is best because it allows you to compare categories quickly.



c. A line graph is best because it shows trends clearly.



d. A circle graph is best because it allows you to compare the different categories to the whole.



## Short Answer

1. Draw a box-and-whisker plot for the set of data.  
27, 35, 44, 51, 52, 54, 56, 69, 69, 79, 80, 100, 100

*Find the range of each set of data.*

2.

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

2|0 = 20

3. 44, 40, 42, 16, 6, 11, 26, 41, 10, 37, 40, 46, 48

4. Find the interquartile range.  
9, 51, 54, 56, 61, 71, 71, 83, 83, 88, 88, 93, 95

*A bin contains seven red chips, nine green chips, three yellow chips, and six blue chips. Find each probability.*

5. Drawing a red chip, replacing it, then drawing a blue chip
6. selecting three green chips without replacement
7. selecting three green chips with replacement

8. choosing a red chip, then a green chip, then a yellow chip, with replacement
9. choosing a red chip, then a green chip, then a yellow chip, without replacement
10. Find the GCF of  $6r^4$  and  $30r^2$ .
11. Factor the polynomial  $18x^3 + 34x^2 - 4x$ .
12. Factor  $2(x - 1) - 5x(x - 1)$ .
13. Factor  $15x^3 - 6x^2 - 25x + 10$  by grouping.
14. Factor  $4x^3 - 16x^2 + 12 - 3x$ .
15. Factor  $x^2 + 37x + 36$  by guess and check.
16. Factor the trinomial  $z^2 + 19z + 90$ .

17. Factor the trinomial  $t^2 - 4t - 32$ .

18. Factor  $x^2 + 20x + 36$ . Check that the original polynomial and the factored form have the same values for  $x = 0, 1, 2, 3,$  and  $4$ .

19. Factor the trinomial  $x^4 + 50x^2 + 625$ .

20. Factor  $3x^2 - x - 10$  by guess and check.

21. Factor  $3x^2 + 11x + 6$ .

22. Factor the trinomial  $5x^2 + 12x - 32$ .

23. Factor  $-3x^2 + 26x - 16$ .

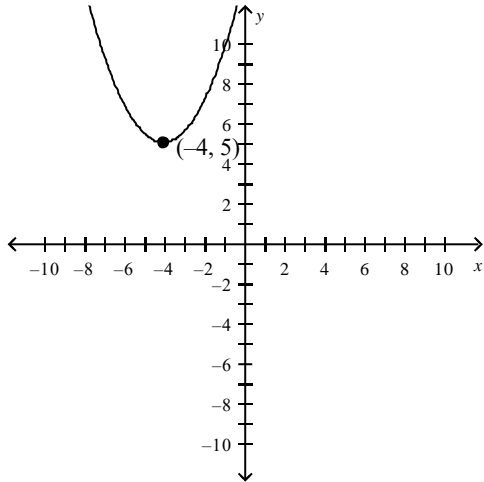
24. Factor  $27x^2z + 36xz + 12z$  completely.

25. Factor the polynomial  $30x^3 + 26x^2 + 4x$  completely.

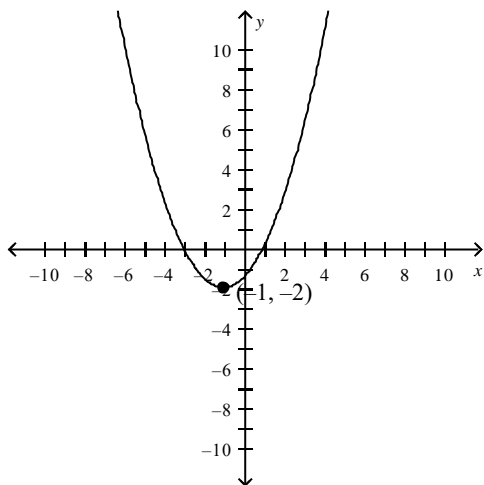
26. Use a table with values  $x = \{-2, -1, 0, 1, 2\}$  to graph the quadratic function  $y = -x^2$ .

27. Tell whether the graph of the quadratic function  $y = -9x^2 - 6x + 1$  opens upward or downward. Explain.

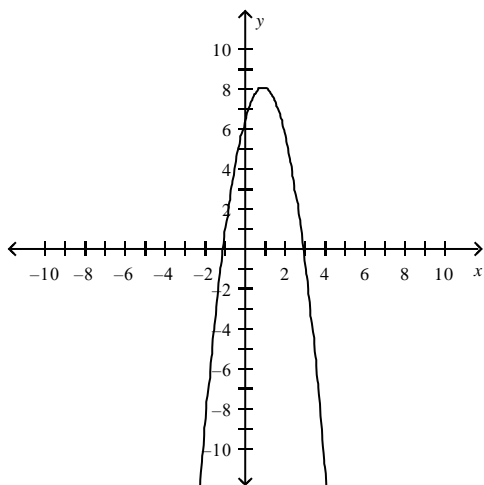
28. Identify the vertex of the parabola. Then give the minimum or maximum value of the function.



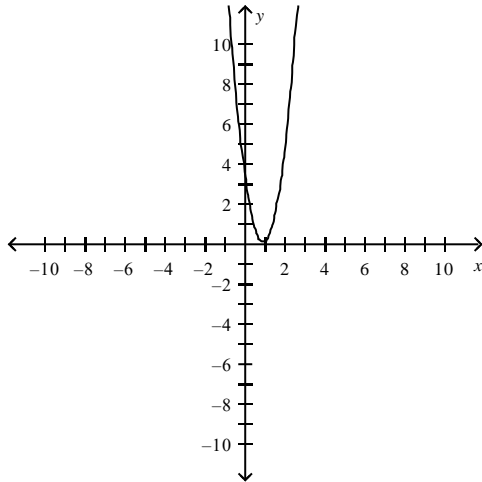
29. Find the domain and range.



30. Find the zeros of the quadratic function  $f(x) = -2x^2 + 4x + 6$  from the graph.

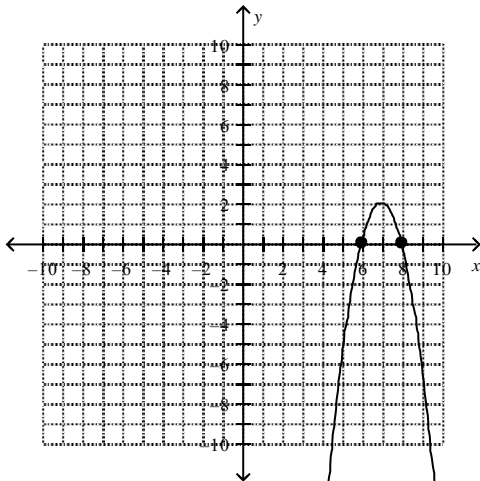


31. Find the axis of symmetry of the parabola.

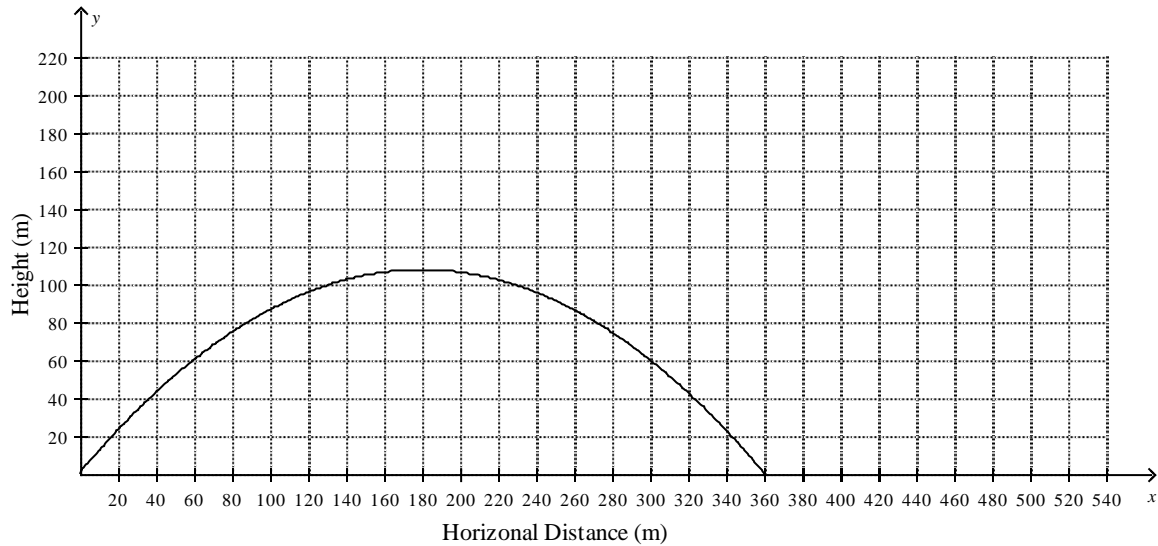


32. Find the axis of symmetry of the graph of  $y = -x^2 + 2x - 2$ .

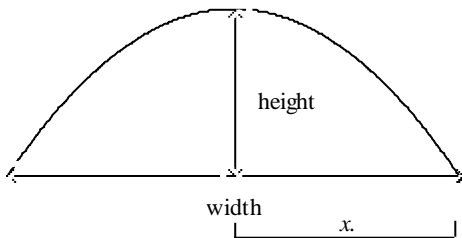
33. Find the vertex of the parabola  $y = -2x^2 + 28x - 96$ .



34. The trajectory of a model rocket launched from a rocket launcher on the ground at an angle of 50 degrees with an initial speed of 60 meters per second can be modeled by the parabola:  $f(x) = 1.19x - 0.0033x^2$ , where the  $x$ -axis is the ground. Find the height of the highest point of the trajectory and the horizontal distance the model rocket travels before hitting the ground.



35. The height of a curved support beam can be modeled by  $f(x) = -\frac{x^2}{300} + 12$ . Find the height and width of the beam.



36. Graph  $y = 3x^2 - 3x + 2$ .



37. The height of a soccer ball that is kicked from the ground can be approximated by the function  $y = -16x^2 + 48x$ , where  $y$  is the height of the soccer ball in feet  $x$  seconds after it is kicked. Graph this function. Find the time it takes the soccer ball to reach its maximum height, the soccer ball's maximum height, and the time it takes the soccer ball to return to the ground.

38. Graph  $y = x^2 - 3x + 4$ . Find the axis of symmetry and the vertex.

39. Order the functions from narrowest graph to widest graph.

$$f(x) = -\frac{1}{4}x^2, \quad g(x) = -4x^2, \quad \text{and} \quad h(x) = 2x^2$$

40. Compare the graph of  $g(x) = -\frac{3}{4}x^2 + 5$  with the graph of  $f(x) = x^2$ .

41. Solve the equation  $x^2 - 6x + 5 = 0$  by graphing the related function.

42. Solve the equation  $-x^2 + 4x - 4 = 0$  by graphing the related function.

43. A golfer hits the golf ball. The quadratic function  $y = -16x^2 + 48x$  gives the time  $x$  seconds when the golf ball is at height 0 feet. How long does it take for the golf ball to return to the ground?
44. A kicker starts a football game by “kicking off”. The quadratic function  $y = -16x^2 + 72x$  models the football’s height after  $x$  seconds. How long is the football in the air?
45. Use the Zero Product Property to solve the equation  $(x + 3)(x - 5) = 9$ .
46. Solve the quadratic equation  $b^2 + 7b + 12 = 0$  by factoring.
47. Solve the quadratic equation  $-4a^2 - 8a - 4 = 0$  by factoring.
48. The height of an arrow that is shot upward at an initial velocity of 40 meters per second can be modeled by  $h = 40t - 5t^2$ , where  $h$  is the height in meters and  $t$  is the time in seconds. Find the time it takes for the arrow to reach the ground.

49. Solve  $x^2 = 100$  using square roots.

50. Solve  $121x^2 - 49 = 0$  using square roots.

51. Solve  $x^2 - 50 = 0$ . Write your answer as a simplified radical.

52. Complete the square for  $x^2 + 12x + ?$  to form a perfect square trinomial.

53. Solve  $x^2 - 18x = -17$  by completing the square.

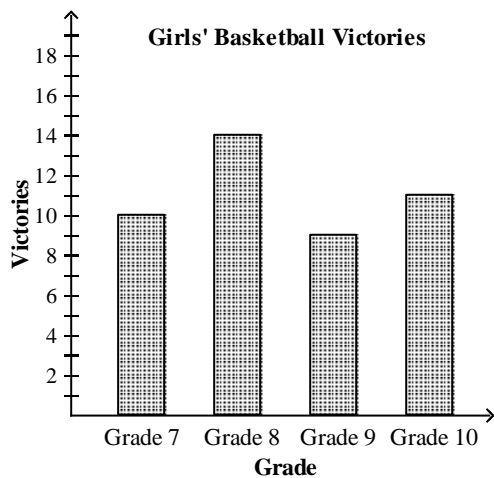
54. Solve  $2x^2 + 12x = -10$  by completing the square.

55. Solve  $3x = x^2 - 4$  using the Quadratic Formula.

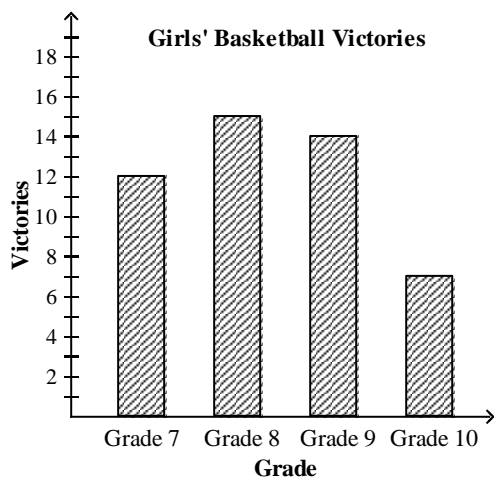
56. Find the number of real solutions of the equation  $9x^2 + 7x + 5 = 0$  using the discriminant.

57. Solve  $a^2 + 16a + 63 = 0$ .

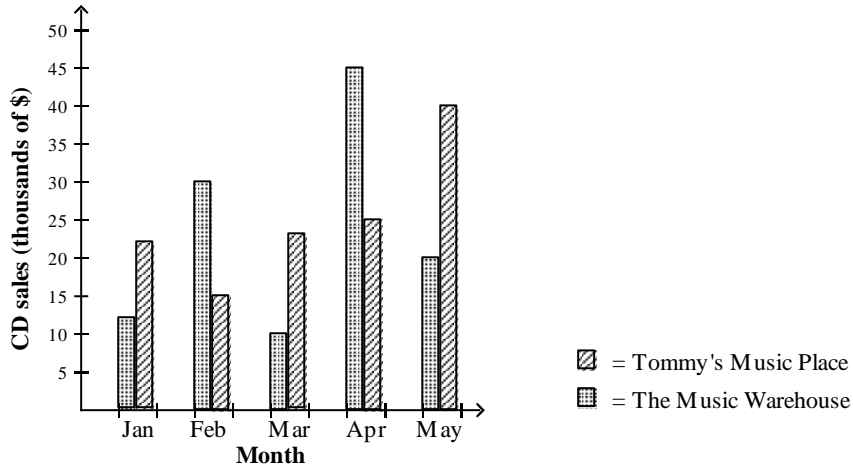
58. How many more victories did the 8th grade basketball team have than the 10th grade team? Use the graph to answer the question.



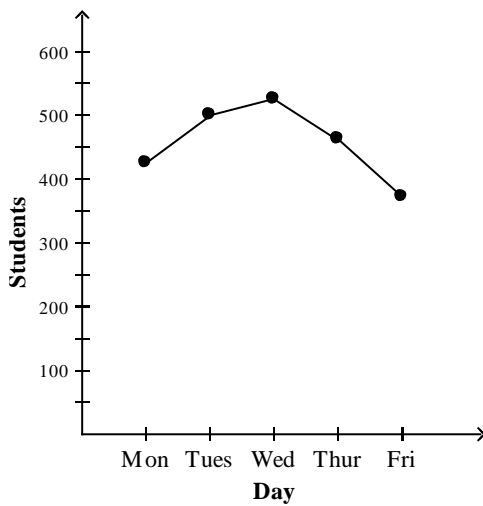
59. How many total victories did the four teams have? Use the graph to answer the question.



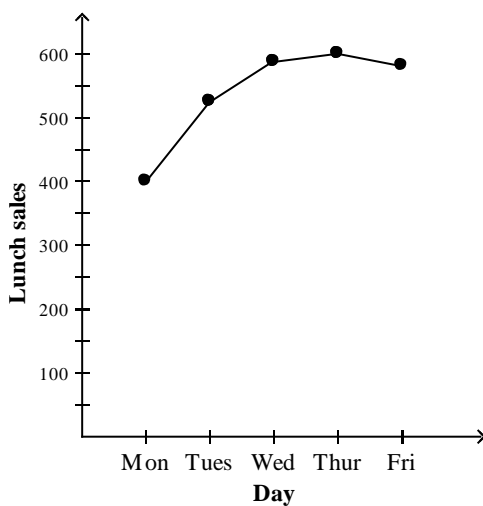
60. In which month were the sales at The Music Warehouse the least? Use the graph to answer the question.



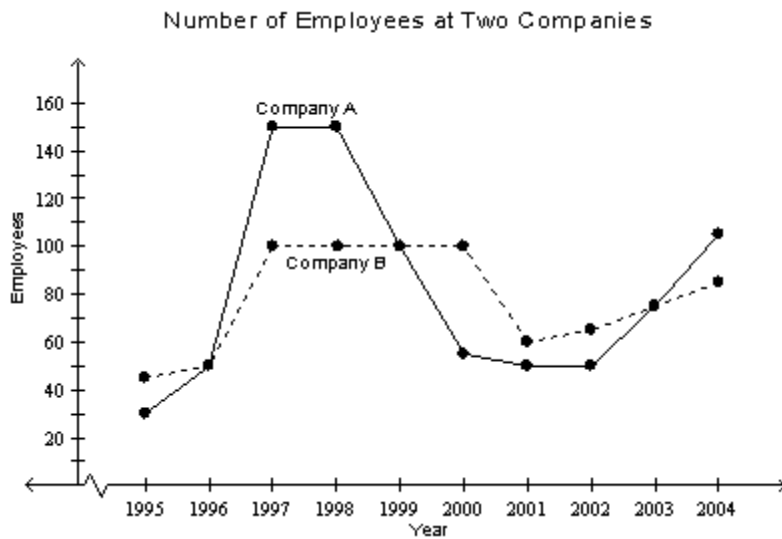
61. On which day did the greatest number of students buy lunch? Use the graph to answer the question.



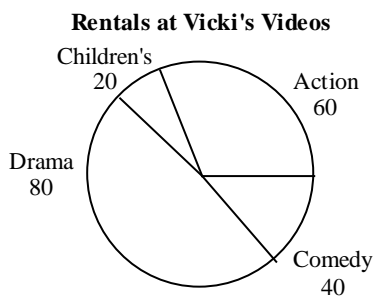
62. Between which two days did lunch sales increase the most? Use the graph to answer the question.



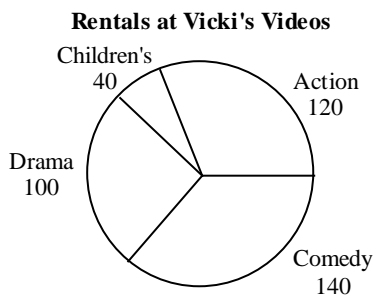
63. In which year(s) is the number of employees in company A less than the number of employees in company B? Use the graph to answer the question.



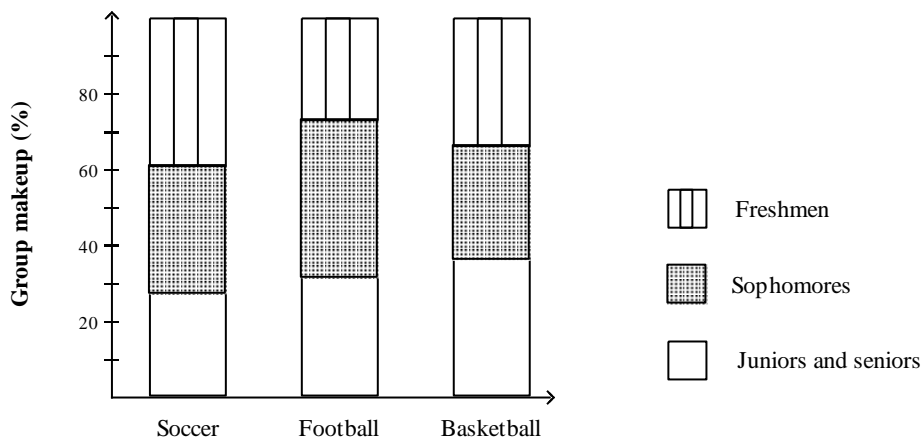
64. Which type of video was rented most often? Use the graph to answer the question.



65. What percent of the movies rented were comedy movies? Use the graph to answer the question.



66. In each of the sports teams at the local high school, there are students from all grades. On which sports team is the percentage of juniors and seniors higher than the percentage of sophomores?



67. The daily low temperatures in degrees Fahrenheit in a city for February 1–14 are given. Use the data to make a stem-and-leaf plot.

Daily Low Temperatures (°F)						
16	22	21	18	22	29	16
21	26	38	31	24	18	26

68. A wildlife biologist tracks the number of wolves in a particular region. Data for 15 months is shown. Use the data to make a frequency table with intervals.

15, 19, 24, 28, 26, 29, 17, 16, 17, 14, 22, 20, 18, 27, 27



69. Make a histogram for the numbers of students in different classes at a community college.

25, 15, 28, 52, 22, 38, 42, 44, 24, 32, 19, 28, 29, 20, 31

70. The cumulative frequencies of each interval have been given. Use this information to complete the frequency column.

<b>Interval</b>	<b>Frequency</b>	<b>Cumulative Frequency</b>
45–52	?	6
53–60	?	23
61–68	?	32
69–76	?	41
77–84	?	75
85–92	?	134

71. Constellations are made up of more than one star. The table shows the number of stars that make up various constellations. Find the mean, median, mode, and range of the data set.

<b>Constellation Number</b>	<b>Number of Stars in Constellation</b>
Constellation 1	23
Constellation 2	33
Constellation 3	31
Constellation 4	23
Constellation 5	27

72. Identify the outlier in the data set {42, 13, 23, 24, 5, 5, 13, 8}, and determine how the outlier affects the mean, median, mode, and range of the data.

73. The monthly rents for five apartments advertised in a newspaper were \$670, \$670, \$790, \$1800, and \$820. Use the mean, median, and mode of the rents to answer the question. Which value best describes the monthly rents? Explain.

mean = \$950, median = \$790, mode = \$670

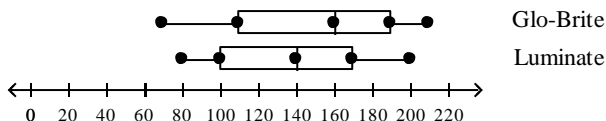
74. The monthly rents for five apartments advertised in a newspaper were \$700, \$700, \$760, \$1500, and \$820. Use the mean, median, and mode of the rents to answer the question. Which value gives the average rent?

mean = \$896, median = \$760, mode = \$700

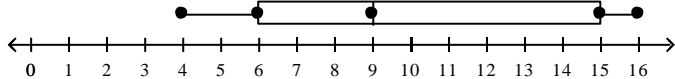
75. The monthly rents for five apartments advertised in a newspaper were \$680, \$680, \$800, \$1550, and \$840. Use the mean, median, and mode of the rents to answer the question. Which value gives the rent that was advertised most often?

mean = \$910, median = \$800, mode = \$680

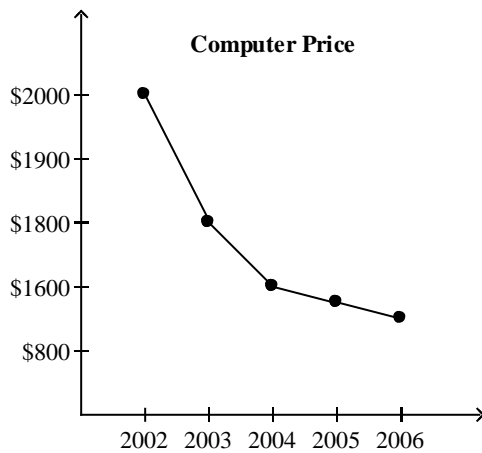
76. The box-and-whisker plot shows the lifespan, in days, of two different brands of 60-watt light bulbs. Which data set has a greater median? About how much greater is the median of that data set?



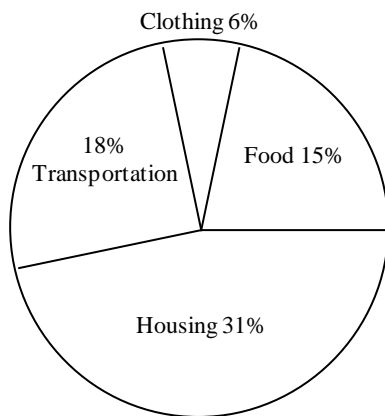
77. List a set of data values that can be represented by the box-and-whisker plot shown.



78. The line graph represents the price of a type of personal computer over a five-year period. Explain why the graph is misleading. What might someone believe because of the graph?



79. The circle graph shows how the average American family spends its money. Explain why the graph is misleading.



80. A researcher surveys people at a train station about whether they favor a tax increase to improve railroad service. Explain why the following statement is misleading: “75% of commuters support a railroad tax increase.”

81. A statistician analyzes data from a company. She reports that the price of the company’s stock will go down. She was asked two questions, and she answered them. What is the difference between the two questions? What do the answers to the questions lead you to believe?

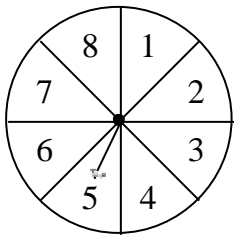
**Question 1:** What are the chances that the stock will go up instead of down?

**Answer 1:** One in one hundred.

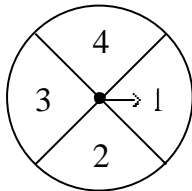
**Question 2:** What are the chances that another company has the same data as this company?

**Answer 2:** One in several billion.

82. Identify the sample space and the outcome shown for spinning the game spinner.



83. Choose *impossible*, *unlikely*, *as likely as not*, *likely*, or *certain* to describe the event.  
This spinner lands on 2, 3 or 4.

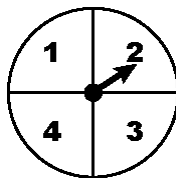
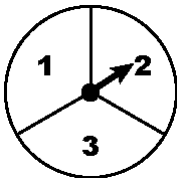


84. An experiment consists of spinning a spinner. Use the results in the table to find the experimental probability that the spinner does not land on red. Express your answer as a fraction in simplest form.

Outcome	Frequency
red	12
blue	10
green	8

85. A manufacturer inspects 500 personal video players and finds that 496 of them have no defects. What is the experimental probability that a video player chosen at random has no defects? Express your answer as a percent.
86. A manufacturer inspects 400 personal video players and finds that 399 of them have no defects. The manufacturer sent a shipment of 1200 video players to a distributor. Predict the number of video players in the shipment that are likely to have no defects.
87. An experiment consists of rolling a number cube. Find the theoretical probability of rolling a number less than or equal to 5. Express your answer as a fraction in simplest form.

88. In an election, 39% of the voters voted for a new school tax. What is the probability that a randomly-selected voter did not vote for the tax? Express your answer as a percent.
89. At a carnival game, you may win an inflatable crayon, you may win a small stuffed animal, or you may win nothing at all. If the probability of winning nothing is 0.61 and the probability of winning a small stuffed animal is 0.33, what is the probability of winning an inflatable crayon? Express your answer as a decimal.
90. The probability of drawing a green marble from a marble bag is 40%. What are the odds in favor of drawing a green marble?
91. Kadonna is chosen to be the first trumpet player in line in the band, and Jerome is chosen to be the second. Tell whether the events are dependent or independent. Explain your answer.
92. Jean spins two spinners. The results of both spins are shown. Tell whether the events are dependent or independent. Explain your answer.



93. A grab bag contains 8 football cards and 2 basketball cards. An experiment consists of taking one card out of the bag, replacing it, and then selecting another card. What is the probability of selecting a football card and then a basketball card? Express your answer as a decimal.

94. A bag contains hair ribbons for a spirit rally. The bag contains 7 black ribbons and 5 green ribbons. Lila selects a ribbon at random, then Jessica selects a ribbon at random from the remaining ribbons. What is the probability that Lila selects a black ribbon and Jessica selects a green ribbon? Express your answer as a fraction in simplest form.
95. Find the next three terms in the geometric sequence  $2, -6, \dots$
96. The first term of a geometric sequence is 6, and the common ratio is 5. What is the 5th term of the sequence?
97. A computer is worth \$3200 when it is new. After each year it is worth half what it was the previous year. What will its worth be after 3 years? Round your answer to the nearest dollar.
98. The function  $f(x) = 50(0.967)^x$ , where  $x$  is the time in years, models a declining lemming population. How many lemmings will there be in 5 years?
99. Tell whether the set of ordered pairs satisfies an exponential function. Explain your answer.  
 $\{(1, -6), (2, -12), (3, -24), (4, -48)\}$

100. Graph  $y = 3(5)^x$ .

101. Graph  $y = -2(5)^x$ .

102. Graph  $y = -4(0.2)^x$ .

103. In the year 2000, the population of Mexico was about 100 million, and it was growing by 1.53% per year. At this growth rate, the function  $f(x) = 100(1.0153)^x$  gives the population, in millions,  $x$  years after 2000. Using this model, in what year would the population reach 118 million? Round your answer to the nearest year.
104. The value of a gold coin picturing the head of the Roman Emperor Marcus Aurelius is \$145. This value is increasing at a rate of 5% per year. Write an exponential growth function to model this situation. Then find the value of the coin in 14 years.
105. Write a compound interest function to model the following situation. Then, find the balance after the given number of years.
- \$8,600 invested at a rate of 3.5% compounded monthly; 8 years
106. The fish population of Lake Collins is decreasing at a rate of 4% per year. In 2004 there were about 1,100 fish. Write an exponential decay function to model this situation. Then find the population in 2010.
107. A radioactive isotope has a half-life of 14 hours. Find the amount of the isotope left from a 240-milligram sample after 56 hours. If necessary, round your answer to the nearest thousandth.



108. Graph the data set  $\{(2, 4), (3, 6), (0, 0), (5, 10), (-2, -4)\}$ . Which kind of model best describes the data?

109. Look for a pattern in the data set. Which kind of model best describes the data?

<b>Population Growth of Bacteria</b>	
<b>Time (hours)</b>	<b>Number of Bacteria</b>
0	2,000
1	5,000
2	12,500
3	31,250
4	78,125

110. Use the information in the table to predict the number of termites in the termite colony after one year.

<b>Termite Colony Population</b>	
<b>Time (months)</b>	<b>Number of Termites</b>
0	30
1	90
2	270
3	810

111. A realtor estimates that a certain new house worth \$500,000 will gain value at a rate of 6% per year. Make a table that shows the worth of the house for years 0, 1, 2, 3, and 4. What is the real-world meaning of year 0? Which type of model best represents the data in your table? Explain. Write a function for the data.

112. Simplify the expression  $\sqrt{\frac{32}{98}}$ .

113. Simplify the expression  $\sqrt{300}$ .

114. Simplify  $\sqrt{\frac{y^{11}}{64y}}$ . All variables represent nonnegative numbers.

115. Simplify  $\sqrt{\frac{50}{81}}$ .

116. Subtract.  
 $7\sqrt{2} - 18\sqrt{2}$

117. Simplify the expression  $\sqrt{20b} + 5\sqrt{125b} - \sqrt{45b}$ .

118. Multiply. Write the product in simplest form.

$$\sqrt{49x} \sqrt{35x}$$

119. Multiply. Write the product in simplest form.

$$\sqrt{8}(\sqrt{6} + \sqrt{5})$$

120. Multiply  $(\sqrt{10} - 8)^2$ . Write the product in simplest form.

121. Simplify the quotient  $\frac{\sqrt{13}}{\sqrt{7}}$ .

122. Solve the equation  $\sqrt{c} = 4$ . Check your answer.

123. Solve the equation  $\sqrt{z} + 1 = 18$ . Check your answer.

124. Solve the equation  $2\sqrt{x} = 12$ . Check your answer.

125. Solve the equation  $\sqrt{3m-3} - \sqrt{m+3} = 0$ . Check your answer.

126. Solve  $\sqrt{20+x} = x$ . Check your answer.

127. Solve the equation. Check your answer.

$$\sqrt{x+7} = x-5$$

128. Identify the excluded value for the rational function  $y = \frac{1}{x-10}$ .

129. Find the excluded values of the rational expression  $\frac{-1}{t^2 + 6t - 27}$ .

130. Simplify the rational expression  $\frac{3z^4 - 6z}{z^3 - 2z^2}$ . Identify any excluded values.

131. Simplify the rational expression  $\frac{x+2}{x^2-3x-10}$ .

132. Simplify the rational expression  $\frac{3-3x}{3x^2+6x-9}$ .

**Multiply or divide. State any restrictions on the variables.**

133.  $\frac{4a^5}{7b^4} \cdot \frac{2b^2}{2a^4}$

134. Multiply. Simplify your answer.

$$\frac{x^2-x-6}{2x^2-6x} \cdot \frac{x^2+x}{x^2+4x+4}$$

135. Divide. Simplify your answer.

$$\frac{1}{r} \div \frac{r-5}{5r}$$

136. Multiply  $\frac{x+2}{4x-8} \cdot \frac{3x-9}{x+4} \cdot \frac{2x-4}{x^2-x-6}$ . Simplify your answer.

*Simplify the given expression.*

137.  $\frac{1}{4x^2-25} + \frac{6}{2x+5}$

138.  $\frac{11}{xy^2} - \frac{10y^2}{8x^2}$

139. Subtract. Simplify your answer.

$$\frac{x^2+x+6}{5x^3+8x^2+3x} - \frac{-4x^2+6}{5x^3+8x^2+3x}$$

140. Find the LCM of  $b^2+8b+15$  and  $4b^2+28b+40$ .

141. Subtract and simplify. Find the excluded values.

$$\frac{5}{x-y} - \frac{3x+2y}{x^2-y^2}$$

142. Divide. Simplify your answer.

$$(12x^4 - 18x^3 + 36x^2) \div 6x^3$$

143. Divide.

$$\frac{c^2 + 2c - 80}{c + 10}$$

144. Divide by using long division.

$$(x^2 - x - 6) \div (x - 3)$$

145. Divide.

$$(3x^2 + 5 - 7x^3) \div (x + 1)$$

146. Solve  $\frac{4}{m-3} = \frac{3}{5m}$ . Check your answer.

147. Solve  $-\frac{2}{y} + \frac{5}{3y} = \frac{2}{y-28}$ . Check your answer.

148. Solve  $\frac{x}{x-6} = \frac{x-4}{5x-30}$ . Check for extraneous solutions.