Developmental Mathematics
Chapter 5 Review

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<tr><td>Add the numbers and then divide by the number of items of data.</td><td>A student's scores on four tests were 80, 64, 91, and 85. What was the average score?
$\frac{80+64+91+85}{4} = \frac{320}{4} = 80$
The average score was 80.</td><td>1. On 5 successive days, Morgan ran 4 mi, 2 mi, 10 mi, 3 mi, and 6 mi. What was the average number of miles per day?
A. 4.5 mi
B. 5 mi
C. 6.25 mi
D. 7 mi</td></tr>
<tr><td colspan="3">Objective [5.1b] Find the median of a set of numbers and solve applied problems involving medians.</td></tr>
<tr><td>Brief Procedure</td><td>Example</td><td>Practice Exercise</td></tr>
<tr><td>List the data in order from smallest to largest. The median is the middle number if there is an odd number of data items. If there is an even number of data items, the median is the average of the two middle numbers.</td><td>Find the median of each set of hourly wages.
a) \$6.50, \$5.75, \$7.25, \$8.00, \$7.40
b) \$20, \$15, \$10, \$12

a) List the data in order from smallest to largest:
\$5.75, \$6.50, \$7.25, \$7.40, \$8.00
There is an odd number of data items. The middle number is \$7.25, so the median wage is \$7.25.

b) List the data in order from smallest to largest.
\$10, \$12, \$15, \$20
There is an even number of items. The median is the average of the two middle numbers:
Median $= \frac{\$12+\$15}{2} = \frac{\$27}{2} = \$13.50$</td><td>2. Find the median of the following temperatures:
56°, 48°, 61°, 66°, 53°
A. 53°
B. 56°
C. 58.5°
D. 61°</td></tr>
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Objective [5.1c] Find the mode of a set of numbers and solve applied problems involving modes.

Brief Procedure	Example	Practice Exercise
The mode of a set of data is the number or numbers that occur most often. If each number occurs the same number of times, there is no mode.	Find the modes of each set of data. a) 16, 23, 27, 27, 27 b) \$34, \$34, \$51, \$58, \$58, \$64 c) 7, 9, 15, 21, 45 a) The number that occurs most often is 27. Thus the mode is 27. b) The two numbers \$34 and \$58 occur most often. Thus the modes are \$34 and \$58. c) No number occurs more often than any other. Thus there is no mode.	3. Find the mode of these data: \$17, \$28, \$33, \$41, \$56, \$56, \$91 A. \$41 B. \$46 C. \$56 D. There is no mode.

Objective [5.2a] Extract and interpret data from tables.

Brief Procedure	Example
Examine the table carefully, using column headings, row labels, and data entries to extract the desired information.	The following table lists nutritional information for Fresh Stuffed Pitas at Wendy's.

Pita	Calories	Fat	Protein	Sodium
Garden Veggie	390	15 g	13 g	780 mg
Garden Ranch Chicken	480	17 g	32 g	1170 mg
Chicken Caesar	490	17 g	36 g	1300 mg
Classic Greek	430	19 g	17 g	1070 mg

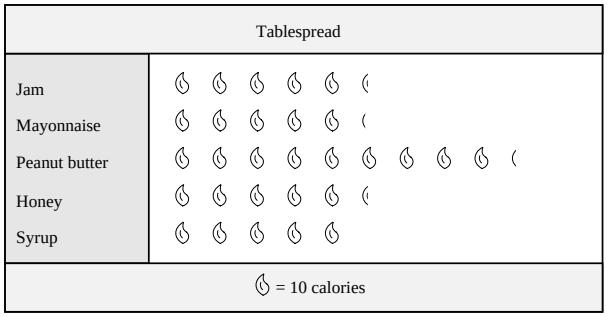
Which pita contains the most sodium?

Look down the column headed "Sodium" until you find the largest number. That number is 1300 mg. Then look across that row to find the type of pita, Chicken Caesar.

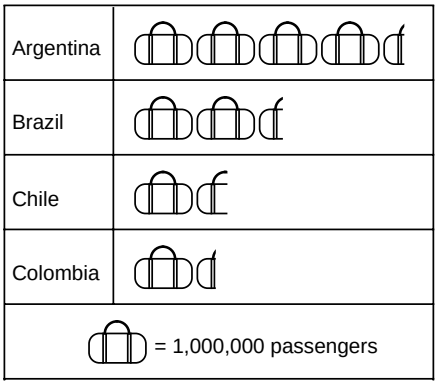
Practice Exercise

4. Use the table in the example above to determine which Fresh Stuffed Pita has the least fat.
A. Garden Veggie
B. Garden Ranch Chicken
C. Chicken Caesar
D. Classic Greek

Objective [5.2b] Extract and interpret data from pictographs.

Brief Procedure	Example
Examine the pictograph carefully, noting the key that tells what each symbol represents and the number of symbols for each item.	The following pictograph represents the calories per tablespoon in various tablespreads.  a) Which tablespread contains the most calories per tablespoon? b) How many calories per tablespoon does syrup contain? a) Peanut butter has the largest number of symbols, so it contains the most calories per tablespoon. b) Syrup is represented by 5 symbols, each of which represents 10 calories. Thus, syrup contains $5 \cdot 10$, or 50 calories per tablespoon.
	Practice Exercise
	5. Use the pictograph in the example above to determine approximately how many more calories per tablespoon there are in peanut butter than in jam. A. 10 calories B. 20 calories C. 30 calories D. 40 calories

Objective [5.2c] Draw simple pictographs.

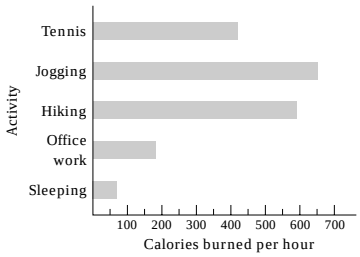
Brief Procedure	Example
Select a symbol and determine what it will represent. Then calculate how many symbols will be used for each item. List the items in a column, draw the appropriate number of symbols beside each, and give the pictograph a descriptive title.	International airline passenger arrivals in a recent year in four South American countries are listed below. Draw a pictograph to represent arrivals in these countries. Use a suitcase symbol to represent 1,000,000 arrivals. Argentina: 4,300,000 Brazil: 2,400,000 Chile: 1,500,000 Colombia: 1,300,000 First we compute the number of symbols needed to represent the arrivals in each country. Argentina: $4,300,000 = 4.3 \times 1,000,000$, so we need 4 whole symbols and 0.3, or about $\frac{1}{3}$, of another symbol. Brazil: $2,400,000 = 2.4 \times 1,000,000$, so we need 2 whole symbols and 0.4, or about $\frac{1}{2}$, of another symbol. Chile: $1,500,000 = 1.5 \times 1,000,000$, so we need 1 whole symbol and 0.5, or $\frac{1}{2}$, of another symbol. Colombia: $1,300,000 = 1.3 \times 1,000,000$, so we need 1 whole symbol and 0.3, or about $\frac{1}{3}$, of another symbol. Now we can draw the pictograph. List the countries in a column, draw the appropriate number of symbols beside each, and title the pictograph "International Airline Passenger Arrivals." **International Airline Passenger Arrivals** 

(continued)

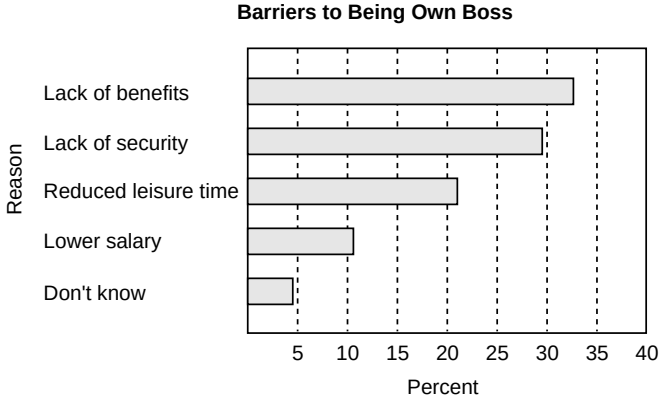
Objective [5.2c] continued

	Practice Exercise
	6. The weekly audiences for various radio formats are listed below. Suppose you draw a pictograph to represent the data, using a radio symbol to represent 10,000,000 listeners. How many symbols would you use to represent the Top 40 audience? Country: 43,300,000 News/talk: 38,900,000 Adult contemporary: 38,800,000 Top 40: 22,800,000 Oldies: 22,300,000 A. About $2\frac{1}{3}$ B. About 4 C. About $10\frac{1}{3}$ D. About 23

Objective [5.3a] Extract and interpret data from bar graphs.

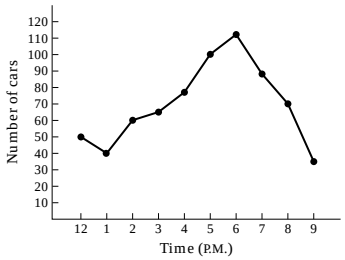
Brief Procedure	Example
Examine the bar graph carefully, noting the items listed, the scale used, and the lengths of the bars.	The following bar graph shows the number of calories burned per hour by a 152 lb person during various activities.  a) Which activity burns the fewest calories per hour? b) About how many calories are burned per hour by jogging? a) The shortest bar is for sleeping. Thus, sleeping burns the fewest calories. b) Move to the right end of the bar representing jogging and then go down to the horizontal scale. We read that jogging burns abut 650 calories per hour.
	Practice Exercise
	7. Use the bar graph in the example above to determine which activity burns about 420 calories per hour. A.Tennis B. Hiking C. Office work D. Sleeping

Objective [5.3b] Draw bar graphs.

Brief Procedure	Example
Determine whether a horizontal or a vertical bar graph will be drawn. Label the appropriate scales, draw bars corresponding to the data, and give the graph an appropriate title.	Listed below are the reasons adult workers give for not going into business for themselves. Make a horizontal bar graph of the data. Lack of benefits: 34% Lack of security: 29% Reduced leisure time: 22% Lower salary: 11% Don't know: 4% First, on the vertical scale label the reasons given in five equally spaced intervals, and title that scale "Reason." Then mark and label the horizontal scale by 5's, and title this scale "Percent." Draw a horizontal bar for each reason to show the corresponding percent. Finally, give the graph an appropriate title, such as "Barriers to Being Own Boss." 
	Practice Exercise
	8. The number of units of a popular software product sold in four recent years are listed below. 1995: 30 million 1996: 63 million 1997: 84 million 1998: 110 million Suppose you draw a vertical bar graph of the data. Which label would be appropriate for the vertical scale? A.Type of software B. Price C. Year D. Units sold (in millions)

Objective [5.3c] Extract and interpret data from line graphs.

Brief Procedure	Example
Examine the graph carefully, noting the items on the horizontal and vertical scales, the marks on the scales, and the points on the graph.	The following line graph shows the number of cars passing through an intersection during various hours of the day.



a) During which hour was traffic the heaviest?
b) During which hour did about 70 cars pass through the intersection?

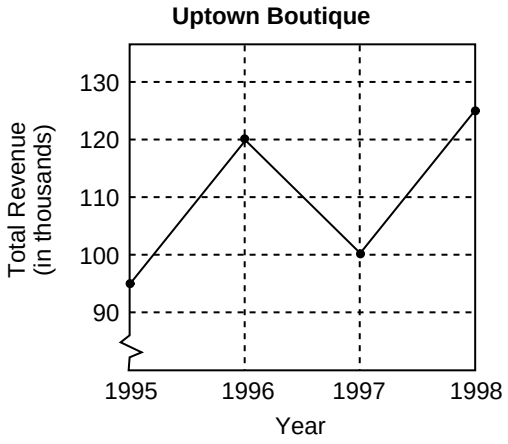
a) Find the highest point on the graph and then go down to the horizontal scale to read the corresponding hour. We see that traffic was heaviest during the 6 P.M. hour.
b) We locate 70 on the vertical scale and go to the right until we come to a point (a dot) on the graph. Then go down to the horizontal scale to read the corresponding hour. We see that about 70 cars passed through the intersection during the 8 P.M. hour.

Practice Exercise

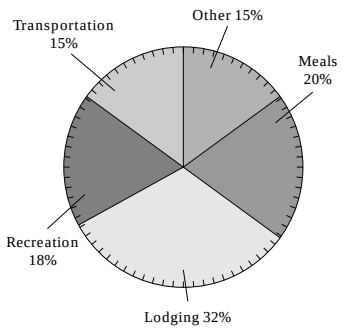
9. Use the line graph in the example above to determine whether the traffic decreased, stayed the same, or increased between 3 P.M. and 4 P.M.

A.Decreased
B. Stayed the same
C. Increased

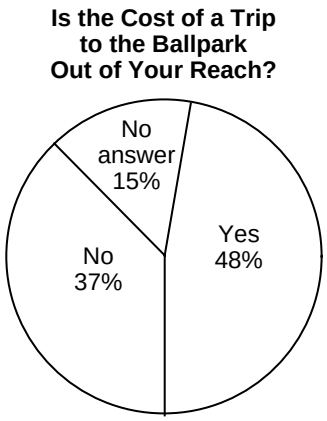
Objective [5.3d] Draw simple line graphs.

Brief Procedure	Example
Mark, label, and title the scales. Draw points representing the data, connect them with line segments, and give the graph an appropriate title.	Listed below is the total revenue for the Uptown Boutique for several years. Make a line graph of the data. 1995: \$95,000 1996: \$120,000 1997: \$100,000 1998: \$125,000 Indicate the years on the horizontal scale and label it "Year." We will scale the vertical axis in thousands. Mark the vertical scale by 10's starting with \$90. Use a jagged line to indicate the missing numbers. Label the vertical scale "Total revenue (in thousands)." Draw points representing the data and connect them with line segments. Finally, give the graph an appropriate title, such as "Uptown Boutique." 
	Practice Exercise
	10. Caryn's scores on five math tests are listed below. Test 1: 83% Test 2: 91% Test 3: 74% Test 4: 79% Test 5: 86% Suppose you draw a line graph of the data. Which label would be appropriate for the horizontal scale? A.Caryn B. Test C. Percent D. Score

Objective [5.4a] Extract and interpret data from circle graphs.

Brief Procedure	Example
Examine the graph carefully, noting the items listed, the percents, and the sizes of the sections.	The following circle graph shows how vacation money is spent.  a) On which item is the greatest amount spent? b) Suppose a family spends \$2000 on a vacation. How much is spent for transportation? a) The largest section of the graph is for lodging, so the greatest amount is spent on lodging. b) The graph shows that the section for transportation represents 15% of expenditures: 15% of \$2000 $= 0.15 \times$ \$2000 = \$300
	Practice Exercise
	11. Use the circle graph in the example above to determine what percent of vacation money is spent for meals and recreation. A.18% B. 20% C. 38% D. 50%

Objective [5.4b] Draw circle graphs.

Brief Procedure	Example
Use a circle with 100 equally spaced tick marks, and think of it as a pie with 100 equally sized pieces. Each piece of the pie represents 1%. Draw wedges corresponding to the given data. For example, to represent 15%, draw a wedge containing 15 pieces of the pie. The wedges can be colored or shaded if desired. Finally, give the graph an appropriate title.	Recently, in a telephone survey, 1000 adults were asked the question "Do you think the cost of attending a major-league baseball game is out of reach for people like you?" Their responses are listed below. Make a circle graph of the data. Yes: 48% No: 37% No answer: 15% Start with a circle with 100 equally spaced tick marks. We can start with 48%. Draw a line from the center to any tick mark. Then count off 48 ticks and draw another line. Label this wedge "Yes 48%." Then count off 37 ticks from the previous wedge and draw another line. Label this wedge "No 37%." The remaining wedge represents the "No answer" category. Label it accordingly. Finally give the graph an appropriate title such as "Is the Cost of a Trip to the Ballpark Out of Your Reach?" 
	Practice Exercise
	12. The sources of children's money are shown below. Gifts from parents: 16% Gifts from others: 8% Work outside the home: 10% Household tasks: 21% Allowances, no strings attached: 45% Suppose you draw a circle graph of the data. Starting with a circle with 100 equally spaced tick marks, how many tick marks would you count off to represent work outside the home? A. 8 B. 10 C. 16 D. 21

Objective [5.5a] Compare two sets of data using their means.

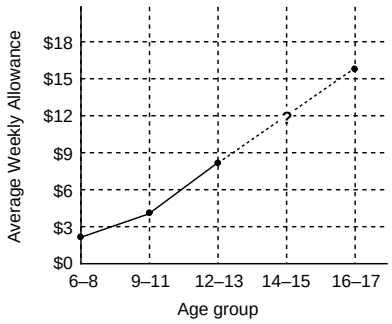
Brief Procedure	Example
Find the mean, or average, of each set of data and compare the results.	Volunteers drank two brands of orange juice and rated their taste from 1 to 10, where 10 represents the best taste. The results are given below. On the basis of this test, which brand tastes better? Brand A: 7, 8, 6, 4, 10, 5, 9, 8, 8, 7 Brand B: 6, 10, 9, 7, 8, 7, 4, 5, 6, 7 Brand A average: $\frac{7+8+6+4+10+5+9+8+8+7}{10} = \frac{72}{10} = 7.2$ Brand B average: $\frac{6+10+9+7+8+7+4+5+6+7}{10} = \frac{69}{10} = 6.9$ The average for Brand A is higher than that for Brand B, so Brand A tastes better.
	Practice Exercise
	13. Two brands of light bulbs were tested. The lives, in hours, of 8 bulbs of each brand are listed below. On the basis of this test, which bulb is better? Brand A: 950, 967, 835, 1214, 1130, 891, 1070, 998 Brand B: 1015, 898, 1147, 935, 946, 893, 1235, 842 A. Brand A B. Brand B

Objective [5.5b] Make predictions from a set of data using interpolation or extrapolation.

Brief Procedure	Example
Interpolation can be used to find a value between two known values. To use interpolation to make a prediction, we can graph the given data and read the predicted value from the graph. We can also find the average of the known values on either side of the missing value.	The following table gives the average weekly allowance for children in various age groups. Use interpolation to estimate the average weekly allowance for children in the 14-15 age group.

Age Group	Allowance
6-8	\$2.79
9-11	\$4.08
12-13	\$8.16
14-15	?
16-17	\$15.70

First we graph the data.



From the graph we estimate that the average weekly allowance for children in the 14-15 age group is about \$12.

We can also estimate this value by finding the average of the data values \$8.16 and \$15.70:

$$\frac{\$8.16 + \$15.70}{2} = \$11.93$$

Practice Exercise

14. The following table gives the times several math students spent studying for a test and their test scores. Estimate the missing data value.

Study time (in hours)	Test score (in percent)
4	76
6	79
7	80
9	85
10	?
12	91

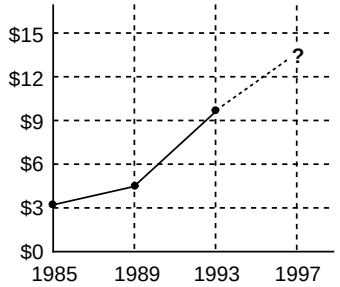
A. 86
B. 88
C. 90
D. 92

Objective [5.5b] continued

Brief Procedure	Example
Extrapolation can be used to find a value that goes beyond the given data. To use extrapolation to make a prediction, we graph the data, extend the graph, and read the predicted value from the extended graph.	The following table gives the average weekly allowance of children 12 years old and younger in various years. Use extrapolation to estimate the income in 1997.

Year	Income
1985	\$3.03
1989	\$4.42
1993	\$9.56
1997	?

We graph the given data and then draw a "representative" line beyond the data.



From the graph we estimate that the value for 1997 is about \$13.50. Answers will vary depending on the placement of the "representative" line.

Practice Exercise

15. The following table gives the prices of 2″ x 4″ lumber of various lengths. Use extrapolation to estimate the price of an 18-ft piece of 2″ x 4″ lumber.

Length	Price
8 ft	\$1.99
10 ft	\$2.99
12 ft	\$3.78
14 ft	\$4.57
16 ft	\$5.98
18 ft	?

A. About \$7
B. About \$9
C. About \$10
D. About \$12