Chapter 9

Name_____ Date _____

Chapter 9 — Statistical Measures

Dear Family,

In this chapter, your student will study different forms of statistical measures. One of the most common statistical measures is finding the mean of a set of data. Another word for mean is *average*. Think about ways you use the word *average* outside of the classroom. Consider the examples below before brainstorming your own ideas.

Have you ever said "today is an average day"? What does that mean? You are probably comparing that particular day to a day that went really great or maybe to a day that did not turn out so good. So, what determines whether a day is good, average, or bad? Do you think your average day would be the same as a sibling or a parent? Spend some time thinking about the difference between a good, average, and bad day.

How about temperatures? How does a meteorologist determine what the average high or low temperatures are for any given day? Do some research on the Internet as a family to discover how meteorologists keep track of average temperatures for your city.

Some other questions to consider:

- How would a record high or low temperature affect the average temperature on a given day?

- What other factors could affect an average temperature?

Now it is your turn! Think about other situations, activities, or events in which averages are used as a form of measurement or comparison. Make a list as a family and discuss how averages are used in each of the situations. Then consider what is being measured and how knowing the average is beneficial to you.

May you have above average luck!

Nombre _____ Fecha _____

Medidas de estadística

Estimada familia,

En este capítulo, su estudiante estudiará las diferentes medidas de estadística. Una de las medidas de estadística más comunes requiere encontrar la media de un conjunto de datos. Otra palabra para media es *promedio*. Piensa en las maneras en que puedes usar la palabra *promedio* fuera del salón de clases. Considera los ejemplos a continuación antes de pensar en tus propias ideas.

¿Alguna vez has dicho "hoy es un día promedio "? ¿Qué significa eso? Probablemente estás comparando ese día con un día que fue estupendo o que de pronto no fue tan bueno. Entonces, ¿qué determina que un día sea bueno, promedio o malo? ¿Crees que tu día promedio sería igual al de tu hermano o hermana o al de uno de tus padres? Dedica tiempo a pensar sobre la diferencia entre un día bueno, promedio y malo.

¿Qué hay de las temperaturas? ¿De qué manera un meteorólogo determina la temperatura promedio más alta o baja para un determinado día? Investiga en Internet con tu familia para descubrir cómo los meteorólogos llevan datos de las temperaturas promedio de tu ciudad.

Algunas otras preguntas para considerar:

- ¿De qué manera una temperatura récord alta o baja afecta la temperatura promedio de una día determinado?

- ¿Qué otros factores podrían afectar una temperatura promedio?

¡Ahora es tu turno! Piensa en otras situaciones, actividades o eventos en los que se usen promedios para hacer medidas o comparaciones. Hagan una lista en familia y hablen sobre cómo los promedios se usan en cada una de las situaciones. Luego consideren lo que están midiendo y cómo conocer el promedio es beneficioso.

¡Que tengan una mejor suerte que la promedio!

Start Thinking!
For use before Activity 9.1

If you asked 10 classmates what their favorite color is, how many answers could you get?

If you asked the same 10 classmates how many pennies are in a quarter, how many answers could you get?

How are the two questions different?

Warm Up
For use before Activity 9.1

Use a number line to order the numbers from least to greatest.

1. 7   **2.** 3   **3.** 0

4. -3 **5.** -2 **6.** 4

Start Thinking!

For use before Lesson 9.1

What is the difference between a statistical question and a non-statistical question? Give an example of each.

Warm Up

For use before Lesson 9.1

Answer the question. Determine if your answer would be the same as your classmates'.

1. How many letters are in the alphabet?

2. How many centimeters are in one meter?

3. How many letters are in your last name?

4. What size shoe do you wear?

9.1   Practice A

Answer the question. Determine if your answer would be the same as your classmates'.

1. How many cars are in the parking lot?

2. How many letters are in the word apple?

3. In what year will you graduate from college?

Determine whether the question is a statistical question. Explain.

4. In what year was the Declaration of Independence signed?

5. How many pickles are in the pickle jar?

6. What night of the week do you watch your favorite show?

Display the data in a dot plot. Identify any clusters, peaks, or gaps in the data.

7.

Day of the Month			
14	16	15	15
15	14	15	13
14	15	15	15

8.

Age of Soccer Player (years)			
21	23	20	19
20	22	23	20
31	20	21	20

9. The dot plot shows the speeds of pitches of a baseball.
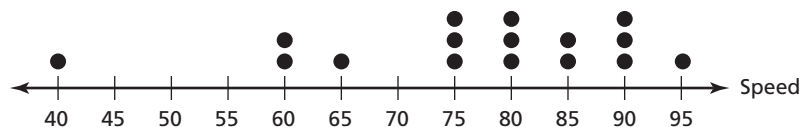
   a. How many pitches are represented?

   b. How can you collect this data? What are the units?

   c. Write a statistical question that you can answer using the dot plot. Then answer the question.

9.1 Practice B

Determine whether the question is a statistical question. Explain.

1. How long did you wait in line?

2. How many games did you bowl?

3. How many quarters are in a football game?

Display the data in a dot plot. Identify any clusters, peaks, or gaps in the data.
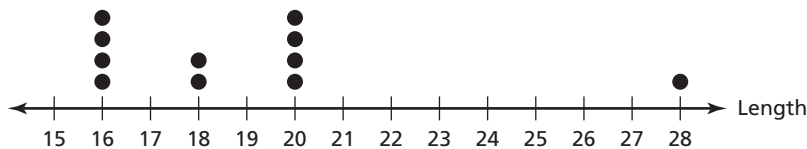
4.

Number of Emails			
12	15	16	14
2	17	18	13
45	19	16	16

5.

Number of Ounces			
12	20	12	12
20	32	12	32
20	12	12	20

6. The dot plot shows the lengths of racing boats.

  a. How many racing boats are represented?

  b. How can you collect this data? What are the units?

  c. Write a statistical question that you can answer using the dot plot. Then answer the question.

7. The results of a survey are shown.

  a. Is this a statistical question? Explain.

  b. Display the data in a dot plot. Identify any clusters, peaks, or gaps in the data.

  c. Use the distribution of the data to answer the question.

How many customers did you serve at lunch today?			
25	24	22	20
23	24	25	24
21	25	22	31
25	27	23	30

Name_____ Date _____

9.1 Enrichment and Extension

Collecting Statistics

Survey the students in your class. Record their responses in the tables below.

How many hours of TV do you watch each day?	
Name	**Time (hours)**

How many pets do you own?	
Name	**Number of Pets**

How long did you sleep last night?	
Name	**Time (hours)**

What is your favorite sport?	
Name	**Sport**

Use the data to answer the questions.

1. Do most people you surveyed watch more or less TV than you? Are these results what you would expect?

2. Of those you surveyed, who sleeps the most? Who sleeps the least?

3. The National Sleep Foundation estimates the average teen needs 8.5–9.25 hours of sleep per night. Who got enough sleep last night?

4. Which table displays data differently than the others? Why is the data different? Is the data still useful? Explain.

Name _____ Date _____

9.1 Puzzle Time

If A Seagull Flies Over The Sea, What Flies Over The Bay?

Write the letter of each answer in the box containing the exercise number.

Determine whether the question is a statistical question.

1. How many hours do sixth-graders spend watching television on the weekend?

   A. Yes   **B.** No

2. How many states begin with the letter A?

   D. Yes   **E.** No

3. How many members in the sixth-graders' households have cell phones?

   A. Yes   **B.** No

Display the following data in a dot plot. Then use the dot plot to answer the questions.

Number of Sixth-Graders In a Classroom				
24	23	24	25	23
24	31	22	26	24
27	25	32	24	31
22	25	24	25	23

4. Identify the peak.

   K. 25   **L.** 24   **M.** none

5. Identify the cluster.

   B. Around 24   **C.** Around 31   **D.** none

6. Identify the gap.

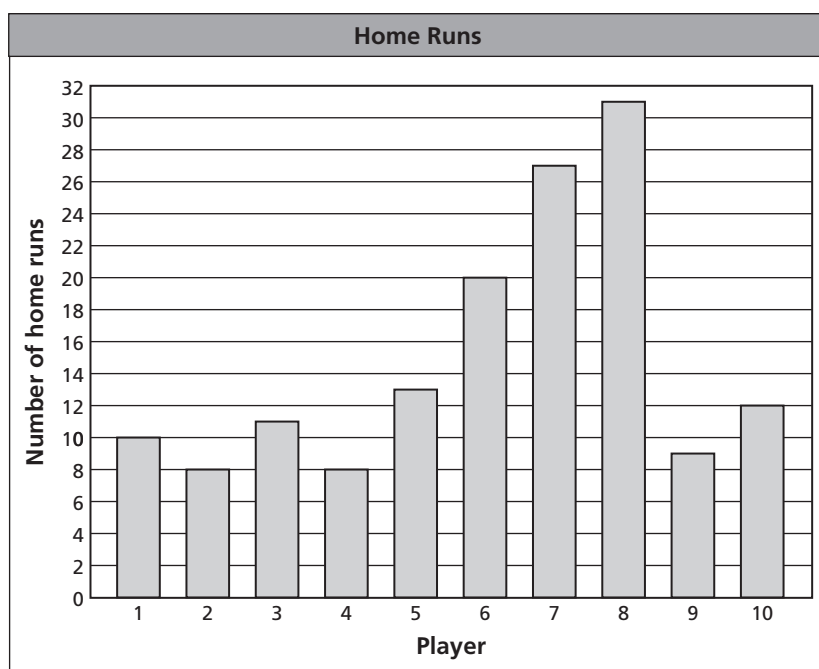   **F.** Between 22 and 27   **G.** Between 27 and 31   **H.** none

3		5	1	6	2	4

Activity 9.2

Start Thinking!
For use before Activity 9.2

What comes to mind when you think of the word *average*? How does the word *average* relate to math?

Activity 9.2

Warm Up
For use before Activity 9.2

The bar graph shows the number of home runs hit by 10 players on a baseball team during the regular season.

Home Runs

Number of home runs (vertical axis, 0 to 32)
Player (horizontal axis, 1 to 10)

Player 1: 10
Player 2: 8
Player 3: 11
Player 4: 8
Player 5: 13
Player 6: 20
Player 7: 27
Player 8: 31
Player 9: 9
Player 10: 12

1. Which player hit the most home runs? How many did he hit?

2. Of the ten players shown, what percent hit more than 20 home runs?

3. Of the ten players shown, what percent hit fewer than 12 home runs?

Start Thinking!
For use before Lesson 9.2

What do you think is the average height of all the people in your class?

Measure everyone in your class (including your teacher). Record everyone's height rounded to the nearest inch.

Find the average by adding all of the heights and dividing by the number of people.

Was your guess close to the average? Explain.

Lesson 9.2

Warm Up
For use before Lesson 9.2

Describe an average value of the data.

1. TV shows watched each day this week:
2, 2, 3, 4, 1, 0, 2

2. Points scored by each starter on a basketball team: 22, 18, 15, 6, 4

3. New messages in your inbox: 2, 5, 7, 2, 3, 2

4. Minutes spent getting ready for school:
45, 53, 65, 37, 29

Name_____ Date _____

9.2 Practice A

Describe an average value of the data.

1. 7, 5, 9, 6, 3

2. 8, 10, 15, 7, 18, 14

3. 66, 93, 76, 101, 88, 81, 72, 95

4. 31, 73, 82, 58, 44, 60

Find the mean of the data.

5.

Movies Watched in Class	
Language Arts	||||
Social Studies	ⅢⅢ |
Math	|
Science	|||
Art	|

6.

Students Absent	
Monday	||||
Tuesday	|
Wednesday	|
Thursday	||
Friday	|||

7.

Marching Band Members	
Wilson M.S.	44
East M.S.	62
Central M.S.	75
Seminole M.S.	39
Gator M.S.	55

8.

Problems Completed	
Kara	18
Josh	12
Dana	13
Robert	8
Katie	19

9.

10.
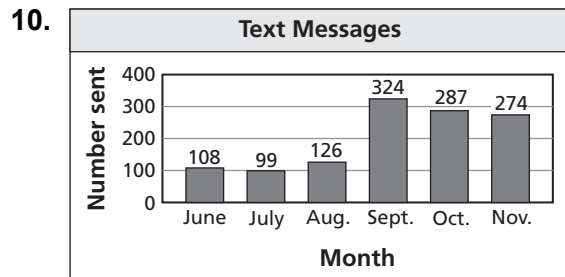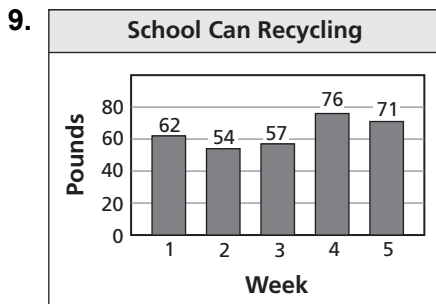
11. For ten school days, the numbers of bikes parked at a school bike rack are 10, 12, 8, 11, 13, 9, 2, 1, 9, and 12.

    a. What is the mean number of bikes per day?

    b. Identify two outliers for the data. Describe how the outliers affect the mean.

12. You spend 100 minutes on homework each night from Monday through Friday. You spend 190 minutes on homework on Saturday. What is your mean daily number of minutes on homework?

Name _____ Date _____

Describe an average value of the data.

1. 84, 89, 99, 78, 67, 98, 100, 71, 88

2. 234, 201, 311, 189, 404, 255, 276, 333

3. 0.34, 0.27, 0.11, 0.45, 0.32, 0.29, 0.32

4. 62.0, 62.8, 62.1, 62.8, 62.2, 62.3, 62.4, 62.8

5. 34, 101, 255, 87, 66, 75, 222

6. 11.2, 67.1, 8.5, 30.0, 44.4, 56.3, 38.8, 3.7

7. Compare your mean test scores for your science and math classes.

Science: 88, 96, 93, 99   Math: 91, 92, 96

8. The body temperatures (in degrees Fahrenheit) of some students are shown.

   a. Which data value is an outlier? Explain.

   b. Find the mean with and without the outlier. Then describe how the outlier affects the mean.

   c. Describe a situation that could have caused the outlier in the problem.

9. The table shows the radii of the four planets closest to the Sun. Estimate the mean radius. Explain your method. Then find the actual mean.

Planet	Radius (km)
Mercury	2439
Venus	6052
Earth	6378
Mars	3398

10. The table shows the radii of the five best-known objects in the outer solar system.

   a. Which data value is an outlier? Explain.

   b. Find the mean with and without the outlier. Describe how the outlier affects the mean.

   c. Look up information about the outer solar system. Based on how the five objects are classified, do you think that an average of the data has more meaning *with* the outlier or *without* it? Explain your reasoning.

Object	Radius (km)
Jupiter	71,492
Saturn	60,268
Uranus	25,559
Neptune	24,764
Pluto	1151

11. There are six boys and six girls in a class. The mean height of the girls is 59 inches and the mean height of the boys is 60 inches. One of the boys is 72 inches tall. Is the mean height of the other five boys greater than the mean height of the six girls? Explain.

Name_____ Date _____

9.2 Enrichment and Extension

Which Class Wins a Prize?

Students in three classes are collecting food to donate to charity. The number of pounds of food each student collected is shown in a table.

Mrs. Rodriguez's Class									
4.2	0	1.7	3.0	14.0	2.8	0	27.7	4.3	9.3
2.5	2.1	0	7.0	52.8	0	15.5	29.5	0	1.3
7.2	6.6	44.2	0	25.8	9.0	0	9.5		

Mr. Woo's Class									
2.6	0.7	0	3.8	10.5	50.0	14.2	8.5	0	6.3
7.5	1.8	0	14.3	0	0	43.1	57.5	12.8	78.1
0	22.8	5.5	0						

Mrs. Smith's Class									
2.6	11.5	1.6	14.2	30.3	7.2	3.6	0	10.2	15.2
9.8	0	20.2	3.2	11.4	23.5	4.5	18.4	8.2	48.6
18.6	10.0	6.3	10.2	0	1.5	13.5	4.0	22.9	10.8

1. Find the number of pounds of food collected for each class. The class with the greatest number of pounds of food collected wins one week of free lunches. Which class wins?

2. Find the mean number of pounds of food collected per student for each class. The class with the greatest mean number of pounds of food collected per student wins free yearbooks. Which class wins?

3. Each class also collected the amount of money shown in the table. The money buys 5-pound bags of potatoes for $2.50 each.

Mrs. Rodriguez's Class	$120
Mr. Woo's Class	$80
Mrs. Smith's Class	$65

   a. Add the weights of the potatoes to the food collection totals for each class.

   b. Do the winners in Exercises 1 and 2 change if the potatoes are included in the calculations? Explain.

Name _____ Date _____

9.2 Puzzle Time

What Is Really Easy To Get Into, But Really Hard To Get Out Of?

Write the letter of each answer in the box containing the exercise number.

Find the mean of the data.

1.

Number of Text Messages Per Day	
Jill	22
Dylan	15
Bill	18
Bella	20
Drew	10

2.

Number of Cats Owned	
Louise	|||
Ted	||
Mark	||
Alexis	|

3.

Number of TVs in Home	
Spencer	□□□□□
Megan	□□□□
Tyler	□□□
Ann	□□
Beth	□□□□□
Ashley	□□□□
Mike	□□□□□

4.

Number of Visits to the Stadium	Matt	Brady	Olivia	Ellie	Riley	Noah	Sam
	○○○○	○○	○○○○○	○○○	○○	○	○○○○

5. 12, 15, 18, 22, 25, 28

6. 2.6, 2.9, 3.2, 4.2, 5.6

Find the outlier of the data.

7. 60, 55, 65, 8, 57, 62

8. 2, 2, 3, 3, 4, 32

9. 11, 13, 13, 15, 15, 76

10. 18, 17, 1, 15, 19, 23

8	2	3		7	5	6	1	10	4	9

Activity 9.3 **Start Thinking!**
For use before Activity 9.3

Record the age of everyone in your class (including your teacher).

Then find the mean.

Is the mean a good representation of the average age of the people in your class? Explain.

Activity 9.3 **Warm Up**
For use before Activity 9.3

Find the mean of the numbers.

1. 5, 6, 2, 8, 3, 6

2. 12, 16, 16, 28, 50

3. 63, 68, 45, 13, 68, 31

4. 38, 2, 8, 45, 78, 23, 23

5. 80, 81, 82, 83, 84, 85, 86, 87

6. 4, 7, 12, 46, 12, 26, 18, 3

The **mode** of a data set is the value that occurs most often.

Do you think it is possible for a set of data to have no mode? If so, give an example. If not, explain why not.

Do you think it is possible for a set of data to have more than one mode? If so, give an example. If not, explain why not.

Use grid paper to find the median of the data.

1. 48, 49, 37, 41, 43, 44, 46

2. 18, 35, 46, 234, 65, 34

3. 14, 11, 10, 14, 15, 13, 14, 17

4. 6, 6, 6, 4, 5, 7, 6, 7

Name_____ Date _____

9.3 Practice A

Find the median and mode(s) of the data.

1. 1, 3, 5, 6, 7, 9, 11

2. 2, 2, 6, 8, 10, 14

3. 12, 15, 10, 12, 21, 9, 12

4. 15, 22, 21, 22, 12, 16

5. 52, 61, 56, 55, 72, 64

6. 71, 51, 37, 44, 50, 49, 55

7. 91, 96, 89, 97, 89, 98, 94, 93

8. 55, 60, 60, 40, 60, 75, 40, 25

9. Describe and correct the error in finding the median and mode of the data.

data: 25, 28, 24, 22, 27, 24, 29, 26

ordered data: 22, 24, 25, 26, 27, 28, 29

The median is 26.
There is no mode.

Find the mode(s) of the data.

10.

Breeds of Dogs in a Pet Hotel		
lab	poodle	beagle
schnauzer	lab	pug
pit bull	boxer	pit bull
beagle	akita	poodle
boxer	pit bull	lab

11.

Students' Initials				
TC	AT	RC	CC	LD
DT	LB	TR	SS	TL
JG	RL	JC	MB	GR
FM	MS	DR	BB	JT
RG	PS	MJ	WS	FC

Find the mean, median, and mode(s) of the data. Choose the measure that best represents the data. Explain your reasoning.

12. 6, 35, 8, 20, 6, 16, 7

13. 66, 57, 66, 16, 2, 35, 66, 114

14. You sent the same email message to 10 of your friends. The numbers of hours it took them to reply were 1, 1, 1, 2, 2, 3, 4, 5, 5, and 25.

 a. Find the mean, median, and mode of the data.

 b. Which measure best represents the data? Explain your reasoning.

 c. Which data value is an outlier? Explain your answer.

 d. Predict how the mean, median, and mode would change if you omit the outlier in the data list.

Name _____ Date _____

Find the mean, median, and mode(s) of the data. Choose the measure that best represents the data. Explain your reasoning.

1. 83, 68, 56, 100, 78, 94, 74

2. 55, 65, 49, 22, 56, 65, 61, 57

3. 104, 128, 72, 73, 75, 73, 119

4. 20.1, 13.4, 9.8, 21.3, 20.8, 19.1, 68.1, 22.6

Find the mean, median, and mode(s) of the data with and without the outlier. Describe the effect of the outlier on the measures of central tendency.

5. 72, 75, 26, 65, 72, 67, 71

6. 70, 85, 150, 70, 85, 65, 65, 85

Find the mean, median, and mode(s) of the data.

7. 0.39, 0.52, 0.30, 0.33, 0.44, 0.42

8. 2.4, 1.6, 1.2, 2.4, 2.7, 1.9, 2.5, 2.1

9. $\frac{1}{3}, \frac{1}{2}, \frac{1}{6}, \frac{2}{3}, \frac{5}{6}, \frac{1}{2}$

10. $4\frac{1}{8}, 2\frac{1}{4}, 4\frac{3}{4}, 1\frac{1}{4}, 3\frac{1}{2}, 3\frac{5}{8}, 4\frac{1}{8}, 2\frac{3}{8}$

Find the mode(s) of the data.

11. A, B, D, C, D, B, A, B, C, B, A

12. X, Y, X, X, Y, Y, Y, X, X, Y, X, Y, X

13. A punter's first four punts in a football game are shown. After a fifth punt, the punter's mean was 30 yards. How long was the fifth punt? Explain how you found your answer.
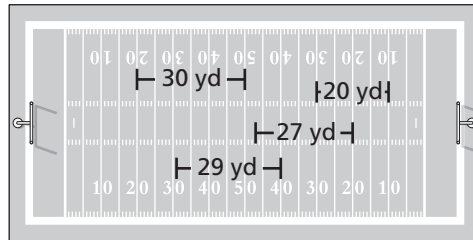
14. Each of five children picks out a birthday present for their mother. They share the total cost of the gifts equally.

    a. Find the mean, median, and mode.

    b. Which measure best represents the typical price of a gift? Explain.

    c. Which measure best represents each child's share of the cost? Explain.

Gift prices
$9.95
$10.25
$9.80
$9.95
$24.95

9.3 Enrichment and Extension

Using Measures of Central Tendency

1. The mean age of a family of five is 22 years. The median is 13, the mode is 42, and the range is 39 years.

   a. Find the ages of the five family members.

   b. Will the range of the ages always be the same throughout any given year? Explain.

2. The mean age of a family of seven is 23 years. The median is 16, the modes are 12 and 45, and the range is 35 years.

   a. Find the ages of the seven family members.

   b. Give a scenario that would result in the two given modes.

3. A fish and wildlife conservation release three bald eagles that have been rehabilitated. Before release, they measure the wingspan (in feet) and weight (in pounds) of each eagle.

   - The mean of the wingspans is $6\frac{1}{4}$ feet, the median is 6, and the range is $1\frac{3}{4}$ feet.

   - The mean of the weights is 12.75 pounds, the median is 12.75, and the range is 5 pounds.

   a. What are the wingspans of the three bald eagles?

   b. What are the weights of the three bald eagles?

   c. How do you think you would complete the table that shows the wingspan and weight for each bald eagle? Explain.

	Wingspan (feet)	Weight (pounds)
Bald Eagle 1		
Bald Eagle 2		
Bald Eagle 3		

9.3 Puzzle Time

What Should Always Go Up When The Rain Is Pouring Down?

Write the letter of each answer in the box containing the exercise number.

Find the mean, median, and mode(s) of the data.

1. 4, 6, 8, 10, 12, 4, 12

2. 13, 18, 15, 12, 15, 17

3. 94, 82, 95, 72, 90, 92, 95, 100

4. 43, 12, 35, 51, 18, 26, 32

5. 14, 35, 20, 30, 31, 14, 19, 6, 2

6. 50, 39, 35, 50, 44, 39, 53, 66

Find the mode of the data.

7.

Favorite Sport	
Soccer	Gymnastics
Baseball	Baseball
Swimming	Soccer
Football	Gymnastics
Gymnastics	Basketball
Golf	Lacrosse
Basketball	Golf
Hockey	Football

8.

Favorite Food	
Pizza	Pizza
Cheeseburger	Spaghetti
Apples	Cheeseburger
Spaghetti	Pizza
Hot dog	Spaghetti
Pizza	Apples
Cheeseburger	Hot dog

Answers
U. 19, 19, 1
F. Soccer
T. Apples
R. 15, 15, 15
P. Spaghetti
L. Gymnastics
A. 31, 32, none
B. 8, 8, 4, and 12
W. Football
L. 47, 47, 39 and 50
M. 90, 93, 95
E. Pizza

5	3	1	2	8	7	6	4

Activity 9.4

Start Thinking!

For use before Activity 9.4

Explain to a partner how to find the mean, median, and mode of the data set.

$$20, 21, 19, 19, 21, 21, 20, 18, 21$$

Activity 9.4

Warm Up

For use before Activity 9.4

Find the mean, median, and mode(s) of the data.

1. 7, 11, 6, 13, 5, 8, 13

2. 19, 23, 18, 25, 26, 21

3. 47, 40, 49, 42, 42, 35, 40, 49

4. 88, 76, 83, 84, 91, 85, 67

Start Thinking!
For use before Lesson 9.4

Make a dot plot of each data set. Identify
the data set that is the least spread out
and the data set that is the most spread out.

Set 1: 98, 93, 92, 99, 100

Set 2: 75, 87, 92, 92, 74

Set 3: 88, 89, 91, 92, 90

Warm Up
For use before Lesson 9.4

**Use grid paper to find the median of the
data. Then find the median of the lower half
and the median of the upper half of the data.
Describe the spread of the data.**

1. 10, 12, 17, 11, 18, 11, 13

2. 23, 34, 21, 30, 30, 26, 28

3. 54, 52, 55, 54, 55, 53, 56

4. 98, 95, 75, 87, 93, 90, 88

Name_____ Date _____

9.4 Practice A

Find the range of the data.

1. 34, 31, 35, 36, 27, 33

2. 76, 78, 76, 79, 81, 85, 92

3. Describe and correct the error in finding the range of the data.

> ✗ 3, 7, 12, 8, 30, 16, 24
>
> The range is $24 - 3 = 21$.

Find the median, first quartile, third quartile, and interquartile range of the data.

4. 23, 33, 25, 16, 27, 43, 29, 40, 35

5. 52, 63, 55, 56, 62, 54, 59, 60, 53, 61, 88

6. 73, 83, 72, 81, 77, 74, 89, 50, 75, 84

7. 106, 117, 127, 125, 118, 107, 123, 105, 136

8. Use the interquartile range to identify any outliers in Exercises 4–7.

9. The table shows the swim times for swimmers in the final heat.

a. Find and interpret the range of the swim times.

b. Find and interpret the interquartile range of the swim times.

Swim Times (seconds)			
24.7	23	27.9	25.1
24	23.8	24.5	25
23.9	24.1	23.5	23.2

10. The table shows the ages of automobiles in the parking lot.

a. The range of the ages is 12 years. Find the missing age.

b. Find and interpret the interquartile range.

c. Another automobile enters the parking lot. The range and interquartile range of the automobiles does not change. Find a possible age of the new automobile.

Age of Automobile (years)			
5	3	1	8
10	6	9	?

Name _____ Date _____

Find the range of the data.

1. 63, 71, 65, 66, 87, 53

2. 16, 28, 6, 19, 21, 15, 22, 33, 17

3. 143, 121, 135, 126, 107, 133

4. 2.1, 8.2, 1.6, 3.9, 4.3, 5.5, 7.2, 1.1

Find the median, first quartile, third quartile, and interquartile range of the data.

5. 32, 53, 72, 66, 47, 54, 49, 67, 71

6. 142, 126, 145, 156, 132, 154, 149, 160, 153

7. 203, 183, 212, 181, 157, 204, 189, 190

8. 1.6, 3.7, 2.7, 9.1, 4.8, 5.7, 2.6, 8.6, 1.3, 9.9

9. Use the interquartile range to identify any outliers in Exercises 5–8.

10. The table shows the water level at the dock over a 12-hour period.

   a. Find and interpret the range of the water levels.

   b. Find and interpret the interquartile range of the water levels.

Water Level (feet)			
$3\frac{1}{4}$	$3\frac{3}{4}$	4	$4\frac{3}{4}$
$4\frac{1}{2}$	$4\frac{1}{4}$	$3\frac{1}{2}$	$3\frac{1}{4}$
3	$2\frac{3}{4}$	$2\frac{1}{4}$	2

11. The table shows the points earned by the contestants in a competition.

   a. Find and interpret the range of the points earned.

Points Earned			
15	12	17	8
21	20	6	9

   b. Find and interpret the interquartile range of the points earned.

   c. The second table shows the points earned by the contestants after 5 bonus points were awarded to each contestant. Find the range and interquartile range of the points earned after the bonus.

Points Earned After Bonus			
20	17	22	13
26	25	11	14

   d. If 2 more bonus points were added to each contestant, what would be the range and interquartile range of the points earned after the new bonus? Explain.

12. Create a set of data with 6 values that has a mode of 5, a median of 9, a range of 22, and an interquartile range of 10.

Name_____ Date _____

Showing Interquartile Range

The first and third quartile, and the median can be plotted on a number line to show where each equal part of the data lies. This method allows you to see how spread out or condensed the data is.

Example: Find the median, first quartile, and third quartile of the data shown. Then plot each on a number line.

$$4, 5, 3, 6, 5, 23$$

$\cancel{3}, \cancel{4}, 5, 5, \cancel{6}, \cancel{23}$ Arrange to find the median $= 5$.

Lower Half: 3, 4, 5 $Q_1 = 4$

Upper Half: 5, 6, 23 $Q_3 = 6$

Plot each on a number line to see the interquartile range.

Find the median, first quartile, and third quartile of the data. Then plot each on a number line and find the interquartile range.

   1. 158, 151, 166, 150, 161, 155, 156, 161, 159, 162

   2. 80, 62, 75, 80, 78, 66, 85

   3. 15, 15, 15, 15, 15, 15, 16, 15, 16

   4. 10, 13, 15, 14

   5. 201, 209, 191, 200, 200, 194, 206, 199

   6. 201, 19, 401, 1, 389, 11, 199, 381

9.4 Puzzle Time

How Is The Snail Housing Market?

Write the letter of each answer in the box containing the exercise number.

The table shows the number of minutes sixth-graders spend reading per night.

1. Find the range of the data.

2. Find the median of the data.

3. Find the first quartile of the data.

4. Find the third quartile of the data.

5. Find the interquartile range of the data.

6. Does this set of data contain any outlier(s)? If yes, what is the outlier?

Minutes				
36	12	26	20	31
30	19	34	10	24

The table shows the number of players on the different football teams in the surrounding area.

7. Find the range of the data.

8. Find the median of the data.

9. Find the first quartile of the data.

10. Find the third quartile of the data.

11. Find the interquartile range of the data.

12. Does this set of data contain any outlier(s)? If yes, what is the outlier?

Players					
24	37	16	32	39	24
20	35	62	24	40	26

Answers

S. 19

B. 62

I. 12

U. 38

L. 29

A. 25

H. 46

G. 31

S. No

I. 26

T. 24

G. 14

2		12	5	9		6	8	10	11	4	1	3	7

Activity 9.5 **Start Thinking!**
For use before Activity 9.5

Peter says the range of the data is 10. Annie says the range is 12. Who is correct? Explain your answer.

22, 19, 12, 10, 15, 17, 21, 12

Activity 9.5 **Warm Up**
For use before Activity 9.5

Find the range of the data.

1. 20, 34, 21, 33, 28, 25, 22

2. 4, 2, 5, 7, 8, 2, 4, 8, 3

3. 36, 32, 33, 34, 32, 31, 33

4. 89, 92, 80, 100, 96, 87, 92

5. 56, 52, 54, 49, 48, 51, 50

6. 67, 65, 60, 64, 72, 70, 59

Start Thinking!
For use before Lesson 9.5

Find the mean of the data below. Then make a dot plot of the data.

34, 32, 38, 39, 42, 32, 35

Which value deviates the most from the mean? Which value deviates the least from the mean? Explain how you found your answers.

Lesson 9.5

Warm Up
For use before Lesson 9.5

Find the average distance each data value in the set is from the mean. Round your answer to the nearest tenth, if necessary.

1. Prices of video games online: $50, $20, $30, $40, $20, $50, $40, $30

2. Birth years of kids in a family: 2001, 2003, 2006, 2008, 2012

3. Test scores of 6 students: 83, 88, 95, 91, 93, 84

9.5 Practice A

Find the average distance each data value in the set is from the mean. Round your answer to the nearest tenth, if necessary.

1. Numbers of houses on a street: 12, 8, 9, 11, 10

2. Years of birth: 1958, 2001, 1989, 1995, 1986, 2002

Find and interpret the mean absolute deviation of the data. Round your answer to the nearest tenth, if necessary.

3.

Weights of Bookbags (pounds)			
12	15	9	10
7	8	13	14

4.

Numbers of Fish in the Aquarium			
14	23	30	17
24	20	21	19

5.

Numbers of Pages in a Book			
186	205	192	189
226	212	198	200

6.

Gallons of Gas in Container			
4.8	3.4	5	3.5
4.2	2.6	4.3	2.6

7. The table shows the number of lawns mowed each day of the week. Find and interpret the range, interquartile range, and mean absolute deviation of the data. Round your answer to the nearest tenth, if necessary.

Lawns Mowed				
5	7	10	9	6

Which data set do you think would have the greater mean absolute deviation? Explain your reasoning.

8. numbers of bicycles parked in a garage

   numbers of bicycles parked at a school

9. the number of miles driven each day

   the number of miles walked each day

Name _____ Date _____

Find the average distance each data value in the set is from the mean. Round your answer to the nearest tenth, if necessary.

1. Numbers of marbles in a bag: 25, 42, 61, 33, 45, 50, 34, 42

2. Square footages of homes: 2052, 1250, 2200, 1856, 1442

Find and interpret the mean absolute deviation of the data. Round your answer to the nearest tenth, if necessary.

3.

Numbers of Squares in a Quilt			
8	20	16	12
24	18	32	30

4.

Numbers of Desks in a Classroom			
25	25	25	25
25	25	25	25

5.

Heights of Bleachers (feet)			
110	105.4	97.8	100
98.6	112.5	104.6	99.1

6.

Weights of Wrestlers (pounds)			
131.4	130.7	131.2	131.8
130.6	131.9	130.1	129.5

7. The data shows the prices of five shirts and five pairs of pants.

   Shirts: $15, $21, $18, $19, $24

   Pants: $25, $32, $40, $36, $29

   Find the MAD of each data set. Then compare their variations.

8. Add or subtract the MAD from the mean in the data set in Exercise 5.

   a. What percent of the values are within one MAD of the mean?

   b. What percent of the values are within two MADs of the mean?

   c. Find the range and interquartile range for the data set. Use these values to give a possible explanation for the answer to part (b).

Name_____ Date_____

9.5 Enrichment and Extension

Median Absolute Deviation

Finding the median absolute deviation of a set of data is similar to finding the mean absolute deviation.

Example: Find the median absolute deviation of the set of data.

$$1, 1, 2, 3, 3, 4, 5, 5$$

Follow the same method for finding the mean absolute deviation, but substitute the Median for the Mean.

1̸, 1̸, 2̸, 3, 3, 4̸, 5̸, 5̸   Step 1: Median = 3

2, 3, 1, 0, 0, 1, 2, 2   Step 2: Find the distance between each data value
                                        and the median.

0̸, 0̸, 1̸, 1, 2, 2̸, 2̸, 3̸
$\dfrac{1 + 2}{2} = 1.5$ Step 3: Find the median of the values found in Step 2.
                                        Median = 1.5

Find the median absolute deviation for each set of data and compare it to the mean absolute deviation. Round to the nearest tenth if necessary.

   1. 3, 1, 4, 3, 15

   2. 7, 9, 7, 8, 8, 4, 5, 6

   3. 57, 77, 91

   4. 2, 2, 3, 5, 9, 8, 11, 4

   5. 1, 2, 5, 3, 0, 1, 4, 8, 2, 6, 1

   6. 0, 1, 1, 50, 10

   7. Review the answers calculated in Exercises 1−6. Do you think the mean absolute deviation is more useful than the median absolute deviation? Explain.

9.5 Puzzle Time

How Do You Measure Poison Ivy?

Write the letter of each answer in the box containing the exercise number.

Use the tables to find the mean and the MAD.

1. Find the mean of the data.

2. Find the mean absolute deviation of the data.

Number of Strikes During a Bowling Game			
3	2	6	9
2	7	3	0

3. Find the mean of the data.

4. Find the mean absolute deviation of the data.

Scores on a Test (percent)				
63	70	95	88	84
59	76	92	63	90

5. Find the mean of the data.

6. Find the mean absolute deviation of the data.

Number of Library Patrons			
124	120	140	165
147	156	141	207

7. Find the mean of the data.

8. Find the mean absolute deviation of the data.

Prices of Skateboards (dollars)					
44	63	24	99	58	36

Answers

Y. $19\frac{1}{3}$

H. 78

C. $19\frac{1}{2}$

I. 4

S. 11.8

T. 54

E. 2.5

B. 150

5	8		1	7	6	3	2	4

Name_____ Date _____

Technology Connection

For use after Section 9.4

Using Spreadsheet Formulas

Most spreadsheet applications contain built-in programs called formulas that allow you to quickly perform complicated calculations. When using a formula in a spreadsheet, you are able to quickly find and interpret the results instead of spending your time performing calculations.

EXAMPLE Use spreadsheet formulas to find the mean, median, mode, and mean absolute deviation for the following set of data:

83, 94, 76, 98, 89, 72, 89, 90, 85, 86, 79

SOLUTION

Step 1 Enter the list of data in cells A1 through A11 in your spreadsheet.

Step 2 To find the mean, in cell B1 type: =AVERAGE(A1:A11) and then press Enter. The mean is 85.55.

Step 3 To find the median, in cell B2 type: =MEDIAN(A1:A11) and then press Enter. The median is 86.

Step 4 To find the mode, in Cell B3 type: =MODE(A1:A11) and then press Enter. The mode is 89.

Step 5 To find the mean absolute deviation, in cell B4 type: =AVEDEV(A1:A11) and then press Enter. The MAD is 5.95.

Use a spreadsheet program and formulas to find the mean, median, mode, and mean absolute deviation of the data.

1. The table below lists the monthly average high temperatures (in degrees Fahrenheit) for San Diego, California, and Denver, Colorado.

Month	J	F	M	A	M	J	J	A	S	O	N	D
San Diego, CA	65	66	66	68	69	71	76	78	77	75	70	66
Denver, CO	43	47	51	61	71	82	88	86	78	67	52	40