Name_____ Date _____

Fair Game Review

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

1. 1.5, 4.5, 5, 2.5, 1, 3

2. 6, 3.5, 4, 5.5, 7.5, 4.5

3. 5.25, 6, 3.5, 5, 6.25, 4.25

4. 4.75, 6.5, 7, 7.75, 5.5, 3

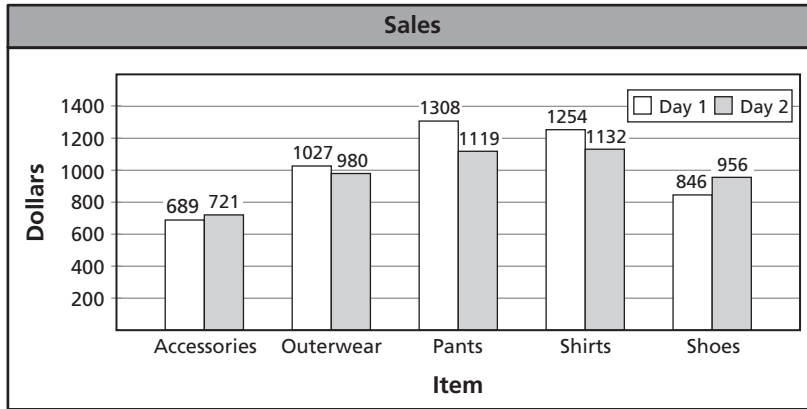**5.** 3.25, 5.75, 4.5, 3.75, 4.25, 6.5

6. 3.75, 1.5, 4.75, 1.25, 2.25, 3.5

Chapter 9

Fair Game Review (continued)

In Exercises 7–9, use the double bar graph that shows the sales of a clothing store over two days.

Sales

7. How much more did the store earn selling shirts on Day 1 than on Day 2?

8. Which item had the largest change in sales?

9. Which item had the highest sales total for the two days?

Name_____ Date _____

9.1 Introduction to Statistics
For use with Activity 9.1

Essential Question How can you tell whether a question is a statistical question?

1 **ACTIVITY:** Using Data to Answer Questions

Work with a partner.

a. Find your pulse by counting the number of beats in 10 seconds. Have your partner keep track of the time. Write a rate to describe your result.

b. Complete the ratio table. What is your heart rate in beats per minute?

Time (seconds)	10	30	60
Number of beats			

c. Collect the recorded heart rates (in beats per minute) of the students in your class, including yourself. Compare the heart rates.

d. **MODELING** Make a *line plot* of your data. Then answer the following questions:

- How many values are in your data set?

- Do the heart rates *cluster* around a particular value or values?

- Are there any *peaks* or *gaps* in the data?

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Record and Practice Journal

9.1 **Introduction to Statistics** (continued)

- Are there any unusual heart rates that are far removed from the other values?

e. **REASONING** How would you answer the following question by using only one value? Explain your reasoning.

"What is the heart rate of sixth grade students?"

f. **REASONING** Read and compare the following questions. How did you answer each question? Could the answer be the same for both questions? Explain.

- *What is your heart rate?*
- *What is the heart rate of sixth grade students?*

2 **ACTIVITY: Identifying Types of Questions**

Work with a partner.

a. Answer each question below on your own. Then compare your answers with your partner's answers. For which questions should your answers be the same? For which questions might your answers be different?

1. What is your shoe size?

2. How many states are in the United States?

3. How many brothers and sisters do you have?

4. How many U.S. presidents have been in office?

5. What is your favorite type of movie?

6. How tall are you?

9.1 **Introduction to Statistics** (continued)

    b. CONJECTURE Some of the questions on the previous page are considered *statistical* questions. Which ones do you think they are? Why?

3 **ACTIVITY:** Analyzing a Question in a Survey

Work with a partner. A student asks the following question in a survey:

"Do you prefer salty potato chips or healthy granola bars to be sold in the school's vending machines?"

    a. Do you think this is a fair question to ask in a survey? Explain.

    b. LOGIC Identify the words in the question that may influence someone's response. Then explain how you can reword the question.

    c. How might the results of the survey differ when the student asks the original question and your reworded question in part (b)?

What Is Your Answer?

    4. REASONING What do you think "statistics" means?

    5. IN YOUR OWN WORDS How can you tell whether a question is a statistical question? Give examples to support your explanation.

    6. Find the least and the greatest heart rates in your class. How can you use these two values to answer the question in Activity 1(e)?

    7. Create a one-question survey. Explain why your question is a statistical question. Then conduct your survey and organize your results in a line plot. Make three observations about your data set.

Name _____ Date _____

Practice
For use after Lesson 9.1

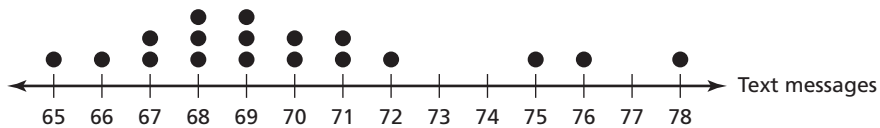**Tell whether the question is a statistical question. Explain.**

1. How many songs are on your MP3 player?

2. How many feet are in 1 yard?

3. What is the name of your favorite movie?

4. How many sixth graders attend your school?

5. The dot plot shows the numbers of text messages received by students over the weekend.

   a. How many students 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.

Name_____ Date_____

9.2 Mean
For use with Activity 9.2

**Essential Question** How can you find an average value of a data set?

1 ACTIVITY: Finding a Balance Point

Work with a partner. Discuss the distribution of the data. Where on the number line do you think the data set is *balanced*? Is this a good representation of the average? Explain.
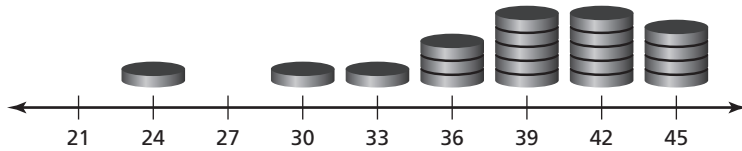
a. number of quarters brought to a batting cage
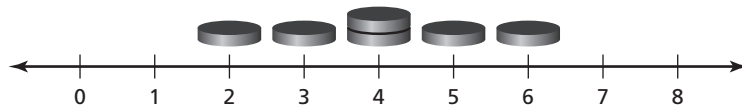
b. annual income of recent graduates (in thousands of dollars)
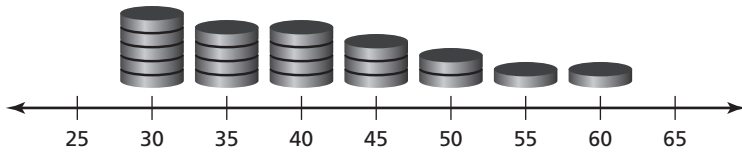
c. hybrid fuel economy (miles per gallon)

Name _____ Date _____

2   ACTIVITY: Finding a Fair Share

Work with a partner. It costs $0.25 to hit 12 baseballs in a batting cage. The table shows the numbers of quarters six friends bring to the batting cage. They want to group the quarters so that everyone has the same amount.

Quarters					
John	Lisa	Miguel	Matt	Cheryl	Jean
6	3	4	5	2	4

Use counters to represent each number in the table. How can you use the counters to determine how many times each friend can use the batting cage? Explain how this procedure results in a "fair share."

3   ACTIVITY: Finding an Average

Work with a partner. Use the information in Activity 2.

   a. What is the total number of quarters the group of friends brought to the batting cage?

   b. **REASONING** How can you use math to find the average number of quarters that each friend brought to the batting cage? Find the average number of quarters. Why do you think this average represents a fair share?

4   ACTIVITY: Answering a Statistical Question

Work with a partner. The table shows the numbers of quarters several people bring to a batting cage. You want to answer the question:

"How many quarters do people bring to the batting cage?"

   a. Explain why this question is a statistical question.

Quarters			
6	8	8	12
8	12	8	4
8	6	6	10
7	10	7	8

Name_____ Date _____

b. MODELING Make a dot plot of the data. Use the distribution of the data to answer the question. Explain your reasoning.

← | | | | | | | | | | | | | | | | | | | | | | | | | →

c. REASONING Use an average to answer the question. Explain your reasoning.

What Is Your Answer?

5. **IN YOUR OWN WORDS** How can you find an average value of a data set?

6. Give two real-life examples of averages.

7. Explain what it means to say the average of a data set is the point on a number line where the data set is balanced.

8. There are 5 students in the cartoon. Four of the students are 66 inches tall. One is 96 inches tall.

   a. How do you think the students decided their average height is 6 feet?

   "Yup, the average height in our class is 6 feet."

   b. Does a height of 6 feet seem like a good representation of the average height of the 5 students? Explain why or why not.

Name _____ Date _____

Find the mean of the data.

1. Emails sent in the last 4 hours:

   2, 5, 4, 5

2. Magazine subscriptions sold this week:

   3, 6, 7, 6, 7, 9, 11

3.

Books Brought Home	
Monday	|
Tuesday	|||
Wednesday	||||
Thursday	||||
Friday	|

4. The table shows the number of points scored by your team in each quarter of a football game. What is the mean number of points scored in a quarter?

Quarter	1	2	3	4
Points	3	14	10	0

Name_____ Date _____

Essential Question   In what other ways can you describe an average of a data set?

1 **ACTIVITY:** Finding a Median

Work with a partner.

   a. Write the total number of letters in the first and last names of 19 celebrities, historical figures, or people you know. Organize your data in a table. One person is already listed for you.

Person	Number of letters in first and last name
Abraham Lincoln	14

   b. Order the values in your data set from least to greatest. Then write the data on a strip of grid paper with 19 boxes.

   c. Place a finger on the square at each end of the strip. Move your fingers toward the center of the ordered data set until your fingers touch. On what value do your fingers touch?

   d. Now take your strip of grid paper and fold it in half. On what number is the crease? What do you notice? This value is called the *median*. How would you describe to another student what the median of a data set represents?

   e. How many values are greater than the median? How many are less than the median?

Name _____ Date _____

   f. Why do you think the median is considered an average of a data set?

2 **ACTIVITY:** Adding a Value to a Data Set

Work with a partner.

   a. How many total letters are in your first name and last name? Add this value to the ordered data set in Activity 1. How many values are now in your data set?

   b. Write the ordered data, including your new value from part (a), on a strip of grid paper.

   c. Repeat parts (c) and (d) from Activity 1. Explain your findings. How do you think you can find the median of this data set?

   d. Compare the medians in Activities 1 and 2. Then answer the following questions. Explain your reasoning.

     • Do you think the median always has to be a value in the data set?

     • Do you think the median always has to be a whole number?

3 **ACTIVITY:** Finding a Mode

Work with a partner.

   a. Make a dot plot for the data set in Activity 2. Describe the distribution of the data.

9.3 **Measures of Center** (continued)

    b. Which value occurs most often in the data set? This value is called the
       mode.

    c. Do you think a data set can have no mode or more than one mode? Explain.

    d. Do you think the mode always has to be a value in the data set? Explain.

    e. Why do you think the mode is considered an average of a data set?

What Is Your Answer?

    4. **IN YOUR OWN WORDS** In what other ways can you describe an average
       of a data set?

    5. Find the mean of your data set in Activity 2. Then compare the mean,
       median, and mode. Is there one measure that you think best represents
       your data set? Explain your reasoning.

Name _____ Date _____

9.3 **Practice**
For use after Lesson 9.3

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

1. 3, 2, 3, 6, 7, 5, 9

2. 17, 21, 30, 17, 28, 21

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 center.

3. 4, 15, 6, 12, 68, 12

4. 0, 54, 62, 64, 55, 55, 54, 62

5. The data show your strokes for 18 holes of miniature golf.

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

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

Name_____ Date_____

9.4 Measures of Variation
For use with Activity 9.4

Essential Question How can you describe the spread of a data set?

Work with a partner. There are 24 students in your class. Your teacher makes the following statements:

- *"The exam scores range from 75% to 96%."*

- *"Most of the students received high scores."*

a. What do you think the first statement means? Explain.

b. In the first statement, is your teacher describing the center of the data set? If not, what do you think your teacher is describing?

c. What do you think the scores are for most of the students in the class? Explain your reasoning.

d. Use your teacher's statements to make a dot plot that can represent the distribution of the exam scores of the class.

2 **ACTIVITY:** Grouping Data

Work with a partner. The numbers of U.S. states visited by each student in a sixth grade class are shown.

Number of States Visited			
1	7	5	2
11	6	3	20
4	18	1	6
2	7	1	8
10	2	12	5
3	21		

a. Between what values do the data range?

b. Write the ordered data values on a strip of grid paper and fold it to find the median. How many values are greater than the median? How many are less than the median?

Name _____ Date _____

9.4 **Measures of Variation** (continued)

c. REPEATED REASONING Fold the strip in half again. On what values are the two new creases? What do you think these values represent?

d. Into how many parts did you divide the data set? How many data values are in each part?

e. Graph the median and the values you found in parts (a) and (c) on a number line. Are the distances the same between these points?

f. How can you use these values to describe the spread of the data?

3 ACTIVITY: Adding a Value to a Data Set

Work with a partner. A new student joins the class in Activity 2. The new student has visited 41 states.

**a.** Add this value to the ordered data set in Activity 2. Does your answer to part (a) change? Explain.

b. How does the distribution of the data change when this value is added? Explain your reasoning.

c. How does adding this value affect the values on your number line in part (e) of Activity 2?

Name_____ Date _____

4 **ACTIVITY:** Analyzing Data Sets

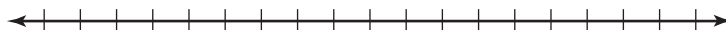**Work with a partner. Identify the data set that is the least spread out and the data set that is the most spread out. Explain your reasoning.**

a.

b.

c.

d.
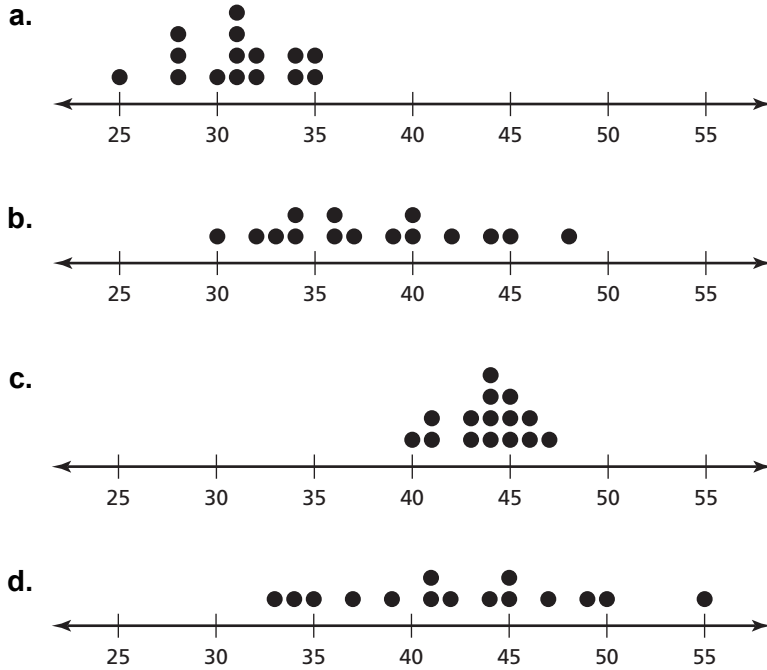
What Is Your Answer?

5. IN YOUR OWN WORDS How can you describe the spread of a data set?

6. Make a dot plot of the data set in Activity 2. Describe any similarities between the dot plot and the number line in part (e).

Name _____ Date _____

9.4 Practice
For use after Lesson 9.4

Find the range of the data.

1. 3, 1, 6, 10, 12, 2

2. 9, 13, 8, 7, 14, 16

3. 11, 17, 21, 23, 19, 16

4. 29, 37, 27, 28, 31, 33

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

5. 20, 12, 14, 22, 18, 21, 24, 15

6. 37, 28, 30, 40, 31, 27, 33, 42, 43

7. The table shows the number of song downloads a group of friends made on Saturday.

Numbers of Songs			
12	6	9	14
15	16	8	10

  a. Find and interpret the range of the numbers of song downloads.

  b. Find and interpret the interquartile range of the numbers of song downloads.

Name_____ Date _____

9.5 Mean Absolute Deviation
For use with Activity 9.5

Essential Question How can you use the distance between each data value and the mean of a data set to measure the spread of a data set?

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1 ACTIVITY: Finding Distances from the Mean

Work with a partner. The table shows the exam scores of 14 students in your class.

a. What is the mean exam score?

Exam Scores			
Ben	89	Mike	95
Emma	86	Hong	96
Jeremy	80	Rob	92
Pete	80	Amy	90
Ryan	96	Sue	76
Dan	94	Kim	84
Lucy	89	Heather	85

b. Make a dot plot of the data. Place an "X" on the number line to represent the mean.

←─┼─→

c. Is the number of exam scores that are greater than the mean equal to the number of exam scores that are less than the mean? Explain.

d. Which exam score *deviates* the most from the mean? Which exam score *deviates* the least from the mean? Explain how you found your answers.

e. Overall, do you think the exam scores are *close to* the mean or *far away* from the mean? Explain your reasoning.

9.5   **Mean Absolute Deviation** (continued)

2   **ACTIVITY:** Using Distances From the Mean

Work with a partner. Use the information in Activity 1.

   a. Complete the table below. Add rows if needed. Be sure to find the sum of the
   values in the last column of the table.

Student with Score *Less Than* the Mean	Exam Score	Distance from the Mean
	Sum:	

   b. Complete the table for students with scores greater than the mean.

Student with Score *Greater Than* the Mean	Exam Score	Distance from the Mean
	Sum:	

   c. **LOGIC** What do you notice about the sums you found in your tables? Why do
   you think this happens?

9.5 **Mean Absolute Deviation** (continued)

3 **ACTIVITY:** Interpreting Distances From the Mean

Work with a partner.

a. **LOGIC** Add the sums you found in your tables in Activity 2. Divide that amount by the total number of students. Round your result to the nearest tenth.

In your own words, what do you think this value represents?

b. **REASONING** In a data set, what do you think it means when the value you found in part (a) is close to 0? Explain.

What Is Your Answer?

4. **IN YOUR OWN WORDS** How can you use the distances between each data value and the mean of a data set to measure the spread of a data set?

5. **REASONING** Find the range and the interquartile range of the data set in Activity 1. What do you think it means when these values are close to 0? Explain.

Name _____ Date _____

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

1.

Price of Textbooks (dollars)				
78	99	90	80	55
56	102	88	60	42

2.

Numbers of Songs on an Album				
10	13	7	12	9
8	12	10	11	13

3.

Height of Plants (inches)				
1	7	10	5	3
3	6	12	9	4

4.

Numbers of Applications on a Smart Phone				
30	46	25	45	18
25	15	32	40	24

5. The data set shows the admission prices at several amusement parks.

$16, $25, $12, $20, $10, $25

Find and interpret the range, interquartile range, and mean absolute deviation of the data.