Unit 8 Parent Guide

Lesson 1—Making Sense of Data--Helpful Hints

*In today's lesson students will learn about numerical data and create their own questions that would result in numerical data. Students will also be introduced to ways to display and interpret numerical data. Some important vocabulary and examples of the big ideas from today's lesson are included below:

Numerical Data: numerical data involves numbers and quantities.

Example: What length of time does it takes each student to travel to school in the morning?
How many siblings does each student in class have?
What is the number of years each teacher in the school has been teaching?

All of these questions would provide us with numerical data. All of these questions would also provide us with a variety of answers.

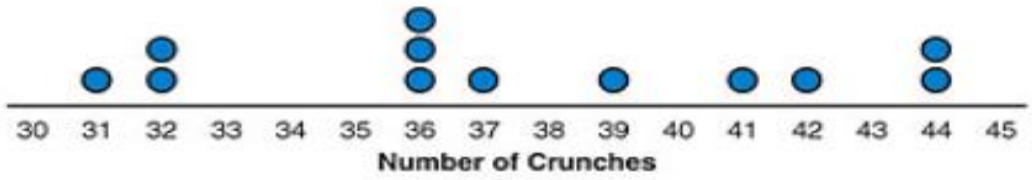
*Students used numerical data to analyze, compare and contrast and answer questions about the data points. Students did this by looking at tables and dot plots. Examples of these are shown below:

Dot Plot: a dot plot displays the frequency of numerical data. It uses dots to show how often numbers occur.

Ms. Jackson's Class	
Student	**Number of Crunches**
Lucas	36
Ava	32
Tyler	44
Alexis	36
Jada	37
Chase	41
Sabrina	39

Mr. Ryan's Class	
Student	**Number of Crunches**
Reyna	32
Julien	42
Lia	36
Omar	44
Jorge	31

A **dot plot** displays the frequency of numerical data.
It uses dots to show how often numbers occur.



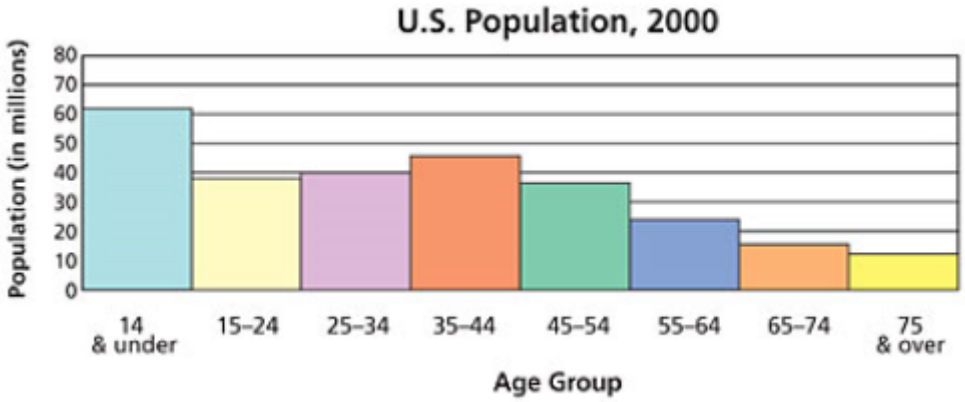
*Lesson 2—Dot Plots and Histograms--Helpful Hints

*Today's lesson allowed students additional practice with dot plots. Students also learned how to use, analyze and interpret histograms to represent numerical data. Examples are shown below:

Histogram: a histogram is a frequency display that uses bars to show the distribution of data in a set. The data points are presented in intervals. An **interval** is a range of numbers.

REMINDERS ABOUT HISTOGRAMS

*a histogram is used when you need to display a large set of data.
*the intervals are usually the same size or range
*the bars in a histogram touch so all the data in the set are included.
*the height of the histogram (y-axis) shows the frequency, or number of times that range of data occurs.
*the horizontal width (x-axis) shows the intervals into which the data are grouped.



Which age group has the least number of people?

Answer: 75 & over

Which age groups have nearly the same numbers of people?

Answer: 15-24, 25-34, and 45-54

What age group has about 15 million people?

Answer: 65-74

About how many people are 14 & under or 75 & older?

Answer: about 70 million

*On the lesson 2 homework assignment, students will need to create their own dot plot and histogram to represent the data points in a table. Use the "REMINDERS ABOUT HISTOGRAMS" section to assist your student with creating their own histogram. Also use the examples of dot plots shown in lesson 1 if your student needs support creating their own dot plot.

*Lesson 3—Making Data Groups Equal--Helpful Hints

*Today students will discuss how making data groups equal will help them to calculate the mean, or average, data point. Examples and reminders are below:

Mean: the mean is a measure of the center for a set of numerical data. It summarizes all of its values with a single number. Mean is also known as the "average" of a data set.

*students used the terms "leveling out" and "fair share" to also understand mean in today's lesson. If you think about the mean as leveling out all data points so that all data points are equal, you will also be able to identify the mean.

Example 1: Calculate the mean for the following data set.

Quiz Scores	
Student	Score (number correct)
Bill	6
Dani	7
Olivia	8
Jamaal	9
William	5
Shanika	8
Cora	6
Enrico	7

To find the mean, you must first **ADD ALL THE NUMBERS IN THE DATA SET** and then you will **DIVIDE BY THE AMOUNT OF DATA POINTS THERE ARE.**

So I will add up 6 + 7 + 8 + 9 + 5 + 8 + 6 + 7 = 56

Then I will divide 56 by 8 because there are 8 total student scores. 56 ÷ 8 = 7

The mean is 7. This means that the average of the 8 scores shown is 7.

*Lesson 4—Use the Mean--Helpful Hints

*Today, students will continue to work with the mean of a data set. Today students will use the mean to summarize and compare data. Students will work with real world problems and will use the mean to answer multi-step problems.

Example 1: In Mrs. Green's reading class, the mean of four quiz scores and a final test score determine the quarterly grade. During the first quarter, Kayla's four quiz scores were 92, 89, 87 and 95.

What is the sum of Kayla's four quiz scores?

Answer: Sum means to add so add up the four quiz scores. 92 + 89 + 87 + 95 = 363

What must the sum of Kayla's FIVE scores be for her to average 90 or more on all four quizzes and the test? Explain your thinking.

Answer: If you want the average of all 5 scores to be 90, then to find the sum of all five scores added together, you would just need to use repeated addition 90 + 90 + 90 + 90 + 90 =450 or take 90 x 5 = 450. The sum would need to be 450 if you wanted the average to be 90 because 450 ÷ 5 is 90.

What is the minimum score Kayla must earn on the final test to have an average score of at least 90 for the quarter?

Answer: Kayla must score an 87 on her final test in order to have an average score of 90. I know this because to have an average score of 90 Kayla's five scores must add up to a sum of 450. The sum of her first four scores was 363. So the difference between 450 and 363 is 87 (450- 363 = 87)

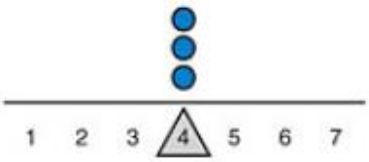
*Homework Hint: For number 2 and 3 of the lesson 4 homework assignment, it is very important that students read and understand that the two schools have a different amount of classes. This information must be included when finding the mean amount of students

*Lesson 5—The Mean as a Balance Point--Helpful Hints

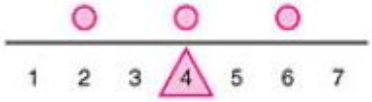
*Today students will use what they have learned about calculating and analyzing the mean and apply it to determining the mean when using a dot plot. Students will also learn that the mean is considered the "balance point" of a dot plot. Examples are shown from today's lesson below:

Draw a dot plot to show the new arrangement of dots.

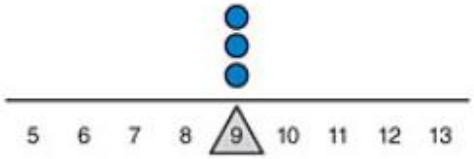
1. Move one dot to the left and move one dot to the right so the balance point remains the same.



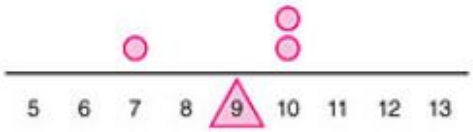
Sample answer:



2. Move all of the dots so the balance point remains the same.



Sample answer:



Explanation:

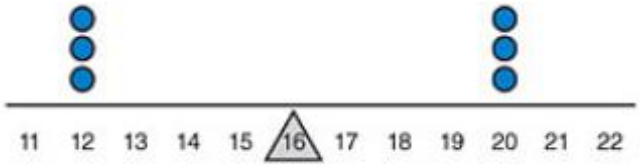
In number 1, the balance point remains the same in the sample answer because each dot that was moved, was moved the same amount of spaces in opposite directions. So the balance point remains at 4.

In Number 2, the balance point remains the same in the sample answer because 2 of the dots were moved one space and one dot was moved two spaces. So the balance point remains at 9. Students could also check this by calculating the mean of the data set.

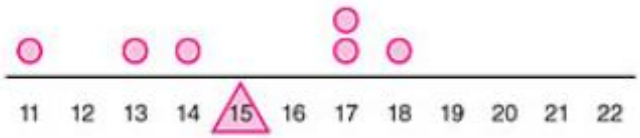
Summary for 1 and 2 : When we unlevel data in these ways, students should make the following connections:

*The balance point remains the same
*The mean remains the same
*The balance point is the mean

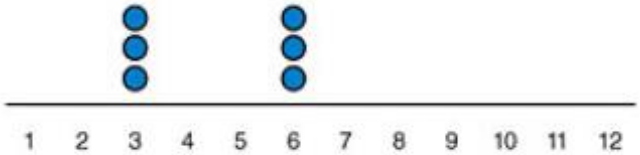
3. Move all of the dots so that the balance point changes to a different whole number. Draw the new balance point.



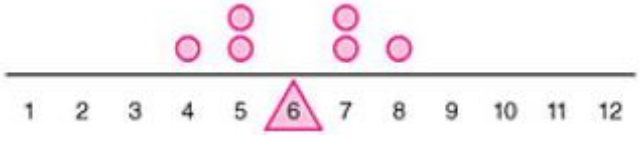
Sample answer:



4. Move all of the dots so that the balance point is 6.



Sample answer:



Explanation:

In number 3, the balance point changes to a different whole number in the sample answer because there is no equal leveling in the movement of the dots.

In Number 4, the sample answer is a correct answer because the dots have been leveled equally. There are 3 on one side of 6 and 3 on the other side, so the mean is clearly 6.

*Lesson 6—Find and Use the Median--Helpful Hints

*In today's lesson students will be introduced the median of a data set. Students will learn to find the median of a numerical set of data. Students will also work with problems to understand that shifting data can affect the mean and median. Examples and important vocabulary is included below:

Median: the median is a single number that summarizes the center of a set of numerical data. The median is the MIDDLE number when the data points are arranged from least to greatest.

*If there is an ODD number of data points, the median will be able to be found easily because there will be one number in the middle of the data set.

*If there is an EVEN number of data points, the median will need to be found by finding the average/mean of the two numbers in the middle.

Example 1:

1. The numbers at the right are ordered from least to greatest. Find the median.

   10 21 22 37 46

   The median is 22.

2. The dot plot at the right displays 10 data values. Find the median of the data.

   The median is 47.5 or $47\frac{1}{2}$.

3. Some animals can move very fast for short distances. The table at the right shows the top speeds at which some animals can move. Find the median speed.

Animal	Speed (mph)
Giraffe	32
Rabbit	35
Squirrel	12
Wildebeest	50
Elephant	25
Gray Fox	42
Zebra	40
Wart Hog	30

   The median speed is 33.5 or $33\frac{1}{2}$ mph.

Example 2: Students saw the below problem today during class. There is a similar problem on their homework for this lesson. This problem forces students to show their understanding of both mean and median and also allows them to compare the data and argue which would be the more appropriate measure to use based off of the situation. See below for the specific examples.

Estimates of the populations of seven cities in Colorado are shown in the table at the right. The populations have been rounded to the nearest thousand.

City	Population
Durango	17,000
Montrose	18,000
Windsor	17,000
Loveland	66,000
Erie	17,000
Canon City	16,000
Golden	17,000

25. Calculate the mean of the data. 24,000

26. Find the median of the data. 17,000

27. How could you summarize the populations of all seven cities using only one number? Would you choose the mean, or the median, to summarize the populations? Give a reason to support your answer.

Answers will vary. Sample answer: the median is a better summary because the mean is greater than the populations of six of the seven cities.

Rachel has a new part-time summer job. She works 3 days per week. Her earnings for the first two weeks are shown in the table at the right.

Earnings	
Week 1	**Week 2**
$20	$40
$40	$10
$30	$40

28. Calculate the mean earnings per day for each week.

Week 1: $30 Week 2: $30

29. Calculate the median earnings per day for each week.

Week 1: $30 Week 2: $40

30. Suppose Rachel wants to summarize her earnings for the first two weeks using only one number. Should Rachel choose a mean or a median to summarize her earnings? Give a reason to support your answer.

Answers will vary. Sample answer: the mean is a more sensible choice because the mean is the same for both weeks.

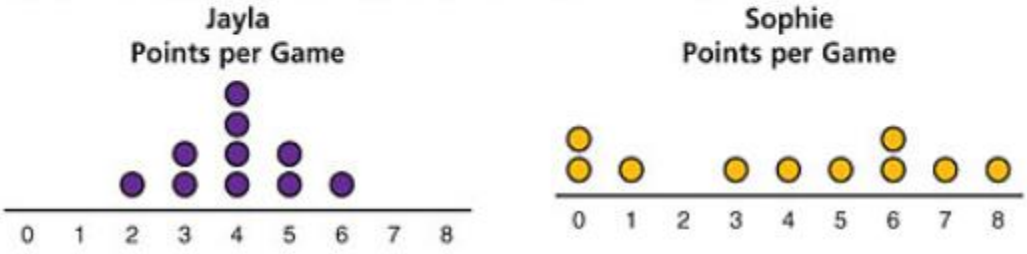
*Lesson 7—Variability in Data--Helpful Hints

*In this lesson students will learn that range is a measure that can be used to show how the variability of a data set. Students will learn how to calculate range in this lesson as well. Students will also learn how to calculate the first and third quartile of a set of numerical data.

Range: the range is a single number that summarize the variability of a set of data. The range of a set of numbers is calculated by SUBTRACTING THE SMALLEST NUMBER IN THE SET FROM THE LARGEST NUMBER IN THE SET. (Largest number - smallest number = range)

Example 1: Calculate the range of the data in each dot plot

Jayla and Sophie are members of a sixth grade basketball team. The dot plots below show the number of points scored by each player during the first 10 games of the season.



The range is a single number that summarizes the variability of a set of data. You can calculate the **range** of a set of numbers by subtracting the least number from the greatest number in the set.

1. Calculate the range of each dot plot.

Jayla: range 4 Sophie: range 8

Quartiles: quartiles are the values of the points that separate a set of data into four equal parts.
First Quartile: the first quartile separates the lower half (the half with the lower values) of the data into two equal parts.

Third Quartile: the third quartile separates the upper half (the half with the larger values) of the data into two equal parts.

Example 2:

Look at Set A. When a set of data has an odd number of values, the median is a value in the set.

Set A

101
first quartile → 133
137
median → 210
212
third quartile → 275
284

10. What number is the median, or middle number, of the set? 210

11. Explain why 133 is the first quartile of the set and 275 is the third quartile.
Sample answer: 133 is the median of 101, 133, and 137; 275 is the median of 212, 275, and 284.

Look at Set B. When a set of data has an even number of values, the median is not a value in the set.

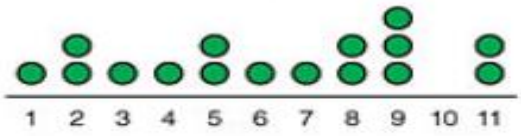
Set B

26
first quartile → 28
51
median →
55
third quartile → 64
87

12. Explain how to calculate the median, or middle number, of the set. Then calculate the median.
Divide the sum of 51 and 55 by 2; the median is 106 ÷ 2 or 53.

13. Explain why 28 is the first quartile of the set and 64 is the third quartile.
Sample answer: 28 is the median of 26, 28, and 51; 64 is the median of 55, 64, and 87.

Plot A

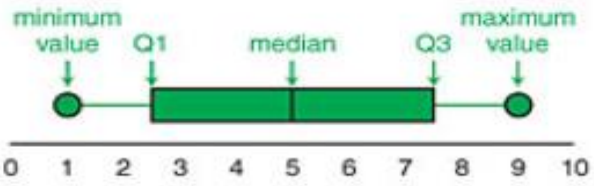


14. Plot A: median: 6.5
first quartile: 3.5
third quartile: 9

*Lesson 8—Box Plots--Helpful Hints

*In this students will explore box plots. Students will learn how to draw and interpret a box plot for a set of numerical data. Students will also calculate the interquartile range of a data set. See below for examples and important vocabulary.

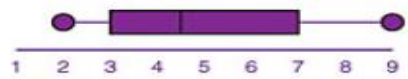
Box Plot: a box plot is a graphic summary that shows the median, quartiles and the minimum and maximum values of a data set.



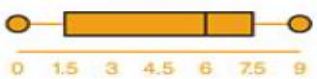
Interquartile Range: the interquartile range (IQR) is the difference between the upper (third quartile) and lower(first quartile) quartiles. It is a way to describe the spread of data in a set.

Use the box plots below for Exercises 9–11.

Box Plot A



Box Plot B



9. Calculate the IQR of Box Plot A.
4

10. Calculate the IQR of Box Plot B.
6

11. Compare the IQR of Box Plot A to the IQR of Box Plot B. What does the comparison suggest about the spread of data in Plot A when compared to the spread of data in Plot B?
The IQR of Box Plot A is lower and indicates that the middle 50% of the data are not as spread out as the middle 50% of the data in Box Plot B.

*Lesson 9—Mean Absolute Deviation--Helpful Hints

*Today's lesson provides students with the tools needed to calculate each value's distance from the mean which is called the mean absolute deviation. After learning how to calculate the mean absolute deviation, students also learned how to compare and interpret these values. Examples are below:

Mean Absolute Deviation: the mean absolute deviation is the mean, or average, distance each data value is from the mean. The mean absolute deviation describes the spread of data in a set.

Example 1:

Follow the steps below to calculate the mean absolute deviation of the set of data shown at the right.

1	1	3	5	9	9	10	10

8. Find the mean of the data. 6

9. Find the distance each value is from the mean.
   1: 5 units; 1: 5 units; 3: 3 units; 5: 1 unit;
   9: 3 units; 9: 3 units; 10: 4 units; 10: 4 units

10. Write the sum of the distances. 28

11. Calculate the mean absolute deviation by dividing the sum of the distances by the number of values. 3.5

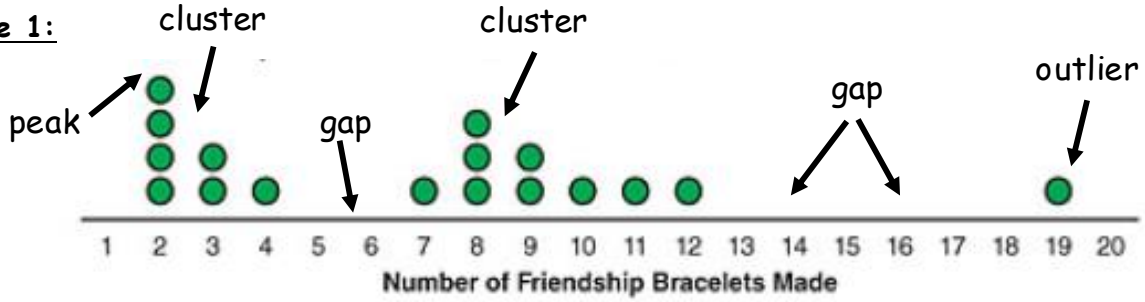
12. Which set has data that is more spread out from the mean?
    The mean absolute deviation is greater for the second set of data so the second set of data is more spread out.

*Lesson 10—Clusters, Peaks, Gaps and Outliers--Helpful Hints

*In today's lesson students will further analyze data in a set by identifying different aspects of the shape of the data. Students will learn about how to describe the shape of the data using the terms cluster, peak, gap, and outlier. Examples and important vocabulary is shown below:

Cluster: a cluster is a group of data values
Peak: a peak is the value that appears most often, creating a tall peak in the data set
Gap: a gap is an interval with no data
Outlier: an outlier is an extreme or distant value

Example 1:



*Lesson 11—Collect, Display and Interpret Data--Helpful Hints

*In today's lesson, students will be flying paper airplanes in order to collect data. Once the data is collected students will create different ways to display the data (dot plots, box plots, etc) and will then analyze and interpret the data using terms they learned in this unit. All topics covered today have been previously taught and shown in other parts of this guide. Please use the necessary parts of this parent guide to assist your student with their homework for this lesson.