Name _____ Date_____

Describing the Center of a Distribution Using the Median

1. What is the median age for the following data set representing the age of students requesting tickets for a summer band concert?

   13 14 15 15 16 16 17 18 18

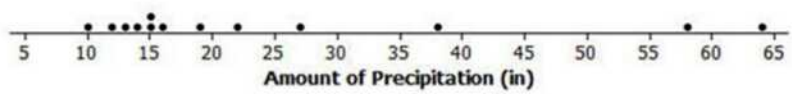
2. What is the median number of diseased trees from a data set of diseased trees on 10 city blocks?

   11 3 3 4 6 12 9 3 8 8 8 1

3. Describe how you would find the median for a set of data that has 35 values. How would this be different if there were 36 values?

1. The amount of precipitation in the western states in the U.S. is given in the table as well as the graph.

State	Amount of Precipitation (in.)
WA	38.4
OR	27.4
CA	22.2
MT	15.3
ID	18.9
WY	12.9
NV	9.5
UT	12.2
CO	15.9
AZ	13.6
NM	14.6
AK	58.3
HI	63.7



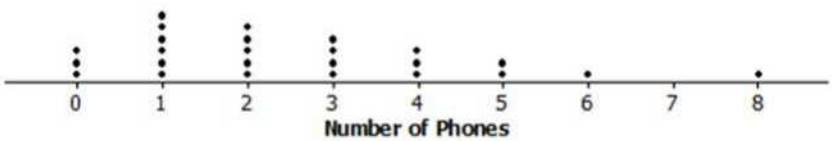
Data Source: http://www.currentresults.com/Weather/US/average-annual-state-precipitation.php

a. How do the amounts vary across the states?
b. Find the median. What does the median tell you about the amount of precipitation?
c. Use the median and the range to describe the average monthly precipitation in western states in the U.S.
d. Do you think the mean or median would be a better description of the typical amount of precipitation? Explain your thinking.

2. Identify the following as true or false. If a statement is false, give an example showing why.
   a. The median is always equal to one of the values in the data set.
   b. The median is the midpoint between the smallest and largest values in the data set.
   c. At most, half of the values in a data set have values less than the median.
   d. In a data set with 25 different values, if you change the two smallest values of a data set to smaller values, the median will not be changed.
   e. If you add 10 to every element of a data set, the median will not change.

3. Make up a data set such that the following is true:
   a. The set has 11 different values and the median is 5.
   b. The set has 10 values and the median is 25.
   c. The set has 7 values and the median is the same as the smallest value.

4. The dot plot shows the number of landline phones that a sample of people have in their homes.



   a. How many people were in the sample?
   b. Why do you think three people have no landline phones in their homes?
   c. Find the median number of phones for the people in the sample.
   d. Use the median and the range (maximum-minimum) to describe the distribution of the number of phones.

5. The salaries of the Los Angeles Lakers for the 2012–2013 basketball season are given below.

Player	Salary ($)
Kobe Bryant	$27,849,149
Dwight Howard	$19,536,360
Pau Gasol	$19,000,000
Steve Nash	$8,700,000
Metta World Peace	$7,258,960
Steve Blake	$4,000,000
Jordan Hill	$3,563,600
Chris Duhon	$3,500,000
Jodie Meeks	$1,500,000
Earl Clark	$1,240,000
Devin Ebanks	$1,054,389
Darius Morris	$962,195
Antawn Jamison	$854,389
Robert Sacre	$473,604
Darius Johnson-Odom	$203,371

Data Source: www.basketball-reference.com/contracts/LAL.html

a. Just looking at the data, what do you notice about the salaries?

b. Find the median salary, and explain what it tells you about the salaries.

c. Find the median of the lower half of the salaries and the median of the upper half of the salaries.

d. Find the width of each of the following intervals. What do you notice about the size of the interval widths, and what does that tell you about the salaries?

   i. minimum salary to median of the lower half:

   ii. median of the lower half to the median of the whole set:

   iii. median of the whole set to the median of the upper half:

   iv. median of the upper half to the highest salary:

6. Use the salary table from above to answer the following.

   a. If you were to find the mean salary, how do you think it would compare to the median? Explain your reasoning.

   b. Which measure do you think would give a better picture of a typical salary for the Lakers, the mean or the median? Explain your thinking.

1. What is the median age for the following data set representing the age of students requesting tickets for a summer band concert?

$$13 \quad 14 \quad 15 \quad 15 \quad 16 \quad 16 \quad 17 \quad 18 \quad 18$$

The median is the 5^{th} value, or 16 years old, as there are 4 values less than 16 and 4 values greater than or equal to 16.

2. What is the median number of diseased trees from a data set of diseased trees on 10 city blocks?

$$11 \; 3 \; 3 \; 4 \; 6 \; 12 \; 9 \; 3 \; 8 \; 8 \; 8 \; 1$$

To find the median, the values first need to be ordered: $1 \; 3 \; 3 \; 3 \; 4 \; 6 \; 8 \; 8 \; 8 \; 9 \; 11 \; 12$

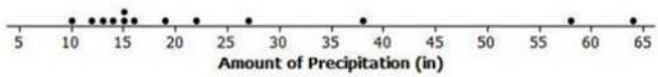
As there is an even number of data values, the median would be the mean of the 6^{th} and 7^{th} values: $\frac{6+8}{2}$, *or* 7 *diseased trees.*

3. Describe how you would find the median for a set of data that has 35 values. How would this be different if there were 36 values?

Answers will vary; first you would order the data from smallest to largest. Because there are 35 values, you would look for the 18^{th} value from the top or bottom. This would be the median with 17 values above and 17 values below. If the set had 36 values, you would go halfway between the 18^{th} and 19^{th} values.

1. The amount of precipitation in the western states in the U.S. is given in the table as well as the graph.

State	Amount of Precipitation (in)
WA	38.4
OR	27.4
CA	22.2
MT	15.3
ID	18.9
WY	12.9
NV	9.5
UT	12.2
CO	15.9
AZ	13.6
NM	14.6
AK	58.3
HI	63.7



Data Source: http://www.currentresults.com/Weather/US/average-annual-state-precipitation.php

a. How do the amounts vary across the states?

Answers will vary: The spread is pretty large: 54.2 inches. Nevada has the lowest at 9.5 inches per year. Hawaii, Alaska, and Washington have more rain than most of the states; Hawaii has the most with 63.7 inches followed by Alaska at 58.3 inches.

b. Find the median. What does the median tell you about the amount of precipitation?

The median is 15.9 inches; half of the states have more than 15.9 inches of precipitation per year and half have less.

c. Use the median and the range to describe the average monthly precipitation in western states in the U.S.

The amount of precipitation varies from 63.7 to 9.5 inches per year. Half of the states have from 9.5 to 15.9 inches per year, but only two have more than 40 inches.

d. Do you think the mean or median would be a better description of the typical amount of precipitation? Explain your thinking.

The mean at 24.8 inches reflects the extreme values, while the median seems more typical at 15.9 inches.

2. Identify the following as true or false. If a statement is false, give an example showing why.

a. The median is always equal to one of the values in the data set.

False. If the numbers are 1 and 5, the median is 3 and it is not in the set.

b. The median is the midpoint between the smallest and largest values in the data set.

False. Look at the number of french fries per bag for Restaurant A above where the median is 82, which is not halfway between 66 and 93 (79.5).

c. At most, half of the values in a data set have values less than the median.

True.

d. In a data set with 25 different values, if you change the two smallest values of a data set to smaller values, the median will not be changed.

True.

e. If you add 10 to every element of a data set, the median will not change.

False. The median will increase by 10 as well. If the set is $1, 2, 3, 4, 5$, the median is 3; for the set $11, 12, 13, 14, 15$, the median will be 13.

3. Make up a data set such that the following is true:

a. The set has 11 different values and the median is 5.

Answers will vary depending on the whether the numbers are whole numbers or fractions. If the numbers are whole numbers, the set would be $0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10$.

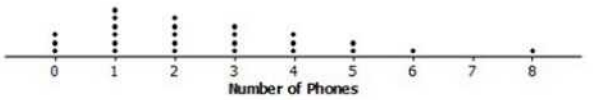
b. The set has 10 values and the median is 25.

Answers will vary. One answer is to have all 25's.

c. The set has 7 values and the median is the same as the smallest value.

Answers will vary. One answer is to have $1, 1, 1, 1, 2, 3, 4$.

4. The dot plot shows the number of landline phones that a sample of people have in their homes.



a. How many people were in the sample?

25

b. Why do you think three people have no landline phones in their homes?

Possible answers: Some people might only have cell phones, or some people may not be able to afford a phone.

c. Find the median number of phones for the people in the sample.

The median number of phones per home is 2.

d. Use the median and the range (maximum-minimum) to describe the distribution of the number of phones.

Possible answer: The median number of phones was 2 per home, and over half of the people have fewer than 3 phones in their homes. Three had none, and one house had 8 phones.

5. The salaries of the Los Angeles Lakers for the 2012–2013 basketball season are given below.

Player	Salary ($)
Kobe Bryant	$27,849,149
Dwight Howard	$19,536,360
Pau Gasol	$19,000,000
Steve Nash	$8,700,000
Metta World Peace	$7,258,960
Steve Blake	$4,000,000
Jordan Hill	$3,563,600
Chris Duhon	$3,500,000
Jodie Meeks	$1,500,000
Earl Clark	$1,240,000
Devin Ebanks	$1,054,389
Darius Morris	$962,195
Antawn Jamison	$854,389
Robert Sacre	$473,604
Darius Johnson-Odom	$203,371

Data Source: www.basketball-reference.com/contracts/LAL.html

a. Just looking at the data, what do you notice about the salaries?

Possible answer: A few of the salaries for the big stars like Kobe are really big, while others are very small in comparison.

b. Find the median salary, and explain what it tells you about the salaries.

$3,500,000 *for Chris Duhon. Half of the players make more than* $3,500,000 *and half make less than that.*

c. Find the median of the lower half of the salaries and the median of the upper half of the salaries.

$962,195 *for the bottom half of the salaries;* $8,700,000 *for the top half of the salaries.*

d. Find the width of each of the following intervals. What do you notice about the size of the interval widths, and what does that tell you about the salaries?

i. minimum salary to median of the lower half: $\$758,824$

ii. median of the lower half to the median of the whole set: $\$2,537,805$

iii. median of the whole set to the median of the upper half: $\$5,200,000$

iv. median of the upper half to the highest salary: $\$19,149,149$

The largest width is from the median of the upper half to the highest salary. The smaller salaries are closer together than the larger ones.

6. Use the salary table from above to answer the following.

a. If you were to find the mean salary, how do you think it would compare to the median? Explain your reasoning.

Possible answer: The mean will be a lot larger than the median because when you add in the really big salaries, the size of the mean will increase a lot.

b. Which measure do you think would give a better picture of a typical salary for the Lakers, the mean or the median? Explain your thinking.

Possible answer: The median seems better as it is more typical of most of the salaries.