

Statistical Measures

Ex: ①

During eruptions at Jezeff Geyser, water shoots up to various heights. What is the mean height of the geyser's eruptions?

Heights of Jezeff Geyser Eruptions (feet)
15, 30, 27, 23, 26, 19, 14, 11, 22

*To calculate the mean you must add up all the #s in the list & then divide the sum by the amount of #s in the list *

$$\text{Mean} = \frac{15 + 30 + 27 + 23 + 26 + 19 + 14 + 11 + 22}{9} = \frac{189}{9}$$

Mean = 23 This is the average

*To calculate the median you must write your list in order from smallest to biggest & then find the middle # *

~~11, 14, 15, 19, 22, 23, 26, 27, 30~~ (22) 23, 24, 26, 30

Median = 22 This is the middle #

Ex: ②

What is the IQR of the depths of a sample of hot spring pools in Yellowstone National Park?

Depths of Hot Springs (feet)
25, 6, 27, 23.5, 25, 32.5

*To calculate the range you subtract the smallest # from the biggest # *

$$\text{Range} = 32.5 - 6 = 26.5$$

Range = 26.5 This tells you how spread out all of the data is.

*To calculate the interquartile range (IQR) follow these steps:

① Write your list in order from smallest to biggest

6, 23.5, 25, 25, 27, 32.5

② Find the median

~~6, 23.5, 25, 25, 27, 32.5~~ 25 | 25, ~~27, 32.5~~

③ Find the median of the bottom half of the list & the top half of the list

~~6, 23.5, 25, 25, 27, 32.5~~ (23.5) | 25 | (27), ~~32.5~~

1st
Quartile
(Q₁)

3rd
Quartile
(Q₃)

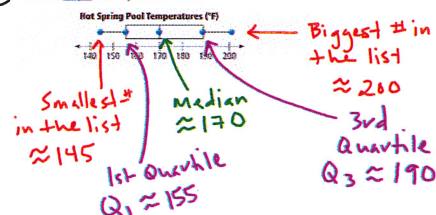
④ Subtract Q₃ - Q₁

$$27 - 23.5 = 3.5$$

IQR = 3.5 This tells me how spread out the middle part of my data is

Ex: ③

Ms. Adventure and Data Girl are visiting different hot springs in Yellowstone. Data Girl makes a list of the temperatures she records.



$$\text{Range} = 200 - 145$$

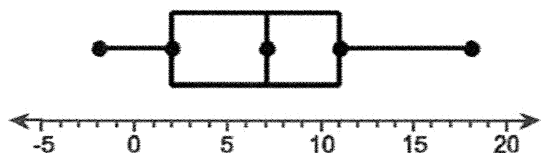
$$\text{Range} = 55$$

$$\text{IQR} = 190 - 155$$

$$\text{IQR} = 35$$

Lesson 15-1 Homework

1. Find the mean and median of the data set 5, 8, 5, 9, 1, and 2
2. Find the mean and median of the data set 9, 8, 7, 4, and 5
3. What is the interquartile range of this box plot?



4. The data set 55, 65, 40, 40, 30, 50, 64, 45, 40, and 41 shows the admission price (in dollars) for one-day tickets to 10 theme parks in the United States. What is the interquartile range of the data values?
5. A random sample is taken from two different groups of people. The age of each subject in the sample is recorded.
 - a) Find the mean age for the sample from each group.
 - b) If a person is chosen at random from each group, which group's person is likely to be younger?

Ages of People	
Sample from Group A	Sample from Group B
18	41
19	24
38	37
31	42
38	41

6. Find the mean and median of the data set 1,199; 958; 1,240; 1,094; 1,153; and 957
7. Find the interquartile range of the data set 32.6, 98.5, 16.6, 22.4, 99.8, 72.6, 68.2, 51.8, and 49.3
8. Find the range and the interquartile range of the data set 35.6, 7.4, 6.2, 27.7, -28.4, -32.2, -27.9, 17.1, and -35.2

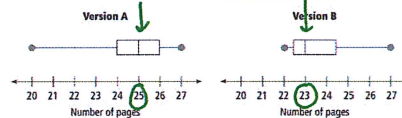
Using Measures of Center

There are two measures of center:

① Median

② Mean

EX: ① A book publisher is testing two versions of a new book. A random sample of people is given 30 minutes to read each version. What is the median of each sample? *Make a comparative inference based on the median values.*

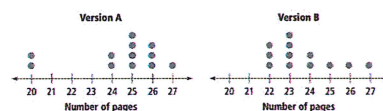


Median A = 25

Median B = 23

I think Version A is better because people were able to read more pages.

EX: ② A book publisher is testing two versions of a new book. A random sample of people is given 30 minutes to read each version. What is the mean of each sample? *Make a comparative inference based on this measure of center.*



This is a Dot Plot. Each dot represents a piece of data.

20, 20, 24, 24, 25,
25, 25, 25, 26, 26,
26, 27

$$\text{Mean}_A = \frac{293}{12}$$

$$\text{Mean}_A \approx 24.4$$

22, 22, 22, 23, 23, 23,
23, 24, 24, 25, 26, 27

$$\text{Mean}_B = \frac{284}{12}$$

$$\text{Mean}_B \approx 23.7$$

I think Version A is better because people are able to read more pages.

EX: ③ Next, the planner records the weight of a day's recycling from a random sample of households. Find the mean weight of recycling in each neighborhood to the nearest tenth.

Weight of Recycling (lbs)

Neighborhood A	Neighborhood B
2.4, 0.5, 5.8, 3.3, 1.4, 2.2, 1.2, 0, 2.7, 2.5, 1.9	4.8, 3.5, 6.9, 5.5, 6.3, 4.9, 5.1, 6.1, 8, 5.8, 5.2

$$\text{Mean A} = \frac{23.9}{11}$$

$$\text{Mean A} \approx 2.2$$

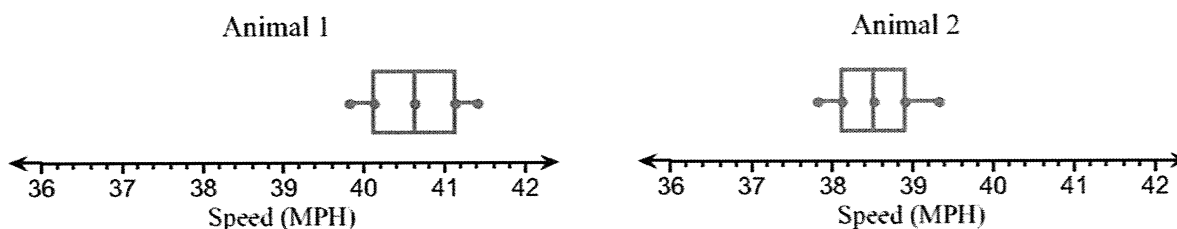
$$\text{Mean B} = \frac{62.1}{11}$$

$$\text{Mean B} \approx 5.6$$

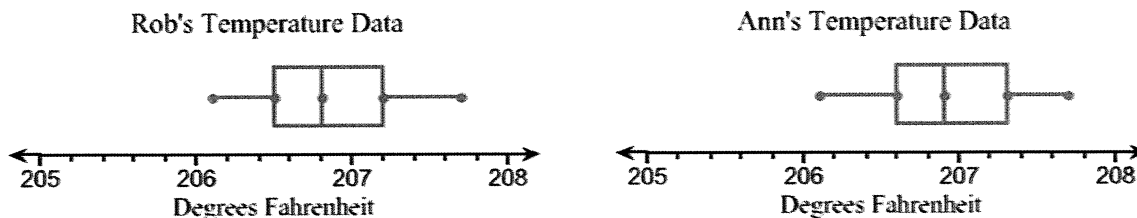
The people in Neighborhood B are more conscientious about recycling.

Lesson 15-3 Homework

1. The box plots display how fast two different animals can run. Compare the median of each box plot. Which of the following is the best description of the medians?
- ☐ A. The median for Animal 2 is greater.
 - ☐ B. The medians are about the same.
 - ☐ C. The median for Animal 1 is greater.



2. Water boils at different temperatures based on its elevation above sea level. Rob and Ann are in different cities. They both boil water in a number of pots. Each person records the water temperature just as the water starts to boil. The higher the elevation is the lower the boiling point is and the lower the elevation is the higher the boiling point is. They use box plots to display their data. Compare the medians of the box plots.
- a) Which of the following is the best description of the medians?
- ☐ A. The median from Rob's data is greater.
 - ☐ B. The median from Ann's data is greater.
 - ☐ C. The medians are about the same.
- b) Which of the following is the best inference based on the median values?
- ☐ A. Ann is at a greater elevation.
 - ☐ B. Rob and Ann are at about the same elevation.
 - ☐ C. Rob is at a greater elevation.

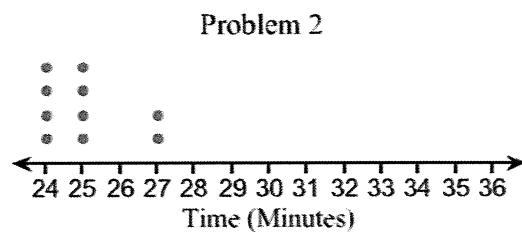
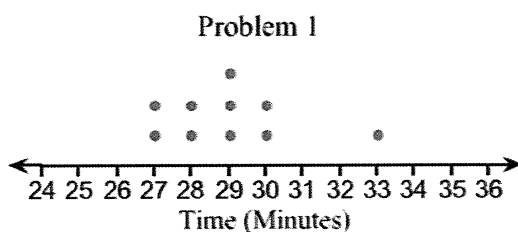


3. An experiment compares the life spans of two brands of light bulbs. Twelve bulbs of each type were tested until failure. The results are shown for the two types of light bulbs in hours.
- Find the mean time of each light bulb.
 - Which of the following is the correct description of the populations?
 - ☐ A. HotLight generally has the greater lifespan.
 - ☐ B. BrightBulb generally has the greater lifespan.
 - ☐ C. The two bulbs generally have the same lifespan.

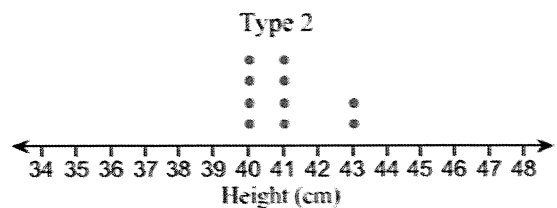
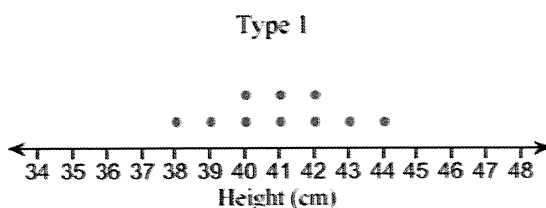
Bulb A: HotLight Time, in hours		
967	1,255	1,474
1,451	1,520	1,033
963	1,363	1,437
1,393	1,050	1,512

Bulb B: BrightBulb Time, in hours		
1,147	1,418	997
931	1,452	1,096
941	1,003	1,477
1,147	1,094	1,545

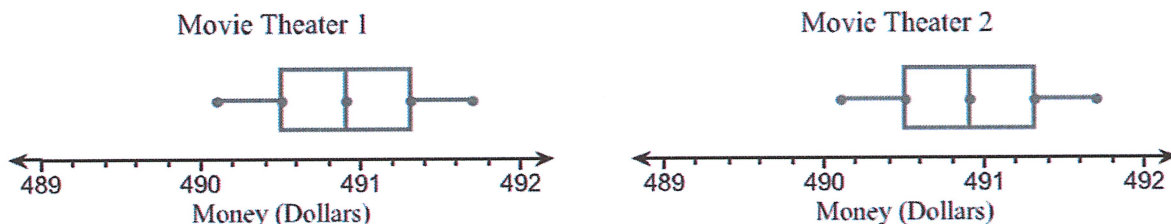
4. The dot plots show the amount of time it takes each person, in a random sample, to complete two similar problems.
- What is the mean time for each problem?
 - Which of the following is a correct inference based on the mean values?
 - ☐ A. Problem 2 is more challenging than Problem 1.
 - ☐ B. Problem 1 is more challenging than Problem 2.
 - ☐ C. The problems are equally challenging.



5. There are two types of plants in a greenhouse. The dot plots show the heights of 20 plants, 10 of Type 1 and 10 of Type 2. The plants are given the same amount of food and water.
- What is the mean height for each type of plant?
 - Which of the following is a correct inference based on the mean values?
 - ☐ A. The two types were planted at the same time.
 - ☐ B. Type 1 was planted first.
 - ☐ C. Type 2 was planted first.



6. There are two movie theaters in a town. A student wants to compare the amount of money each theater makes over a period of days. The box plots show the data for the amount of money each theater makes over a period of days. Compare the median of each box plot. Which of the following is the best description of the medians?
- ☐ A. The median for Movie Theater 2 is greater.
 - ☐ B. The median for Movie Theater 1 is greater.
 - ☐ C. The medians are the same.

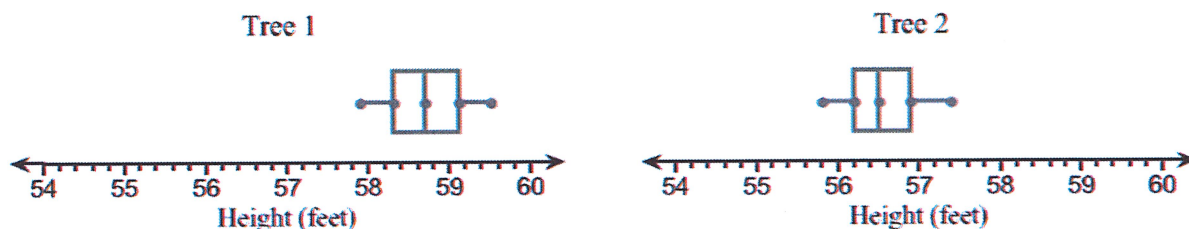


7. A student is studying two different breeds of dogs. The following are the weights of 6 of each breed of dog.
- a) Find the mean weight of each population.
 - b) Which of the following is a correct inference based on the mean values?
 - ☐ A. Dog Breed 2 generally weighs more than Dog Breed 1.
 - ☐ B. Dog Breed 1 generally weighs more than Dog Breed 2.
 - ☐ C. Dog Breed 1 and Dog Breed 2 generally weigh about the same.

Dog Breed 1 Weight (lb)		
61	59	48
54	50	46

Dog Breed 2 Weight (lb)		
44	38	43
46	45	36

8. The box plots show different heights of two trees. Which of the following is the best description of the medians?
- ☐ A. The median for Tree 2 is greater.
 - ☐ B. The medians are about the same.
 - ☐ C. The median for Tree 1 is greater.



9. A group of scientists are studying forests. The data below shows the number of rings from twelve trees, six from Forest 1 and six from Forest 2.
- a) Find the mean number of rings for each forest.
- b) Which of the following is a correct inference based on the mean values?
- ☐ A. The trees in each forest generally are the same size.
 - ☐ B. The trees in Forest 2 generally are greater in size.
 - ☐ C. The trees in Forest 1 generally are greater in size.
- c) Which of the following is another conclusion that a person might make?
- ☐ A. The trees in each forest are about the same age.
 - ☐ B. The trees in Forest 2 are older.
 - ☐ C. The trees in Forest 1 are older

Forest 1 Rings		
24	26	37
35	22	30

Forest 2 Rings		
21	14	19
20	12	22

Using Measures of Variability

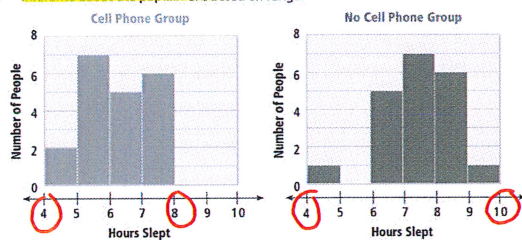
There are two measures of variability:

① Range

② Interquartile Range (IQR)

Ex: ①

A researcher is studying the effects of owning a cell phone on the number of hours people sleep. What is the range of hours slept for each group? Make a comparative inference about the populations based on range.



This is a histogram. It's similar to a bar graph.

$$\text{Range (cell)} = 8 - 4$$

$$\text{Range (cell)} = 4$$

More consistency for this group.

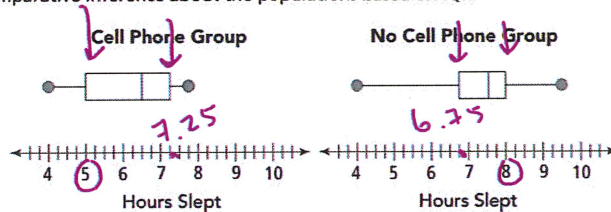
$$\text{Range (No cell)} = 10 - 4$$

$$\text{Range (No cell)} = 6$$

More variability for this group

Ex: ②

A researcher is studying the effects of owning a cell phone on the number of hours people sleep. What is the interquartile range of hours slept for each group? Make a comparative inference about the populations based on IQR.



$$\text{IQR (cell)} = 7.25 - 5$$

$$\text{IQR (cell)} = 2.25$$

This group has more variability.

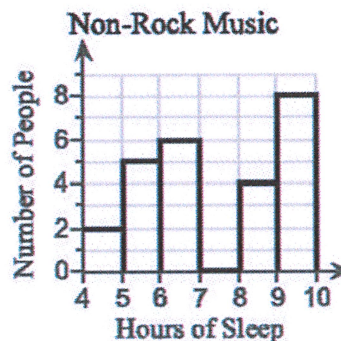
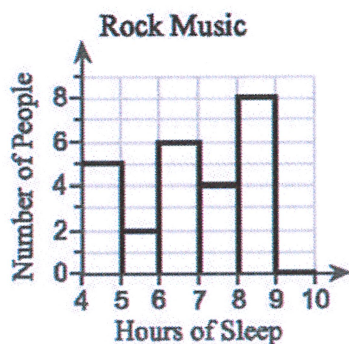
$$\text{IQR (No cell)} = 8 - 6.75$$

$$\text{IQR (No cell)} = 1.25$$

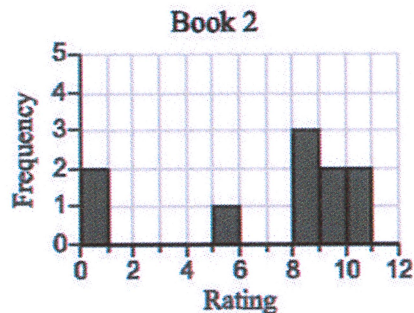
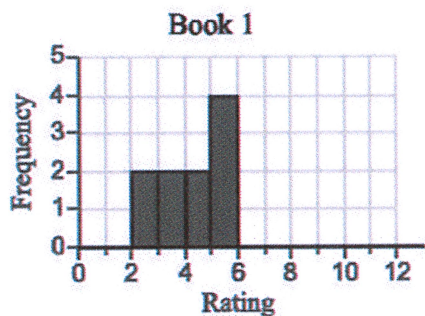
This group has more consistency.

Lesson 15-4 Homework

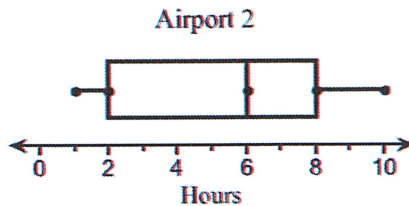
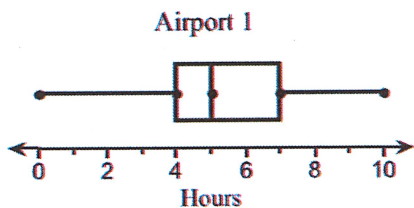
1. A researcher is studying the effects of listening to rock music on the number of hours people sleep. What is the range of hours slept for each group?



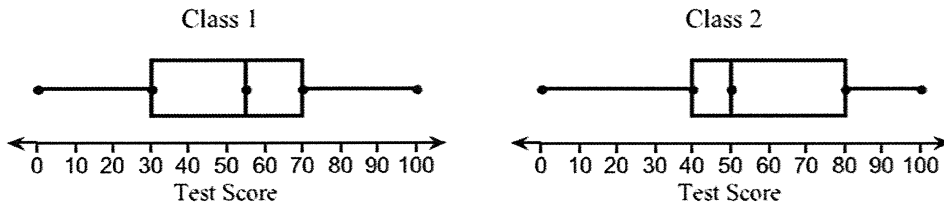
2. A group of 10 people were asked to rate books, shown in the histograms.
- Find the range of the ratings for each sample.
 - Make a comparative inference about the ratings of the books.
 - ☐ A. The ratings vary to the same degree for both Book 1 and Book 2.
 - ☐ B. The ratings vary less for Book 1 than for Book 2.
 - ☐ C. The ratings vary less for Book 2 than for Book 1.



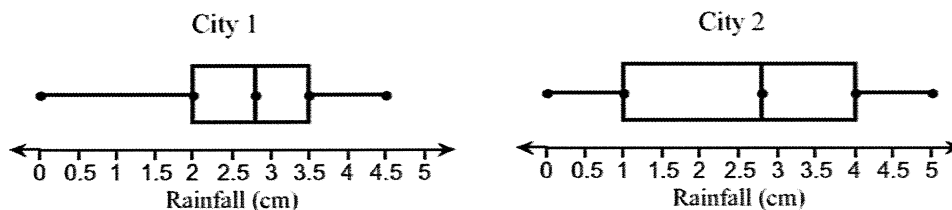
3. The box plots show the lengths of flight delays at two major airports. What is the interquartile range of the delays for each airport?



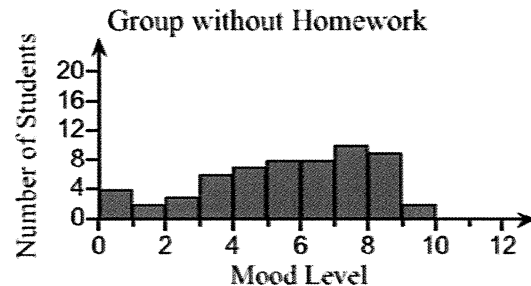
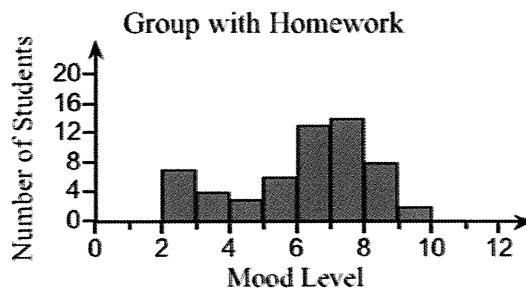
4. The box plots show the frequency of test scores on a recent math test in two classes.
- What is the interquartile range (IQR) of the test scores for each class?
 - Make a comparative inference about the populations based on the IQR.
 - ☐ A. The test scores for Class 2 are more consistent than those for Class 1.
 - ☐ B. The test scores for Class 1 and Class 2 are equally consistent.
 - ☐ C. The test scores for Class 1 are more consistent than those for Class 2.



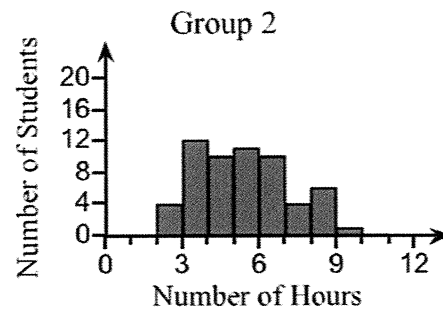
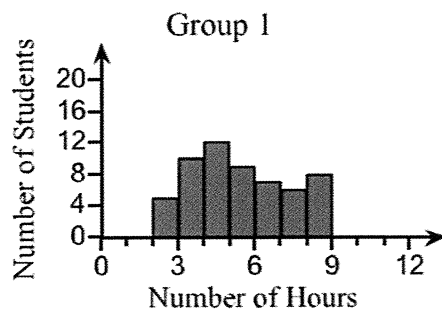
5. The box plots show the rainfall amounts over the past month in two major cities.
- What is the interquartile range (IQR) of the amounts of rainfall for each city?
 - Make a comparative inference about the cities based on the IQR.
 - ☐ A. The rainfall amounts for City 1 are more consistent than those for City 2.
 - ☐ B. The rainfall amounts for City 2 are more consistent than those for City 1.
 - ☐ C. The rainfall amounts for City 1 and City 2 are equally consistent.



6. A teacher conducted a study on the mood level of students with a lot of homework and those without any homework. Find the range of mood levels for each group.



7. The histograms show the number of hours students in two groups spend exercising in one week.
- Find the range of the number of hours for each group.
 - Make a comparative inference about the number of hours students spend exercising in each group.
 - ☐ A. The number of hours students spend exercising varies to the same degree for both groups.
 - ☐ B. The number of hours students spend exercising varies less for the students in Group 2 than for those in Group 1.
 - ☐ C. The number of hours students spend exercising varies less for the students in Group 1 than for those in Group 2.



8. The following box plots show the number of bushels of corn per acre harvested on two farms. What is the interquartile range of corn harvested for each farm?

