

Explore It!

Ella surveys a random sample of 20 seventh graders about the number of siblings they have.

The table shows the results of her survey.

Student	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
Number of Siblings	1	1	2	0	2	1	3	1	1	6	1	2	3	2	1	3	2	0	2	1

A. Model with Math Draw a model to show how Ella can best display her data.

B. Explain why you chose that model.

Lesson 8-3

Make Comparative Inferences About Populations

I can...
draw comparative inferences about two populations using median and interquartile range (IQR).

Focus on math practices

Reasoning Using your data display, what can you infer about the number of siblings that most seventh graders have? Explain.

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Essential Question

How can data displays be used to compare populations?

INTERACTIVE RESOURCE

ANSWERS

EXAMPLE 1

Use Box Plots to Compare Populations

Finn and Jonah attend different middle schools. They compare the number of hours students at each school spend on homework each week. Finn and Jonah each conduct a random sample of 20 students who attend their schools, and then list the data in order from least to greatest. What can Finn notice about the time spent on homework?

Hours That 20 Students Spend on Homework Each Week																					
Finn's School	1	1	2	3	3	4	4	4	4	4	5	5	5	5	6	6	7	7	8	9	11
Jonah's School	1	5	5	5	5	6	6	6	6	6	8	8	8	8	8	8	9	9	10	11	

STEP 1 Display the two data sets in box plots.

This box is between $3\frac{1}{2}$ and $6\frac{1}{2}$. The median is 5.

This box is between $5\frac{1}{2}$ and 8. The median is 7.

Look for Relationships The median best describes the data because both data sets have outliers.

STEP 2 Use the box plots to compare the two data sets.

The line for the median of Jonah's data set is to the right of the line for the median of Finn's data set. So, Finn can say that the median of Jonah's data set is greater.

The box for Finn's data set is longer than the box for Jonah's data set. So, Finn can say that his data is more spread out, or has greater variability.

Try It!

Kono gathers the heights of a random sample of sixth graders and seventh graders and displays the data in box plots. What can he say about the two data sets?

The median of the grade sample is greater than the median of the grade sample.

The grade sample has greater variability.

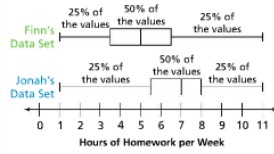
Convince Me! How can you visually compare data from two samples that are displayed in box plots?

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EXAMPLE 2 Draw Inferences Using Median and Interquartile Range

Finn and Jonah analyze the measures of center and variability of the data they collected. Do these measures support Finn's assessment of the two data sets in Example 1?

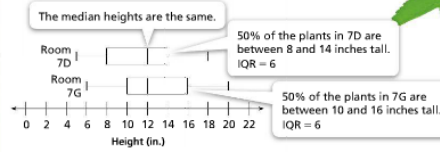


	First Quartile	Median	Third Quartile	Interquartile Range
Finn's Data Set	$3\frac{1}{2}$	5	$6\frac{1}{2}$	3
Jonah's Data Set	$5\frac{1}{2}$	7	8	$2\frac{1}{2}$

The median of Jonah's data set is greater. So the students at Jonah's school generally spend more hours on homework each week than the students at Finn's school. The interquartile range of Finn's data set is greater. So there is greater variability, or spread, in the number of hours students in Finn's school spend on homework.

EXAMPLE 3 Draw More Inferences Using Measures of Center and Variability

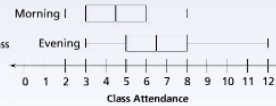
Mr. Bunsen had students grow the same type of plant in two different rooms to test the growing conditions. The box plots show the heights of all the plants after 3 weeks. How do the two populations compare? What inferences can be drawn?



While the median heights of the plants are the same, the plants in Room 7G are generally taller. You can infer that the growing conditions in Room 7G are more favorable for plant growth than in Room 7D.

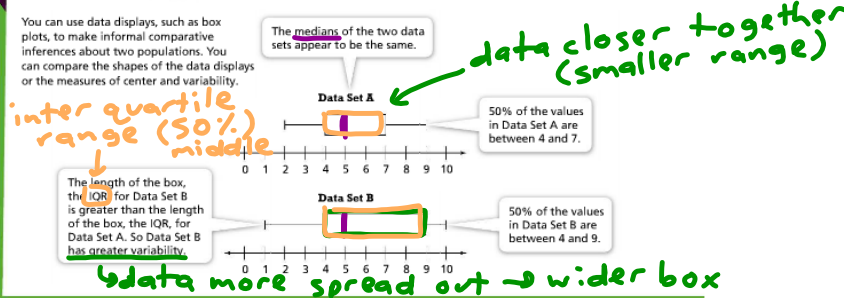
Try It!

A local recreation center offers a drop-in exercise class in the morning and in the evening. The attendance data for each class over the first month is shown in the box plots at the right. What can you infer about the class attendance?



KEY CONCEPT

You can use data displays, such as box plots, to make informal comparative inferences about two populations. You can compare the shapes of the data displays or the measures of center and variability.

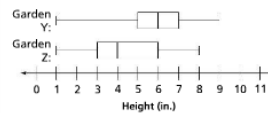


Do You Understand?

- Essential Question** How can data displays be used to compare populations?
- Generalize** What measures of variability are used when comparing box plots? What do these measures tell you?
- Make Sense and Persevere** Two data sets both have a median value of 12.5. Data Set A has an interquartile range of 4 and Data Set B has an interquartile range of 2. How do the box plots for the two data sets compare?

Do You Know How?

The box plots describe the heights of flowers selected randomly from two gardens. Use the box plots to answer 4 and 5.



- Find the median of each sample.
Garden Y median = inches
Garden Z median = inches
- Make a comparative inference about the flowers in the two gardens.

Name: _____

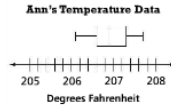
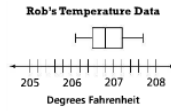
Practice & Problem Solving

Levelled Practice For 6-8, complete each statement.

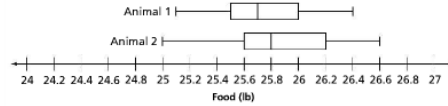
6. Water boils at lower temperatures as elevation increases. Rob and Ann live in different cities. They both boil the same amount of water in the same size pan and repeat the experiment the same number of times. Each records the water temperature just as the water starts to boil. They use box plots to display their data. Compare the medians of the box plots.

The median of Rob's data is the median of Ann's data.

This means Rob is at elevation than Ann.



7. Liz is analyzing two data sets that compare the amount of food two animals eat each day for one month.



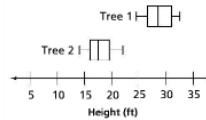
a. The median of Animal 2's data is than the median of Animal 1's data.

b. Liz can infer that there is variability in the data for Animal 1 than for Animal 2.

c. Liz can infer that Animal generally eats more food.

8. The box plots show the heights of a sample of two types of trees.

The median height of Tree is greater.



9. Reasoning A family is comparing home prices in towns where they would like to live. The family learns that the median home price in Hometown is equal to the median home price in Plainfield and concludes that the homes in Hometown and Plainfield are similarly priced.

What is another statistical measure that the family might consider when deciding where to purchase a home?



more fluctuation (higher highs, lower lows)

10. Higher Order Thinking The box plots show the daily average high temperatures of two cities from January to December. Which city should you live in if you want a greater variability in temperature? Explain.



Full range 10 to 60
IQR 30-50
Full range 10 to 60
IQR 25 to 50
Full range 10 to 60

Assessment Practice

11. Paul compares the high temperatures in City 1 and City 2 for one week. In City 1, the range in temperature is 10°F and the IQR is 5°F. In City 2, the range in temperature is 20°F and the IQR is 5°F.

What might you conclude about the weather pattern in each city based on the ranges and interquartile ranges?

- A The weather pattern in City 1 is more consistent than the weather pattern in City 2.
- B The weather patterns in City 1 and City 2 are equally consistent.
- C The weather pattern in City 2 is more consistent than the weather pattern in City 1.
- D The range and interquartile range do not provide enough information to make a conclusion.

