

COMPARING POPULATIONS

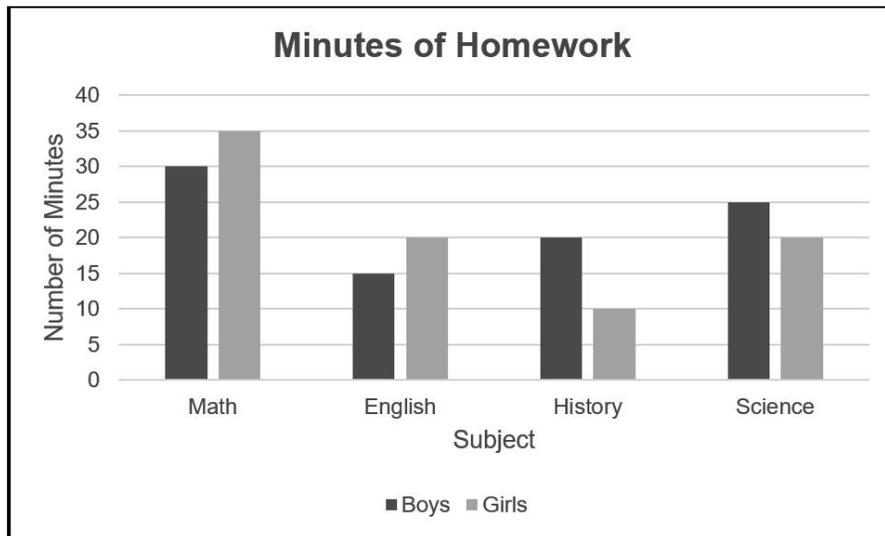


The student is expected to compare two populations based on data in random samples from these populations, including informal comparative inferences about differences between the two populations.



TELL ME MORE...

A teacher surveyed all of her classes and asked students about how many minutes per night they spend on homework in each of their core subjects. She then found the average in each subject and each group of students; boys and girls. The results are shown below in the double bar graph.



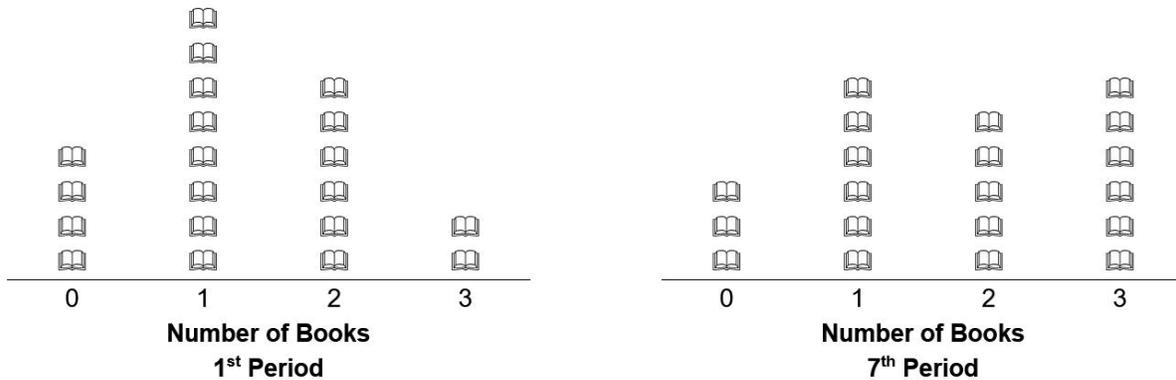
In looking at the data in the chart, there are several inferences or conclusions one could make. There are also inferences that would be invalid. Read the scenario again and look at the chart, then read each of the inferences below. Some are valid inferences and some are not.

| Valid Inferences | Invalid Inferences |
|---|---|
| <ul style="list-style-type: none"> On average, girls spend more time on Math homework than boys. Boys spend about 10 more minutes completing History homework than girls. Boys spend about twice as much time completing Math homework as they do English homework. Girls spends almost 1.5 hours on homework each night. Boys spend more time on homework than girls. | <ul style="list-style-type: none"> More girls like Math than English. More girls are enrolled in English than boys. More girls are enrolled in English than History. Boys make higher grades in Science than girls. |

The data set is only about the number of minutes boys and girls spend on homework in their core subjects. The data do not address favorite subject, enrollment, or grades. Valid inferences must be made based on the data given in the scenario or graph.

EXAMPLES

EXAMPLE 1: The librarian at Cypress Middle School conducted a survey of seventh grade language arts classes. During the first week of school, she randomly asked students in 1st period and 7th period language arts classes how many books they read over the summer. The results of her survey are shown below. Each student's response is represented by 



Use the results of the survey to complete the following statements.

- I. Three times as many students in ____ period read 3 books as students in ____ period.
- II. Students in ____ period were more likely to have read no books than students in ____ period.
- III. Students in 1st period were ____ likely to have read 2 books than students in 7th period.

STEP 1 Use the pictographs to compare the number of students who read 3 books in each population.

- For 1st period, 2 students read 3 books.
- For 7th period, 6 students read 3 books.
- $2 \times 3 = 6$, so three times as many students in 7th period than 1st period read 3 books.

Three times as many students in 7th period read 3 books as students in 1st period.

STEP 2 Use the pictographs to compare the number of students who read no books in each population.

- For 1st period, 4 out of 20 students read no books.
- For 7th period, 3 out of 20 students read no books.
- $\frac{4}{20} > \frac{3}{20}$, so students in 1st period were more likely to have read no books over the summer.

Students in 1st period were more likely to have read no books than students in 7th period.

YOU TRY IT!

Xuan manages a music store. She surveyed a random sample of customers to determine their favorite type of music. She also asked their age. Her results are shown in the table.

| Music Genre | Under 25 | Over 40 |
|-------------|----------|---------|
| Rock | 10 | 25 |
| Country | 8 | 10 |
| Tejano | 30 | 8 |
| Hip Hop | 12 | 7 |

For which population did half of respondents prefer Tejano music?

- Under 25: $\frac{\text{Tejano}}{\text{Total}} = \frac{\quad}{\quad} = \quad\%$
- Over 40: $\frac{\text{Tejano}}{\text{Total}} = \frac{\quad}{\quad} = \quad\%$
- Population with half: _____

STEP 3 Use the pictographs to compare the number of students who read 2 books in each population.

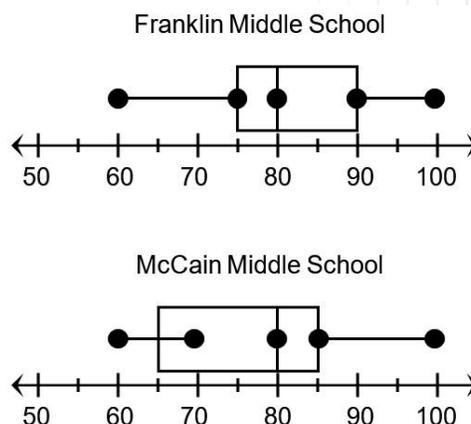
- For 1st period, 6 out of 20 students read 2 books.
- For 7th period, 5 out of 20 students read 2 books.
- $\frac{6}{20} > \frac{5}{20}$, so students in 1st period were *more likely* to have read 2 books over the summer.

Students in 1st period were more likely to have read 2 books than students in 7th period.

EXAMPLE 2: Students from Franklin Middle School and students from McCain Middle School recently competed in a band competition. 25 students from each school were randomly selected and asked for their contest scores. The comparative dot plots show the survey results.

Use the results of the survey to complete the following statements.

- The middle 50% of scores at McCain Middle School were _____ spread out than the middle 50% of scores at Franklin Middle School.
- The range of scores at McCain Middle School is _____ the range of scores at Franklin Middle School.



STEP 1 Use the comparative box plots to compare the middle 50% of the scores from each population.

- At McCain Middle School, the width of the box is $85 - 65 = 20$ points, so the middle 50% of the scores are spread out by 20 points.
- At Franklin Middle School, the width of the box is $90 - 75 = 15$ points, so the middle 50% of the scores are spread out by 15 points.
- The spread at McCain Middle Schools is greater than the spread at Franklin Middle School.

The middle 50% of scores at McCain Middle School were more spread out than the middle 50% of scores at Franklin Middle School.

STEP 2 Use the comparative box plots to compare the range of the scores from each population.

- At McCain Middle School, the range of scores is $100 - 60 = 40$ points.
- At Franklin Middle School, the range of scores is $100 - 60 = 40$ points.
- The range of scores at both schools is the same.

The range of scores at McCain Middle School is the same as the range of scores at Franklin Middle School.



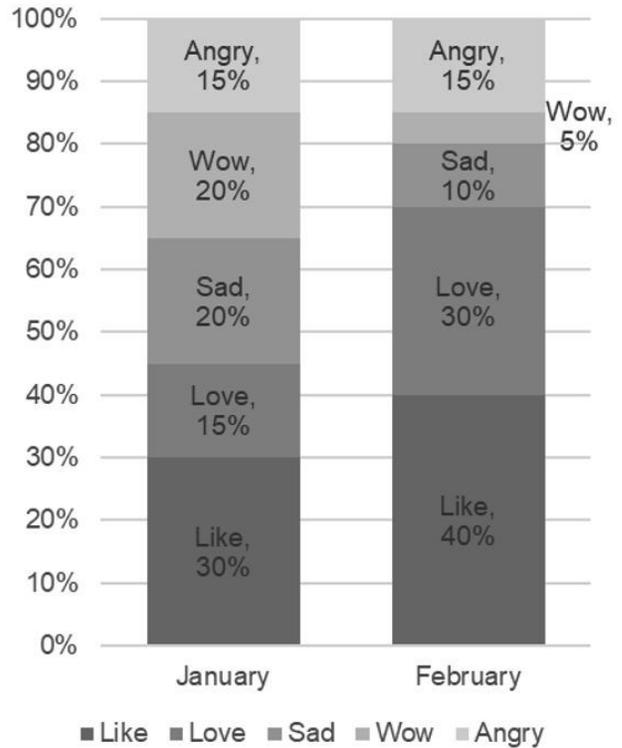
PRACTICE

Use the graph and information below to answer questions 1-3.

Denisha randomly selected 20 social media posts from January and 20 social media posts from February. The percent bar graph shows the distribution of reactions her friends made to this sample of posts.

- How many times did Denisha’s friends mark a post with “Love” in these two months?
- If Denisha actually made 120 posts in these two months, how many times did her friends mark a post with “Love” with all of her posts?
- Which two reactions in January had the same percent of reactions combined as “Like” did in February?

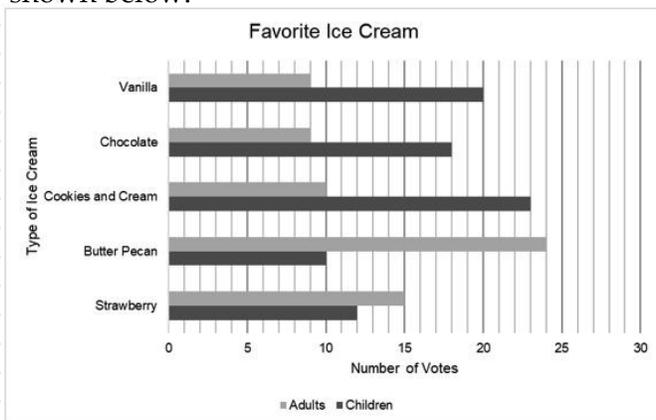
Social Media Posts



- Based on the survey, which of the following statements is true?
 - More than twice the number of children picked *Butter Pecan* than adults.
 - Exactly half the number of adults picked *Cookies and Cream* as children.
 - A total of 30 adults picked either *Cookies and Cream* or *Vanilla* as their favorite flavor.
 - The same number of adults were surveyed as children.

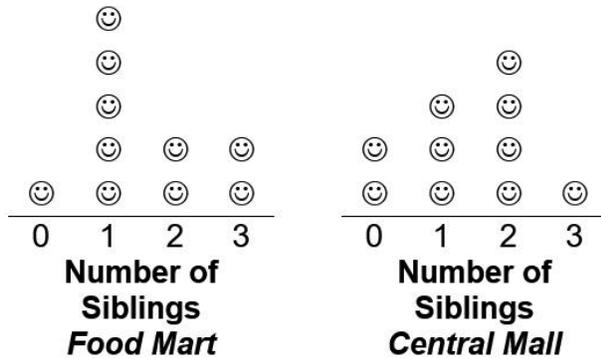
Use the graph below to answer question 4.

A local ice cream parlor randomly surveyed some of its customers over a recent Independence Day holiday. The manager asked children and adults their favorite ice cream flavor. The results of the survey are shown below.



Use the graph below to answer questions 5-6.

Ami took a survey at Food Mart and Central Mall. She asked 10 people at each location how many siblings they have. The results are shown. Each ☺ represents 1 person.



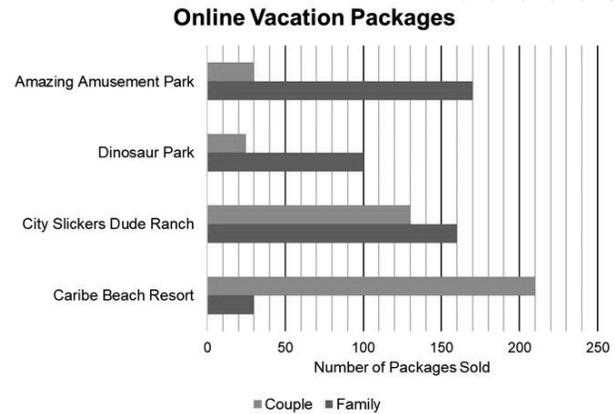
5. Based on the results of the survey, which of the following statements is **not** true?

- F Half of the people surveyed at *Food Mart* had only 1 sibling.
- G Twice as many people surveyed at *Central Mall* had no siblings as the people who had 3 siblings.
- H 50% of the people surveyed at *Central Mall* had either 2 or 3 siblings.
- J More people at *Central Mall* had 1 sibling than the people at *Food Mart*.

6. Based on the results of the survey, which of the following statements is true?

- A People who shop at *Food Mart* are less likely to have only 1 sibling than people who shop at *Central Mall*.
- B 20% of the people at *Central Mall* have no siblings.
- C 30% of all the people surveyed at both locations have no siblings.
- D 40% of all the people surveyed at both locations have 1 sibling or less.

7. An online vacation booking site randomly selected a sample of reservations from a recent 24-hour period. The analyst recorded the number of vacation packages sold to couples and to families. The results are shown in the graph.



Based on the data gathered, which of the following statements is true?

- F Families prefer the *Caribe Beach Resort* over *Amazing Amusement Park*.
- G The combined number of couples taking a vacation at *Dinosaur Park* and *Amazing Amusement Park* is greater than the number of couples taking a vacation at *City Slickers Dude Ranch*.
- H Over 300 families are going to vacation at either *City Slickers Dude Ranch* or *Amazing Amusement Park*.
- J The *Caribe Beach Resort* is the most popular vacation among families.