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Lesson Tutorials
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EXAMPLE **1** **Making Predictions from Samples**

You want to know if students at a school are in favor of building a new soccer field. You conduct two surveys. For Survey 1, you randomly ask 50 students in the lunch room. For Survey 2, you randomly ask 50 student athletes. There are 1200 students in the school.

Response	Survey 1	Survey 2
Yes	17	32
No	25	11
Not Sure	8	7

a. Use the results of each survey to predict the number n of students in the school that are in favor of building a new soccer field.

Find the fraction of students in each sample that responded "yes."

Survey 1		*Survey 2*
$\dfrac{17}{50}$	$\dfrac{\text{Responded "yes"}}{\text{Number in sample}}$	$\dfrac{32}{50}$

Multiply each fraction by the total number of students in the school to find n for each survey.

Survey 1	*Survey 2*
$n = \dfrac{17}{50}(1200) = 408$	$n = \dfrac{32}{50}(1200) = 768$

∴ Using Survey 1, you can predict that 408 students are in favor of building a new soccer field. Using Survey 2, you can predict that 768 students are in favor of building a new soccer field.

**b. Which prediction is more reliable? Explain.**

The sample in Survey 1 is selected at random, representative of the population, and large enough to provide accurate data. This sample is reasonable.

The sample in Survey 2 is not representative of the population because student athletes are more likely to be in favor of building a soccer field. This sample is not reasonable.

∴ The prediction from Survey 1 is more reliable because it uses a reasonable sample.

EXAMPLE 2 Using Samples to Compare Populations

The double box-and-whisker plot shows the gas mileages of random samples of cars and trucks. Compare the gas mileages of cars to the gas mileages of trucks.
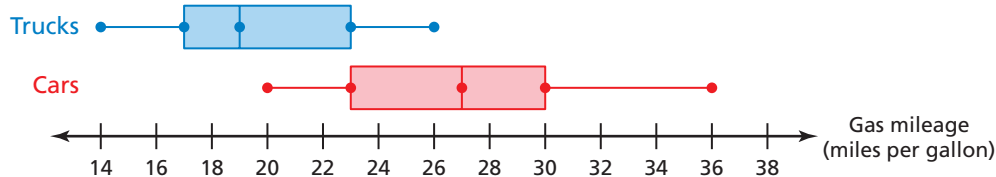

Trucks: The third quartile is 23 miles per gallon. So, 25% of the trucks get 23 miles per gallon or *more*.

Cars: The first quartile is 23 miles per gallon. So, 75% of the cars get 23 miles per gallon or *more*.

⋮ In general, cars get better gas mileage than trucks.

Practice

1. **SPORTS** You want to survey students in your grade about their favorite sport. Describe samples that are (a) reasonable and (b) not reasonable.

2. **PROJECT** Conduct the surveys in Exercise 1 at your school.

   a. Use the results of each survey to predict the favorite sport of the students in your grade.

   b. Do you think your predictions are reasonable? Explain.

3. **HEIGHT** The double box-and-whisker plot shows the heights of random samples of boys and girls in a school. Compare the heights of boys to the heights of girls.
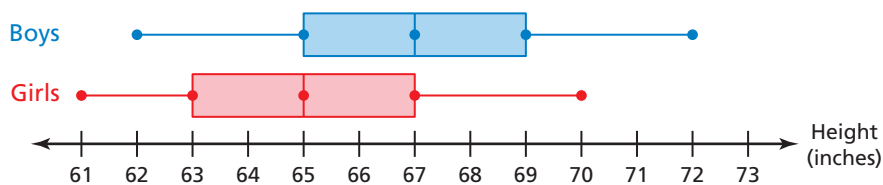
4. **GRADES** Each table shows a random sample of test grades in a class. Create a double box-and-whisker plot of the data. Compare the two data sets.

Grades in Mr. Smith's Class			
72	68	84	87
76	75	52	73
88	84	69	71
76	78	86	82

Grades in Mrs. Higsbee's Class			
85	88	93	78
76	65	71	86
90	96	85	88
79	90	82	94