Lesson 15.6:

Samples and Populations

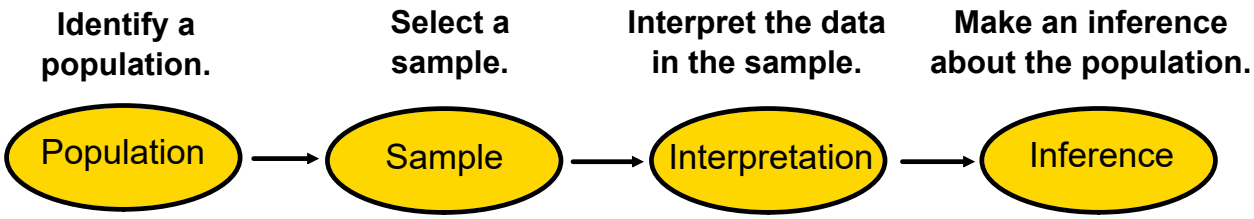
Essential Question

How can you determine whether a sample accurately represents a population?

A **population** is an entire group of people or objects.

A **sample** is a part of the population.

You can use a **sample** to make an *inference*, or conclusion, about a **population**.



Identify the population and sample.

1. residents of a city; senior residents of a city

P > S

2. members of a gym who play basketball; members of a gym

S < P

3. books in a classroom; nonfiction books in a classroom

P > S

4. travel mugs in a souvenir shop; mugs in a souvenir shop

S < P

An **unbiased sample** is a representative of a population. It is selected at random and is large enough to provide accurate data.

A **biased sample** is not representative of a population. One or more parts of the population are favored over others.

Work with a partner. When a sample is selected at random, each member of the population is equally likely to be selected. You want to know the favorite extracurricular activity of students at your school. Determine whether each method will result in a random sample. Explain your reasoning.

a. You ask members of the school band.

Not random - they'll choose band

b. You publish a survey in the school newspaper.

Not random - students w/ strong opinions will chose to answer

c. You ask every eighth student who enters the school in the morning.

Yes - all have = chance of being asked

d. You ask students in your class.

Not random - your class could be an elective, not rep. of whole school

Work with a partner. A new power plant is being built outside a town. In each situation below, residents of the town are asked how they feel about the new power plant. Determine whether each conclusion is valid. Explain your reasoning.

a. A local radio show takes calls from 500 residents. The table shows the results. The radio station concludes that most of the residents of the town oppose the new power plant.

Large → ✓

Random → ✗

✗

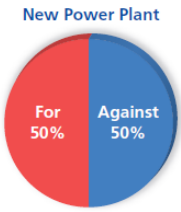
New Power Plant	
For	70
Against	425
Don't know	5

b. A news reporter randomly surveys 2 residents outside a supermarket. The graph shows the results. The reporter concludes that the residents of the town are evenly divided on the new power plant.

Large → ✗

Random → ✓

✗



c. You randomly survey 250 residents at a shopping mall. The table shows the results. You conclude that there are about twice as many residents of the town against the new power plant than for the new power plant.

Large → ✓

Random → ✓

(all have access to mall)

✓

New Power Plant	
For	32%
Against	62%
Don't know	6%

You want to estimate the number of students in a high school who ride the school bus. Which sample is unbiased?

- ✗ 4 students in the hallway
- ✗ all students in the marching band
- ✗ 50 seniors at random
- ● 100 students at random during lunch

1. WHAT IF? You want to estimate the number of seniors in a high school who ride the school bus. Which sample is unbiased? Explain.

C) 50 seniors at random

2. You want to estimate the number of eighth-grade students in your school who consider it relaxing to listen to music. You randomly survey 15 members of the band. Your friend surveys every fifth student whose name appears on an alphabetical list of eighth graders. Which sample is unbiased? Explain.

Every 5th → band members are biased towards enjoying music

You want to know how the residents of your town feel about adding a new stop sign. Determine whether each conclusion is valid.

a. You survey the 20 residents who live closest to the new sign. Fifteen support the sign, and five do not. So, you conclude that 75% of the residents of your town support the new sign.

Not valid → live near, most impacted

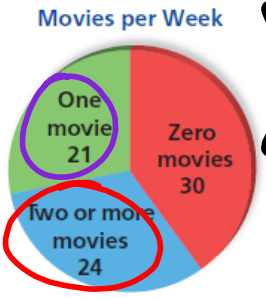
b. You survey 100 residents at random. Forty support the new sign, and sixty do not. So, you conclude that 40% of the residents of your town support the new sign.

Valid → large & random

3. In Example 2, each of 25 randomly chosen firefighters supports the new sign. So, you conclude that 100% of the residents of your town support the new sign. Is the conclusion valid? Explain.

Not valid → their job is biased towards safety

You ask 75 randomly chosen students how many movies they watch each week. There are 1,200 students in the school. Predict the number *n* of students in the school who watch one movie each week.



$\frac{21}{75} = \frac{x}{1200}$

$\frac{75x}{75} = \frac{25200}{75}$ $x = 336$

Predict the number of students in the school who watch two or more movies each week.

$\frac{24}{75} \overset{\times 16}{=} \frac{x}{1200}$ ($\times 16$)

$x = 384$