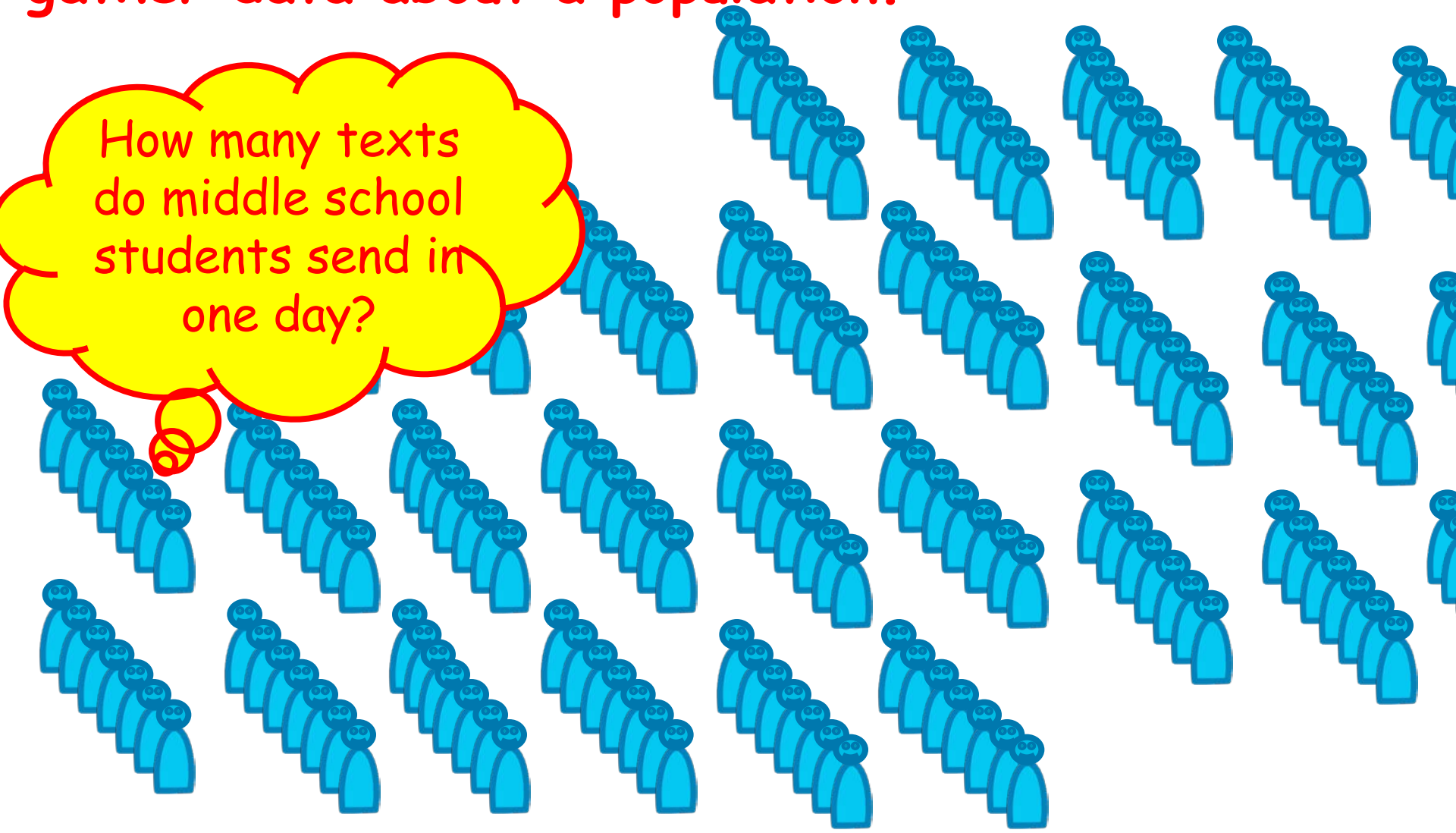
10.6

Sample and Populations

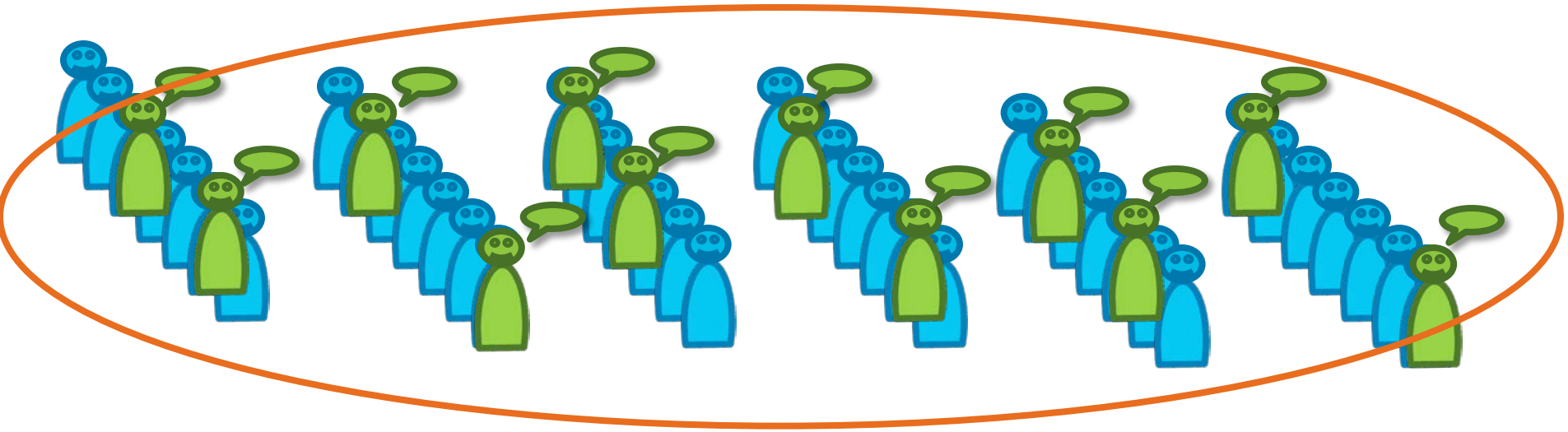
Do Now

How do you predict the winner of an election before the election takes place?

Statistical questions are used to gather data about a population.



By surveying a _____ of the group, you can make a _____ about the entire group.



The _____ is the entire group being studied.

A _____is part of the population being surveyed.

Examples

1) **Predict the winner of the upcoming presidential election.**

   Population - _____

   Sample - _____

2) **Tracking migration pattern of birds**

   Population - _____

   Sample - _____

Examples

3) To gauge students' preference for a new school mascot, the Student Council President surveys her soccer team.

Population - _____

Sample - _____

Hmm…

1) You are buying ice cream for a party at your school, in which 700 students will attend. How would you use sampling to make a generalization about students' preferred ice cream flavors?

2) Why not survey all 700 students?

3) Describe the sample you would survey, and explain why you chose that sample.

Making Predictions

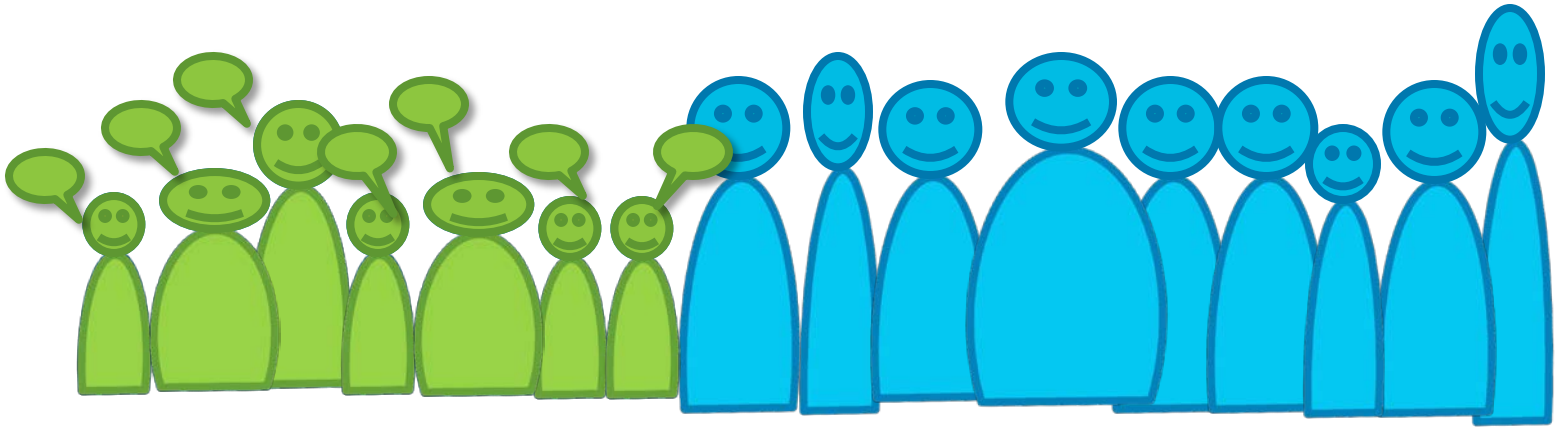
If you had to order t-shirts for your entire school, what sample would you choose to help you predict how many t-shirts of each size to order?

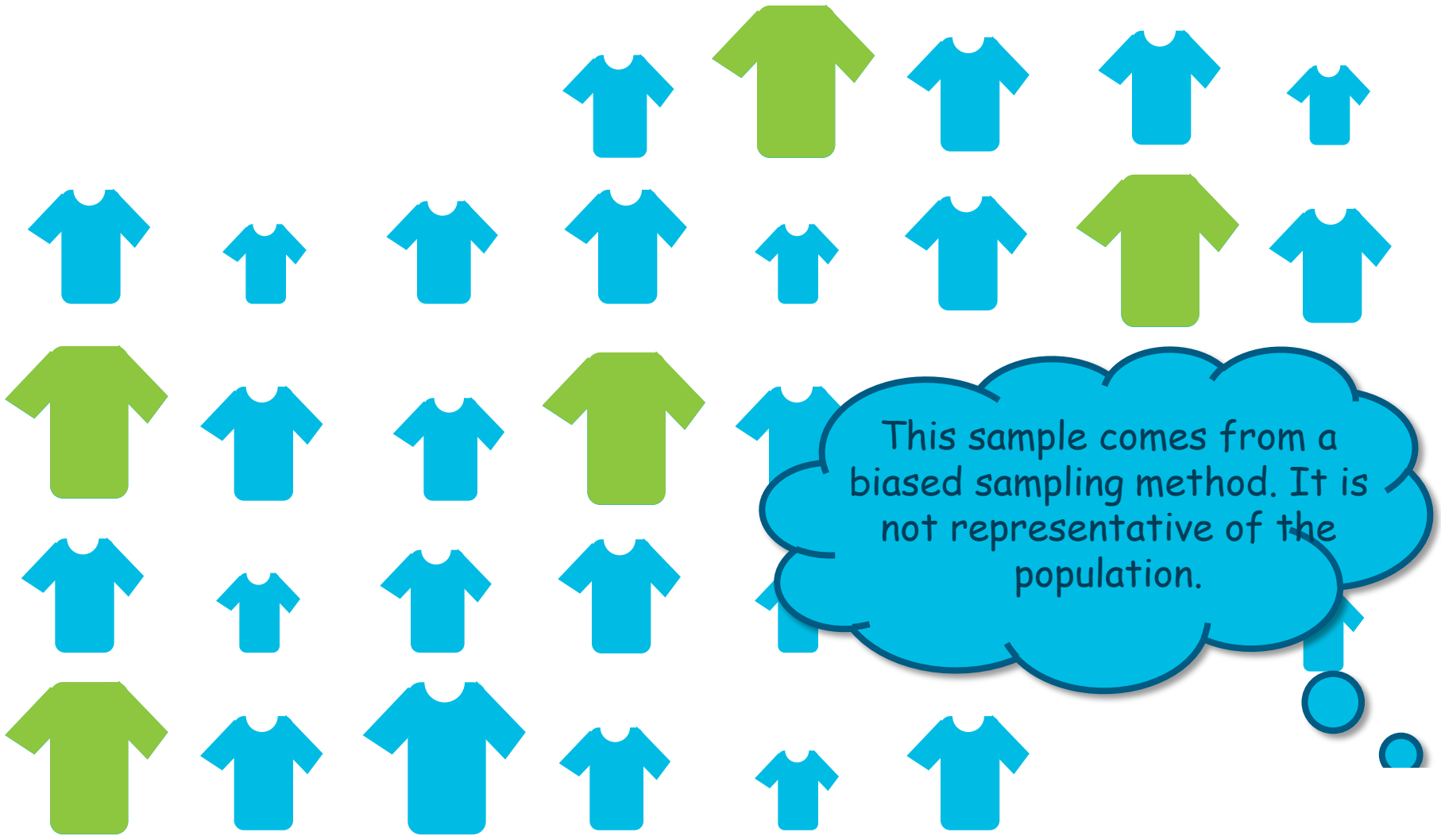
Biased vs Unbiased Sampling

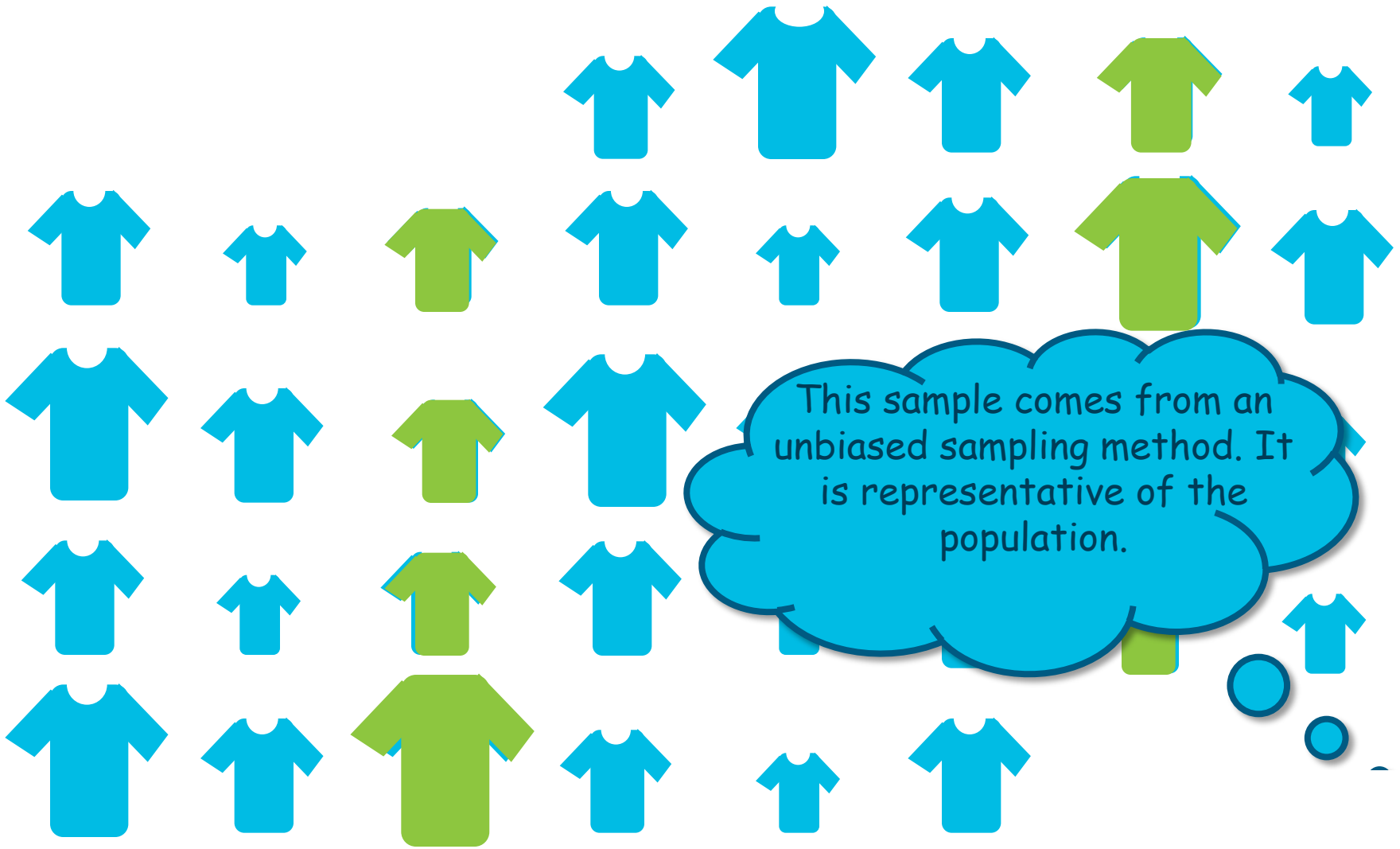
Unbiased sample: _____ **of a population. It is selected at** _____ **and is** _____ **enough to provide** _____ **data.** NOT VALID

Biased sample: _____ _____ **of a population.** ___ **or** _____ **parts of the population are** _____ **over** _____. VALID

Not all samples will lead to good predictions about an entire population.




This sample comes from a biased sampling method. It is not representative of the population.


This sample comes from an unbiased sampling method. It is representative of the population.

Biased vs Unbiased?

Color of leaves in September

a) 100 fallen leaves collected from the ground
b) 100 leaves on tree branches
c) 50 fallen leaves and 50 leaves on branches
d) 50 fallen oak leaves and 50 oak leaves on branches

Biased vs Unbiased?

Estimate the number of students in a high school who ride the school bus. Which sample is unbiased?

a) 4 students in the hallway
b) all students in the marching
c) 50 seniors at random
d) 100 students at random during lunch

What if you want to estimate the number of seniors in high school who ride the school bus. Which sample is unbiased?

Biased vs Unbiased?

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.

Valid vs Not Valid?

2) 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.

3) 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.

Predicting Proportion

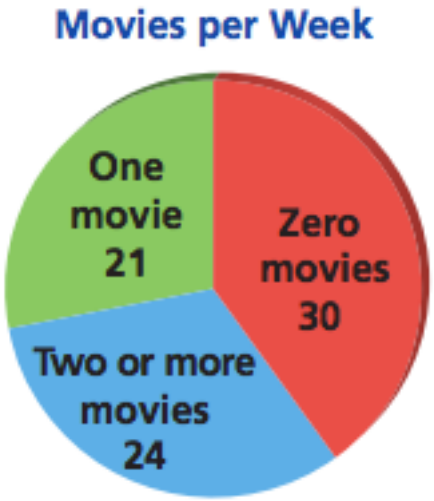
$$\frac{\text{sample piece}}{\text{sample size}} = \frac{X \text{ (prediction)}}{\text{entire population}}$$

1) **A university has 30,600 students. In a random sample of 240 students, 20 speak 3 or more languages. Predict the number of students at the university that speak 3 or more languages.**

2) There are 4500 elk located on a preserve in Colorado. A biologist thinks that the herd may be infected with parasite. She does a random sample of 50 elk. If she discovers that 8 of the sample is infected. Predict how many elk the biologist can expect to be infected.

3) 56 students have traveled. Zack chooses a random sample of 50 out of 400 students. He finds that 7 of them have traveled to a foreign country. Zack claims that more than 50 of the 400 students have traveled to a foreign country. Do you agree with his answer? Explain.

4) You ask 75 randomly chosen students how many movies they watch each week. There are 1200 students in the school. Predict the number of students in the school who watch one movie each week.



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