STATISTICS: UNIT 7
Sampling & Populations

Basic Vocabulary

- **Statistics** : the branch of math that deals with collecting, organizing, interpreting, and presenting data
- **Survey**: a method of gathering information about a specific group of items or individuals

- **Population**: the entire group of items or individuals being studied

- **Sample**: a part of the population being studied
  - A representative sample of the population is needed in order to make a valid inference, or an accurate prediction based on data.

- Example

Population: all pennies currently in circulation

Sample: one penny from each 7th grade student

- **Unbiased sample**: A sample that is selected so that it is representative of the entire population.
  - An unbiased sample is selected at **random** and is large enough to provide accurate data.

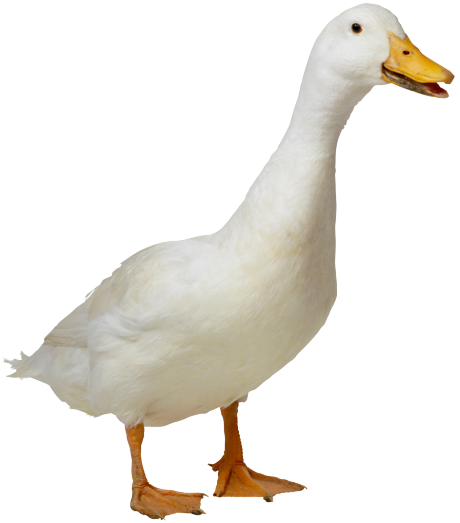
- **Biased sample**: A sample drawn in such a way that one or more parts of the population are favored over others.

Example 1: A 7th grade advisory was surveyed to determine how many texts students at Blake Middle School send each day.

- What is the population?
- What is the sample?
- Biased or unbiased?

Example 2: To track migration patterns of a particular species of bird, scientists randomly tag, release, and track 50 birds of that species.

- What is the population?
- What is the sample?
- Biased or unbiased?



Biased or unbiased?

Example 3: If you were taking a survey of the different colors of leaves seen in September, which of the following would be an unbiased sample?

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, 50 oak leaves on branches

Biased or unbiased?

Example 3: If you were taking a survey of the different colors of leaves seen in September, which of the following would be an unbiased sample?

a. 100 fallen leaves collected from the ground

Biased: The same color of leaves might fall first.

b. 100 leaves on tree branches

Biased: The same color of leaves will come off the tree.

c. 50 fallen leaves and 50 leaves on branches

Unbiased: This gives a mix of leaves that have and have not fallen, and it doesn't specify a certain type of tree.

d. 50 fallen oak leaves, 50 oak leaves on branches

Biased: This only looks at oak leaves, which may not represent all trees in the area.

Example 4: You want to estimate the number of 7th grade students that walk home right after school in the spring time. Which sample is unbiased?

a. Three 7th grade students randomly selected in the hallway before homeroom
b. 7th grade members of the Modified Track Team
c. Every fifth 7th grader walking down the sidewalk after school
d. Every fifth student from an alphabetical list of the 7th graders

Example 4: You want to estimate the number of 7th grade students that walk home right after school in the spring time. Which sample is unbiased?

a. Three 7th grade students randomly selected in the hallway before homeroom
   - Biased: The sample is too small to make an accurate conclusion.

b. 7th grade members of the Modified Track Team
   - Biased: they stay after school for practice in the spring

c. Every fifth 7th grader walking down the sidewalk after school
   - Biased: they are already walking home when surveyed

d. Every fifth student from an alphabetical list of the 7th graders
   - Unbiased: represents the population of 7th graders, selected randomly, and large enough sample to provide accurate data

Using samples to make inferences about a population

- There is a lake with trout, whitefish and walleye in it. You want to make some inferences about the fish in the pond.
- In a random sample of 300 fish, there are 125 trout, 130 whitefish, and 45 walleye. Based on this sample, you could say that:
  - there are more trout and whitefish than walleye in the lake.
  - there are about ⅓ as many walleye as trout or whitefish.
- Be careful saying that whitefish are the most common fish.
  - In our sample this is true, but it's not significantly bigger.
  - The sample was random, so having only 5 fish difference would not necessarily mean that whitefish were the most common fish.