# SAMPLING TECHNIQUES

**Learning Goals**

    **- describe how data can be collected for a survey**

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*Some terminology...*

**Statistics:** is the collection and ___*analysis*___
                     of information

**Data:** facts or collected pieces of ___*information*___

**Population:** _all_ individuals or items that _belong_ to a group being studied

e.g. all HS students in Ontario

**Sample:** only a _part_ of the population is studied

e.g. only MT students

**Census:** _data_ collected about _all_ Canadians every _5_ years

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## Population                    Sample
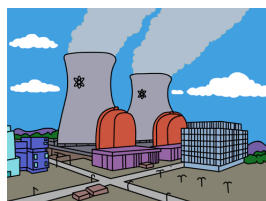
## Population

## Sample



## Population



## Sample

**Bias:** A _sample_ that does _NOT_ accurately reflect the entire _population_.
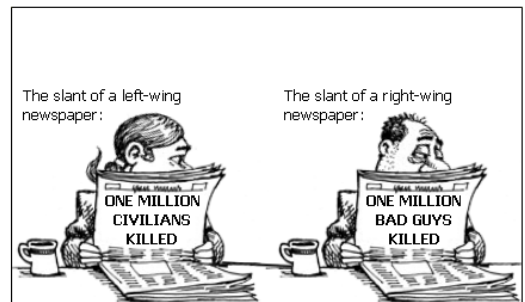
Bias may be caused by...

- an unrepresentative sample        Rm 326

- the wording of the questions
    Tim's is the best coffee, isn't it?

- the interpretation and presentation of the results

**Skewed News**   by  Eric Per1in

The slant of a left-wing
newspaper:

The slant of a right-wing
newspaper:

ONE MILLION
CIVILIANS
KILLED

ONE MILLION
BAD GUYS
KILLED

www.funnytimes.com

**5**

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**Primary Source:** a person who collects data for their _own_ use
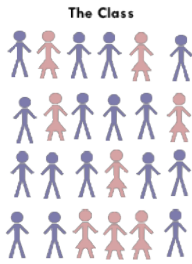                e.g. You conducting  a survey.

   How?    mail, phone, text, in person

**Secondary Source:**  a database or research collected by _someone_ else

   How?    Internet, newspapers, library archives

**Six Sampling Techniques**

The Class

1. **Simple Random Sample:** Each member of the *population* has an *equal chance* of being *selected*

(i.e., put numbers in a hat & select students # 3, 7, 9, 10, 12, 24 )

Problem: not always an *accurate representation* of the population

1. **Systematic Sample:** Every *$n^{th}$ student* of the population is selected. (i.e., Sample every 4th student ).

Population is better represented with 3 boys and 3 girls.

1. **Stratified Random Sample:** The population is *divided* into *subgroups* (i.e., gender, age, nationality) and a *random sample* is selected from each subgroup in *proportion* to its size in the population

🧍 = 16 students ● → ¼ boys = 4 🧍🧍🧍🧍    🧍 = 8 students ● → ¼ girls = 2 🧍🧍

1. **Voluntary Response Sample:** The sample contains *members of population* who have *chosen* to *respond* to the survey. (i.e., a comment card)

1. **Cluster Sample:** The population is *divided* into clusters and a *certain #* clusters are chosen. Every *member* of the cluster is part of the *sample*

1. **Convenience Sample:** The sample contains those members of the population from which *data* is most easily *collected*

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*EXAMPLES*

1. A high school Vice-Principal enters the cafeteria and randomly selects two tables. All students at those two tables are surveyed.

Population: *H.S. students*

Sample: *people at 2 tables*

Type of Sampling: *cluster*

Is there bias in the survey? Explain. *friends have similar views*

1. A school is divided into 4 groups by grade. There are 300 grade nines, 350 grade tens, 270 grade elevens and 320 grade twelves. Proportion of each group chosen 10%. Thirty grade nines are surveyed, 35 grade tens, 27 grade elevens and 32 grade twelves.

Population: *H.S. students*

Sample: *10% of students in each grade*

Type of Sampling: *stratified*

Bias? Explain. *NO → same proportion* *YES → age sensitive questions*

1. Students from Ms. Bailey's math class are given a survey assignment. Crystal goes home and surveys her immediate family only.

Population: *Depends on the question*

Sample: *people in family*

Type of Sampling: *convenience*

Bias? Explain. *YES → family has similar views*

# Seatwork / Homework

# Handout

1. Choose the best **sampling technique** for each survey. **Explain** your choice.

a) A bolt manufacturer wants to determine the average length of bolt being made by a machine.

Systematic

b) The president of a company wants to know which of two potential vice-presidents the employees prefer.

simple random or systematic

c) A music store wants to know what type of music they should stock for an upcoming sale.

stratified

2. Identify the **population** and the **sample** in each situation.

a) You ask every student in your class about their favourite snack to recommend the type of snacks the cafeteria should sell.
Population: ___HS___
Sample: ___class___

b) All the dentists in the greater Toronto area are asked if they would recommend a new toothpaste designed to whiten teeth, so the manufacturer can indicate the percent of dentists who recommend the product on the box.
Population: _____dentists
Sample: _____
dentists in Toronto

3. The government of Ontario wants to know how many college students find work right after they graduate.

a) Identify the population.
college grads

b) Is it practical to survey the entire population? Explain.
no, too many

c) How could the whole population be surveyed effectively?

census

4. Can you make accurate conclusions based on a sample of 10% of a population?  Explain.

**yes that is the minimum required**

5. Renee works as a quality control officer at a lumber yard. She selects every 200th two-by-four that is cut and measures its dimensions.

   a) What type of sampling technique is she using?

   **systematic**

   b) How could Renee improve her sampling technique?

   **stratified or simple random**

6. The parent-teacher council wanted to determine the number of hours students spend on homework each night.  The survey:

   | Grade | # Students | # Surveyed |
   |-------|-----------|-----------|
   | 9     | 225       | 15        |
   | 10    | 250       | 20        |
   | 11    | 310       | 25        |
   | 12    | 125       | 25        |

   a) Is the sample representative of the population?  Explain.

   **no, not the same % of each grade**

   b) What type of sampling technique was used?

   **stratified**

   c) Is this an appropriate technique?  Explain.

   **yes -  but at least 10%
        - same % of each grade**