

Important Concepts . . .

Preview Review



Mathematics Grade 9

W3 - Lesson 14: Representing Data

Important Concepts of Grade 9 Mathematics

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Materials Required

Paper
Pencil
Grid Paper

**No Textbook
Required**

**This is a stand-
alone course.**

Mathematics Grade 9

Version 6

Preview/Review W3 - Lesson 14

ISBN: 978-1-927090-00-8

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Preview/Review Concepts for Grade Nine Mathematics



W3 – Lesson 14:

Representing Data

OBJECTIVES

By the end of this lesson, you will be able to:

- Describe the effect of bias, use of language, ethics, cost, time and timing, privacy or cultural sensitivity on the collection of data.
- Select and defend the choice of using either a population or a sample of a population to answer a question.
- Develop and implement a project plan for the collection, display and analysis of data by
 - Formulating a question for investigation
 - Choosing a data collection method that includes social consideration
 - Drawing conclusions to answer the question

GLOSSARY

First-hand data: Data collected by counting, conducting polls, conducting experiments or using measuring devices.

Second-hand data: Data that is not obtained directly, usually from sources such as encyclopaedias, newspapers, reference books and the internet.

Sample: A sample is a small, subset of a population.

Population: A population is an entire defined group. Statistics are used to describe a population and to make predictions about a population. When a population is large, usually a sample of the population is used to represent the entire population.

Bias: Anything that skews or contaminates to sway an opinion one way or another. Bias can exist in a sample, in a question, in a graph, etc.

Frequency: Frequency represents the number of specific items in a set of general items, or the number of times an event occurs in an experiment. Since frequency represents "the number of ...", the letter "n" usually stands for frequency.

Graph: In mathematics, a graph is a visual representation of the relationship of two (or more) variables in an equation (relation). In statistics, a graph is a visual representation of data.

W3 – Lesson 14: Representing Data

Materials required:

- Paper, Pencil, and Grid Paper

Part 1: Understanding Bias

Statistics is a way of showing a gathering a data. Data can be any of the following:

First Hand Data: You have collected this data **yourself**.

Ex. Going out to do a survey, reading a book yourself.

Second Hand Data: You use data that was collected by **someone else**.

Ex. Using data gathered by another class, using a book, using the internet, reading the newspaper.

Combination: using data that you have collect and data that was collected by someone else.

Ex. Using your survey and the survey done by another class.

There are certain factors that can influence data. These factors can affect how the data is collected or how the responses were obtained.

A **bias** is to favour one group over another, not doing a random sample.

Example 1

12 kindergarten students were asked, “Do you own a car?”

The bias here is that no kindergarten children would own a car. Therefore, if this was the sample population used for the question, “Do you own a car,” the results would all be negative.

Example 2

A Grade 9 sports team is sponsored by FizzlePop, a soft drink company. They were asked what type of vending machine they would like to have in the school cafeteria.

The bias here is asking students who receive support and funding from FizzlePop, a soft drink company. It is highly likely they will suggest a vending machine that sells this same brand of soft drink because of that.

Practice Questions

1. Identify the bias in each of the following statements. Re-write each question to eliminate the bias.

- a. Grade 1 students were asked who is their favourite hockey team.

- b. Fred went to to a local service station and asked how many people owned a car.

- c. Kaylee asked 50 students if they enjoy going swimming on weekdays.

Part 2: Considering Other Influencing Factors

There are other influencing factors besides a bias that can affect how data is collected or how responses are obtained. These factors include:

Use of the language in the question: The language must be clear, free of bias, and easy to understand. Participants must understand the question being asked.

Ethics: When surveying people, the question asked must be appropriate and must not offend the participants of the survey.

Cost: When conducting a survey, is it cost effective? For example, do the benefits justify spending the money to conduct the survey?

Time: When conducting the survey, how much time will it require? Is the time frame realistic? Does the time when the data is collected affect the results one way or another?

Privacy: Does the survey violate someone's privacy? Do the participants have the right to refuse to answer the question?

Cultural Sensitivity: It is important to construct the question so that it does not offend anyone from cultural groups and also so that all cultures can understand the question equally.

Example 1

Identify any influencing factors in the following question:

A telemarketer calls the Smith family one evening at 9:00pm. As she asks the question to Mrs. Smith, Mrs. Smith replies back that she is not interested in participating in the survey at this time. The telemarketer responds back, "Why not? Your information is extremely valuable to us. We are simply trying to create the best product possible and really want your input." The telemarketer begins to repeat the question.

Ethics: To push someone into answering a question they have already declined is not fair to the participant. Chances are the information that is collected will not be valid. They just want to get off the phone.

Time: Calling at 9:00pm is not appropriate. This phone call should have been earlier in the evening. 9:00pm is when many families are preparing for bed.

Privacy: The sales representative is not respecting the individual's right to choose whether or not to participate in the survey.

Practice Questions

1. The following situation to answer questions a and b.

As Brianna is surfing the internet, a survey pops up, regarding opinions on soap products. The survey offers a free download from an online music store for everyone who completes the survey. Brianna is unable to close the pop up box on her computer. The company is not associated with the online music store.

- a. Identify at least 3 influencing factors in the following situation.

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are approximately 20 lines visible. The paper has a slight shadow on its right side, suggesting it's resting on a surface.

- b. Re-write the situation so that it is free of influencing factors.

Part 3: Samples and Populations

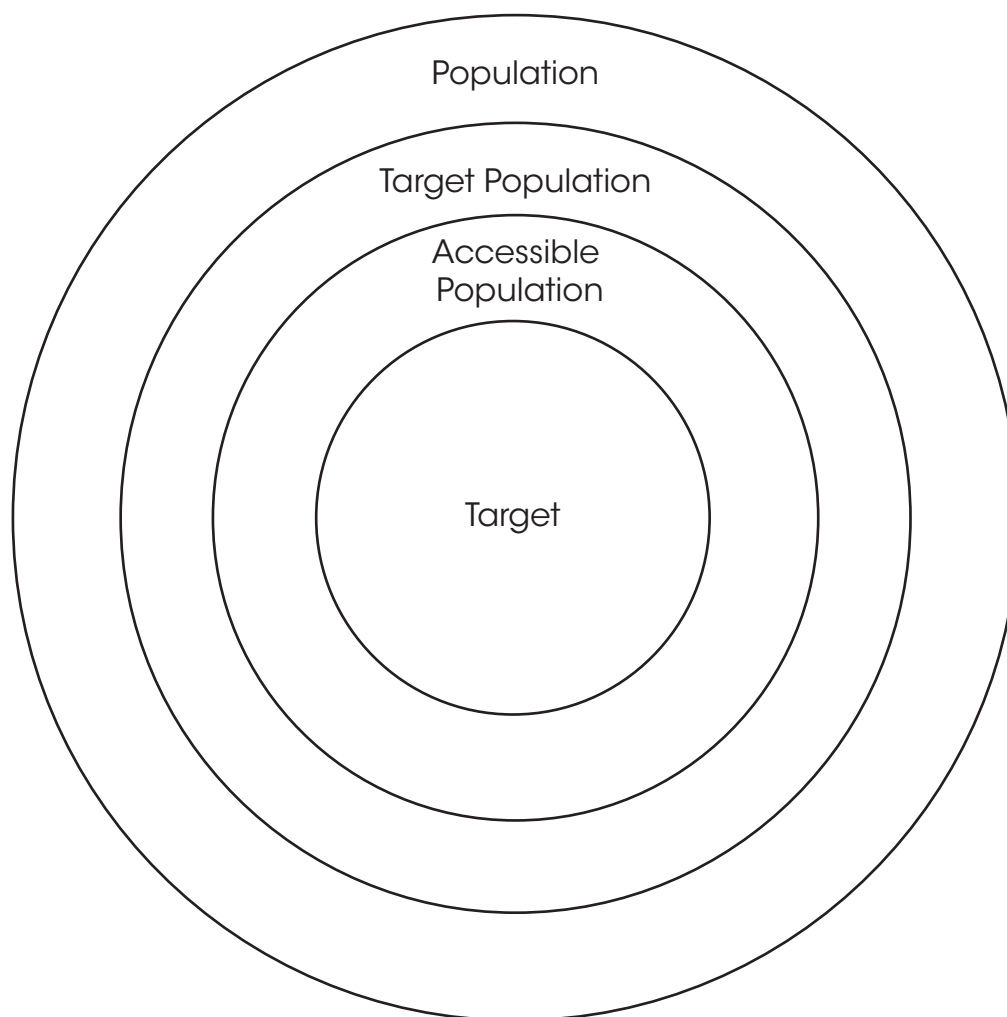
Sampling is important because everyone who is qualified to take a survey may not be available due to time, money, etc. A sample is taken to get a general idea of what the group will want. Statistics are calculated from the sample and used either to describe the population or make inferences about the population.

Population: everyone

Target population: the individuals impacted by the survey

Accessible Population: the amount of people available to sample

Sample: the individuals who are surveyed



The process for selecting a sample should ensure that a "random" selection from the population is made. A random selection will occur if each member of the population has an equally likely chance of being chosen for the sample. When the sample is random, statistics calculated using the sample better describe the population and more accurately make predictions about the population.

Example 1

Population: Citizens of Taber

Target Population: Students

Accessible Population: Autumn Springs Middle School

Sample: Grade 9 Classes

Sample Populations are used to describe the population or make inferences about the population.

For example, 25 students were polled, and 11 indicated they owned at least one pet. Using this data, predict how many of the 350 students have pets.

$$\frac{11}{25} = \frac{x}{350} \quad \text{Cross multiply}$$

$$3850 = 25x$$

$$x = 154$$

One can predict that 154 out of 350 students will own at least one pet.

Example 2

Which is the better sample to find out “How many people own a pet?”

- people shopping at the mall: *this is the best random sample.*
- people shopping at SuperPetCo: *not a good sample because it is likely that they all will own a pet since they are at a pet store.*
- 5 people walking down the street: *this is not a big enough sample.*

Practice Questions

1. Choose the better sample for each question.

a. How many own a car?

People shopping at the mall: _____

10 people walking down the street: _____

People at the bus stop: _____

b. How many people enjoy watching football on T.V?

People shopping at the mall: _____

People shopping at a local sporting goods store: _____

Students in a Kindergarten class: _____

2. An individual wants to determine how many students in Huntsville participate in extra curricular activities. 30 students from P. T. High School in Huntsville were randomly polled in the hallway at their school; 15 of them indicated they participate in extracurricular activities.

a. Identify the:

Population: _____

Target Population: _____

Accessible Population: _____

Sample: _____

b. Predict how many students in the school participate in extracurricular activities if there were 420 people in the school.

Lesson 14 Assignment

1. Rewrite each survey question without any influencing factors.
 - a. A survey was conducted at the airport. People were asked the following question:
Do you think that flying is the cheapest way to travel long distances?

- b. A recent survey shows that 44% of adolescents will use the Internet to watch TV programs. What TV programs do you watch most often on-line?

2. Keenan asked questions to verify his prediction. What is the bias in each?

- a. Keenan asked the basketball team if they enjoy playing basketball.

- b. Keenan asked a local sporting goods store how many boys buy a particular brand of sneakers to play basketball.

- c. Keenan noted that 18 out of 160 males enrolled at his school are part of the basketball team. He predicts that a neighbouring school with a population of 800 males would have roughly 200 of them as part of their basketball team.

3. For each of the following situations, identify the population for each survey. Indicate whether the entire population should be used or a sample.

- a. Which heavy metal band is the best?

- b. Who will be the grade 9 student body president?

- c. What percentage of a home owner's property tax should be put toward local road maintenance?

