

*Important Concepts . . .*

# Preview Review



**Mathematics   Grade 9   TEACHER KEY**  
**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

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# Preview/Review Concepts for Grade Nine Mathematics

## Teacher Key



***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.

*The bias here is that most grade 1 students like the hockey team their parents like or are unfamiliar with the different teams due to their age.*

*Possible re-write: I will ask 50 people at a local mall, "Who is your favourite hockey team?"*

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

*The bias here is that if someone is at a local service station, they are most likely having their vehicle serviced, so people being surveyed most likely own a car.*

*Possible re-write: I will select 50 people randomly from the phone book and ask, "Do you own a car?"*

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

*The bias here is that most students are in school during the weekdays.*

*Possible re-write: Kaylee asked 50 students if they enjoy swimming.*



## 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.

***Bias: The survey contains a bias. Only people who are on line have the opportunity to answer. These people are more likely to take the survey for a free download.***

***Ethics: The survey is not associated with an online music store.***

***Did they get permission from an online music store to use their name?***

***Cost: If lots of people took the survey and they offer a free download each time, the cost of downloads could be expensive.***

***Privacy: Brianna is not able to decline the survey. She should be given the right to close the pop up, without responding to the survey.***

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

***As Brianna is surfing the internet, a survey pops up, regarding opinions on soap products. She has the choice to take the survey, say no thanks or take the survey at another time.***

### Part 3: Samples and Populations

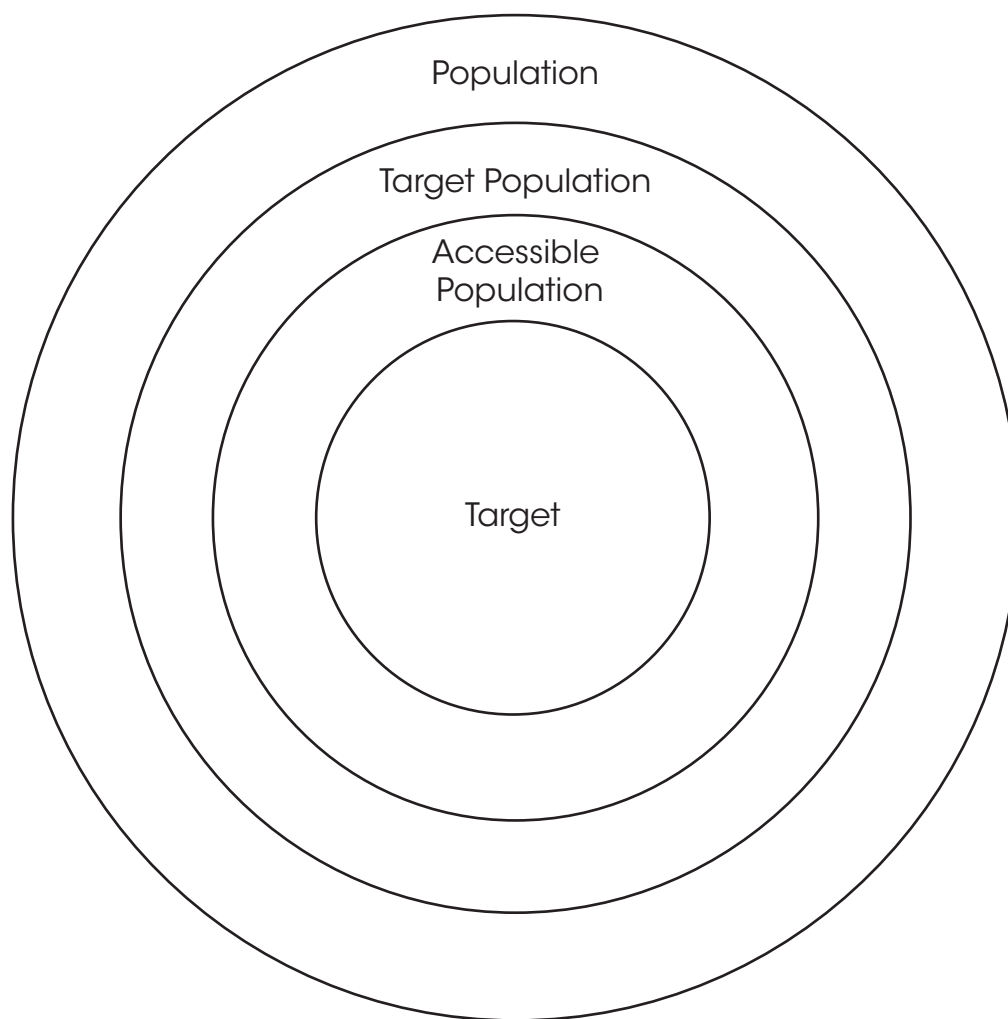
**Sampling** is important because everyone who is qualified to take a survey may not be available due to time, money, etc. A sample is taken to get a general idea of what the group will want. Statistics are calculated from the sample and used either to describe the population or make inferences about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

10 people walking down the street: **the sample is too small**

People at the bus stop: **not a good sample (likely they don't own a car and that is why they are at the bus stop)**

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

People shopping at the mall: **a good sample**

People shopping at a local sporting goods store: **people at a sporting goods store are more likely to enjoy watching sports on TV**

Students in a Kindergarten class: **young children usually don't like watching sports on TV**

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: **students in Huntsville**

Target Population: **High School students**

Accessible Population: **students at P. T. High School**

Sample: **30 random students in the hallway**

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

**210**

## 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?

*Conducting the survey at an airport is not going to provide valid results because people at the airport are more likely to be in favour of flying. Instead, the same question could be asked in a more random location.*

- 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?

*This question does not take into account that the people answering the question may not be in the 44% who watch programs on-line. Instead you could ask students: Do you watch TV programs on-line and if the answer is yes, proceed with the survey question.*

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.

*Asking a basketball player if he/she enjoys playing basketball will likely get a high response of yes.*

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

*Approaching the store directly will only yield results specific to that particular store.*

- 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.

$$\frac{18}{160} = \frac{x}{800}$$

$$x = 90$$

***Keenan should predict 90 males are part of the other school's 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?

***The population surveyed should be people who like heavy metal music. A sample population could be used, by surveying people in the heavy metal section of music stores.***

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

***The grade 9 students of that school make up the population being targeted. The entire grade 9 population should be surveyed, since it is a relatively small population.***

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

***Tax payers and home owners make up the target population. Surveying the entire population could be time consuming and expensive; a sample population of home owners could be used. The sample population should not be limited to car owners, since roads are needed by everyone (for public transportation, for emergency vehicles, for garbage disposal).***





