**Math 9 Chapter 9 – Probability and Statistics Review**

**LEARNING OUTCOME: 9B:** I can identify and address problems related to data collection.

1. Choose the term that best matches the description below. **A term may be used more than once or not at all.**

**A**. bias & Use of Language **B**. privacy **C**. cost **D**. timing

**E**. cultural sensitivity **F**. time **G.** ethics

(a) Responses are not kept confidential or respondents do not have the right to refuse to answer. **B**

(b) The period during which the survey is conducted influences the responses. **D**

(c) Survey questions show a preference or favour a specific answer.  **A**

(d) The expense of the survey is greater than the benefits obtained. **C**

(e) The wording of the question is not clear. **A**

1. A company with a factory conducts a survey.
“The proposed new factory will produce 250 jobs and economic benefits for your community. Are you in favour of having a forward-thinking factory in your community? YES or NO”
	1. Does the survey question influence the results? Explain.

**Yes it does – it is biased towards building the factory by using language such as economic benefits and “forward-thinking”. These positive oriented words are going to influence the participants to select yes.**

* 1. Rewrite the question so that it is free of influencing factors.

**Are you in favour of the proposed new factory? YES OR NO**

**Information on the positives and negative factors of the factory should be given to the public before the survey!**

1. For each situation, identify any bias or influencing factors. Explain why.
	1. Free samples of sunscreen are sent to every home in the **fall and winter.** A mail reply card asks people **if they would use the product again**.

**Timing – this is not a great time for a sample to be sent out because they are most likely not going to be using sunscreen in the fall or winter. The results would probably say that most people wouldn’t use the sunscreen again**

* 1. A grocery store employee conducts a telephone survey of people living within 10 kilometres of the store. To help determine what meat products to sell, she asks what type of red meat people prefer.

**Cost and Use of language**

**It will take way too long to survey everyone living within a 10 km radius of the grocery store. PLUS calling the takes even longer!**

**Also, if she wants to determine what meat products to sell – she should not limit the options to just red meat.**

* 1. Your school is under construction and is quite dusty and dirty. A survey is conducted about the environmental health of your school. The survey is done every four years.

**Timing – your school is under construction right now! In four years, the construction will probably be finished and the survey would get completely different results**

* 1. A sales representative sets up an online survey. The survey offers a free MP3 file of a song that was downloaded from the Internet to everyone who completes the survey. The company has not bought the rights to the song.

**Ethics & Bias – the participants might be biased to give a positive survey since they are getting something free.**

**It is not ethical to provide the song when they have not bought the rights to the song.**

**LEARNING OUTCOME: 9C:** I can use either a population or a sample to answer a question.

1. Identify the population of each survey:
	1. The manager of an apartment building wants to find out which apartments in the building need new carpet.

**Everyone that lives in the apartment building**

* 1. The manager of a video game store in Burnaby wants to find out how many video games are owned by the average teenager in town.

**All of the teenagers in Burnaby.**

* 1. A company that manufactures programmable thermostats wants to test its thermostats for defects.

 **All of the company’s programmable thermostats.**

1. Identify the population for each situation. Then, state whether you would survey the entire population or a sample of the population. **Explain your reasoning.**
	1. A coffee shop owner wants to know if her customers are satisfied with the service.

Population?: **All of the coffee shop’s customers**

Use Census or sample?: **Sample – it will be difficult to ask every single customer. Some customers will only go to a coffee store once and it is difficult to predict when each customer will come in.**

* 1. The school board wants to know how many hours of homework students do each day.

Population?: **Every single student in the school board (Burnaby school district)**

Use Census or sample?: **Sample – it will take too long to reach every single student in the district but it is possible to get enough students to get a decent sample (e.g. 100 students in each grade from a selection of different schools?)**

* 1. An outdoor rock-climbing school wants to inspect its equipment for safety.

Population?: **All of the rock climbing school’s equipment**

Use Census or sample?: **Census!! It needs to make sure that all of its equipment is safe. They cannot risk that one of the pieces of equipment will not be safe.**

1. In each case, a sample was used to collect data. **Do you think the conclusions would be valid**? Explain.
	1. To find out of more daycare centres are needed in the city, all residents over the age of 50 were surveyed.

**Invalid: People over the age of 50 are much less likely to have kids who are young enough to go to daycare**

* 1. To find out what percent of the vehicles in a mall parking lot have a bumper sticker, Neil looks on the bumper of every fourth vehicle.

**Valid – it would be tough to look at every single vehicle. A systematic sampling method makes sense here**

* 1. To find out how many players on the hockey team use a wooden stick, the coach surveyed all defensemen.

**Invalid – the coach only surveyed the defensemen – offensive players may use a different type of stick. He should make sure to ask either all the players or at least make sure he gets a variety of players**

**LEARNING OUTCOME: 9D:** I can understand and use different sampling methods.

1. Match each statement with the correct term. Each term may be used once, more than once, or not at all.

**A**. Simple Random Sampling **B**. Bias **C**. Convenience Sampling

**D.** Systematic Sampling **E**. Census Sampling **F**. Sample

**G**. Cluster Sampling **H**. Stratified Sampling **I**. Self-Selected Sampling

(a) Every th person on the list is sampled. **H**

(b) All people in Canada are surveyed to determine how many people live in Canada. **E**

(c) Statisticians use techniques to eliminate **B** to collect reliable data.

(d) Every person from the population has the same probability of being

 selected when drawn at random. **A**

(e) College students were selected by their student i.d. number ending in

 a randomly selected digit. **\_A**

(f) A survey is conducted on a sample of people between the ages of 65-70. **H**

(g) When only a part of a population is asked a survey. **F**

(h) A surveyor randomly asks people on the street a question to determine an opinion. **C**

12. Identify the sampling method used for each survey.

 a) Ten students from each class are chosen to participate in a survey about the eating habits of teenagers.

**Stratified sampling – classes are naturally existing groups and then ten students are chosen from each of these naturally existing groups.**

 b) A market researcher wants to find out the favourite brand on sunglasses of people who go to the beach. He surveys people who walk in front of his beach chair while sitting on the beach.

 **Convenience sampling – he is selecting the people that are easiest to find**

**Chapter 9 CURRICULAR COMPETENCIES REVIEW QUESTIONS:**

13. Students are given this information from a study.

|  |
| --- |
| Students who do not eat a healthy breakfast are less mentally and physically active in school, tend to eat more junk food and snacks, and are more likely to gain weight. |

What assumptions might the following students be making?

1. Vanessa, who plans to go to college, plans to start eating a healthy breakfast

**She is assuming that the study’s conclusions were valid**

1. Alicia, who plans to go to university, does not plan to change her habit of skipping breakfast.

**She assumes that the study’s conclusions were invalid.**

14. Josh wants to find out how much, on average, grade 9 students spend on food each month.

1. Identify potential problems he may encounter related to:

Privacy: **Not everyone will want to share how much money they spend.**

Ethics: **This will depend on how Josh is planning to use this information. He should be very honest with the participants about how he is planning on using this information.**

Language: **He will need to make sure that there is no judgement based on how much the students say they are spending.**

Timing: **He should consider how the grade 9’s spending habits vary from month to month – for example how it differs in the summer when school is not in session vs. during the school year.**

b) For each potential problem in part a, suggest how Josh could avoid it.

 **Privacy – he could make the survey anonymous**

**Ethics – He could be very open and honest about how he is going to use the information and not share it with anybody else unless he has the participants’ permission**

**Language: He will need to make sure that the questions do not lead the participant towards a certain answer.**

**Timing – ask people during first block so that they are not influenced by just having spent money on food (after lunch time or during lunch time)**

15. Alvaro and Esinam are in the same grade 9 class. Alvaro sends an email survey to **15 of his** classmates and finds that 30% of them have experienced cyber-bullying. He reports that 30% of the grade 9 students have experienced cyber-bullying. Esinam surveys **all the students in grade 9** and finds that 16% of them have experienced cyber-bullying.

1. Whose conclusion is more likely to be **valid**? Explain.

**Esinam’s conclusions are more likely to be valid because he asked all of the students in grade 9. His survey is much bigger.**

b) Why might the other student’s conclusion not be valid?

**Because they only emailed 15 people and when emailing, it’s impossible to keep your results private**.

16. Suppose you are the principal of a high school. You want to know where students volunteer most often.

a) What population are you interested in surveying?

**All of the students at the high school who volunteer.**

b) Would you survey a sample or population? Explain.

**Population because it would be easy to ask everyone at the high school who volunteers. The students are at the school and not everyone will volunteer so the populations would not be a significant number of people.**

c) If you had to use a sample, what would you do to make sure your conclusions are valid?

**Use a stratified sample based on age, gender, and where the students lived so that the sample would be representative of the population.**