11.1 Factors Affecting Data Collection 9W

MathLinks 9, pages 414–421

Memorize ## Key Ideas Review

Choose from the following terms to complete the statements in #1 to 4.

| bias | ethics | influencing factors | survey |

1. A ___Survey___ can be used to collect opinions and/or information about a topic.

2. Several ___influencing___ ___factor___ affect how data are collected or how responses are obtained.

3. An influencing factor that shows a preference for a specific product is an example of ___bias___.

4. An influencing factor that involves judgments of right and wrong is an example of ___ethics___.

Check Your Understanding

5. In each case, identify and describe any factors that may affect the collection of data.

   a) Survey teachers about the new menu in the student cafeteria.
   Influencing factor(s): *The choice of people interviewed shows bias. All members of the school should be asked.*

   b) Ask customers at a sporting goods store about what brand of snowboard they prefer.
   Influencing factor(s):

   c) Survey students about the timetable in September. Students who respond will be entered in a draw for a digital audio player.
   Influencing factor(s):

   d) Ask grade 9 students if they would use a cell phone in class, even though it is not allowed.
   Influencing factor(s):

6. For each situation, identify whether there is bias. If so, highlight the parts that show bias. Then, rewrite to correct the bias.

   a) Ask customers in a sporting goods store the following question.

   > Titanium Skateboards are the fastest and smoothest skateboards in this store. What brand will you buy?
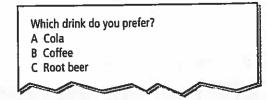
   Bias: (YES) NO *(See Underlined Section)*

   Rewrite:
   What brand of skateboard would you buy?

b) A sales representative in a grocery store asks customers the following question.

> Which drink do you prefer?
> A Cola
> B Coffee
> C Root beer

Bias: YES   NO

Rewrite:

7. In each case, describe the effect of any influencing factors on the collection of data. Then, write an improved survey question.

a) A government party member asks the following question.

> Is the current premier not the best premier in Canadian history?
> YES   NO

Influencing factor(s):

Rewrite:

b) A small electronics company asks the following question.

> Do you know about the RC Games Company that supplies the excellent games and systems that you and your friends need?
> YES   NO

Influencing factor(s):

Rewrite:

8. For each situation, write two different survey questions that may have resulted in each conclusion.

a) Blue is the most popular car colour.

Question 1: What is your favourite colour of car?

Question 2: Rank your favourite car colour choices from least to most favourite

b) Four out of five mechanics surveyed recommend regular oil changes for family vehicles.

Question 1:

Question 2:

9. Write a survey question for each situation. Identify whom you would ask to participate in the survey.

a) You want to find out which music group teens like best.

Question: What music group do you like best?

Whom to ask: Teens (13 to 19 yrs)

b) You want to find out if brand or options is more important when buying a digital music player.

Question:

Whom to ask:

10. Rewrite the survey question so that it collects more helpful data.

> Is lacrosse your favourite sport?
> YES   NO

Question:

11.2 Collecting Data

MathLinks 9, pages 422–429

Key Ideas Review

1. Identify the difference between a population and a sample. Give an example of each.

   Population – All individuals being studied
   Sample – A portion of the population.
   ↳ All grade 9's in a K-9 school.

Connect each statement in column A with the related type of sample in column B.

A	B
2. All of the people leaving a concert are handed a card and asked to mail in their response. E	a) convenience sample
3. A food services company surveys 10% of the students at each of four high schools in the district. c	b) random sample
4. Every tenth person on a voters' list is polled about whom they will vote for in the next election. D	c) stratified sample
5. Franco surveyed all of his friends about their favourite pastime. A	d) systematic sample
6. At the mall, a marketing representative asks customers chosen at random about which grocery store they prefer. B	e) voluntary response sample

Know These Samples

Check Your Understanding

7. Identify the population for each survey question. Indicate whether the population or a sample should be used for the survey. Justify your choice.

   a)
   > Who will be next year's student council president?

   Population: All students

   Survey ☑ the population ☐ a sample

   Justify: Everyone should be allowed/considered to answer.

   b)
   > What colour do you prefer for the lacrosse team shirt?

   Population:

   Survey ☐ the population ☐ a sample

   Justify:

8. For each context, identify and describe the sample you would select for a survey.

  a) The mayor of a city wants to know what people think about the recreational programs offered to residents.

  Sample: Stratified – Portion of each region in the city.
  Survey the ~~population~~ portion of each region.

  b) A school librarian wants to know which fiction books to order for the library.

9. For each context, would you recommend surveying the population or a sample? Justify your choice.

  a) You want to determine the water quality in Shuswap Lake, BC.

  b) You want to test the quality of jet engines.

10. A member of the city council plans to ask every person visiting a local park the following questions.

  Do the park rules need better signs?
  YES   NO
  Should the city allow concerts in the park?
  YES   NO

  a) Identify the sample.
  People in the park on a certain day.
  b) Identify the population.

  All people who visit the park.

c) Will the results of the survey accurately represent the population? Explain.

d) Should the same sample be used for both questions? Explain your thinking.

11. a) Anya, Dhara, and Ian plan to ask students the following question: "What mascot would best represent our new school?" How might you improve the survey question? Explain your reasoning.

  b) There are 1400 students enrolled at the school. Anya suggests using a random sample of 30 students. Dhara suggests using a stratified sample to get input from each grade. Ian wants to survey the whole student population. Whose sampling method is better? Explain your reasoning.

11.3 Probability in Society

MathLinks 9, pages 430–439

Key Ideas Review

Unscramble the words to complete each of the following sentences.

Know!

1. A __biased__ __Sample__ can make survey results inaccurate.
   DESBIA   PELSMA

2. If a sample represents the population, you can __generalize__ the
   results to the population.   ELIZERAENG

3. You can use __experimental__ probability and __theoretical__
   LATPEREXINEM   CALORETTHEI
   probability to help make decisions based on probability.

Check Your Understanding

4. A computer chip factory samples chips as they come off the assembly line. A random sample shows that 1 chip out of every 40 is defective. In a run of 3200 chips, the quality manager predicts that 80 chips will be defective.

   a) What assumptions did the quality manager make in her prediction?

   The random sample is large enough to represent the entire population. The defect occurs on a regular basis.

   b) Is her prediction reasonable? Justify your answer.

   $\frac{1}{40} = 2.5\%$ $(3200 \times 0.025) = 80$ defects.

   Yes it is reasonable.

5. A playing card factory samples every 200th deck of cards for damage. The sample shows a 0.20% probability of damage. How many decks of cards would you expect to be damaged in the daily production of 100 000 decks of cards? Include any assumptions you made in your prediction.

6. A manufacturer makes the following claim about the lifetime of its batteries.

   Each battery has a lifetime of 100 h.

   Carla and Pedro tested 20 batteries to check the claim. Five batteries lasted less than 100 h and two batteries lasted exactly 100 h. The rest lasted longer than 100 h. The students predicted that 25% of the batteries made by the company would not meet the claim.

   a) Did the sample lead the students to make a false prediction? Explain.

   b) If the prediction is false, explain what you would change to make the prediction more accurate.

7. A school with 5400 students is electing a student council president. A reporter for the student newspaper polled 100 people. The table shows that 45% chose candidate A, 15% chose candidate B, and the rest chose candidate C.

a) According to the poll, how many students will choose each candidate?

Candidate A	Candidate B	Candidate C	Total
45%	15%		100%
			5400

b) What is the experimental probability for candidate C? What is the theoretical probability that a voter will choose candidate C? What assumptions did you make?

Experimental probability:

Theoretical probability:

Assumptions:

c) The reporter predicts that candidate C will win the election. Do you agree with her prediction? Explain your reasoning.

8. Cody records the scores from his ten most recent golf games.

Game	Score
1	70
2	69
3	71
4	73
5	74
6	72
7	73
8	75
9	78
10	74

a) Calculate Cody's mean score based on all ten games.

b) Use the first three game scores as a sample. Calculate the mean.

c) Use the last three game scores as a sample. Calculate the mean to the nearest hundredth.

d) Compare the mean from each sample to the mean for all games. Are the samples a good predictor for Cody's overall score? Explain.

9. Karen read an article claiming that 1 out of every 6 people is born with blue eyes. She predicts that 10 people in a sample of 100 people will have blue eyes. She tested the prediction by rolling a die 100 times for each of 8 trials. Here are the results.

Trial	Blue Eye Colour	Other Eye Colour
1	17	83
2	13	87
3	15	85
4	10	90
5	10	90
6	18	82
7	17	83
8	18	82

Do these experimental results confirm Karen's prediction or the article's claim? Show your thinking.