

MathLinks 9 Practice and Homework Book

Chapter 11 Answers

11 Get Ready

1. a) mean = $7.\bar{2}$; median = 8; mode = 8
b) mean = 5.14; median = 5; mode = 4.3
2. Example:
 - The mean is easiest. Add the values and divide by the number of values.
$$\frac{3 + 5 + 7 + 3 + 5 + 2 + 7 + 3}{8} = 4.375$$
 - The mode is next easiest. The value that occurs most often is 3.
 - The median is the most difficult. The value halfway between the two middle numbers 3 and 5 (after they have been arranged in order) is 4.
3. a) 6 b) 24
4. Example: The highest value is 7 more than the lowest value, 10. The highest value is 17.
5. a) Example: 28% b) Example: About 43%
c) Example: $5\% + 22\% = 27\%$;
 $0.27 \times 500 = 135$. I would expect 135 out of 500 boys to watch up to 2 h of TV per day.

11.1 Factors Affecting Data Collection

1. survey
2. influencing factors
3. bias
4. ethics
5. Examples:
 - a) An influencing factor is the choice of people interviewed. Students should also be surveyed; not including them shows bias. When will the cafeteria customers be surveyed? Surveying them after a good meal may affect their response.
 - b) There are no influencing factors. Customers at a sporting goods store may have opinions about the brand of snowboard they prefer.
 - c) An influencing factor is cost. Offering a digital audio player might be quite costly for the administration.
 - d) An influencing factor is ethics. Asking participants about something that they know is not allowed is unethical.

6. Examples:

- a) Bias: Yes. The bias is using language such as “fastest and smoothest” to describe one brand of snowboard. Rewrite: “What brand of snowboard would you buy?” or “What properties of a snowboard do you consider most important?”
- b) Bias: Yes. The bias is assuming that all people drink the three given beverages. Rewrite: “Which drink do you prefer? A Pop, B Coffee/tea, C Root beer, D Other _____ (Please specify.)”

7. Examples:

- a) Influencing factor: The government member may be biased in favour of the current premier. Rewrite: “Who do you think is the best premier in Canadian history?”
- b) Influencing factor: The respondents may be confused by the wording of the question. Rewrite: “What games and systems do you and your friends need?”

8. Examples:

- a) Question 1: “What is your favourite car colour?” Question 2: “What is the most popular car colour on drawings in a grade 9 art class?”
- b) Question 1: “Do you think it is important for family vehicles to have regular oil changes?” Question 2: “How often should family vehicles have an oil change? A Never, B Regularly, C Frequently, D Other _____ (Please specify.)”

9. Examples:

- a) Question: “What music group do you like best?” Whom to ask: Teens aged 13 to 19.
- b) Question: “What is the most important consideration when buying a digital music player?” Whom to ask: Customers shopping for a digital music player.

10. Example: “What is your favourite sport?
A Hockey, B Soccer, C Volleyball, D Other _____ (Please specify.)”

11.2 Collecting Data

1. Example:

- Population: All of the individuals being studied; all of the dogs in an animal shelter
- Sample: Any group of individuals in a population; all of the mixed-breed dogs in an animal shelter

2. e) voluntary response sample

3. c) stratified sample

4. d) systematic sample

5. a) convenience sample

6. b) random sample

7. a) Population: All students at the school

Examples:

- Survey the population: If this is an election, everyone should be invited to vote.
- Survey a sample: If this is an opinion poll, use a sample to determine the popular candidates.

b) Population: All players on the lacrosse team.

Example: Survey the population: Since the team is small in number, survey all team players.

8. Examples:

- a) Use a stratified sample by dividing the city into regions according to population. Then, survey a proportional number of people from each region.
- b) Use a systematic sample by surveying every fourth student on the class roster for each grade. Or, use a convenience sample and survey the first 50 students who enter the library on a school day.

9. Examples:

- a) Take samples: Survey the water quality in different areas of the lake. It would be impractical to survey the population since that would involve testing all of the water in the lake, which would be very costly.
- b) Survey the population: All jet engines should be tested since public safety is at stake.

10. Examples:

- a) Sample: People in the park on a certain day
- b) Population: All citizens and visitors to the city
- c) Yes, the results of the survey about the signage in the park would likely represent the population. No, the results of the survey about park use for concerts would not represent the population. The survey should include people who may not use the park but have an opinion about where concerts should be held.

- d) The same sample should not be used for both questions. Even though the two questions involve the park, they are unrelated. People who are not in the park should also be surveyed about whether concerts should be allowed.

11. Examples:

- a) "Which mascot do you prefer to represent our new school? A Bear, B Cougar, C Lion, D Other _____ (Please specify)." The original question is too open-ended and may result in many different responses. It may take more time to sort out the responses.
- b) If Dhara uses a stratified sample that is larger than 30, then this sampling method may be better. Also, using a stratified sample would ensure representation from each grade. Anya's sample of 30 students may be too small to represent all students. Ian's survey of the population may take too much time.

11.3 Probability in Society

1. biased sample

2. generalize

3. experimental; theoretical

4. Examples:

- a) • The random sample is large enough to represent the entire population.
- The defect occurs on a regular basis.
- b) Yes. The random sample indicates $\frac{1}{40} = 2.5\%$. In a run of 3200 chips, you could expect $3200 \times 2.5\% = 80$ computer chips to be defective.

5. Example: $0.002 \times 100\,000 = 200$

I predict that 200 decks of cards will be damaged. I assume that the sample represents the population.

6. Examples:

- a) The prediction may be false since only 20 batteries were tested. The survey results may have allowed students to overestimate the number of batteries that would not last longer than 100 h.
- b) Test more than 20 batteries and purchase a quantity of the same battery from different stores.

7. a)

Candidate A	Candidate B	Candidate C	Total
45%	15%	40%	100%
2430	810	2160	5400

b) experimental probability: 40%; theoretical probability: $33\frac{1}{3}\%$

Sample Assumptions:

- Each candidate has the same chance of winning.
- The sample represents the population of students who will vote in the election.

c) No. If the poll represents the population of voters, then candidate A will win, not candidate C.

8. a) 72.9 b) 70 c) 75.67

d) Example: Neither of the samples is a close predictor of the overall score. The mean of the first three games is significantly lower than the mean for the overall score. The mean of the last three games is significantly higher than the mean for the overall score.

9. The experimental probability of having blue eyes is 14.75%. This is slightly less than the article's claim for 16.67%, but more than Karen's prediction of 10%. The experimental results are closer to the article's claim.

11.4 Developing and Implementing a Project Plan

The purpose of this section is to assist you in developing and implementing a project plan. Responses will vary according to the research you plan.

11 Chapter Link

1. a) 250 b) 95%

- c) The theoretical probability is 25%. This assumes that each category of browser has the same chance of being chosen.
- d) The theoretical probability of 25% is less than the experimental probability of 27%.
- e) Example: Yes. Since a stratified sample of 5000 Canadians was used, the sample appears to represent the population of grade 9 students. Therefore, the result indicating that Internet Explorer is the preferred choice can be generalized to the population.

2. Examples:

- a) All grade 9 students in Canada who use the Internet
- b) Use a sample. It would be impractical, costly, and time consuming to survey the population.
- c) • Use a random sample by putting all the names of grade 9 students in the school in a box and drawing 50 names.
• Use a systematic sample by selecting every fifth student from a student roster.
- d) What is your preferred online activity?
A E-mail/instant messaging, B Browsing,
C Downloading and saving music, D Playing games, E Downloading or watching movies/TV,
F Other _____ (Please specify.)

11 Vocabulary Link

1. influencing factors
2. stratified sample
3. convenience sample
4. random sample
5. population
6. survey
7. biased sample
8. systematic sample
9. voluntary response sample
10. sample
11. generalize