UNIVERSITY OF WATERLOO

Faculty of Mathematics
Waterloo, Ontario N2L 3G1

Centre for Education in
Mathematics and Computing

Grade 6 Math Circles

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Intro to Statistics - Problem Set

1. For each scenario, identify the population and sample.

   (a) A toothpaste company randomly selects 10 dentists from a province's registry of dentists to ask if they would recommend their company's toothpaste.

   (b) A food safety inspector randomly checks the temperature of 20 meals that exit the restaurant kitchen during the hour from 6–7pm to see if they have been cooked to a safe temperature.

   (c) A fast food company randomly selects 10 of their own restaurants each month. They then interview all of the employees at that location about their work environment.

   (d) A hockey equipment manufacturer wants to learn about who is buying their equipment online, so with every tenth purchase, they ask the customer a few simple questions before checking out.

   (e) A quality control inspector randomly selects 50 cans of soda from a factory production line each day to check for defects.

2. For each scenario, identify whether it would be more appropriate to use a census or a sample survey to collect data. Why?

   (a) A team of researchers wants to learn more about the relationship between exercise and pet ownership to design a program to improve people's health.

   (b) To assure the quality of their product, a factory must open individual packages for inspection.

   (c) You have some friends over and are collecting orders for lunch.

   (d) An advertising agency wants to test a new marketing campaign before launching it.

(e) A large conference needs to compile a list of email addresses to send out information in advance.

3. Identify each variable as quantitative or categorical.

   (a) the height of a tree

   (b) the variety (type) of an apple

   (c) the breed of a dog

   (d) the city that a person was born in

   (e) the amount of water that a cup holds

   (f) the price of a hotdog

   (g) the favourite number of a person

   (h) the age of a person, grouped into a class: 0–9, 10–19, 20–29, and so on

   (i) the length of a movie

   (j) the credit card number of a person

4. Find the mean of each list of numbers.

   (a) 9, 5, 10, 6, 7

   (b) 11, 16, 11, 12, 18, 9, 12, 14, 15, 12

   (c) 87, 69, 70, 72, 94, 85

5. A school has 400 students in total. Find the proportion of students in each grade. Express this proportion as a simplified fraction, a decimal, and a percentage.

grade	# of students in grade	proportion of students in grade
5	93	?
6	125	?
7	88	?
8	94	?

6. Your class is responsible for planning a surprise ice cream party at school. There are four flavours of ice cream to choose from: vanilla, chocolate, strawberry, and mint chocolate-chip. Each tub of ice cream will be be enough for 30 sundaes. Altogether, there are 800 students at your school to order ice cream for. It's okay to have a bit extra, but we want to end up with as little waste as we can.

To decide how many tubs of each flavour to order, you conduct a survey in your class of 20 students. Out of the 20 students, 4 choose vanilla, 6 choose chocolate, 3 choose strawberry, and 7 choose mint chocolate-chip.

(a) What are the population and sample?

(b) Is the variable quantitative or categorical?

(c) Based on your sample survey, how many tubs of each flavour of ice cream should you order?

(d) After every students gets one sundae, how many will be left over?

7. A small start-up company, Alarm, wants to survey its customers about satisfaction with their product. Altogether, Alarm has 90 000 customers. A survey is sent to 4500 of them. However, in the end, only 1000 of those customers filled it out.

   The responses are summarised below:

rating	# of people
5	349
4	428
3	74
2	24
1	125

   (a) What are the population and sample?

   (b) Is the variable quantitative or categorical?

   (c) Based on the sample data, what is the average customer satisfaction of Alarm products?

   (d) What proportion of customers rate Alarm products as 3 out of 5 or lower?

8. To compete in a school Halloween candy contest, students have to guess how many of each type of candy bar are in a bucket. There are three types of candy bars—Jupiter Bars, Saturn Bars, and Neptune Bars—and 200 total candies in the bucket. Before guessing, each student is allowed to close their eyes and randomly pick 8 candies out of the bucket to inform their guess. The student who guesses the closest for how many of each bar there are in the bucket gets to take all of the candy home.

   During your turn, you get 3 Jupiter Bars, 3 Saturn Bars, and 2 Neptune Bars.

(a) What are the population and sample?

(b) Is the variable quantitative or categorical?

(c) Based on your sample, what should you guess for how many of each type of candy bar there is?

9. For an activity in class, every student randomly picks out 10 books from your school library and calculates the average number of pages in their books. The book lengths of you and two classmates are summarised below:

	# of pages:		
book	you	classmate A	classmate B
1	23	48	48
2	72	48	85
3	108	18	218
4	98	320	30
5	16	510	373
6	210	280	188
7	208	52	250
8	755	366	222
9	108	324	384
10	76	288	288

(a) What are the population and sample for you, Classmate A, and Classmate B?

(b) Is the variable quantitative or categorical?

(c) What is the average length of the 10 books that you picked out?

(d) What is the average length of the 10 books that Classmate A picked out?

(e) What is the average length of the 10 books that Classmate B picked out?

(f) Compare the three averages. Why are they the same or different? If they are different, are they close? Why?

(g) Try the same activity! Close your eyes and point to a book to add it to your sample of 10 books, and then find the average length of books in your sample. Chose another sample of 10 books and compare the averages lengths in your two samples.

10. Look up the latest reports of COVID-19 cases in your area. It'll also be helpful to find out your area's population!

(a) Based on the the information available about the number of total cases, what is the proportion of people in your area who have tested positive for COVID-19

(b) Based on the the test positivity rate (which is the proportion of tests taken that had positive results for the virus) and total cases, how many COVID-19 tests have been administered in your area?