

Directions: Read the information below.

Sampling is the process by which researchers take a set of information from a group of people and apply the information to a larger group. An example of this might be wanting to know the favorite food of kids in your grade level. You can't survey every single student in your grade level at your school, so you instead take a smaller portion of that population — a sample — and ask them. If that sample is representative, you would expect it to show you the same results as it would for the population. If almost everybody you survey says their favorite food is pizza, then it is likely that the whole grade level's favorite food is pizza, too.

It is important to avoid bias when sampling. A bias is something that makes your results appear a certain way when they really are not that way. For example, asking only your soccer teammates or only the clarinet section of your band may yield different results than a representative sample would. There should be diversity in your sample that reflects in the population. If you want to find out how tall the average adult is, you would not want to ask just women because adult women are generally shorter than men. This would make your results seem like all adults are shorter.

The ideal way to do an experiment is with a random sample. In the Engineering Design Process, you will find that this means taking multiple iterations, or trials, of a process. We cannot run our machines one time and expect to understand how they will work all the time; we must test them several times. After we have tested them several times, the results will be more reliable.

Directions: After reading the passage, answer the questions below.

- For each description below, indicate whether it is or is not a representative sample.

Sampling Method	Good or Bad?
Haley wanted to know the average price for a carton of milk in her town. She visited all the grocery stores and checked the price of several milks in each store. Then she found an average.	
Pat wanted to know how long it took her little sister to eat each day. She timed her eating every day for two weeks and found the average.	
Carlos wanted to know the most popular month for birthdays in his school. He counted the birthdays throughout the month of March and compared it to the number from the previous month, February. There were more birthdays in March so he figured March is the most popular month for birthdays.	

2. The two descriptions below are not representative samples. Change the method to be representative.

Bad Sampling Method	Better Sampling Method
Sarah wanted to find the average height of her classmates. So she asked her three best friends in her class how tall they are. They were all pretty short so she figured everybody must be short in her class.	
Richard wanted to know the average amount of students that attend school each day. So he went to the attendance office on Monday and asked how many students were in school that day. There were a lot of kids out sick, but he figured the attendance rate was just pretty bad.	

3. Open your bag of M&M's. Count how many of each color you find and put that into a fraction, then a decimal. Now repeatedly take a sample of five candies and do the same. Record your results below.

	Fraction & Decimal in Whole Bag	Fraction & Decimal in Trial 1	Fraction & Decimal in Trial 2	Fraction & Decimal in Trial 3	Fraction & Decimal in Trial 4
RED					
GREEN					
BLUE					
YELLOW					
BROWN					

4. Does each sample appear to be representative? Why or why not?
5. Now take the average number of each color pulled. For example, if you had three yellow the first time and one the second, the average would be two. Do this for each color and compare it to the whole bag. When you take repeated samples and average those numbers does it appear more representative? Why do you think this happened?