

# COLLECTING SAMPLES



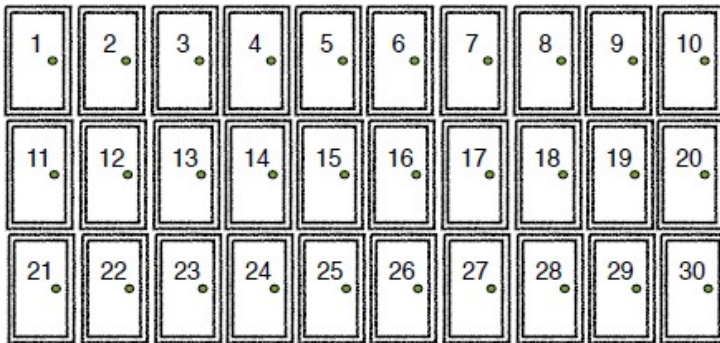
**TYPES OF SAMPLES**

***Simple Random Sampling***

A simple random sample requires that

- all selections must be equally likely
- all combinations of selections must be equally likely

A random sample may not end up being representative of the population, but any deviations are due only to chance. ex. An apartment building superintendent is interested in determining if tenants are satisfied with the maintenance of the building. It is impractical for her to survey every apartment, so she chooses to do a simple random sample.



- Pot #s 1-30 in a hat

- Draw five numbers.

**Systematic Random Sampling**

A systematic random sample is used when you are sampling a fixed percent of the population. A random starting point (i.e., individual, household, or object) is chosen and then you select every nth individual for your study, where n is the sampling interval.

sampling interval — found by evaluating

$$\frac{\text{population size}}{\text{sample size}}$$

$$\frac{30}{5} = 6$$

} Sampling interval

1	2	3 ✓	4	5	6	7	8	9 ✓	10
11	12	13	14	15 ✓	16	17	18	19	20
21 ✓	22	23	24	25	26	27 ✓	28	29	30

- Roll die  
ex: got a 3

**Stratified Random Sampling**

When using a stratified random sample, the population is divided into groups called **strata** (e.g., geographic areas, age groups, places of work, and so on). A simple random sample of the members of each stratum is then taken. The size of the sample for each stratum is proportionate to the stratum's size.

ex. The Canadian Multicultural Society was interested in urban Canadians' understanding of immigration's impact on the growth of their communities. How can they carry out a stratified random sample?

At least 0.1% of population

Populations

348 000

3 675 000

5 647 000

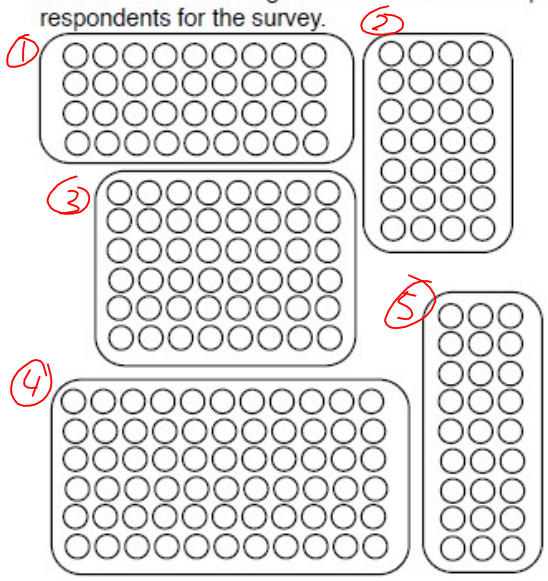
1 068 000

City	Number Sampled
Halifax	348
Montreal	3675
Toronto	5647
Ottawa	1068

**Cluster Random Sampling**

Cluster samples require that the population be organized into groups (e.g., schools, communities, companies, and so on). A random sample of groups would then be chosen. All the members of the chosen groups would then be surveyed.

ex. The Board of Education for the schools in Lincoln, Ontario, needs to determine parent/guardian opinion about offering summer mathematics courses for elementary school students. Design a cluster random sample the Board can use to select respondents for the survey.



- Roll die
- Sample 2 schools' parents

**Multi-Stage Random Sampling**

Multi-stage samples require that the population be organized into groups. A random sample of groups is chosen and then a random sample of members of the chosen groups is taken.

ex. A controversial issue in a school was the banning of all electronic devices from school property. The students' council responded to a few complaints by deciding to collect facts to present to the school administration. Students from the Data Management course suggested that, since this was a very large school, multi-stage sampling would make the most sense. What main steps should they suggest?

- Interview 240 or 10% of the student body

- Admin wanted to minimize disruption

↳ 40% of classrooms

↳ 25% of students in those classrooms

$$0.4 \times 0.25 = 0.1 \\ = 10\%$$

***Destructive Sampling***

Samples from which the selected elements cannot be reintroduced into the population are called destructive sampling (e.g., light bulbs tested for quality control).

***Other Types of Sampling***

- Convenience Sampling
  - Sample based on accessibility
  
- Voluntary Sampling
  - People self-select into the survey

**SAMPLE SIZE: HOW MUCH IS ENOUGH?**

It depends! First, the absolute size of the population will have an impact on the appropriate sample size. Furthermore, sample size is related to the reliability of the results. These are some of the factors that will affect reliability:

- the variability of the population (i.e., the more varied the people in the population are, the larger the sample needs to be)
- the degree of precision required for the study
- the sampling method chosen

In practical terms, the larger the sample, the better.

**Practice: #1-3, 5, 10, 12**