Sampling

ID: 9853

Time required
25 minutes

Activity Overview

*In this activity, students learn about each of the four types of probability sampling methods and use the **randInt** command to find each kind of sample from a given population. For stratified sampling, students find both a proportionate and a disproportionate sample.*

Topic: Sampling

- *Explain that random sampling is the process of sampling in which every element of the population has an equal chance of being selected.*
- *Explain that a simple random sample of size n is one that is selected such that all samples of size n have an equal chance of being selected.*
- *Explain the stratified sampling process and describe contexts in which it is a preferred sampling technique.*
- *Explain the cluster sampling process and describe contexts in which it is a preferred sampling technique.*

Teacher Preparation and Notes

- *This activity is designed to be used for students studying Statistics and Probability.*
- *While this activity is written under the assumption that the teacher will lead the students through each type of sampling method, it is possible for students to complete the activity on their own and at their own pace.*
- *Because all the samples that students must find are random, students will have different samples. For this reason, there is no TI-Nspire solution document.*
- *Notes for using the TI-Nspire™ Navigator™ System are included throughout the activity. The use of the Navigator System is not necessary for completion of this activity.*
- ***To download the student TI-Nspire document (.tns file) and student worksheet, go to education.ti.com/exchange and enter "9853" in the keyword search box.***

Associated Materials

- *Sampling_Student.doc*
- *Sampling.tns*

Suggested Related Activities

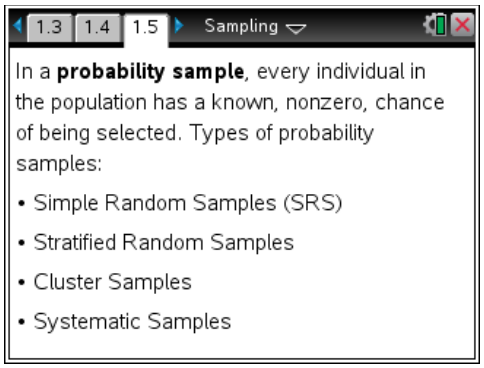
To download any activity listed, go to education.ti.com/exchange and enter the number in the keyword search box.

- *Introduction to the Central Limit Theorem (TI-Nspire technology) — 9892*
- *Surveys and Survey Design (TI-84 Plus family and TI-Navigator) — 1943*
- *Roll the Dice (TI-84 Plus family) — 8971*

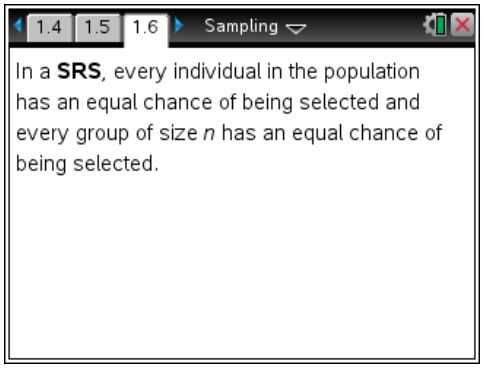
Problem 1 – Find a Simple Random Sample

Use pages 1.2 through 1.4 to discuss populations, samples, and what it means for a sample to be representative of the population.

Page 1.5 introduces the four types of probability samples. Explain that in a simple random sample, abbreviated *SRS*, every individual in the population has an equal chance of being selected, and every group of *n* individuals has an equal chance of being selected.



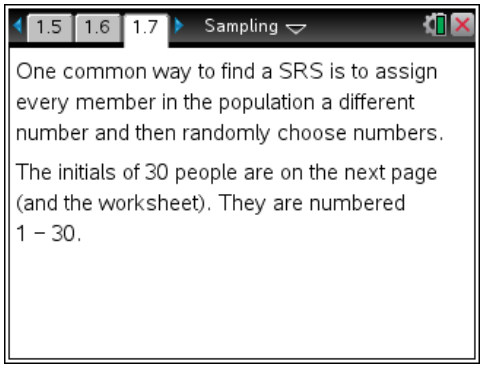
The simplest way to perform an SRS is to put names of everyone in the population in a hat and then select some of the names. This however can become a hassle for large populations. The next best thing is to assign numbers to the individuals and use a random number generator.

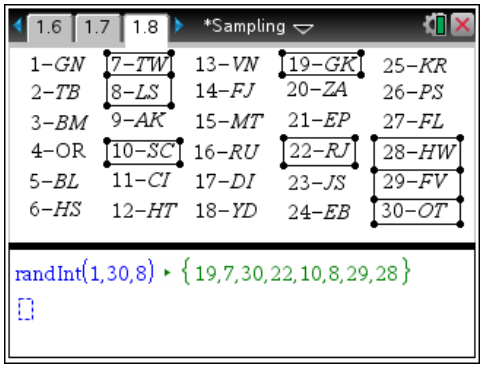


The initials of the 30 people that will be considered the population for this activity are listed both on page 1.8 and on the student worksheet. They are already numbered.

Students are to move to page 1.8 and randomly select 8 people for a sample. The command **randInt(***minimum_integer, maximum_integer, number_of_outputs***)** will be used to produce 8 random integers from 1 to 30. The command can be typed directly, or chosen from the Catalog, 📖. Students should type the command in the MathBox at the bottom of the page.

Ask students what they should do if the same number appears twice. (They should recalculate the random integers until they have 8 unique numbers.) Have students list the numbers and names (initials) of the people in their sample.



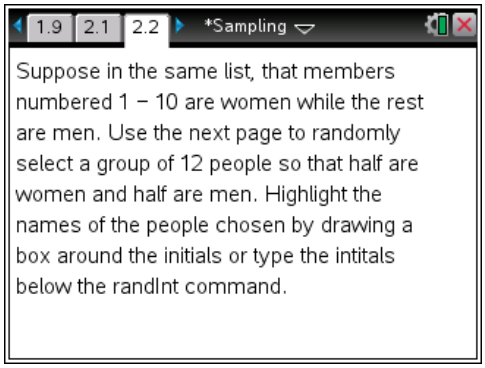


TI-Nspire Navigator Opportunity: *Screen Capture*

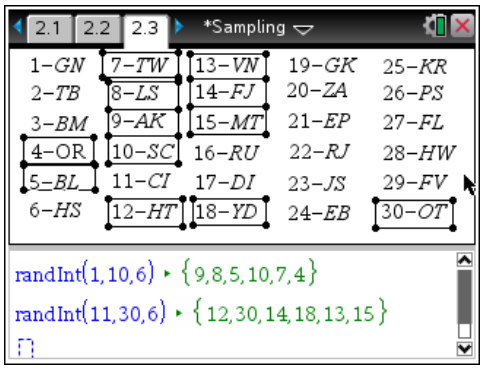
See Note 1 at the end of this lesson.

Problem 2 – Find a Stratified Random Sample

Define and discuss a stratified random sample, often just called a stratified sample. Have students suppose that members 1–10 on the list are women and members 11–30 are men.

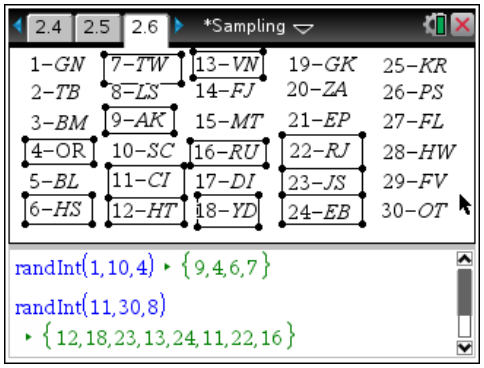


Students advance to page 2.3 to find a random sample of 12 people from the list, where half are men and half are women. They should use **randint(1,10,6)** to select six women and then **randint(11, 30,6)** to select six men.



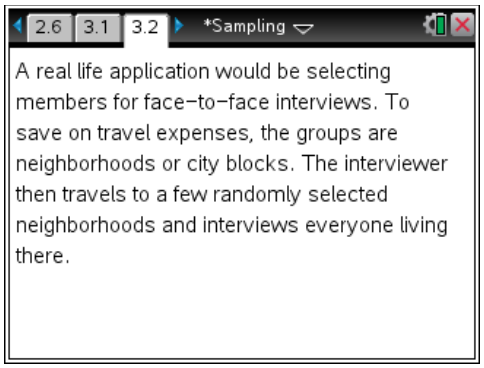
Have students explain why the sample is disproportionate to the population. (Half of the *sample* is female, but only one-third of the *population* is female.)

Students are to use page 2.6 to find a proportionate sample. This sample will be one-third female and two-thirds male, just like the population. This means students will now choose four women and eight men.



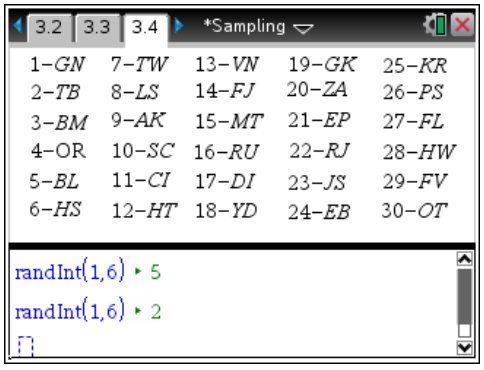
Problem 3 – Find a Cluster Sample

Introduce cluster sampling, using the example on page 3.2. Ask students if they think cluster sampling would be more or less precise than finding an SRS or a stratified sample. (Less precise, it should only be used if a list cannot be made, or if the cost would be too great.)



Tell students to suppose that every fifth person in the list lives in the same apartment complex and have them use page 3.4 to randomly select two of the clusters. Have them list the names (initials) of the people in the sample.

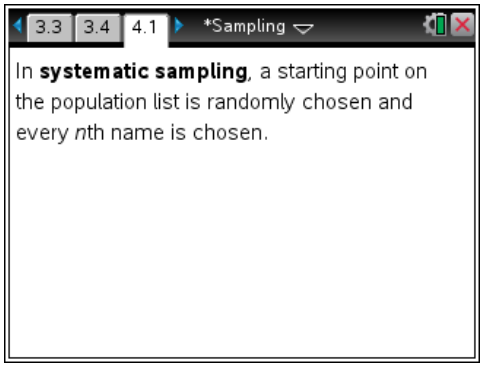
Ask students how they will use **randInt**. They can use **randInt(1,6)** for each of the six clusters. The screen at right shows the device generating clusters 2 and 3, so members numbered 6 through 10 and 11 through 15 would be surveyed.



Problem 4 – Find a Systematic Sample

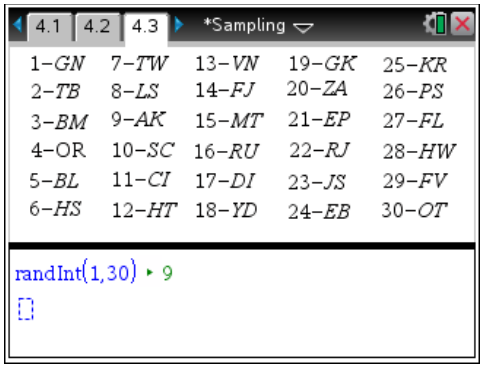
Define and discuss systematic sampling.

A common error is to always start with the first name on the list. The first name should be selected randomly.



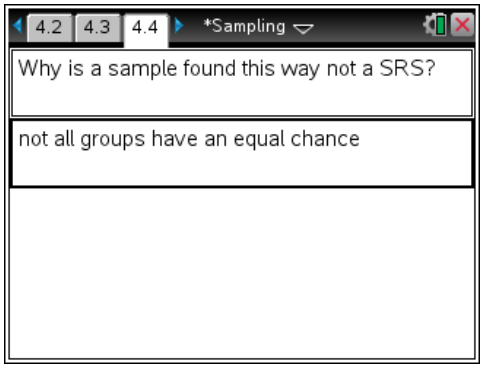
Students are to move to page 4.3 and use **randInt** to find a starting point and then choose every fifth person on the list to form a sample.

For the screen at right, the starting point is 09-AK. This person is in the sample, as well as 14-FJ, 19-GK, 24-EB, 29-FV, and 4-OR.



Discuss why systematic sampling is not a type of simple random sampling. (Not all possible groups of size *n* have an equal chance of being selected. If choosing every fifth person, for instance, a group with members 01, 02, 03, 04, and 05 is not possible.)

Conclude the lesson by having students list advantages and disadvantages of each sampling method and when one would be used over another.



TI-Nspire Navigator Opportunities

Note 1
Problems 1-4, *Screen Capture*

This would be a good place to do a screen capture to compare student results. This will give students the opportunity to see the other results and how they vary. Use *Screen Capture* throughout the activity so that students can compare their results to their fellow students' responses.