

ACTIVITY: PRACTICE QUADRATS

Part 1: Introduction to Scientific Sampling

Scientists often have to count their research subjects. Counting can give scientists clues about an organism's survival, adaptations, or community dynamics. However, it can be very difficult and time consuming for researchers to count every organism of interest in their study site. For example, a marine biologist may want to know the number of snails on the Nahant rocky shore. Counting all the snails on a mile long piece of shore may take days! Taking this long could lead to double counting and other errors that can cause problems with an experiment.

Instead of counting all the **organisms** scientists see, they have turned to a strategy called **sampling**. Sampling in science means to take a **representative** sample of the area you are interested in, and count within that much smaller area. Then, using mathematics, you can approximate the entire population of interest.

One of the most popular methods of surveying is to use **quadrats**. A quadrat is a square, often made of PVC pipe, with known dimensions. Scientists will place this quadrat on the ground where they wish to survey. This can be in a random area, or on a **transect**, a straight line that helps organize scientific field sites. Scientists will then only count the organisms they see within their quadrat. Then, researchers can **approximate** the whole population using the following equation:



Figure 1. A student using a quadrat and transect to sample and count animals that live on the rocky shore at the Marine Science Center.

$$\# \text{ in Quadrat} \times (\text{Total Area} \div \text{Area of Quadrat}) = \text{Approximate Population}$$

In this activity you will act as a scientist and sample some organisms in your classroom. You will then use the equation above to calculate the total population of the organisms you counted.

Part 2: Sampling with a Quadrat

Procedure

1. Place your quadrat randomly on the area where you will be sampling.
2. List all of the species in your quadrat. **Example: Species 1: Purple pom-pom, Species 2: Red string, etc.**
3. Count all of the species that you see in your quadrat. Only count species within your quadrat. If an object is only partially in your quadrat and cut off by your square, do not count it. See **Figure 2** for an example of what to and to not count.

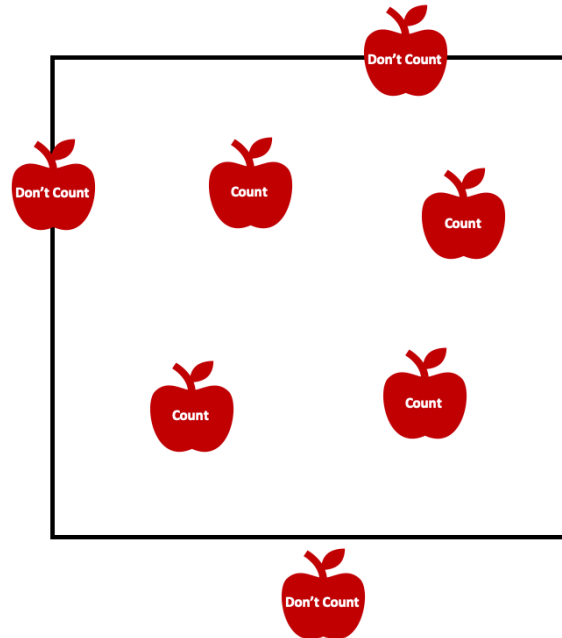


Figure 2. An example quadrat showing which species to count. Do not count any species that fall outside of your quadrat border.

4. Fill out the data sheet on the next page with the number of objects and type of objects you counted.
5. Congratulations! You sampled just like a scientist. Answer the questions on Page 4 to help you analyze your data.

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Table 1. Data sheet for your practice quadrat. Write what species you see in your quadrat and count the number you see.

	Number Counted in Quadrat
Species 1: _____	
Species 2: _____	
Species 3: _____	
Species 4: _____	
Species 5: _____	

Part 3: Analyzing Your Data

1. Calculate the entire populations of each species in your ecosystem.

Use the equation: **# in Quadrat x (Total Area ÷ Area of Quadrat) = Population**

The area of your quadrat is = **Length of your quadrat x Width of your quadrat**

To find the total area of your ecosystem ask your teacher or measure it as a class!

Population of Species 1: _____

Population of Species 2: _____

Population of Species 3: _____

Population of Species 4: _____

Population of Species 5: _____

2. Compare your calculated populations to your classmates. Did they estimate the same populations? Why or why not?

3. What kind of organisms is quadrat sampling best for? In other words, what organisms can't be sampled with a quadrat?

Part 4: Glossary

Approximate: To estimate or come close to.

Organism: An individual animal, plant, or living thing.

Representative: An example of a whole or group.

Sampling: The action of taking or observing a small part of a whole or group.

Transect: A path laid across an ecosystem, often marked by a line that allows scientists to count in a straight line.

Quadrat: A frame, often square, used by scientists as a standard unit to study the population and distribution of organisms.