BIOLOGY 309

Name _____

Period ____

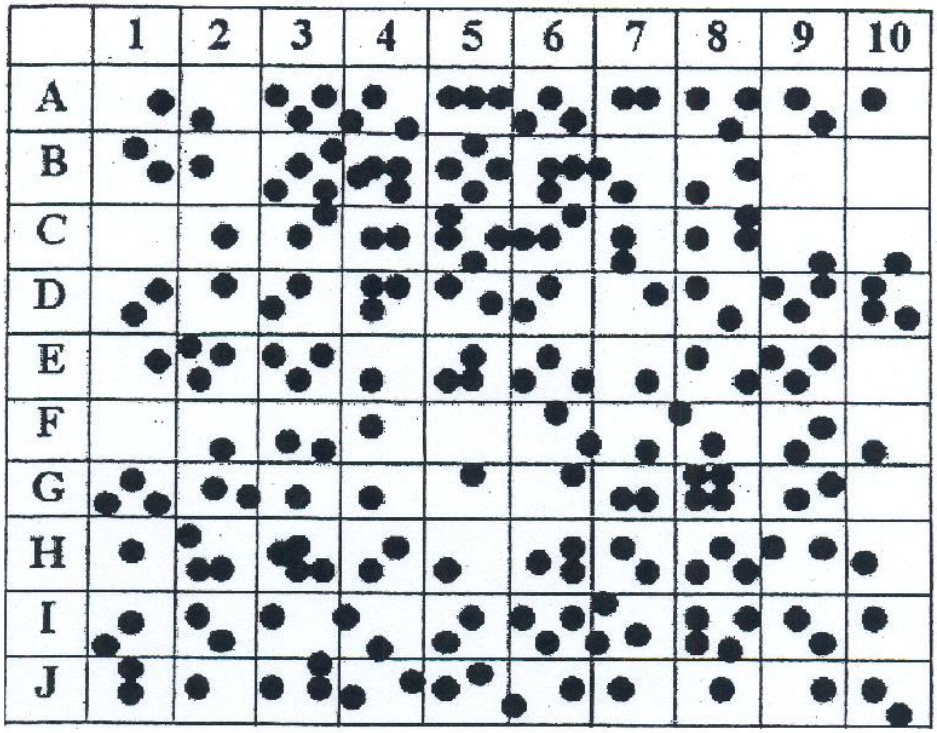
Random Sampling

How do we keep track of populations?

INTRODUCTION:

Scientists cannot possibly count every organism in a population. One way to estimate the size of a population is to collect data by taking random samples. In this activity, you will look at how data obtained from random sampling compare with data obtained by an actual count.

The grid shown below represents a meadow measuring 10 meters on each side. Each grid segment is 1m x 1m. Each black circle indicates one sunflower.



PROCEDURE:

1. Cut a sheet of paper into 20 slips, each approximately the same size (4cm x 4cm)

2. Number 10 of the slips from 1 to 10 and put them is a small container.

3. Label the remaining 10 slips from A to J and put them in another container.

Collecting Random Sample Data:

4. Randomly remove one slip from each container. Write down the number-letter combination and find the grid segment that matches the combination. Count the number of sunflower plants in that grid segment. Record this number on the data table.

5. Return the slips to the containers.

6. Repeat steps 4 and 5 until you have data for 10 grid segments (and the first table is filled out). These 10 segments represent a *sample*. Gather data from a randomly selected sample of a larger area is called *sampling.*

7. Find the <u>total number</u> of sunflower plants for the 10 segment sample. This is an estimation based on a formula. *Add* all the grid segment sunflowers together and *divide* by ten to get an AVERAGE number of sunflower plants per grid segment. Record this number in the table.

8. Multiply the average number of sunflower plants by 100 (this is the total number of grid segments) to find the total number of plants in the meadow based upon your sample. Record this number in the data table.

Collecting Actual Data:

9. Now count all the sunflower plants actually shown in the meadow. Record this number as the total actual number.

10. Divide this figure by 100 to calculate the <u>average</u> number of sunflower plants per grid.

Random Sampling Data	
Grid Segment (number-letter)	Number of sunflowers
Total number of sunflowers:	
Average per grid (dived total by 10)	
Total number of plants in meadow (multiply avg by 100)	

Actual Data	
This data is collected by <u>actually counting</u> every sunflower on the whole graph!	
Total actual number of Sunflowers	
Average number of Sunflowers per grid	

ANALYSIS:

1. Compare the total number you got for sunflowers from the SAMPLING to the ACTUAL count. How close are they?

2. Why were you told to blindly select slips of paper instead of just picking 10 segments?

3. Calculate the percent error. First, find the difference between the actual and the estimated data (subtract the actual count from the estimated count.). Divide this by the actual count and multiply by 100.

   $$\frac{(\text{Actual} - \text{Sampling})}{\text{Actual}} \times 100 = \%\ \text{error}$$

4. How would you change this procedure to reduce your percent error?

5. Why do biologists use sampling? Why can't they just go into the jungle and count all the organisms?

6. Population sampling is usually more effective when the population has an even dispersion patter. Clumped dispersion patterns are the least effective. Explain why this would be the case.

7. Describe how you would use sampling to determine the population of dandelions in your yard.