

STATISTICAL SAMPLING NOTES AND TESTS

Introductory Slide Show:

This presentation explains the types of statistical sampling and some of its applications.

Statistical Sampling – The process of examining a small group in order to learn about a larger group

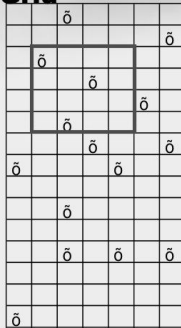
- Political Polls
- Market Surveys
- Census Counts
- Process Assessment

Types of Sampling:

- Random Sampling
- Systematic Sampling
- Stratified Sampling
- Convenience Sampling

Sampling Methods: Grid

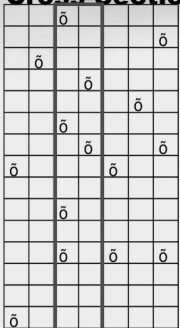
Select a square inside the large region.
Count the number of items inside the square.
Calculate the area of the square.
Calculate the area of the large region.
Use a proportion to estimate the number of items in the large region.



Items: $\frac{3}{16} = \frac{x}{105}$ $x=20$
Area: $\frac{9}{16} = \frac{x}{105}$

Sampling Methods: Cross-Section

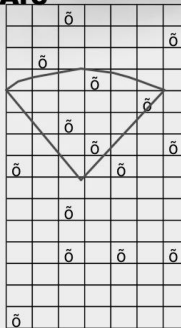
Select a strip inside the large region.
Count the number of items inside the strip.
Calculate the area of the strip.
Calculate the area of the large region.
Use a proportion to estimate the number of items in the large region.



Items: $\frac{6}{30} = \frac{x}{105}$ $x=21$
Area: $\frac{6}{30} = \frac{x}{105}$

Sampling Methods: Arc

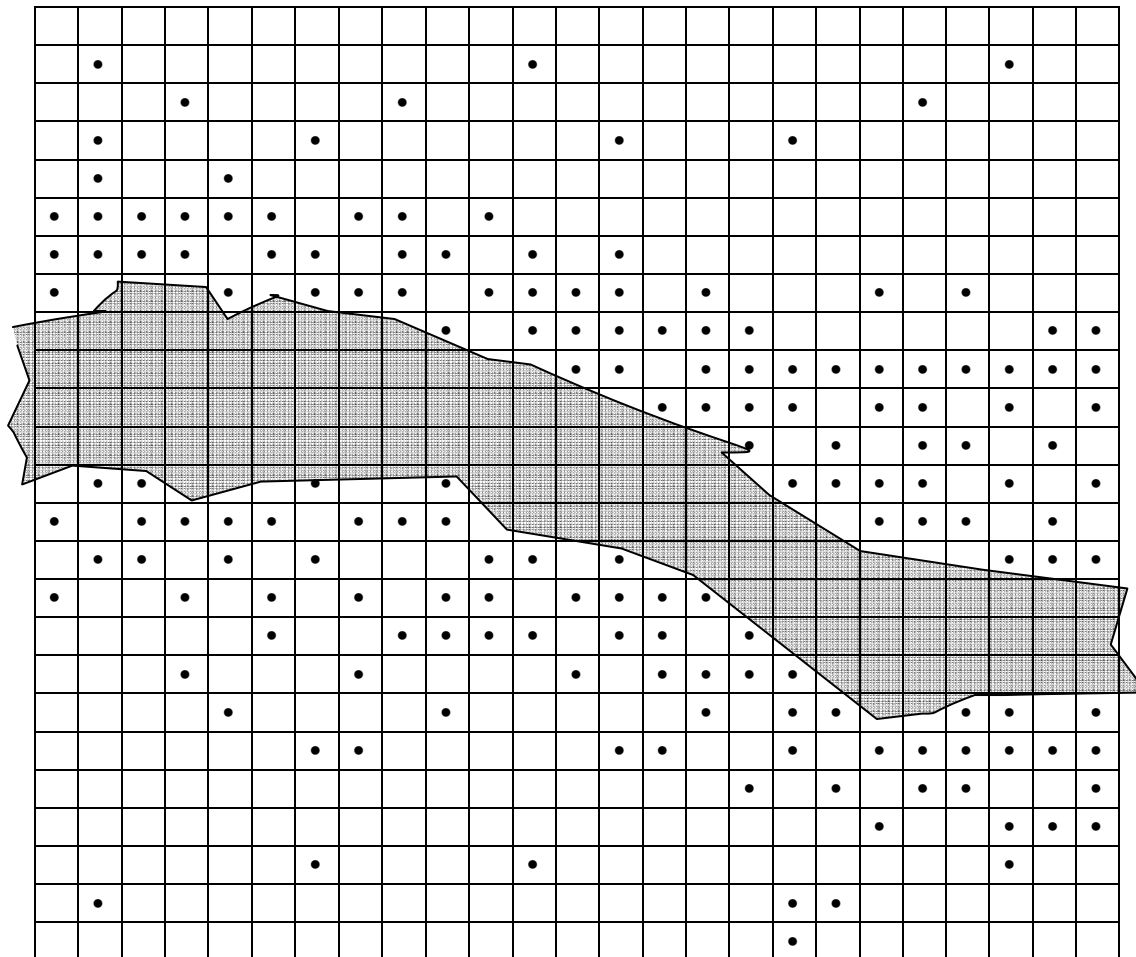
Select a pie slice inside the large region.
Count the number of items inside the arc.
Calculate the area of the arc.
Calculate the area of the large region.
Use a proportion to estimate the number of items in the large region.



Items: $\frac{4}{15.7} = \frac{x}{105}$ $x=27$
Area: $\frac{15.7}{105} = \frac{x}{105}$

The following pages include sample assessments that may be used in conjunction with this lab.

Creating Your Own Statistical Sample



Maggie is examining a plot of land that is crossed by a river. She notices that plants are much more dense along the river's banks. She wants to estimate the number of plant on the land using a statistical sample.

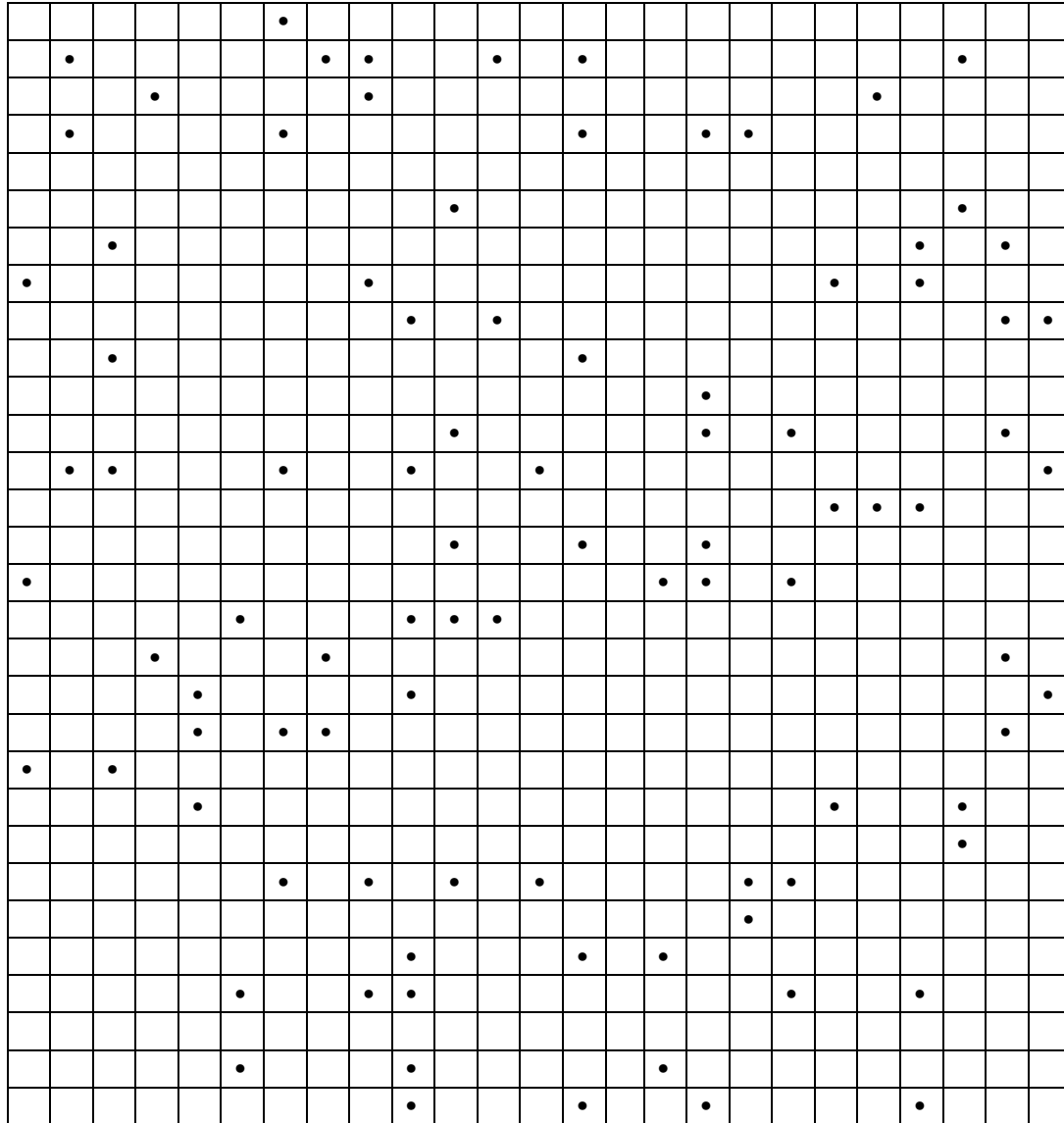
Using the illustration above as a model of Maggie's land, conduct a statistical sample and estimate the number of black dots in the grid. Draw your sample region(s) above, answer the questions below, complete the ratio box and show all calculations.

What method of statistical sampling did you use?

Why? _____

	Area	Number of Dots
Sample Region		
Entire Field		

Conducting a Statistical Sample



Estimate the number of black dots in the grid above by using a grid sample. For full credit you must do each of the following:

- 1) Mark the areas you counted with crayon.
- 2) Count at least three regions and average them.
- 3) Show all calculations.
- 4) Write a description of your process in complete sentences.

Parts 3 & 4 must be completed on a separate sheet of paper.

For part 3, you may use a calculator to **perform** an operation, but you must write down the operation.

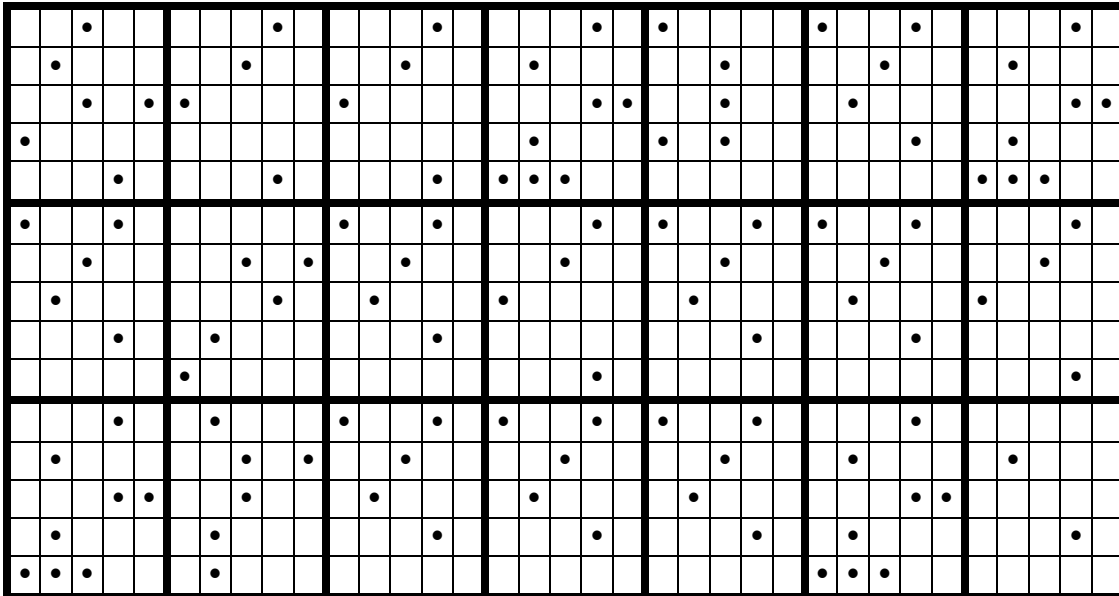
Methods of Statistical Sampling

1. There are four general types of statistical sampling. Two types are “convenience sampling” and “systematic sampling.” What are the other two types?
2. Which method of statistical sampling requires collecting information about several squares inside the total region?
3. Describe a systematic sample.
4. Describe at least two reasons someone might want to conduct a statistical sample.
5. Define “random.”
6. Manuel wants to estimate the number of blades of grass growing in the vacant lot next to house. The lot is 1,000 square feet. He counts 270 blades of grass in an area of 3 square feet. About how many blades of grass are growing in the entire vacant lot? (SHOW YOUR WORK)

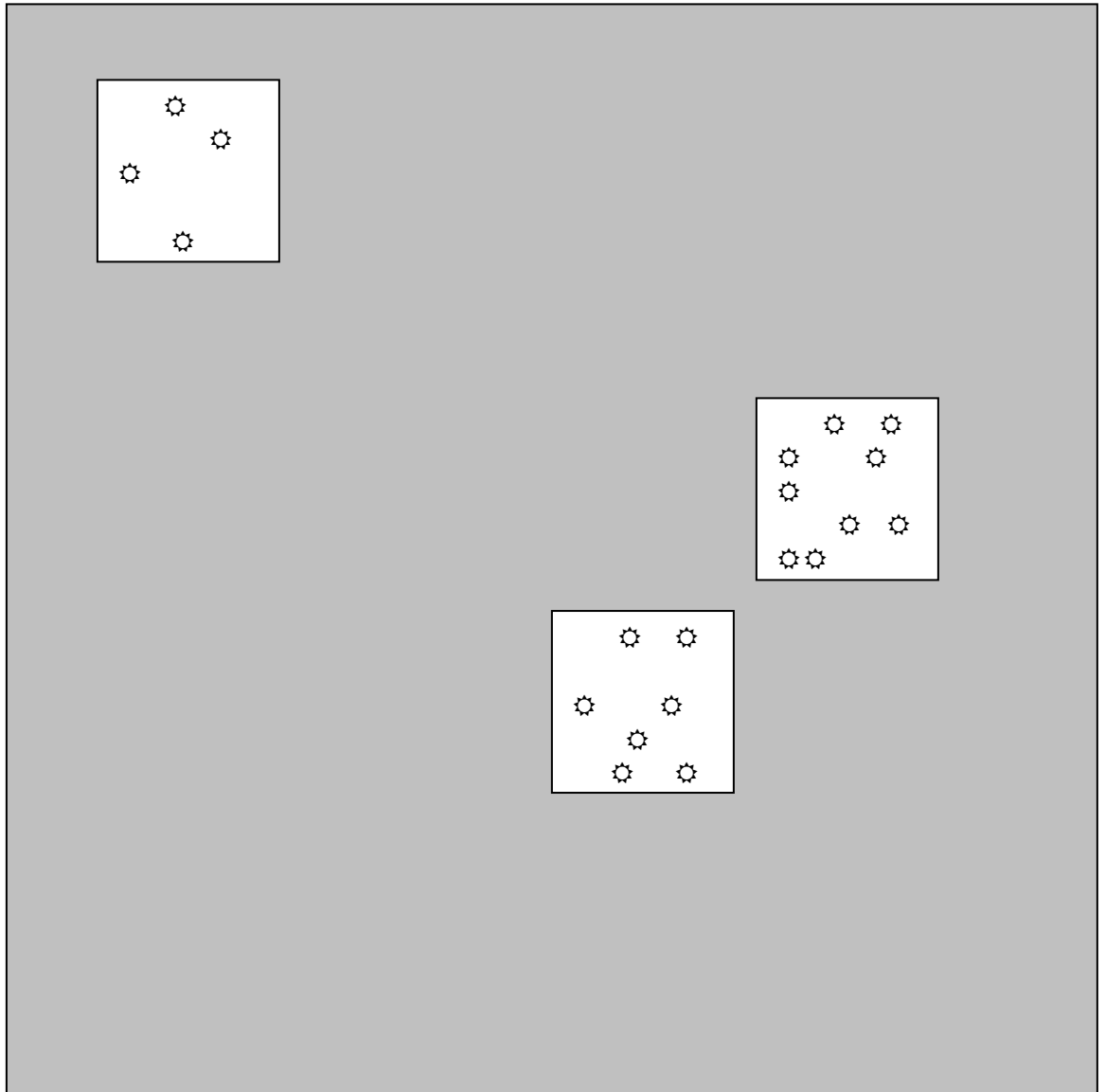
Conducting a Sample

For each problem, SHOW ALL YOUR WORK.

1. A field of wildflowers measures 150 feet wide and 930 feet long. What is the area of the field in square yards?
2. Monica counts 25 ladybugs in an area of 15 square meters. In a similar field with an area of 900 square meters, how many ladybugs would Monica expect to find?
3. Estimate how many circles are located in the area below using a grid sample. You must clearly mark your sample area, show your proportion, show the calculations you used to determine your estimate, and clearly indicate your final estimate.



CONDUCTING A STATISTICAL SAMPLE



The Army Corps of Engineers is preparing to build a bridge across a creek in the Tennessee Valley. The group is concerned about how the bridge will affect native plants, especially the passion flower, which is the state flower.

To estimate how many passion flowers are growing in this construction area, the group carefully surveyed three squares inside of the construction area. The engineers created a scale map showing the construction area, their survey regions, and the plants they discovered. Use the map and a ruler to estimate how many plants are inside the construction zone.

Show the proportion you can use to estimate the number of passion flowers, and calculate your estimate.

TOOLS FOR STATISTICAL SAMPLING

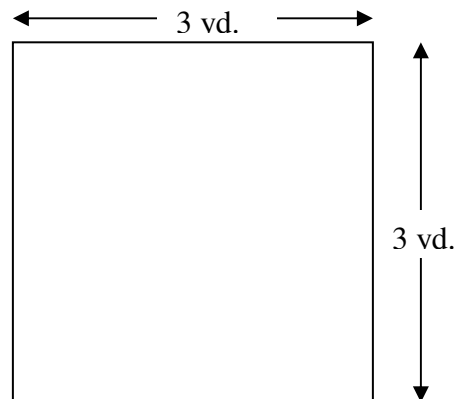
- 1) Savannah is creating a wire sample square so she can conduct a random sample. She has a piece of wire 32 inches long. What is the area of the largest square she can create?

- 2) What is the difference between a grid sample and a cross-section sample?

- 3) How many degrees are in one-fourth of a circle?

- 4) What is the area of a rectangular field that measures 36 feet long and 72 feet wide?

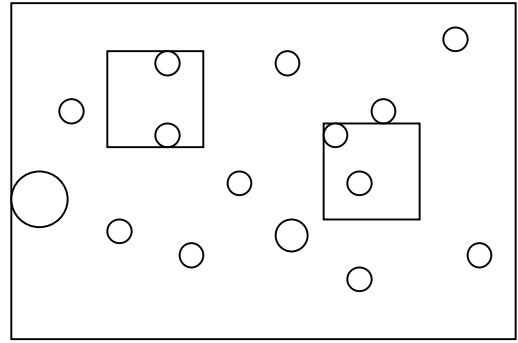
- 5) A sample region has an area of nine square yards. How many square feet are in the sample region?



$$1 \text{ yd.} = 3 \text{ ft.}$$

SAMPLING METHODS

- 1) Danny is trying to estimate how many holes are in a slab of Swiss cheese. You can see some of his work here. Based on this picture, what method of sampling does Danny seem to be using?



- 2) Edna and Nicole are debating how to conduct a statistical sample to estimate the number of Easter eggs in the back yard. Nicole wants to mark a square in the yard, count how many eggs are inside the square, and use a proportion to estimate the number of eggs in the entire yard. Edna wants to walk from one end of the yard to the other, counting how many eggs she sees along the way. Then she will use this count as part of a proportion to estimate the number of eggs in the entire yard. Which of these ladies is suggesting a cross-section method of sampling?
- 3) Carly is surveying 8th graders to determine their favorite brand of tennis shoes. Eric suggests she walk down the hall stopping at every 6th classroom and survey the students inside. Marissa recommends that Carly draw teachers' names from a hat to select which classes she will survey. Which person is recommending a random sample? (For bonus points, what is the name of the other type of sample recommended?)
- 4) Andrew surveys 20 students and discovers that 4 of them like jalapeños on their enchiladas. From this information, estimate how many students would like jalapeños on their enchiladas out of a group of 300.

TI-83+ PROGRAM 'PIZZA'

Overview:

This program for the TI-83+ graphing calculator family can be used along with the arc sample in the *Statistical Sampling* lab. The user enters the length of the radius of an arc and the central angle of the arc, and the program returns the length of the arc, the area of the arc (which is needed for the lab) and the area of the circle related to the arc.

RADIUS R=?■	RADIUS R=?6 DEGREE D=?20■	D=?20 ARC LENGTH 2.094395102 AREA OF ARC 6.283185307 AREA OF CIRCLE 113.0973355 ■
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Source Code:

```
Disp "RADIUS"  
Prompt R  
Disp "DEGREE"  
Prompt D  
Disp "ARC LENGTH"  
Disp ((2(•)R)/(360/D))  
Disp "AREA OF ARC"  
Disp (((•)R^2)/(360/D))  
Disp "AREA OF CIRCLE"  
Disp •*R^2
```