Sampling Rectangles

Name _____

Reports of polls often include the information that the sample populations for the polls were "randomly selected." Why do polls use data from people selected randomly? Can't most people simply do a good job of choosing a "typical" group of people for a poll? Why do scientists choose random samples when they are designing experiments, and how do they make their selections?

For this activity, your teacher will give you a copy of the activity sheet "Random Rectangles," which shows rectangles of different areas. Keep the sheet covered until your teacher gives the signal to begin!

1. Look at the rectangles on the activity sheet. Each small square represents a rectangle that has an area of one. Select five rectangles that you think would give a good representation (that is, a representative or "typical" sample) of all of the rectangles on the sheet.
    a. Record the numbers of the rectangles that you chose and give their corresponding areas.
    b. Compute and record the sample mean area for the five rectangles that you selected.

"Typical" Rectangles

Number of rectangle	Area
1._____	_____
2._____	_____
3._____	_____
4._____	_____
5._____	_____

Sample mean area of the "typical" rectangles _____

2. Generate five random numbers between 1 and 100 by using a random number generator on a calculator or computer. If a number repeats, discard it, and generate another one to replace it.
    a. Use these random numbers to locate the five rectangles that have the corresponding numbers on the sheet, and record their areas.
    b. Compute and record the sample mean area of the five rectangles "selected" by the random numbers.

Random Rectangles

Number of rectangle	Area
1._____	_____
2._____	_____
3._____	_____
4._____	_____
5._____	_____

Mean area of the random rectangles _____

Sampling Rectangles (continued)

Name _____

3. Report to the class the sample mean for the areas of the set of rectangles that you chose as a "typical" sample and the sample mean for areas of the the set of rectangles that you chose randomly. Compile the class results and work with your classmates to make dot plots of the two simulated *sampling distributions*—one for the sample means of the subjectively chosen samples of rectangles and one for the sample means of the randomly chosen samples of rectangles. Compare the simulated sampling distribution of the sample mean areas that you found from random sampling with the simulated sampling distribution that you found from your subjectively chosen samples. What can you observe?

4. Using the activity sheet "Data Record," record a measure of center and a measure of spread (median and interquartile range, or mean and standard deviation) for the simulated sampling distribution of the random samples of size 5. Write a brief description, including shape, center, and spread, of the simulated sampling distribution.