



In these activities you will generate random samples from a population where the proportion of successes is known then observe and describe the variability from sample to sample. After completing the activities, discuss and/or present your findings to the rest of the class.



### Activity 1 [Page 1.3]

1. Do you agree with the following statements about the number of white cars in a random sample of 30 cars from a population where 25% of the cars white? Why or why not?
  - a. It would be surprising if the sample had 5 white cars.
  - b. It would be surprising if the sample had 18 white cars.
  - c. The proportion of white cars has to be between 0.2 and 0.3.
  - d. By chance you may have a random sample where the proportion of white cars is 0.45.
  
2. In a certain community, a two-door car is not as popular as a four-door car. 60% of all cars sold in the area have four doors. Suppose you take random samples of 30 cars from 100 different car dealers.
  - a. Estimate the minimum number and maximum number of four-door cars you would typically see in the sampling distribution of the number of four-door cars. Give both a count and the associated sample proportion.
  
  - b. Describe what you would expect the sampling distribution of the number of four-door cars in random samples of 30 cars to look like.
  
  - c. Generate the sampling distribution and compare it to your description above.
  
  - d. Does the distribution shape of the distribution change if you increase the number of samples to 200?



3. Do not select **Reset**. In another community 50% of all cars sold are four-door. Change the proportion of successes in the population to 0.5.
  - a. Generate ten samples. How do these relate to the sampling distribution when 0.6 of the cars had four doors?
  
  
  
  
  
  
  
  
  
  
  - b. Generate one more set of 10 samples of size 30, then repeat until you have a total of 50 samples, each with 30 cars. How does the shape compare to the distribution of samples from a population where 0.6 of the cars in the dealer lots had four doors?
  
  
  
  
  
  
  
  
  
  
  - c. Generate samples until you have 100 samples of 30 cars each. Describe the distribution of the number of four-door cars.
  
  
  
  
  
  
  
  
  
  
  - d. What is common between the distribution of the number of four-door cars when the 60% of the cars had four doors and when 50% of the population had four doors?
  
  
  
  
  
  
  
  
  
  
4. Indicate whether you agree or disagree with each of the following statements about drawing random samples of size 30 from a population with a given proportion of successes. Explain your thinking in each case.
  - a. If you take 100 random samples of size 30 from the same population where the proportion of successes in the population is from about 30% to 70%, the spread for the number of counts in each sample will be about 14.
  
  
  
  
  
  
  
  
  
  
  - b. A simulated sampling distribution of all possible samples of size 30 drawn from a population with 0.5 chance of a success will center around 15 successes.



# Sample Proportions

## Student Activity

Name \_\_\_\_\_

Class \_\_\_\_\_

- c. Just by chance, you might get sample counts that are five away from what you would expect.
  
  
  
  
  
  
  
  
  
  
- d. If you calculate a proportion of successes from a sample, you can use that number to predict exactly what the population proportion will be.



### Activity 2 [Page 2.2]

1. Go to page 2.2. In a certain community 60% of all pickups sold are black.
  - a. Select **Draw** to generate a sampling distribution of 150 random samples of size 10. How does the horizontal bar on the right relate to the simulated sampling distribution?
  
  
  
  
  
  
  
  
  
  
  - b. Change the sample size to 20 and select Draw. Compare the two horizontal bars.
  
  
  
  
  
  
  
  
  
  
  - c. Without resetting, select **Draw** for sample sizes 40, 60, 80 and 100. What do you notice about the spread of the proportions of black pickups as the sample size changes? Reset and generate the simulated sampling distributions again. Did your observation change?
  
  
  
  
  
  
  
  
  
  
  - d. If it is possible to use any sample size, which one would you choose and why?