

Lesson 15: Random Sampling

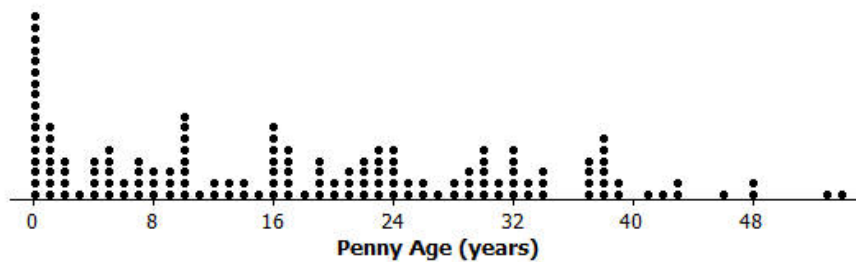
Classwork

In this lesson, you will investigate taking random samples and how random samples from the same population vary.

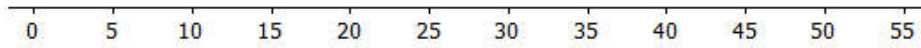
Exercises 1–5: Sampling Pennies

1. Do you think different random samples from the same population will be fairly similar? Explain your reasoning.
2. The plot below shows the number of years since being minted (the penny age) for 150 pennies that JJ had collected over the past year. Describe the shape, center, and spread of the distribution.

Dot Plot of Population of Penny Ages



3. Place ten dots on the number line that you think might be the distribution of a sample of 10 pennies from the jar.



4. Select a random sample of 10 pennies, and make a dot plot of the ages. Describe the distribution of the penny ages in your sample. How does it compare to the population distribution?

5. Compare your sample distribution to the sample distributions on the board.
a. What do you observe?

- b. How does your sample distribution compare to those on the board?

Exercises 6–9: Grocery Prices and Rounding

6. Look over some of the grocery prices for this activity. Consider the following statistical question, “Do the store owners price the merchandise with cents that are closer to a higher dollar value or a lower dollar value?” Describe a plan that might answer that question that does not involve working with all 100 items.

7. Do the store owners price the merchandise with cents that are closer to a higher dollar value or a lower dollar value? To investigate this question in one situation, you will look at some grocery prices in weekly flyers and advertising for local grocery stores.
- a. How would you round \$3.49 and \$4.99 to the nearest dollar?

 - b. If the advertised price was three for \$4.35, how much would you expect to pay for one item?

 - c. Do you think more grocery prices will round up or round down? Explain your thinking.
8. Follow your teacher’s instructions to cut out the items and their prices from the weekly flyers, and put them in a bag. Select a random sample of 25 items without replacement, and record the items and their prices in the table below.

Item	Price	Rounded

Item	Price	Rounded

Example of chart suggested:

Student	Number of times prices were rounded to the higher value	Number of times the prices were rounded to the lower value	Percent of prices rounded up
Bettina	20	5	80%

9. Round each of the prices in your sample to the nearest dollar, and count the number of times you rounded up and the number of times you rounded down.
- Given the results of your sample, how would you answer the question: Are grocery prices in the weekly ads at the local grocery closer to a higher dollar value or a lower dollar value?

 - Share your results with classmates who used the same flyer or ads. Looking at the results of several different samples, how would you answer the question in part (a)?

 - Identify the population, sample, and sample statistic used to answer the statistical question.

 - Bettina says that over half of all the prices in the grocery store will round up. What would you say to her?

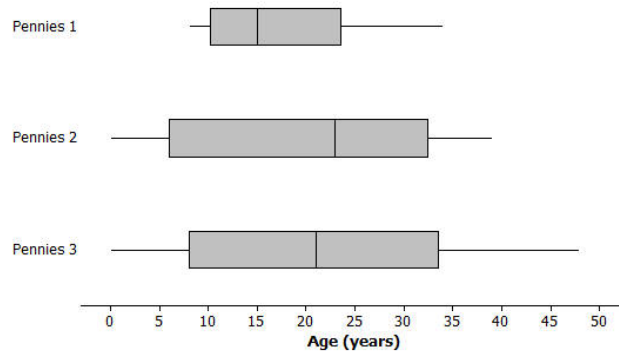
Lesson Summary

In this lesson, you took random samples in two different scenarios. In the first scenario, you physically reached into a jar and drew a random sample from a population of pennies. In the second scenario, you drew items from a bag and recorded the prices. In both activities, you investigated how random samples of the same size from the same population varied. Even with sample sizes of 10, the sample distributions of pennies were somewhat similar to the population (the distribution of penny ages was skewed right, and the samples all had 0 as an element). In both cases, the samples tended to have similar characteristics. For example, the samples of prices from the same store had about the same percent of prices that rounded to the higher dollar value.

Problem Set

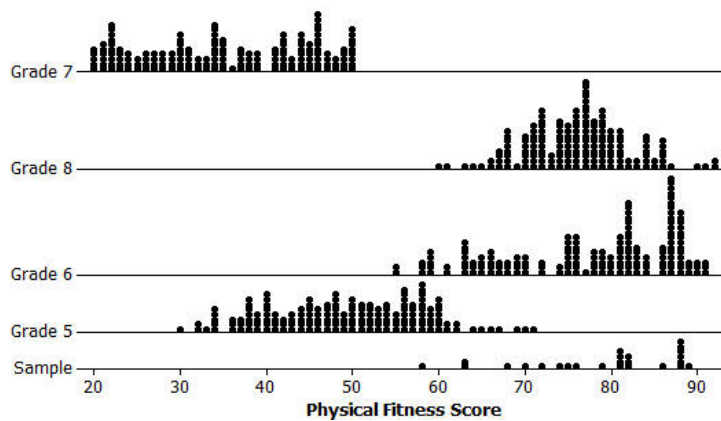
1. Look at the distribution of years since the pennies were minted from Example 1. Which of the following box plots seem like they might not have come from a random sample from that distribution? Explain your thinking.

Box Plots of Three Random Samples of Penny Ages

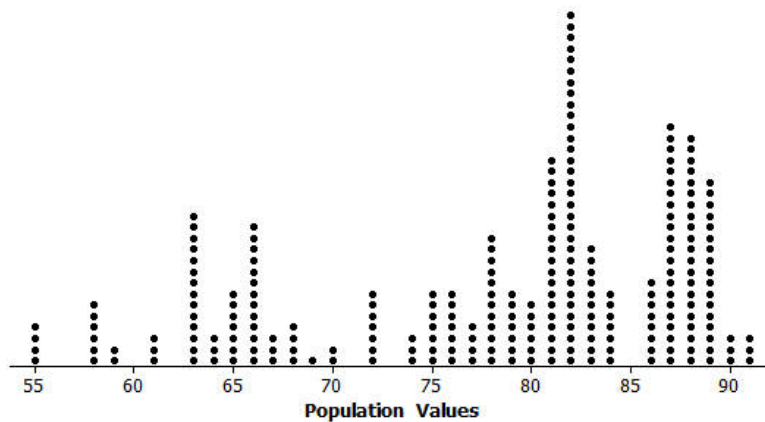


2. Given the following sample of scores on a physical fitness test, from which of the following populations might the sample have been chosen? Explain your reasoning.

Dot Plots of Four Populations and One Sample

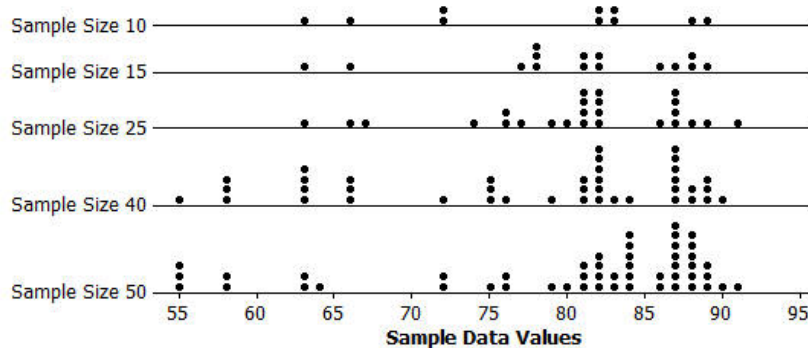


3. Consider the distribution below:



- What would you expect the distribution of a random sample of size 10 from this population to look like?
- Random samples of different sizes that were selected from the population in part (a) are displayed below. How did your answer to part (a) compare to these samples of size 10?

Dot Plots of Five Samples of Different Sizes

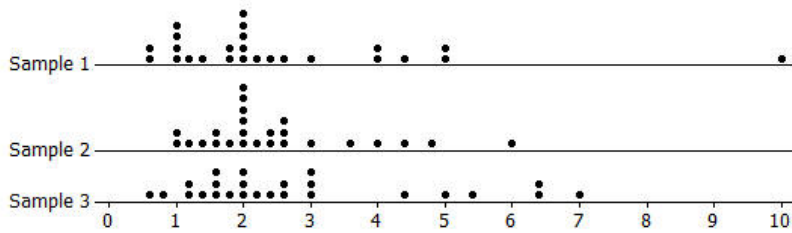


- Why is it reasonable to think that these samples could have come from the above population?
 - What do you observe about the sample distributions as the sample size increases?
4. Based on your random sample of prices from Exercise 2, answer the following questions:
- It looks like a lot of the prices end in 9. Do your sample results support that claim? Why or why not?
 - What is the typical price of the items in your sample? Explain how you found the price and why you chose that method.

5. The sample distributions of prices for three different random samples of 25 items from a grocery store are shown below.

a. How do the distributions compare?

Dot Plots of Three Samples



b. Thomas says that if he counts the items in his cart at that grocery store and multiplies by \$2.00, he will have a pretty good estimate of how much he will have to pay. What do you think of his strategy?