Unit 8, Lesson 17

More about Sampling Variability

Let's compare samples from the same population.

17.1 Average Reactions

Earlier, you worked with the reaction times of twelfth graders to see if they were fast enough to help out at the track meet. Look back at the sample you collected.

1. Calculate the mean reaction time for your sample.

2. Did you and your partner get the same sample mean? Explain why or why not.

17.2 Reaction Population

Your teacher will display a blank dot plot.

1. Plot your sample mean from the previous activity on your teacher's dot plot.
2. What do you notice about the distribution of the sample means from the class?
   a. Where is the center?
   b. Is there a lot of variability?
   c. Is it approximately symmetric?

3. The population mean is 0.445 seconds. How does this value compare to the sample means from the class?

   Pause here so your teacher can display a dot plot of the reaction times of the population.

4. What do you notice about the distribution of the population?
    a. Where is the center?
    b. Is there a lot of variability?
    c. Is it approximately symmetric?

5. Compare the two displayed dot plots.

6. Based on the distribution of sample means from the class, do you think the mean of a random sample of 20 items is likely to be:
    a. within 0.01 seconds of the actual population mean?

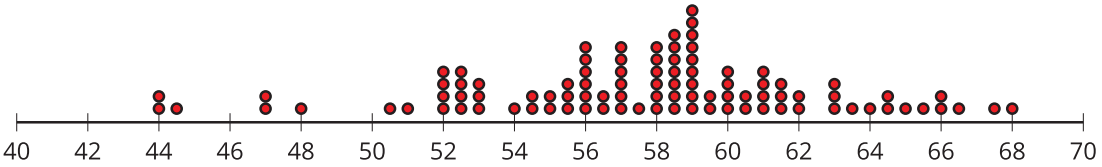
    b. within 0.1 seconds of the actual population mean?

    Explain or show your reasoning.

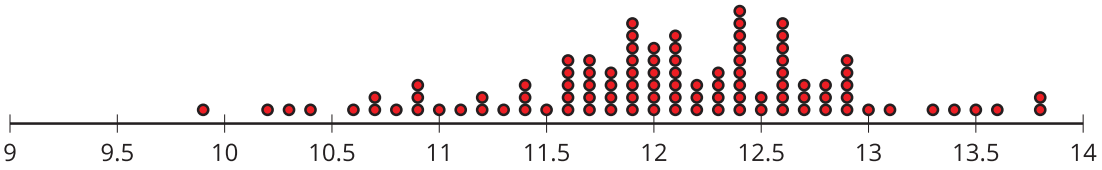
CC BY NC Illustrative Mathematics, based on IM 6–8 Math, CC BY Open Up Resources.

17.3 How Much Do You Trust the Answer?

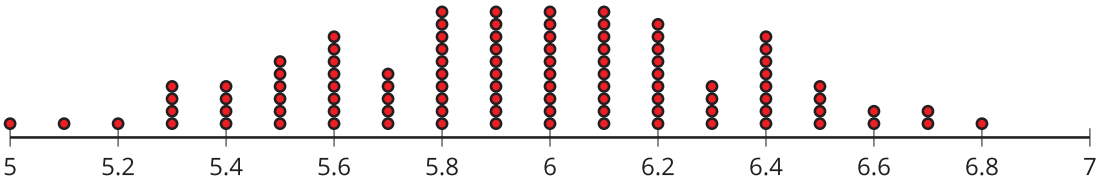
Here are the mean ages for 100 different samples of viewers from each show.



sample means for *Trivia the Game Show*



sample means for *Science Experiments YOU Can Do*



sample means for *Learning to Read*

1. For each show, use the dot plot to estimate the population mean.
   a. *Trivia the Game Show*
   b. *Science Experiments YOU Can Do*
   c. *Learning to Read*
2. For each show, are most of the sample means within 1 year of your estimated population mean?

3. Suppose you take a new random sample of 10 viewers for each of the 3 shows. Which show do you expect to have the new sample mean closest to the population mean? Explain or show your reasoning.

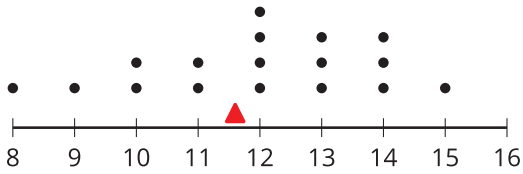
CC BY NC Illustrative Mathematics, based on IM 6–8 Math, CC BY Open Up Resources.

Are you ready for more?

Market research shows that advertisements for retirement plans appeal to people between the ages of 40 and 55. Younger people are usually not interested, and older people often already have a plan. Is it a good idea to advertise retirement plans during any of these three shows? Explain your reasoning.

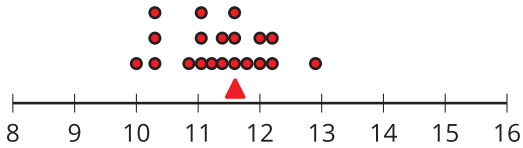
Lesson 17 Summary

A population of hummingbirds has a mean weight of 11.6 grams. This dot plot shows the weights of 18 hummingbirds selected from the population that have the same mean weight as the population. The mean weight is indicated with a triangle.



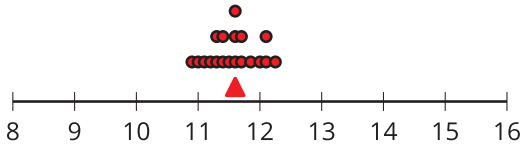
hummingbird weights (grams)

20 more samples, each with 5 hummingbirds, are selected from the original population. For each sample, the mean of the 5 birds is calculated and plotted on this dot plot. The triangle represents the population mean of 11.6 grams. Notice that the sample means are fairly close to the population mean, but that they are not exactly the same.



means of samples of size 5

What is different if more hummingbirds are included in the samples? This dot plot shows the means of 20 samples of 10 hummingbirds, selected at random. Notice that the means for these samples are generally better estimates for the population mean because they tend to be even closer to the mean for the entire population.



means of samples of size 10

In general, as the sample size gets bigger, the mean of a sample is more likely to be closer to the mean of the population.

CC BY NC Illustrative Mathematics, based on IM 6–8 Math, CC BY Open Up Resources.