

# Unit 7 Lesson 11: Reducing Margin of Error

## 1 Notice and Wonder: Female Leads (Warm up)

### Student Task Statement

Five students wanted to see how many children's movies have female lead characters. They each took a sample of children's movies, found the proportion of movies that had female lead characters, then used their results to simulate 100 additional samples. The table shows some of the findings based on the original sample and the simulations.

What do you notice? What do you wonder?

student	number of movies used in the original random sample	estimated proportion	margin of error
A	20	0.273	0.204
B	20	0.205	0.189
C	30	0.280	0.180
D	30	0.232	0.157
E	50	0.205	0.115

## 2 Finding a Job

### Student Task Statement

Elena and Clare are each working on a project about how high school students are having trouble finding jobs. They each find the proportion of students without jobs from a random sample, then use a computer to do 1,000 simulations using the proportion they found and report the results.

Elena says, "The proportion of high school students without jobs is about 0.70 with a margin of error of 0.280."

Clare says, "The proportion of high school students without jobs is about 0.74 with a margin of error of 0.138."

1. Both students reported the margin of error based on 2 standard deviations from their simulations. What are the mean and standard deviation each student found? For at least one student, show your reasoning.
2. Clare and Elena try to figure out why Clare had such a smaller range of values in her report.
  - a. First they consider the proportion they used in the simulations. Elena says, "My simulation used 0.7 as the proportion since I found that proportion in my original sample." Clare says, "My simulation used 0.75 as the proportion since I found that proportion in my original sample." The students used different proportions in their simulations. Do you think this is why Clare has a smaller margin of error? Explain your reasoning.
  - b. They look for more differences in their initial sample and discover that Elena surveyed 10 people in her initial sample and Clare surveyed 40 people. Do you think this is why Clare has a smaller margin of error? Explain your reasoning.

### **3 Exercised**

#### **Student Task Statement**

Cut a sheet of paper into enough slips for each student in the class to get one. On each of the slips you cut, write "Yes" if you spend at least 5 hours intentionally exercising each week, otherwise write "No" on each of the slips. Put one of your paper slips in each student's bag, including your own.

After all the slips are distributed for all the students, return to your bag. Your teacher gave your group a number of slips to draw for each sample. Draw a sample and record the proportion of the slips that say "Yes." Return the slips to the bag and repeat the process until you have 10 sample proportions from 10 samples. Share your results with the group so that each person has 50 sample proportions to work with.

1. Use your 50 sample proportions to report an estimate and associated margin of error for the class. Explain or show your reasoning.
2. Compare the standard deviations of the 50 sample proportions for each of the different groups. Is there a connection to the number of slips chosen in each sample?