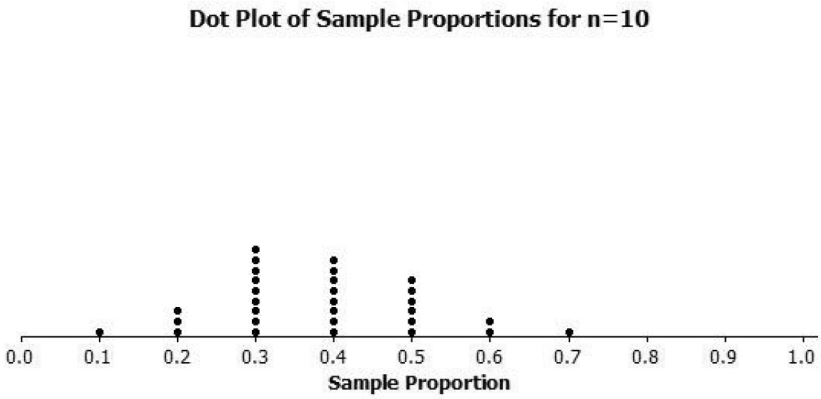
Estimating a Population Proportion

Thirty seventh graders each took a random sample of 10 middle school students and asked each student whether or not they like pop music. Then, they calculated the proportion of students who like pop music for each sample. The dot plot below shows the distribution of the sample proportions.



1. There are three dots above 0.2. What does each dot represent in terms of this scenario?

2. Based on the dot plot, do you think the proportion of the middle school students at this school who like pop music is 0.6? Explain why or why not.

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1. A class of 30 seventh graders wanted to estimate the proportion of middle school students who played a musical instrument. Each seventh grader took a random sample of 25 middle school students and asked each student whether or not they played a musical instrument. Following are the sample proportions the seventh graders found in 30 samples.

0.80	0.64	0.72	0.60	0.60	0.72	0.76	0.68	0.72	0.68
0.72	0.68	0.68	0.76	0.84	0.60	0.80	0.72	0.76	0.80
0.76	0.60	0.80	0.84	0.68	0.68	0.70	0.68	0.64	0.72

   a. The first student reported a sample proportion of 0.80. What does this value mean in terms of this scenario?
   b. Construct a dot plot of the 30 sample proportions.
   c. Describe the shape of the distribution.
   d. Describe the variability of the distribution.
   e. Using the 30 class sample proportions listed above, what is your estimate for the proportion of all middle school students who played a musical instrument?

2. Select another variable or column from the data file that is of interest. Take a random sample of 30 students from the list, and record the response to your variable of interest of each of the 30 students.
   a. Based on your random sample, what is your estimate for the proportion of all middle school students?
   b. If you selected a second random sample of 30, would you get the same sample proportion for the second random sample that you got for the first random sample? Explain why or why not.

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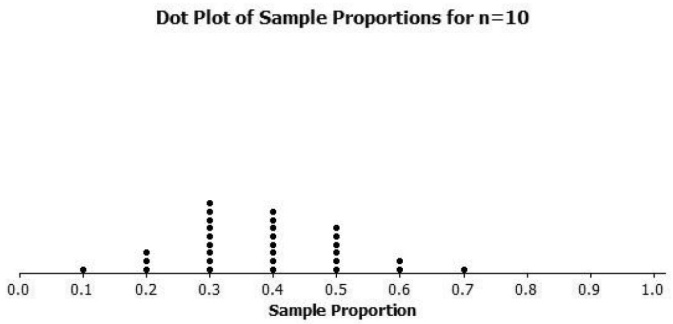
Thirty seventh graders each took a random sample of 10 middle school students and asked each student whether or not they like pop music. Then, they calculated the proportion of students who like pop music for each sample. The dot plot below shows the distribution of the sample proportions.



1. There are three dots above 0.2. What does each dot represent in terms of this scenario?

   Each dot represents the survey results from one student. 0.2 means two students out of 10 said they like pop music.

2. Based on the dot plot, do you think the proportion of the middle school students at this school who like pop music is 0.6? Explain why or why not

   No. Based on the dot plot, 0.6 is not a likely proportion. The dots cluster at 0.3 to 0.5, and only a few dots were located at 0.6. An estimate of the proportion of students at this school who like pop music would be within the cluster of 0.3 to 0.5.

1. A class of 30 seventh graders wanted to estimate the proportion of middle school students who played a musical instrument. Each seventh grader took a random sample of 25 middle school students and asked each student whether or not they played a musical instrument. Following are the sample proportions the seventh graders found in 30 samples.

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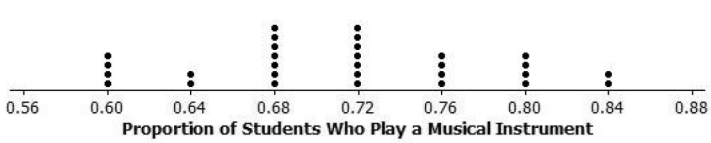
0.76	0.60	0.80	0.84	0.68	0.68	0.72	0.68	0.64	0.72

   a. The first student reported a sample proportion of 0.80. What does this value mean in terms of this scenario?

      A sample proportion of 0.80 means 20 out of 25 answered "yes" to the survey.

   b. Construct a dot plot of the 30 sample proportions.



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c. **Describe the shape of the distribution.**

Nearly symmetrical. It centers at approximately 0.72.

d. **Describe the variability of the distribution.**

The spread of the distribution is from 0.60 to 0.84.

e. **Using the 30 class sample proportions listed above, what is your estimate for the proportion of all middle school students who played a musical instrument?**

The mean of the 30 sample proportions is 0.713.

2. **Select another variable or column from the data file that is of interest. Take a random sample of 30 students from the list, and record the response to your variable of interest of each of the 30 students.**

a. **Based on your random sample, what is your estimate for the proportion of all middle school students?**

Student answers will vary depending on the column chosen.

b. **If you selected a second random sample of 30, would you get the same sample proportion for the second random sample that you got for the first random sample? Explain why or why not.**

No, it is very unlikely that you would get exactly the same result. This is sampling variability—the value of a sample statistic will vary from one sample to another.

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