

Gimme a Kiss!

Hershey's Kisses and Confidence Intervals

(Courtesy of Lisa Brock and Carol Sikes)

In this activity, we will estimate a confidence interval for the proportion of times a Hershey's kiss lands on its base as opposed to its side. To do this, we will drop Hershey's kisses, count how many land on their base, and calculate the confidence interval.

To take your sample, gather five Hershey's kisses in your cup, shake them up, and drop them from about six inches above your desk. Count the number that land on their base.

Repeat ten times to get a sample of 50 Hershey kisses, recording your results in the table below.

Toss Number	Number that land on base	Toss Number	Number that land on base
1		6	
2		7	
3		8	
4		9	
5		10	

Total _____

Your result (50 tosses combined): $\hat{p}$ = _____

Compare your $\hat{p}$ with the others in your group. Did you all get the same answer? _____

Follow these steps to make a 95% confidence interval based on your result.

- Calculate the standard deviation of your sample proportion (standard error):

$$\sigma_{\hat{p}} = \sqrt{\frac{\hat{p}(1 - \hat{p})}{n}}$$

- Look up the critical value, z^* , that corresponds to 95% confidence. Note, this is the z-score that corresponds to the middle 95% of the normal distribution. (Hint: what percentage would be left in each tail of the distribution?). The positive z-score is the **critical value**.

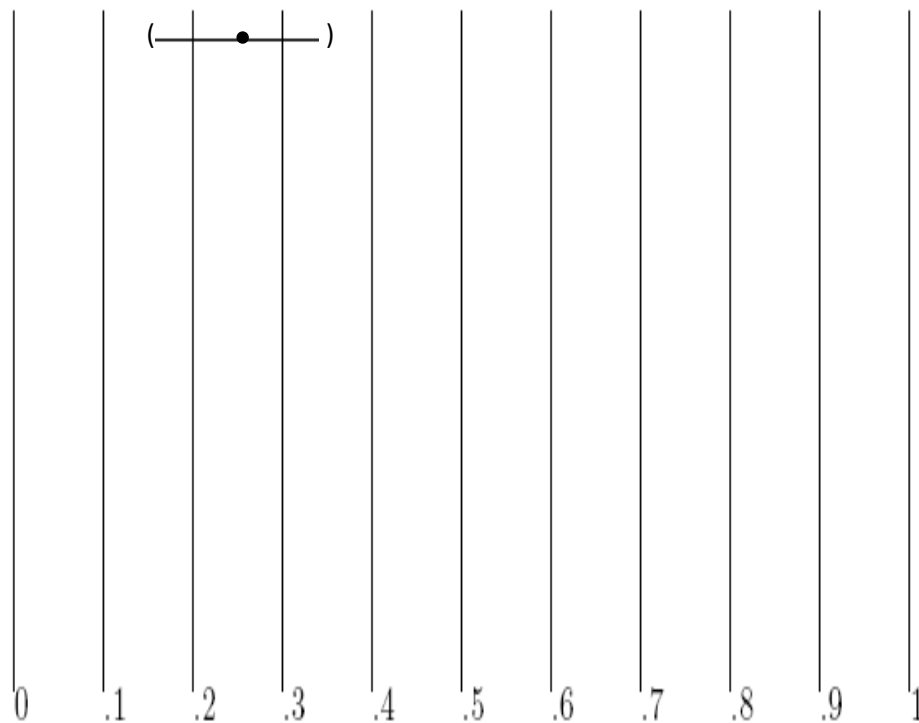
$z^*_{95\%}$ = _____

- The confidence interval is $\hat{p} \pm (z^*_{95\%} \times \sigma_{\hat{p}})$ where **the critical value multiplied by the standard error is the margin of error** for the interval. Adding and subtracting the margin of error from the sample statistic creates the lower and upper bounds for the confidence interval.

your lower bound = _____

your upper bound = _____

Use the lines below to roughly draw the confidence intervals of each person in your group. Indicate the location of $\hat{p}$ as a dot. (An example of a CI from 0.15 to 0.37 with $\hat{p} = .26$ is shown.)



After comparing with your group, plot your sticker on your $\hat{p}$ -value on the chart at the front of the room. Using a marker, extend a line from your sticker to your lower bound and upper bound (in similar fashion as the diagram above)

Interpret the 95% confidence interval in your own words. Write your interpretation below.

Compare your interpretation with your group members' interpretations and come to an agreement on an appropriate interpretation. Write it below.

For even more insight as to what "95% confidence" means, you can go to <http://students.brown.edu/seeing-theory/statistical-inference/index.html#first>