Hershey's Kisses and Confidence Intervals

Today we will use Hershey kisses and confidence intervals to estimate how often a Hershey Kiss lands on its base as opposed to its side. To do this, we will drop Hershey's kisses, count the proportion that land on their base, and calculate a confidence interval.

Part I: Let's create our sample

Step 1: Gather ten Hershey kisses in your hands, shake them up, and drop them from about six inches above your desk.
Step 2: Count the number that land on their base.
Step 3: Repeat five times to get a sample of size 50.
Step 4: Record the proportion of times the kisses land on its base.

Trial #1 result: $\hat{p}$ = _____

Repeat the above steps to create a second trial: Trial #2 result: $\hat{p}$ = _____

Compare with the others around you. Did you all get the same answer?

Part II: Binomial?

Before we calculate the confidence interval, let's answer some questions to get us ready to calculate.

1. Can you say the above scenario follows a binomial distribution? If yes, show that all conditions are satisfied.

   If no, show that the conditions are not satisfied.

2. Which conditions must be satisfied to use the normal curve to approximate the binomial distribution?

3. How do we calculate the mean and standard deviation for a binomial setting (for both X and $\hat{p}$ problems)?

4. What does X represent in a binomial setting?

Part III: Let's create our confidence interval

A. There are three steps for creating a one-proportion interval. List what you believe the steps are below (provide all the parts to each step):
   I. II. III.

B. Explain how to check all the conditions listed in I from above. (yes, the conditions are the same, but the way you check one of them will change)

C. Write down the general format that we have used to calculate confidence intervals so far this chapter.

D. Explain why proportions are z-Intervals.

E. Predict what the new formula will be for a One–Proportion z-Interval.
F. Check your answer from E with your teacher before moving forward….While you wait, record your confidence interval on the board using the following diagram as an example:

Use the lines below to roughly draw the confidence intervals of each person in your group. (An example of a confidence interval from 0.13 to 0.37 is given)

0 .1 .2 .3 .4 .5 .6 .7 .8 .9 1

G. Create and interpret a 95% confidence interval for the true proportion of times a Hershey kiss will land on its base. Write your full solution below.

Part IV: Interpretation

1. Now let's merge your individual samples into one big (class) sample, and make a new confidence interval. Remember that *n* is changing!

Group confidence interval: _____

2. Compare this confidence interval with the confidence intervals from your individual samples.

3. Are the sample proportions ($\hat{p}$) different? If so, how?

4. Are the standard deviations that we used to create the intervals different? If so, how?

5. Are the widths of the confidence intervals different? If so, how?

6. How did increasing the sample size affect the width of the confidence interval?

7. What statistical concept or principle does this remind you of?

Part V: Practice

In a recent survey, 27 out of 85 people agreed that Tiger Woods' image is a positive one. Create a 90% confidence interval for the true proportion of people that have a favorable outlook of Tiger Woods.