How Confident are your Skittles?

Task 1:

1) Using the Skittles given, count the number of each color and calculate that amount as a percent. Record your information in the table below.

Skittles Color		
	Number	Percentage
Green		
Yellow		
Orange		
Red		
Purple		
Totals	n =	100% or 1.0

Since this is a sample, the proportion of each color is denoted as the statistic, $\hat{p}$.

2) Let's say we wish to estimate the proportion of ***orange*** skittles in a standard bag of Skittles. This would be estimating the parameter, p.

   a) Collect the proportions of ***orange*** Skittles from your classmates and record those values in the table below.

b) Since this is a collection of samples, this is a **sampling distribution**. Since the statistic is a proportion we signify the mean and standard error as follows:

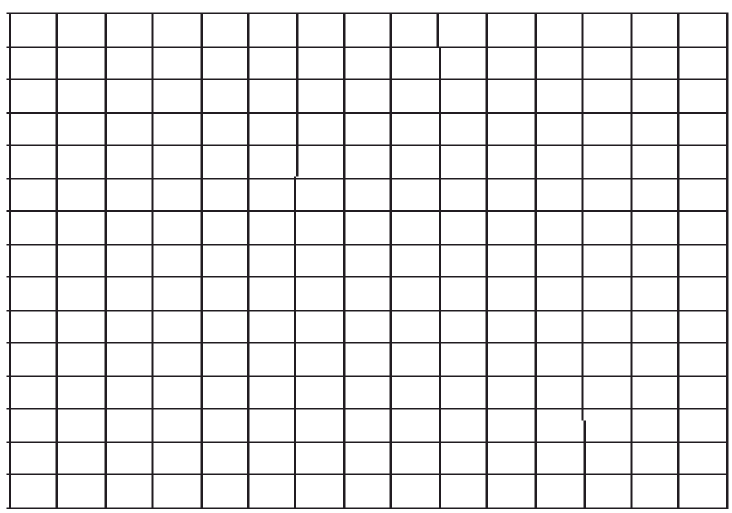
$\mu_{\hat{p}}$ = mean of the sampling distribution of proportions

$\sigma_{\hat{p}}$ = standard error of the sampling distribution of proportions

Calculate the mean and standard error for the class' sampling distribution.

c) Now using the classes proportions, create a histogram using the table and grid below.

Interval (%)	Frequency
0 – 4.9	
5 – 9.9	
10 – 14.9	
15 – 19.9	
20 – 24.9	
25 – 29.9	
30 – 34.9	
35 – 39.9	



Place a dot at the center of each bar in the histogram. Connect those dots with a **smooth** curve. Describe the shape and variability (spread) of the distribution.

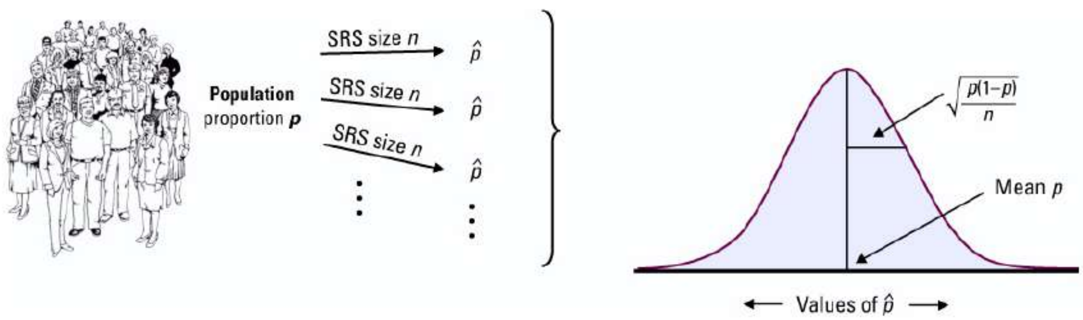
Task 2:

When dealing with sample means we could use the Central Limit Theorem ($n \geq 30$) to confirm a sampling distribution of means was normally distributed. With proportions, there is a similar theorem.

Central Limit Theorem for Proportions

If samples of size n are large enough so that $np \geq 10$ AND $n(1-p) \geq 10$ (where p is the proportion of the desired event), then the samples create a normal distribution such that…

$$\mu_{\hat{p}} = p \qquad \text{and} \qquad \sigma_{\hat{p}} = \sqrt{\frac{p(1-p)}{n}}$$



1) Determine if the Central Limit applies for the Skittles data based upon YOUR sample size for n and the value of $\mu_{\hat{p}}$ for p.

2) Now let's continue estimating the TRUE proportion of orange Skittles in a standard bag. This basically means creating a confidence interval for the proportion.

General Formula:

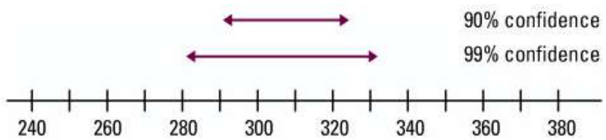
CI = statistic ± z* (standard error of the statistic)

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

a) Using YOUR proportion as the $\hat{p}$ value, create a 95% confidence interval for the proportion of orange in ANY standard bag of Skittles.

Confidence intervals can be graphed to represent the interval that may contain the TRUE parameter.

Example:



b) Graph your 95% confidence interval and the confidence intervals of 3 other classmates above the number line below.

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5 10 15 20 25 30 35 40 (%)

c) Based upon your group's confidence intervals, what would you estimate the TRUE proportion of orange Skittles to be? How did you conclude that?

d) The company that makes the candy has a claimed percent for the TRUE proportion of orange Skittles in a standard bag. (your teacher will share this amount)

1) How close is your group's estimate to the company's claimed percent?

2) Did the company's claimed percent fall within YOUR confidence interval?