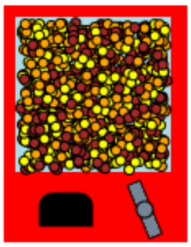
Name: _____ Hour: _____ Date: ___

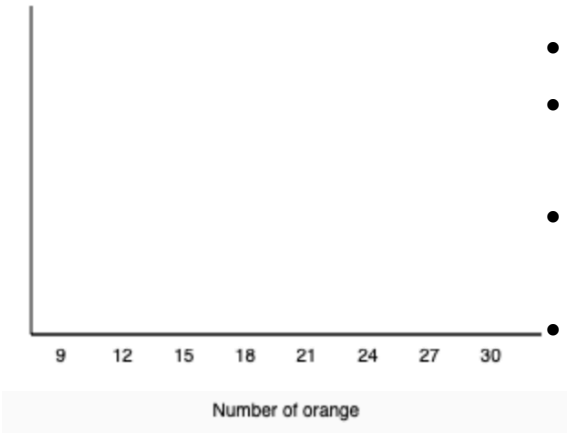
Do you like Reese's Pieces?



The candy manufacturer claims that exactly 40% of the candies are orange. We will use this applet to simulate taking random samples of 50 pieces.

Let *N* = the number of orange candies in a sample.

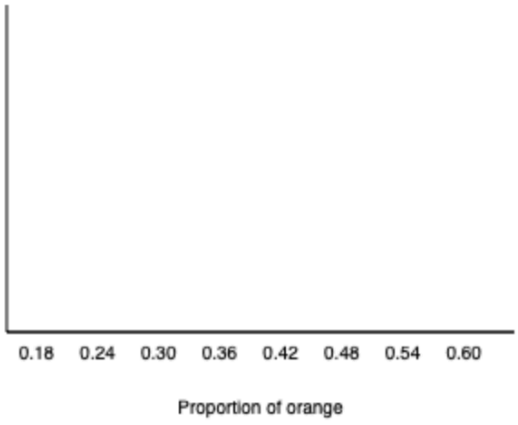
1. Use the applet to take 100 samples of size 50. Sketch the results below.



- Name the distribution.
- What does each dot represent?
- What is the mean of the distribution?
- What is the standard deviation of the distribution?

2. Let $\hat{p}$ = the proportion of orange candies in a sample. What needs to be done to each value of *N* to change it into $\hat{p}$?

3. In the applet, change from "Number of orange" to "Proportion of orange".



- Name the distribution.
- What does each dot represent?
- What is the mean of the distribution?
- What is the standard deviation of the distribution?

4. Suppose we took an SRS of 50 Reese's Pieces and calculated the proportion that are orange ($\hat{p}_1$) and an independent SRS of 100 Skittles and calculated the proportion that are orange ($\hat{p}_2$). Describe the sampling distribution of $\hat{p}_1 - \hat{p}_2$.

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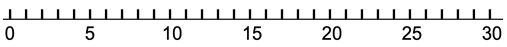
Reese's Pieces are available in snack size bags. Assume the number of total candies in each bag follows a normal distribution with a mean of 16 and standard deviation of 5. We will use this applet to simulate taking random samples of snack size bags.

Let X = the total number of candies in a randomly selected snack size bag.

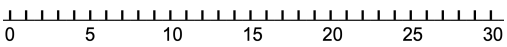
5. Sketch the distribution below.



- Name the distribution.
- What does each black box represent?
- What is the mean of the distribution?
- What is the standard deviation of the distribution?

Let $\bar{x}$ = the mean number of candies from a random sample of 5 snack size bags.

6. Use the applet to take 10,000 samples of size 5.



- Name the distribution.
- What does each blue box represent?
- What is the mean of the distribution?
- What is the standard deviation of the distribution?

Now change the parent population to be skewed.

7. Take 10,000 samples of size 5. Describe the shape of the sampling distribution.

8. Take 10,000 samples of size 25. Describe the shape of the sampling distribution.

9. What happens to the shape of the sampling distribution as sample size increases?

10. Suppose we took an SRS of 25 Reese's Pieces snack size bags and calculated the mean number of candies ($\bar{x}_1$) and an independent SRS of 40 Skittles snack size bags and calculated the mean number of candies ($\bar{x}_2$). Describe the sampling distribution of $\bar{x}_1 - \bar{x}_2$.

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Sampling Distributions

Important ideas:

Homework (AP Classroom)

A large school district held a district-wide track meet for all high school students. For the 2-mile run, the population of female students participating had a mean running time of 8.8 minutes with standard deviation of 3.3 minutes, and the population of male students participating had a mean running time 7.3 minutes with standard deviation of 2.9 minutes. Suppose 8 female students and 8 male students who participated in the 2-mile run are selected at random from each population. Let $\bar{x}_F$ represent the sample mean running time for the female students, and let $\bar{x}_M$ represent the sample mean running time for the male students.

What are the mean and standard deviation of the sampling distribution of the difference in sample means $\bar{x}_F - \bar{x}_M$?

A The mean is 0.4, and the standard deviation is $\sqrt{\frac{8.8}{8} + \frac{7.3}{8}}$.

B The mean is 0.4, and the standard deviation is $\sqrt{\frac{8.8^2}{8} + \frac{7.3^2}{8}}$.

C The mean is 1.5, and the standard deviation is $\sqrt{\frac{3.3^2}{8} - \frac{2.9^2}{8}}$.

D The mean is 1.5, and the standard deviation is $\sqrt{\frac{3.3}{8} + \frac{2.9}{8}}$.

E The mean is 1.5, and the standard deviation is $\sqrt{\frac{3.3^2}{8} + \frac{2.9^2}{8}}$.