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What's the proportion of orange Reese's Pieces?

If we take a sample of Reese's Pieces, what proportion of the candies will be orange?

Suppose a large bag of Reese's Pieces has 1000 pieces. The manufacturer says that exactly 40% of the candies are orange. If we select a sample of 50 pieces, how many will be orange? Let X = the number of orange candies in the sample.

1. What type of probability distribution does X have? Justify.

2. Draw a sample of 50 Reese's Pieces using the applet. How many pieces were orange? Repeat this 5 times. Write the values below.

3. Write the values on sticker dots and add it to the dotplot on the board. Sketch the dotplot below.

4. What does each dot represent?

5. What is the mean and the standard deviation for the distribution of X? Show work.

6. What is the approximate shape of the sampling distribution for X? Explain and sketch it below.

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Instead of finding the number of candies that are orange, we will now find the **proportion** of candies that are orange.

7. Use your samples from #2 and turn each number of orange candies into the **proportion of orange candies** in the sample ($\hat{p}$). Write the proportions below and add them to the second dotplot on the board.

8. Sketch the dotplot below.

9. What does each dot represent?

10. Find the new mean and standard deviation. Show work.

11. What is the approximate shape of the sampling distribution for $\hat{p}$? Explain and sketch it below.

12. We know that bags of Reese's Pieces contain exactly 40% that are orange. If we select a random sample of 50 candies, what is the probability that the sample proportion will be 50% or greater?

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The Sampling Distribution of $\hat{p}$

Important ideas:

Check Your Understanding

According to the American Dental Association, 8% of adults have never had a cavity. A dental graduate student contacts an SRS of 1000 adults and calculates the proportion $\hat{p}$ in this sample who have never had a cavity.

a. Identify the mean of the sampling distribution of $\hat{p}$.

b. Calculate and interpret the standard deviation of the sampling distribution of $\hat{p}$. Check that the 10% condition is met.

c. Is the sampling distribution of $\hat{p}$ approximately Normal? Check that the Large Counts condition is met.

d. Find the probability that the random sample of 1000 adults will give a result within 2 percentage points of the true value.

e. If the sample size were 9000 rather than 1000, how would this change the sampling distribution of $\hat{p}$?