* Population proportion:

Sample proportion:

* Under certain conditions: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Condition 1: 10% condition
* Condition 2: Random
* Condition 3: Large Counts condition
* Suppose there are 10000 candies with different flavors in a candy machine. The manufacturer says that exactly 60% of the candies are orange. If we select a sample of 50 candies, how many will be orange? Let X = the number of orange candies in the sample.

1. X ~ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

1. Find the new mean and standard deviation of sample proportion.

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1. What is the approximate shape of the sampling distribution for ?
2. If we select a random sample of 50 candies, what is the probability that the sample proportion will be 50% or greater?

**The sampling distribution of the difference in sample proportions**

* **E() and Var**

For a categorical variable, when \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with replacement from two \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ populations with population proportion and , the sampling distribution of the difference in sample proportions has mean and standard deviation \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* If \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, difference between sampling without replacement and sampling with replacement is negligible.
* **Determine whether a sampling distribution for can be modelled by normal distribution.**

If the sample size is large enough:

the sampling distribution of will have an approximate normal distribution.



Mr. Wilcox believes that Skittles have a higher proportion of orange candies than M&Ms, while Mrs. Gallas believes the opposite. Who is correct?

A Google search reveals that 21.6% of Skittles are orange and 20% of M&Ms are orange.

1. Describe the sampling distribution of the sample proportion of orange for Skittles () and the sampling distribution of the sample proportion of orange for M&Ms () for samples of size 50.

|  |  |  |
| --- | --- | --- |
|  | Skittles () | M&Ms () |
| Shape: |  |  |
| Mean: |  |  |
| SD: |  |  |

1. Describe the sampling distribution of the difference between proportions of orange Skittles and M&Ms ( *–* ).

Shape:

Mean of difference between proportions:

Standard deviation of the difference between proportions:

1. Mr. Wilcox and Mrs. Gallas calculated a difference between proportions of 0.08 from their samples. Calculate the probability of getting this difference in proportions or higher.

Practice 1:

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 in this sample who have never had a cavity.

1. Identify the mean of the sampling distribution of .
2. Calculate and **interpret** the standard deviation of the sampling distribution of . Check that the 10% condition is met.
3. Is the sampling distribution of approximately Normal?
4. Find the probability that the random sample of 1000 adults will give a result within 2 percentage points of the true value.
5. If the sample size were 9000 rather than 1000, how would this change the sampling distribution of ?

Practice 2:

At Westville High School there are 315 seniors and 389 juniors. 65% of the seniors have parking passes and 42% of the juniors have parking passes. The statistics teacher selects a SRS of 30 seniors and a separate SRS of 30 juniors. Let be the difference in the sample proportions of seniors and juniors that have parking passes.

1. What is the shape of the sampling distribution of ? Why?
2. Find the mean of the sampling distribution.
3. Calculate and **interpret** the standard deviation of the sampling distribution.
4. What is the probability that the difference in sample proportions (senior – junior) of students with parking passes is greater than 30%?