CHI-SQUARE GOODNESS OF FIT TEST

This test is used to determine if observed counts are equal to a hypothesized distribution.

A researcher believes the Mars Company is misleading the public on its color distribution of M&Ms.
He wants to compare the color distribution from a random sample of M&Ms to the Mars Company's expected values:

	Brown	Red	Yellow	Green	Orange	Blue	Purple
Sample	4	4	16	10	8	4	4
Expected	.10 (5)	.20 (10)	.20 (10)	.10 (5)	.10 (5)	.10 (5)	.20 (10)

H   **STATE NULL AND ALTERNATIVE HYPOTHESES:**

H_o: Color distribution of M&Ms is the same as the company claims

H_a: Color distribution of M&Ms is different than the company claims

A   **DETERMINE THAT CONDITIONS FOR TEST ARE ACCEPTABLE:**

- Counts (not percents)- yes

- Every expected count $\geq$ 1 and 80% $\geq$5- yes

T   **PERFORM TEST:**

a)   Calculate Chi-Square statistic:

$X^2 = \Sigma \, (O_i - E_i)^2 / \, E_i = \, (4 - 5)^2 \, /5 + \ldots + (4 - 10)^2/10 = 18.0$

b)   Determine Degrees of Freedom = Number of Categories $- 1 = 7 - 1 = 6$

c)   Determine P-Value

     i)   Using Table:

         P-value $< .01$ for X^2 of 18 and degrees of freedom 6

     ii)   Using calculator:

         DISTR $\rightarrow$ 7: X^2 cdf (18, 100, 6) $\rightarrow$ p = .006

S   **STATE CONCLUSION IN CONTEXT**

There is very good evidence to reject H_o (p = .006) and conclude that the color distribution of M&Ms is **not** what the company claims it should be.