What is Your Favorite Color M&M? Part 1

The company that makes milk chocolate M&Ms claims the following distribution:
12.5% Brown, 12.5% Red, 12.5% Yellow, 12.5% Green, 25% Orange, and 25% Blue. Is this true?

1. Take a class sample and record the results:

Observed counts: Brown:_____ Red:_____ Yellow:_____ Green:_____ Orange:_____ Blue:_____

Total number of M&Ms:_____

2. As a class, write down hypotheses for a significance test.

H_0:

H_a:

3. Let's suppose that M&Ms claimed distribution is correct. If they are correct, how many of each color would we expect to get in our sample.

Expected counts: Brown:_____ Red:_____ Yellow:_____ Green:_____ Orange:_____ Blue:_____

4. Use the table to calculate the test statistic.

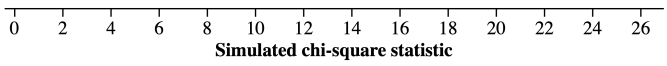
	Observed Counts	Expected Counts	(Observed − Expected)	(Observed − Expected)^2	$\frac{(\text{Observed} - \text{Expected})^2}{\text{Expected}}$
Brown					
Red					
Yellow					
Green					
Orange					
Blue					

Add up all the numbers in the last column. This is our chi-square test statistic: χ^2 = _____

5. What value would we get for χ^2 if our sample was very close to what is expected? Explain.

6. What value would we get for χ^2 if our sample was very far from what is expected? Explain.

7. Go to the candy applet at www.stapplet.com/candy.html and enter the observed counts. At the bottom of the applet, simulate taking 1000 samples from the claimed population of all M&Ms. Sketch the approximate χ^2 density curve. How likely is it to get the χ^2 value we got in class today?



Lesson 12.1 – Introduction to Chi-Square Tests

QuickNotes

Check Your Understanding

Are births equally likely across the days of the week? A random sample of 150 births give the following sample distribution:

Day	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Count	11	27	23	26	21	29	13

a. State the appropriate hypotheses.

b. Calculate the expected count for each day.

c. Calculate the value of the chi-square test statistic.

d. How many degrees of freedom for this chi-square test?

e. Find the *p*-value. What conclusion can you make?