Table Number:__________ Group Name: ________________

Group Members:_____________________ _____________________ _____________________

A Sweet Task

Suppose that we counted the number of M&Ms and Skittles of each color in a bag of the respective candies and recorded the following data.

	Red	**Orange**	**Yellow**	**Green**	**Blue**	**Brown**	**Total**
M&M's	12	6	8	14	10	8	58

	Red	**Orange**	**Yellow**	**Green**	**Blue**	**Purple**	**Total**
Skittle's	9	11	7	10	7	5	49

1. **Create a Two-Way Frequency Table**: We can combine individual frequency tables into a two-way frequency table. The rows represent the types of candy and the columns represent the color of the candy. Use the data above to fill in the two-way frequency table below. Be sure to total each column and row.

	Red	**Orange**	**Yellow**	**Green**	**Blue**	**Purple**	**Brown**	**Total**
M&M's								
Skittle's								
Total								

We read a two-way frequency table in a similar way as a regular frequency table. For example, the number of orange Skittles is listed where the "Orange" column and the "Skittles" row meet. This is called a **joint frequency**.

We can also find the total number of blue candies in the bag. We just look at the total of the "Blue" column. This is a **marginal frequency**.

2. **Analyzing the Data – Finding Marginal and Joint Probabilities:** We can compute the probability of an event occurring from the frequency counts in the candy "mix" two-way frequency table. Find the probability of randomly choosing a candy from the "mix" with the listed attributes. Also, identify each event as either a joint or marginal probability. A joint probability requires two or more characteristics to hold true, whereas a marginal probability requires only one.

	Probability	**Joint or Marginal Probability?**
a. Any Color M&M		
b. A Purple Skittle		
c. A Blue M&M		
d. An Orange Skittle		
e. Any Green candy		
f. A Blue Skittle		

g. In your own words describe how you compute a joint probability given counts in a two-way frequency table.

h. In your own words describe how you compute a marginal probability given counts in a two-way frequency table.

3. **Finding Conditional Probability with Counts:** Imagine that your friend chooses a candy piece from the above "mix". She looks at it, tells you that it is red, but doesn't tell you if it is an M&M or a Skittle.

Knowing that your friend has a red candy in her hand, we can find the probability that it is a red M&M. This is called the **conditional probability** of an event because **we already know something (a condition) about the event in question.**

Answer the following questions to help you find the conditional probability.

a. What is the "total number of <u>possible</u> outcomes" for your friend's candy? *(Remember we know the candy is red.)*

b. What is the probability that your friend has an M&M, if we know the candy is red? (*Keep in mind we only are worried about M&Ms that are red*.)

c. In your own words, explain how to compute conditional probabilities given a two-way frequency table.

What you just found can be written as P(M&M | red), which we read as "the probability of a candy being an M&M *given* that it is red".

4. **Computing Conditional Probabilities:** Using the data about the candy "mix", find the following conditional probabilities. Please show your set up and then your answer as either a simplified fraction or a decimal

a. P (green | Skittle) __________

b. P (M&M | blue) __________

c. P (brown | M&M) __________

d. P (Skittle | red) __________

e. P (Skittle | purple) __________

f. P (M&M | purple) __________

g. P(yellow | M&M) __________

h. P(M&M | yellow) __________

5. If you draw a red candy, is it more likely to be an M&M or Skittle? ________________ Why?

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