

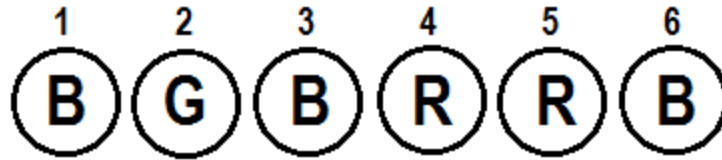
## Tuesday, March 31: More Sampling Distributions

**Group Members:** List the names of your group mates below.

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1. Consider the following “population” of M&M’s blue, green, and red M&M’s.

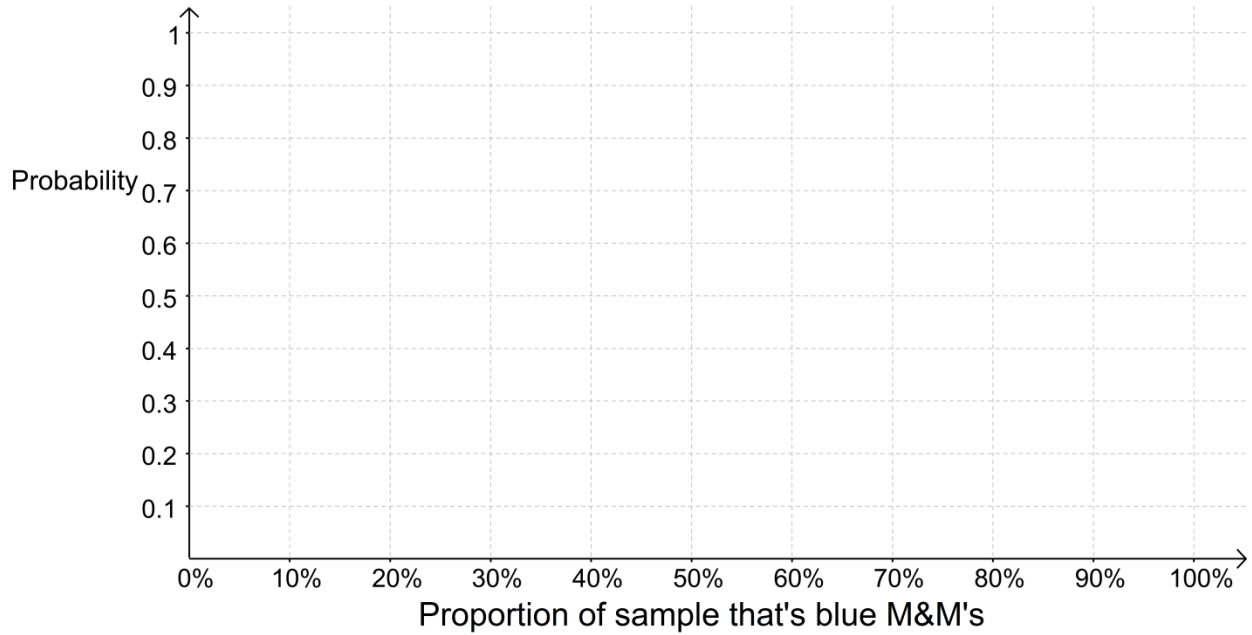


a) Here’s a list of all possible samples of size 4. For each sample, find the proportion of the M&M’s that are blue.

	M&M’s in Sample	Proportion of Blue M&M’s	Proportion of Green M&M’s
Sample 1	1 2 3 4 = B G B R		
Sample 2	1 2 3 5 = B G B R		
Sample 3	1 2 3 6 = B G B B		
Sample 4	1 2 4 5 =		
Sample 5	1 2 4 6 =		
Sample 6	1 2 5 6 =		
Sample 7	1 3 4 5 =		
Sample 8	1 3 4 6 =		
Sample 9	1 3 5 6 =		
Sample 10	1 4 5 6 =		
Sample 11	2 3 4 5 =		
Sample 12	2 3 4 6 =		
Sample 13	2 3 5 6 =		
Sample 14	2 4 5 6 =		
Sample 15	3 4 5 6 =		

b) If we're looking for blue M&M's then the parameter  $p =$

c) Create a graph showing the sampling distribution below.



d) Calculate the mean in the sampling distribution.

e) Calculate the standard deviation in the sampling distribution (*Use a computer to do this!*)

f) Plug the parameter  $p$  and the sample size into the following formula. What do you get? How does this relate to your answer in part e?

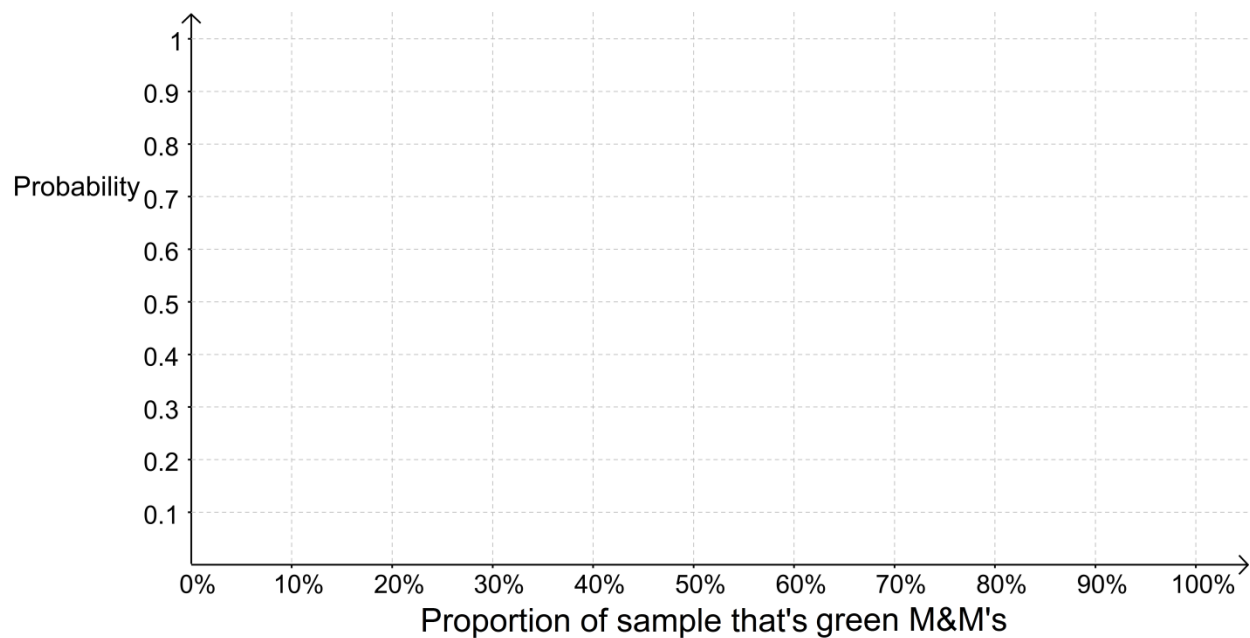
$$\sqrt{\frac{p(1-p)}{n}} =$$

The standard deviation in the sampling distribution is called the **standard error**, and can be calculated very quickly using the formula:

$$\text{Standard Error} = SE = \sqrt{\frac{p(1-p)}{n}}$$

2. Let's change the parameter. What if we are now looking for the proportion of M&M's that are *green*?

a) Draw a graph of the sampling distribution below.



b) What's the mean of the sampling distribution?

c) What's the standard error?

d) Which sampling distribution is more precise? **Explain your answer.**

**Challenge Question:** What if we increased the sample size from 4 to 5? Would this increase the precision or decrease it? What does this have to do with the formula for standard error?