

Name: _____

Probability Challenge 5: Pick a Cup Challenge



Materials:

- a stack of 4 cups
- an m&m

Procedure:

1. Place one cup upside down over the m&m on a desk. Place the other 3 cups to the side.
2. The probability, or likelihood, of something happening is:

(the number of possibilities that meet my requirements)

(the total number of possibilities)

Or, in this case:

(number of cups that have an m&m under them)

(in other words, the total number of cups)

So, the probability that you will guess which cup is hiding the m&m when there is only one cup total is:

1 (the number of cups with an m&m)

1 (the total number of cups)

Theoretical Probability

1. Place two cups upside down on the desk. Have one team member close his/her eyes while the other hides the m&m under one of the cups.

2. With just one guess, what is the likelihood of finding the m&m? (Remember: The probability = the number of cups with an m&m/the total number of cups.)

$$\frac{\text{_____}}{\text{(the number of cups with an m\&m)}} \div \text{(the total number of cups)}$$

3. The teammate whose eyes were closed should guess which cup has the m&m.

Was he/she right? (circle one) Yes No

4. Next, add one more cup so that three are upside down on the desk. The teammate who closed his/her eyes last time should now hide the m&m while the other teammate closes his/her eyes. Now what is the likelihood on the first try of finding the m&m?

$$\frac{\text{_____}}{\text{(the number of cups with an m\&m)}} \div \text{(the total number of cups)}$$

5. The teammate whose eyes were closed should guess which cup the m&m is under.

Was he/she right? (circle one) Yes No

6. Repeat this procedure adding a fourth cup. On your first try, what is the probability of finding the m&m?

$$\frac{\text{_____}}{\text{(the number of cups with an m\&m)}} \div \text{(the total number of cups)}$$

7. The teammate whose eyes were closed should guess which cup the m&m is under. Was he/she right? (circle one) Yes No

You have just used math to figure out your chances of finding a hidden m&m with just one guess. This is called **theoretical probability**, or what we predict will probably happen.

Now we'll see if the theoretical probability is really what happens. This is called **experimental probability**.

Experimental Probability

1. Set up one cup with one m&m under it. Taking turns, have each person in your team see if they can identify which cup has the m&m under it.
 - On the big wall chart that says "Pick a Cup," draw one tally mark under "1 cup" for each teammate who guessed correctly on the first try with one cup.
 - Draw one tally mark for each teammate who made a guess (even if incorrect) in the "total number of people who guessed" row in the "1 cup" column.
2. Have one team member hide his/her eyes while the other gets out a second cup and hides the m&m under one of the cups.
 - Then *switch roles so the other partner gets to make a guess, too.*
 - Draw one tally mark under "2 cups" on the wall chart for each teammate who guessed correctly on the first try.
 - Draw one tally mark for each teammate who made a guess in the "total number of people who guessed" row in the "2 cups" column.
3. Add a third cup and repeat. Mark your results on the wall chart under 3 cups.
4. Add a fourth cup and repeat. Mark your results on the wall chart under 4 cups.

Our **experimental probability** for each trial equals the number of students who guessed correctly the first time divided by the total number of students who made guesses.

What is the experimental probability for each trial (each number of cups)?

(Find this information on the wall chart where everyone has recorded their results.)

1 cup	2 cups	3 cup	4 cups
_____	_____	_____	_____

The **law of large numbers** states that the more times we repeat a test, the closer we come to matching the theoretical probability. Do you see this happening? (circle one)

Yes No

Is the experimental probability the same as the theoretical probability?

Please put away your materials (please throw the m&ms away) and **submit this paper to receive your PLAY Lab token!**
