**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_**

**To Switch, or Not to Switch?**

Today in Math we are going to conduct an investigation into probability, using the Monty Hall problem. Probability means the likelihood of something happening. For example, when I roll a dice that has six sides, and is numbered from 1 through 6, the likelihood that I will roll a “2” is a 1 out of 6 chance. The likelihood that I will roll an even number is a 3 out of 6 chance.

**Explanation of the Monty Hall Problem**

The Monty Hall Problem gets its name from the TV game show, ***Let's Make A Deal***, hosted by Monty Hall[***1***](http://www.montyhallproblem.com/#F1). On this show, contestants were given the opportunity to select one of three closed doors. Behind one of the doors was a great prize - usually a car; behind the other two doors were booby prizes – usually goats. Once a contestant made her selection, Monty Hall would open one of the remaining doors, revealing that it does not contain the prize. He then asked the contestant if she would like to switch her selection to the other unopened door, or stay with her original choice. Here is the problem…

Does it matter if you switch?

**Our Modification of the Monty Hall Problem**

Today we will investigate whether switching or staying with your original choice gives you a better chance for winning the prize. You will work with a partner and each of you will take on a role. One of you will always switch and the other will never switch.

Your partner will hide a paperclip (representing the prize) under one of three cups, labelled A, B or C. You will choose the cup you think holds the paperclip. Your partner will lift one of the other cups that does not hold the paperclip and ask you if you want to switch.

* If you are the partner who took on the role of always switching, then you will switch your choice to the other cup. Your partner will then reveal whether the cup you switched to contains the prize.
* If you are the partner who took on the role of never switching, your partner will reveal what’s under your cup to see if it contains the prize.

You will each complete 15 trials and record your results in the table. After this, you will enter your data into iSense and look at some visualizations to decide whether you are better off switching – or not switching!

**Procedure**

1. Decide who the Switcher is and who the Non-Switcher is. The Non-Switcher guesses first.
2. While the Non-Switcher turns his/her back, the Switcher will line up three cups and put the paperclip under one of them. The Non-Switcher will turn around, look at the cups and select the one she thinks has the paperclip. The Switcher then will turn over one of the other cups that DOES NOT hold the paperclip. Since the Non-Switcher always decides to go with their first choice, the Switcher will lift the cups to reveal the paperclip. Did the Non-Switcher win? Record the results in the table.
3. Repeat this scenario 14 additional times and record the results in the table.
4. The Switcher will guess next. While the Switcher turns his/her back, the Non-Switcher will line up three cups and put the paperclip under one of them. The Switcher will turn around, look at the cups and select the one she thinks has the paperclip. The Non-Switcher then will turn over one of the other cups that DOES NOT hold the paperclip. Since the Switcher always decides to switch, she will decide to go with the other cup. The Non-Switcher will lift the cups to reveal where the paperclip is hiding. Did the Switcher win? Record the results in the table.
5. Repeat this scenario 14 additional times and record the results in the table.
6. Go to <https://isenseproject.org/projects/1465>
7. On the right side of the page, you’ll see the Contribute Data section. Enter the following and then click the Submit key.
Key: Hall
Contributor Name: (your first name)
8. Now under Contribute Data, select Manual Entry.
9. On the data entry screen, enter your ***first name*** for the Data Set Name. Then go ahead and enter the ***total number of losses*** (out of the 15 trials), the ***total number of wins*** (out of the 15 trials) and under the drop-down box for Role, select either ***Switcher*** or ***NonSwitcher***, depending on your role. Click Save when finished.
10. Go to the default visualization to see whether it is better to switch, or not to switch!

**Monty Hall Results Table**

|  |  |  |
| --- | --- | --- |
| **Trials** | **Winner** | **Loser** |
| ***If you won, enter a “1” in Winner and a “0” in Loser or******If you lost, enter a “0” in Winner and a “1” in Loser.*** |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |
| 6 |  |  |
| 7 |  |  |
| 8 |  |  |
| 9 |  |  |
| 10 |  |  |
| 11 |  |  |
| 12 |  |  |
| 13 |  |  |
| 14 |  |  |
| 15 |  |  |