# Simulation for Free Magnets at a Restaurant

A restaurant is giving away free magnets each time you go to the restaurant. There are three different types of magnets and when you go you have an equally likely chance of getting any of the three designs. We need to design a simulation that will help us find how many times we must go to the restaurant until we have all 3 designs.

The typical way of working this problem is to use a spinner divided into 3 equal sections (each section representing a different magnet) and spin it as many times as you need until you finally land in all 3 sections. Maybe you get lucky and it only takes 3 times, but that is not very likely.

We are going to simulate this event, but instead of using a spinner, we will create a spreadsheet and use the skills we have learned to simulate going to the restaurant multiple times. Since we don't know how many times we would have to go until we received all three magnets, we will need to make sure that we simulate going at least 12 times. Watch this video first before following the directions below on setting up the spreadsheet.

Video at https://www.youtube.com/watch?v=t5wDEHx47L4

Directions to create Google Sheet for Simulation

Go to your email account and open Google Sheets
Hit CTRL-A to highlight everything and set your font size as 14.
In cell A1, type "Trip"
In cell B1, type "Magnet (1, 2, 3)"
Widen your columns in A and B if you need.
In cell A2, type the number 1
In cell A3, type the number 2
Use your mouse to highlight cell A2 and A3 and let go.
Drag the bottom corner of A3 with the blue dot down to cell A13 and let go.
This should have done a FILL SERIES giving you the numbers 1 to 12.
In cell B2, type "=RANDBETWEEN(1, 3)"
Hihglight B2 and drag down to B12 and let go of your mouse.
Hit CTRL-D to do a FILL DOWN.
You have now simulated going to the restaurant 12 times.

Here is an example of what your screen might look like

| Trip | Magnet (1, 2, 3) |
|:----:|:----------------:|
| 1 | 2 |
| 2 | 2 |
| 3 | 1 |
| 4 | 2 |
| 5 | 3 |
| 6 | 3 |
| 7 | 1 |
| 8 | 2 |
| 9 | 3 |
| 10 | 3 |
| 11 | 2 |
| 12 | 1 |

From this example you can see that it took 5 trips of going to the restaurant to finally get all three magnets. In our chart below, we will be recording the number of trips it took, so in this case, you would record 5 in Trial 1 below.

If you go to any blank cell in your spreadsheet and type anything, including hitting the space bar, and then hit Return, the spreadsheet will recalculate everything. This gives you a new set of data. Do this to get your 2nd trial, 3rd trial, etc. until you have gotten 20 trials. Record your answers in the chart below.

|  | Number of Trips |  |  | Number of Trips |  |  | Number of Trips |  |  | Number of Trips |
|---|---|---|---|---|---|---|---|---|---|---|
| Trial 1 |  | | Trial 6 |  | | Trial 11 |  | | Trial 16 |  |
| Trial 2 |  | | Trial 7 |  | | Trial 12 |  | | Trial 17 |  |
| Trial 3 |  | | Trial 8 |  | | Trial 13 |  | | Trial 18 |  |
| Trial 4 |  | | Trial 9 |  | | Trial 14 |  | | Trial 19 |  |
| Trial 5 |  | | Trial 10 |  | | Trial 15 |  | | Trial 20 |  |

You now want to create a new spreadsheet in Google Sheets where you can enter the data that you have now recorded for your 20 trials. How you set that up is up to you.

Use the data from your 20 trials to calculate these three things:
1. the least amount of times it took you to get the three magnets.
2. the largest amount of times it took you to get the three magnets.
3. the average number of times it took you to get the three magnets.

Organize your data neatly.

Your teacher will instruct you if he/she wants you to save the spreadsheet and turn it in or if your class is going to discuss your data as a group.