

The Monty Hall problem in Excel: demo notes

Download the exercise file: [monty-hall.xlsx](#)

This thought experiment comes from the television show *Let's Make a Deal!*

- Behind three doors randomly lie two goats and a car, respectively.
- You pick a door.
- Monty opens another door: it has a goat.
- Do you stick to your door, or switch doors? *Does it matter?*

Let's simulate 1,000 rounds of the Monty Hall problem and see whether one strategy works better.

We will use emojis inside conditional formatting to make our simulations come to life. 🍷

You can insert emojis on Windows with the keyboard shortcut **Ctrl + ;** . For Mac, it's **Ctrl + Cmd + Space**.

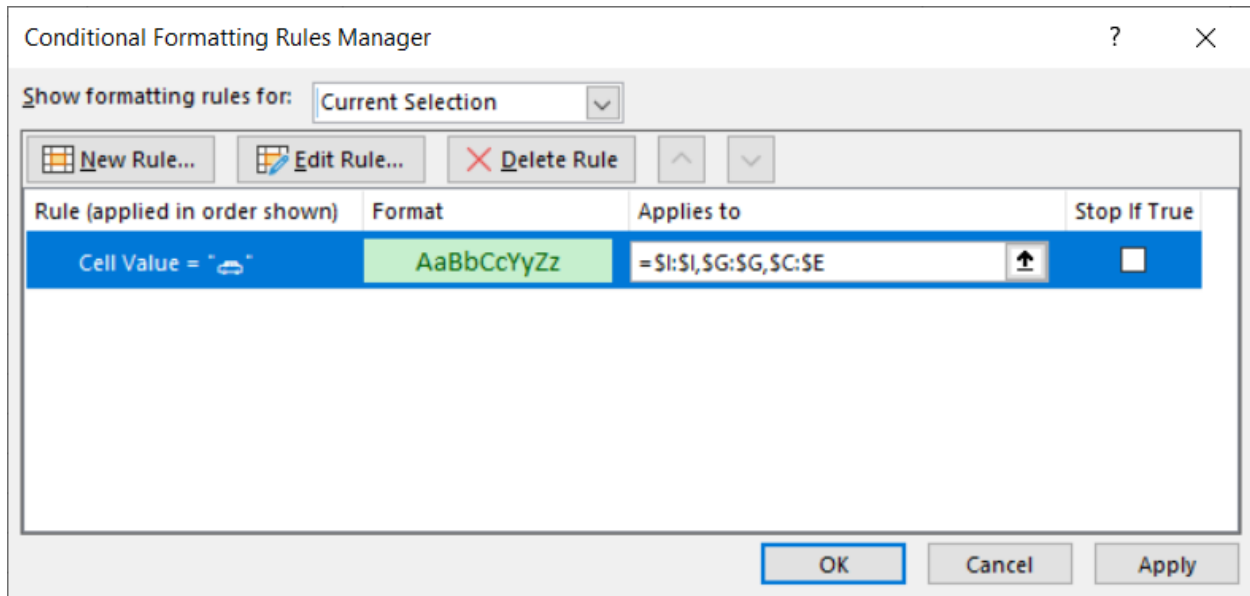
1. Enter the following formulas into the table:

Column reference	Column label	Formula used	Description
B	Random shuffle	=RANDBETWEEN(1,3)	This is used to randomly shuffle our prizes behind the doors.
C	Door #1	=IF(\$B3=1, "🚗", "🐐")	Assign a car or goat to this door.
D	Door #2	=IF(\$B3=2, "🚗", "🐐")	Assign a car or goat to this door.
E	Door #3	=IF(\$B3=3, "🚗", "🐐")	Assign a car or goat to this door.



F	Random selection	= "Door #"&RANDBETWEEN(1,3)	Let's pick a door at random.
G	Prize if you stick	=IF(F3="Door #1",C3,IF(F3="Door #2",D3,E3))	Here's what we win if we stick with that door.
H	Result if you stick	=IF(G3="🚗","Win","Loss")	Did we win or lose by sticking?
I	Prize if you switch	=IF(G3="🐑","🚗","🐑")	Here's what we win if we switch doors.
J	Result if you switch	=IF(G3="🐑","Win","Loss")	Did we win or lose by switching?

2. Conditional formatting is set to turn the cells with a car emoji green in columns C, D, E, G and I.



Our resulting simulation looks like this:

	A	B	C	D	E	F	G	H	I	J
1		=RANDBETWEEN(1,3)	=IF(\$B3=1,"Goat", "Car")	=IF(\$B3=2,"Goat", "Car")	=IF(\$B3=3,"Goat", "Car")	=IF(\$B3=1,"Door #1", "Door #2"&RANDBETWEEN(1,3))	=IF(F3="Door #1", C3, IF(F3="Door #2", D3, E3))	=IF(G3="Goat", "Win", "Lose")	=IF(G3="Goat", "Lose", "Win")	=IF(G3="Goat", "Lose", "Win")
2	No.	Random shuffle	Door #1	Door #2	Door #3	Random selection	Prize if you stick	Result if you stick	Prize if you switch	Result if you switch
3	1	2	Goat	Car	Goat	Door #1	Goat	Lose	Car	Win
4	2	3	Goat	Goat	Car	Door #2	Goat	Lose	Car	Win
5	3	1	Car	Goat	Goat	Door #3	Goat	Lose	Car	Win
6	4	3	Goat	Goat	Car	Door #3	Car	Win	Goat	Lose
7	5	2	Goat	Goat	Goat	Door #3	Goat	Lose	Car	Win
8	6	2	Goat	Goat	Goat	Door #1	Goat	Lose	Car	Win
9	7	1	Car	Goat	Goat	Door #2	Goat	Lose	Car	Win
10	8	3	Goat	Goat	Car	Door #2	Goat	Lose	Car	Win
11	9	1	Car	Goat	Goat	Door #2	Goat	Lose	Car	Win
12	10	1	Car	Goat	Goat	Door #3	Goat	Lose	Car	Win
13	11	1	Car	Goat	Goat	Door #3	Goat	Lose	Car	Win
14	12	1	Car	Goat	Goat	Door #3	Goat	Lose	Car	Win
15	13	2	Goat	Goat	Car	Door #1	Goat	Lose	Car	Win

3. We can now count the number of times we win by sticking versus switching:
 - a. =COUNTIF(\$H\$3:\$H\$1002, "Win")
 - b. =COUNTIF(\$J\$3:\$J\$1002, "Win")

It turns out that we win about two-thirds of the time when we switch. Why?

Interpretation

A contestant gains to benefit from switching in the Monty Hall problem because Monty reveals more information about the placement of the car after opening a door to one of the goats:

- When you pick the first door, you have a 33% chance of picking the car.
- That leaves 66% of the doors “unanswered.”
- Monty opens another door: it has a goat. You *know* this door doesn’t have a car.
 - o You are now twice as likely to find the car in that second door than the first door, because the 66% likelihood has been “pushed into” one door.

Credits

My workbook demonstration is heavily borrowed from the post [“Monty Hall Problem Simulation in Excel.”](#)



Special thank-you to Numberphile's [Monty Hall Problem video](#) and Statistics by Jim's [Monty Hall Problem blog post](#) for further understanding of the problem.

