

what Is the Monty Hall Problem ?

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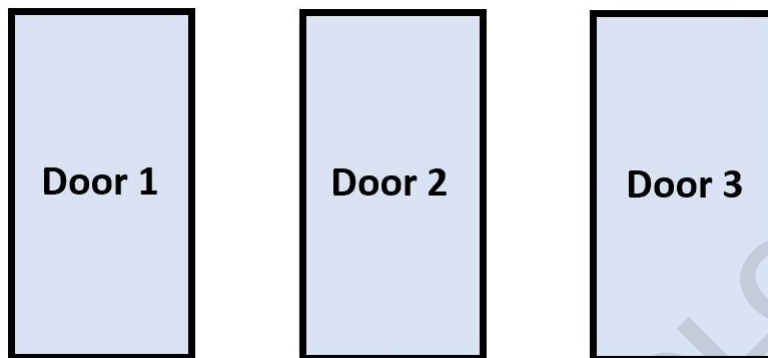
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The Monty Hall Problem is a probability puzzle based on the US television game show *Let's Make a Deal*. It is a challenging and counter-intuitive problem that has been debated since it was first proposed in the 1990s, with many mathematicians and statisticians proposing various solutions to the puzzle. The Monty Hall Problem is still a popular puzzle today, and is a great example of how probability can be used to solve a seemingly difficult problem.

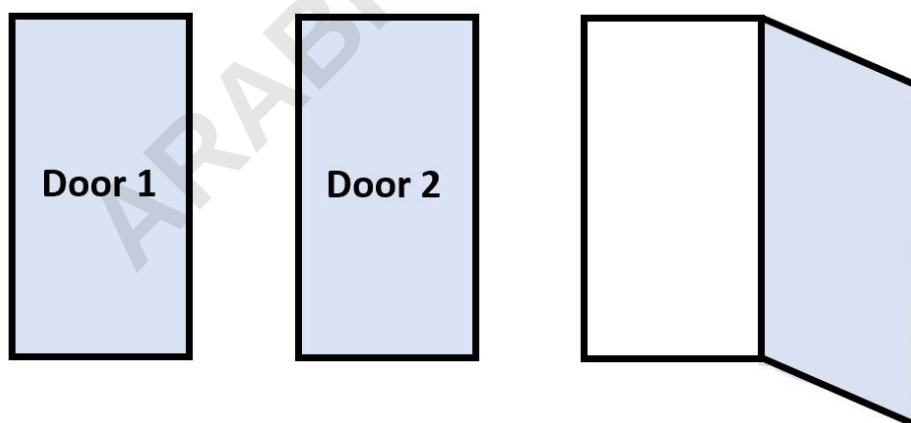
In an old game show titled *Let's Make a Deal*, host presented contestants with three doors.

One of the doors contained a prize while the other two did not.



Monty would ask the contestant to choose which door they believed contained the prize.

After the contestant selected a door, Monty would then open one door that **did not** contain the prize.



The prize remained in one of the two unopened doors.

Monty would then ask the contestant if they would like to switch doors.

While it might be hard to believe, it turns out that switching doors at this point in the game actually gives you a higher probability of winning.

Keep reading to find out why!

The Monty Hall Problem Explained Visually

To illustrate why switching doors gives you a higher probability of winning, consider the following scenarios where you pick door 1 first.

Scenario 1: You pick door 1 and the prize is actually behind door 1.

In this case, Monty will open either door 2 or 3 and show you that nothing is behind one of those doors. If you stay with door 1, **you win**.

Scenario 2: You pick door 1 and the prize is actually behind door 2.

In this case, Monty must open door 3 and show you that nothing is behind it. If you stay with door 1, **you lose**.

Scenario 3: You pick door 1 and the prize is actually behind door 3.

These are all of the possible outcomes if you pick door 1. Notice that if you stay with door 1, you only win one-third of the time. But if you switch, you win two-thirds of the time.

The following table summarizes all of the possible scenarios in this game show along with the outcomes associated with staying and switching:

Statology.org				
Contestant Picks This Door	Prize is Behind This Door	Monty Shows that Prize is Not Behind This Door	Result if Contestant Stays	Result if Contestant Switches
1	1	2 or 3	Win	Lose
1	2	3	Lose	Win
1	3	2	Lose	Win
2	1	3	Lose	Win
2	2	1 or 3	Win	Lose
2	3	1	Lose	Win
3	1	2	Lose	Win
3	2	1	Lose	Win
3	3	1 or 2	Win	Lose
Win %			33%	66%

From the table we can see that you win **33%** of the time when you stay, but you win **66%** of the time when you switch.

Thus, switching doors increases the probability that you will win the prize.

Although this doesn't seem to make sense intuitively, the math doesn't lie.

Check out this video for a nice explanation of the Monty Hall Problem by the Numberphile YouTube channel:

And refer to this interactive online simulator to simulate the Monty Hall Problem yourself: .