Names:

Math 4 - Spring 2023 - Exploration P.3: Cars or Goats?

A popular television game show, *Let's Make a Deal*, featured a new car hidden behind one of three doors. Behind each of the other two doors were goats. When a contestant played the game, they were asked to pick one of the three doors. If the contestant picked the correct door, they won the car!

Generally, we say **probability** of an event is the *proportion* (fraction) of: the number of ways *this* outcome can happen, over the number of all possibilities: $\frac{\#\ this\ outcome}{\#\ possibilities}$. In this exploration, we examine what is the probability of winning a car.

1. Suppose you're a contestant on this show. What do you think the probability is that you will win the car?

You and your partner are given 3 playing cards: two of one color (goats), and one of another color (car). We will **simulate** the game show. One of you decides to be the host. The host shuffles the cards and places them face down.

2. *Picking only one card at a time,* write down whether you received a car (C) or a goat (G).

Game #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Outcome (C or G)															

3. Count up your results and write the proportion of cars you achieved:

# Cars:	
# Games played	

4. What do you guess the proportion would be if you played the game 100 times? What if you played it 1,000 times?

# Cars:		
# Games played	100	1,000

Does your answer to #3 and #4 agree with your original guess in #1?

Let's add a twist to the game. After picking a door, the game show host (who knows where the car is), opens a *different* door to a goat. You don't know what's behind your door yet. The host asks you whether you want to *stay* with your door or *switch* to a different door.

5. Do this simulation with a partner. But now, the person playing the host should reveal a different card after one is picked. The person playing the host should always switch. Record your findings, like before.

Game #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Outcome (C or G)															

What's the proportion now?

# Cars:	
# Games played	

6. [*If* time] In a web browser, go to this link: https://www.rossmanchance.com/applets/2021/montyhall/Monty.html

Test both the "stay" strategies and the "switch" strategies for large numbers. Record your results here.

	Stay	Switch
Wins (Cars)		
Losses (Goats)		
Total		

What does this tell you about the strategy you should choose?
