LET'S MAKE A DEAL! ACTIVITY

NAME: ___________________

DATE: ___________________

<u>SCENARIO</u>:

Suppose you are on the game show *Let's Make A Deal* where Monty Hall (the host) gives you a choice of three doors. Behind one door is a valuable prize. Behind each of the others is a goat. You pick one door, say Door #2. The host, who knows what is behind each door, then opens a door to reveal a goat. The host now gives you a choice: Do you want to stay with your original door choice or do you want to switch to the other unopened door? Is it to your advantage to switch?

Write your hypothesis to the question "Is it to your advantage to switch?" Please give a reason for your hypothesis.

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With your partner, simulate the "*Let's Make a Deal*" game using the cards provided. Play two rounds of the game, switching roles (contestant to host or vice-versa) at the end of round 1. Note that in round 1 the contestant will SWITCH doors, whereas in round 2 the contestant will stay with his/her original choice.

Using your results and the results of other groups in the class, you will make a determination whether it is advantageous to switch. And using mathematics, you will justify your answer.

ROUND 1: SWITCH

GAME #	WRITE "WIN" OR "LOSE"	GAME #	WRITE "WIN" OR "LOSE"
1		11	
2		12	
3		13	
4		14	
5		15	
6		16	
7		17	
8		18	
9		19	
10		20	

ROUND 2: DO NOT SWITCH

GAME #	WRITE "WIN" OR "LOSE"	GAME #	WRITE "WIN" OR "LOSE"
1		11	
2		12	
3		13	
4		14	
5		15	
6		16	
7		17	
8		18	
9		19	
10		20	

Now collect results from every other group in the class and record them in the table below along with your results. The more data you have, the better chance you have of getting closer to the theoretical probability.

Data from all groups from Rounds 1 and 2

Group Number	*Total Number of Games Won when you **Switch***	*Total Number of Games Lost when you **Switch***	*Total Number of Games Won when you **do not Switch***	*Total Number of Games Lost when you **do not Switch***
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
Totals				

Use your results above to find the experimental probability (as a fraction) of winning and losing when **switching** doors each game.

Experimental Probabilities:

P(Win with Switch) = __________ P(Lose with Switch) = __________

Use your results above to find the experimental probability (as a fraction) of winning and losing when you **do not switch** doors each game.

Experimental Probabilities:

P(Win without Switch) = __________ P(Lose without Switch) = __________

According to your experimental simulation, was your initial hypothesis correct? Please explain.

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Draw 2 tree diagrams: one for the possible outcomes if you *switch*, and one for the possible outcomes if you *don't switch*. **Explain in detail** the differences in the outcomes of the two diagrams, as well providing the theoretical probabilities for switching vs. not switching. What advice would you provide to the contestants of this game show? Also, comment on the accuracy of your initial hypothesis based on the theoretical probability.

LET'S MAKE A DEAL! ACTIVITY

NAME: Resource Key

DATE: ___________________

SCENARIO:

Suppose you are on the game show *Let's Make A Deal* where Monty Hall (the host) gives you a choice of three doors. Behind one door is a valuable prize. Behind each of the others is a goat. You pick one door, say Door #2. The host, who knows what is behind each door, then opens a door to reveal a goat. The host now gives you a choice: Do you want to stay with your original door choice or do you want to switch to the other unopened door? Is it to your advantage to switch?

Write your hypothesis to the question "Is it to your advantage to switch?" Please give a reason for your hypothesis.

Answers will vary throughout the activity simulation. Below is an example of a possible hypothesis:

NO, IT IS NOT TO MY ADVANTAGE OR DISADVANTAGE TO SWITCH. SINCE DOOR #2 IS OPENED, I HAVE A 50% CHANCE OF WINNING THE PRIZE EITHER WAY, SWITCHING OR NOT SWITCHING.

With your partner, simulate the "*Let's Make a Deal*" game using the cards provided. Play two rounds of the game, switching roles (contestant to host or vice-versa) at the end of round 1. Note that in round 1 the contestant will SWITCH doors, whereas in round 2 the contestant will stay with his/her original choice.

Using your results and the results of other groups in the class, you will make a determination whether it is advantageous to switch. And using mathematics, you will justify your answer.

ROUND 1: SWITCH

GAME #	WRITE "WIN" OR "LOSE"	GAME #	WRITE "WIN" OR "LOSE"
1	WIN	11	LOSE
2	LOSE	12	WIN
3	WIN	13	WIN
4	WIN	14	WIN
5	WIN	15	WIN
6	LOSE	16	WIN
7	WIN	17	LOSE
8	WIN	18	WIN
9	LOSE	19	WIN
10	LOSE	20	WIN

ROUND 2: DO NOT SWITCH

GAME #	WRITE "WIN" OR "LOSE"	GAME #	WRITE "WIN" OR "LOSE"
1	LOSE	11	LOSE
2	WIN	12	LOSE
3	WIN	13	WIN
4	LOSE	14	LOSE
5	LOSE	15	WIN
6	LOSE	16	LOSE
7	LOSE	17	LOSE
8	LOSE	18	LOSE
9	WIN	19	WIN
10	LOSE	20	WIN

Now collect results from every other group in the class and record them in the table on the following page, along with your results. The more data you have, the better chance you have of getting closer to the theoretical probability.

Data from all groups from Rounds 1 and 2

Group Number	*Total Number of Games Won when you **Switch***	*Total Number of Games Lost when you **Switch***	*Total Number of Games Won when you **do not Switch***	*Total Number of Games Lost when you **do not Switch***
1	14	6	5	15
2	16	4	10	10
3	13	7	7	13
4	15	5	6	14
5	14	6	6	14
6	15	5	8	12
7	11	9	7	13
8	16	4	11	10
9	13	7	6	14
10	14	6	5	15
11	15	5	8	12
12	11	9	7	13
13	14	6	7	13
14	10	10	9	11
15	9	11	7	13
Totals	200	100	109	191

Use your results above to find the experimental probability (as a fraction) of winning and losing when switching doors each game.

Experimental Probabilities:

P(Win with Switch) = $\frac{2}{3}$ P(Lose with Switch) = $\frac{1}{3}$

Experimental Probabilities:

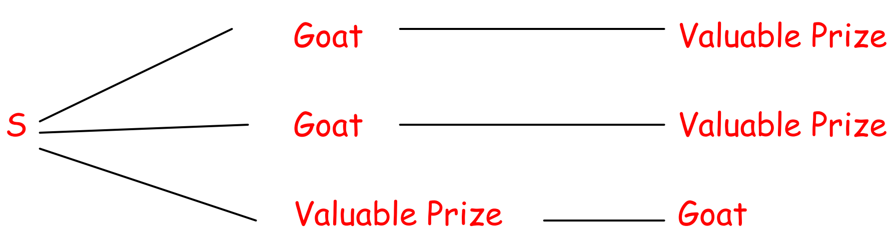
P(Win without Switch) = ____$\frac{109}{300}$______ P(Lose without Switch) = ____$\frac{191}{300}$______

According to your experimental simulation, was your initial hypothesis correct? Please explain.

NO, IT LOOKS LIKE THERE'S A 67% CHANCE OF WINNING THE PRIZE IF I SWITCH VS A 36% CHANCE OF WINNING IF I DON'T SWITCH. IT'S DEFINITELY NOT 50% EITHER WAY.

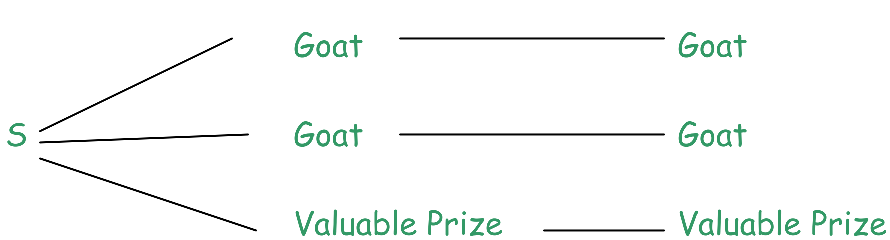
Draw 2 tree diagrams: one for the possible outcomes if you *switch*, and one for the possible outcomes if you *don't switch*. **Explain in detail** the differences in the outcomes of the two diagrams, as well providing the theoretical probabilities for switching vs. not switching. What advice would you provide to the contestants of this game show? Also, comment on the accuracy of your initial hypothesis based on the theoretical probability.

PROBABILITY OF WINNING BY SWITCHING



You have a 2/3 chance of winning as a result of switching doors, because the 2 doors which are not Valuable Prizes become winning possibilities.

PROBABILITY OF WINNING WITHOUT SWITCHING



You have a 1/3 chance of winning as a result keeping your original door. The door you pick MUST be the door with the Valuable Prize in order to win, which gives only a 1/3 chance.

Answers will vary regarding comments on the accuracy of each initial hypothesis.

 GOAT	 GOAT	 VALUABLE PRIZE
 GOAT	 GOAT	 VALUABLE PRIZE
 GOAT	 GOAT	 VALUABLE PRIZE