## (TEACHER EXAMPLE) Let's Play the Lottery!

Step 1 - Pick your game! Here are the rules...

- There must be at least 5 ways to win (You can click on "How to Win" once you click on each game)
- You can not pick the same game as anyone else in the class
- If your game has at least 1 "way to win" that involves a "Combination" (the technical math term) you will get extra credit! Honors students MUST have at least 7 ways to win.

https://www.masslottery.com/games/draw-and-instants



Step 2 - Answer each of these questions about your game:

a) How do you play & win? (3-5 sentences in your own words)

Answers will vary. Must be 3-5 sentences in your own words

b) Why did you choose this game? (2-3 sentences in your own words)

Answers will vary. Must be 2-3 sentences in your own words

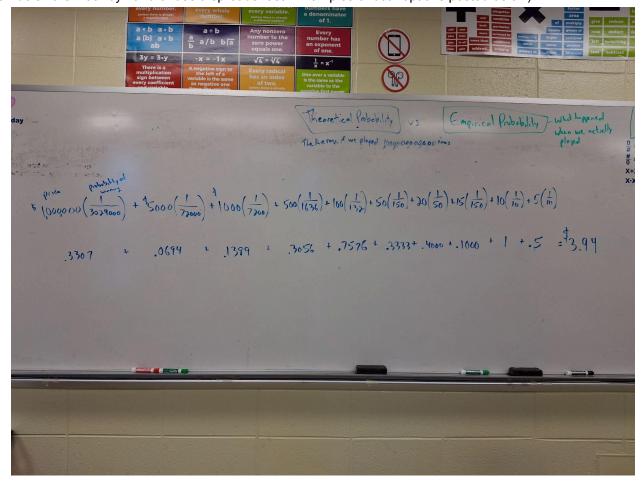
c) What is the most you could possibly win and what is the probability that you will win that prize?

\$1,000,000 is the maximum prize and the odds of winning it are 1 in 3,024,000

Step 3 - Do the math!

- a) List all of the possible prizes and the probability of winning each prize.
- b) Convert each probability to a decimal and multiply each probability by the prize amount.

c) Add each of these products together to get the "expected value" of a ticket. (You can do all the math by hand or use a spreadsheet. Examples of both options posted below)



1/3024000	0.000000331		Prize Value x Probability	
	0.000000331	0.330687831		
1/72000	0.000013889	0.069444444		
1/7200	0.000138889	0.138888889		
1/1636	0.000611247	0.305623472		
1/132	0.007575757	0.757575757		
1/150	0.000666666	0.3333333333		
1/50	0.2	0.4		
1/150	0.006666666	0.1		
1/10	0.1	1		
1/10	0.1	0.5		
Total Expected Value		3.935553726		
	1/7200 1/1636 1/132 1/150 1/50 1/150 1/10	1/7200 0.000138888 1/1636 0.000611247 1/132 0.007575757 1/150 0.000666666 1/50 0.2 1/150 0.006666666 1/10 0.1 1/10 0.1	1/7200 0.000138889 0.138888889   1/1636 0.000611247 0.305623472   1/132 0.007575757 0.757575757   1/150 0.000666666 0.33333333333   1/50 0.2 0.4   1/150 0.006666666 0.1   1/10 0.1 1   1/10 0.1 0.5	

## Step 4 - Answer & Reflect

a) How does the "expected value" of each ticket compare to the price you would have paid for each ticket? Is it worth it to buy a ticket? Why or why not?

Since the price of each ticket is \$5 and the "expected value" of each ticket is \$3.94, I would conclude that (answers will vary)

b) What do you expect would happen if you purchased \$10,000 of these lottery tickets?

If I purchased \$10,000 worth of tickets, I would likely win approximately \$7,880 (math below)  $10000 \times (3.94/5) = 7880$ 

c) If you won the lottery, you would probably have to pay a lot of taxes. Do some internet research to find out what percentage of your winnings you would have to pay back in taxes. What did you find? (Cite your sources)

## Answers may vary. Cite your sources

d) Does your answer to question "c" change your answer to question "a"? Why or why not?

Answers will vary. Explain your reasoning.