

Name: _____ Date: _____

EXPECTED VALUE: Winning the Lottery

Millions of people play the lottery in Georgia each year. Using actual odds we will discover what you should expect to make playing the lottery

Georgia Powerball

In this game you pick 5 numbers from 1-69 and one "powerball" number from 1-26.

Below are the possible winning combinations

Combination	Prize	Odds
Match 5 + Powerball	\$186,000,000 (jackpot)	1 in 292,201,338
Match 5	\$1,000,000	1 in 11,688,054
Match 4 + Powerball	\$50,000	1 in 913,129
Match 4	\$100	1 in 36,525
Match 3 + Powerball	\$100	1 in 14,494
Match 3	\$7	1 in 580
Match 2 + Powerball	\$7	1 in 701
Match 1 + Powerball	\$4	1 in 92
Just powerball	\$4	1 in 28

Assume you are going to play the lottery for an entire year. The drawings for powerball are twice a week which means you can play 104 times a year. Each play costs \$2. What do you predict to be your expected value or in other words how much you expect to win over the year?

To find the Expected value of an event:

STEP ONE: (CASH PAYOUT of event 1)x(PROBABILITY of event 1) + (CASH PAYOUT of event 2)x(PROBABILITY of event 2) + ... continue until all events are accounted for. You add all the events together because those are ALL possible outcomes. This will give you the expected value (expected winnings) of one play (or of one ticket)

STEP TWO: You had to 'pay to play', that means you need to SUBTRACT the cost of the event. In powerball every play costs \$2, so subtract \$2 from your expected winnings

STEP THREE: If you want to find the value of **MULTIPLE PLAYS**, multiply your answer by the number of times you plan to play (so if you plan on buying 5 lottery tickets multiply by 5)

1. Find the expected value of one ticket in powerball

2. If you played for an entire year what would be your expected value of powerball winnings?

There is an option on Powerball that you can play for higher money by choosing “the POWER PLAY.” In this option, you pay an additional \$1 per play BUT, it increases your prize money if you win.

Combination	REGULAR payouts	POWER PLAY payouts	Odds (same)
Match 5 + Powerball	\$136,000,000 (jackpot)	\$136,000,000 (jackpot)	1 in 292,201,338
Match 5	\$1,000,000	\$2,000,000	1 in 11,688,054
Match 4 + Powerball	\$50,000	\$100,000	1 in 913,129
Match 4	\$100	\$200	1 in 36,525
Match 3 + Powerball	\$100	\$200	1 in 14,494
Match 3	\$7	\$14	1 in 580
Match 2 + Powerball	\$7	\$14	1 in 701
Match 1 + Powerball	\$4	\$8	1 in 92
Just powerball	\$4	\$8	1 in 28

3. What do you notice about all the prize payouts?
4. Do you think the prizes are high enough to justify paying the extra \$1 for the ticket?
5. Find the expected value of one play of powerball if you choose to do the POWER PLAY
6. What is the expected winnings of playing powerball with POWER PLAY for an entire year?
7. Fill in the table

	Powerball	Powerball with POWER PLAY
Expected winnings of one ticket		
Expected winnings for a year		

8. What would you say to someone who wants to play the POWER PLAY because they could double their winnings if they won?

SCRATCH-OFF TICKETS

There are multiple kinds of scratch off tickets that range from \$1 to \$30. Generally \$1 have smaller cash payouts than \$30 tickets

1. Do you think you will have a better expected value from a \$1 or a \$30 ticket? Why?

We are going to investigate a few different scratch -offs for a few different price values

\$1 ticket “Quick 7s”

To win- Match any of your numbers to the winning number and win the prize shown on that number.

2. Find the expected value of one ticket the \$1 Shimmering Cash

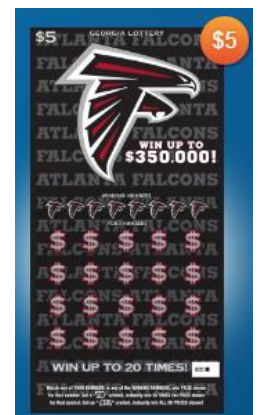


Prize	Odds
Free ticket (\$1)	1 in 10
\$2	1 in 19
\$4	1 in 60
\$7	1 in 50
\$14	1 in 150
\$17	1 in 300
\$27	1 in 482
\$37	1 in 3,200
\$47	1 in 8,000
\$77	1 in 24,000

\$5 ticket “Atlanta Falcons”

To win- Match any of your numbers to any of the winning numbers and win the prize shown on that number.

3. Find the expected value of playing the \$5 shimmering cash



Prize	Odds
Free ticket (\$5)	1 in 10
\$5	1 in 60
\$8	1 in 60
\$10	1 in 20
\$15	1 in 60
\$20	1 in 24
\$25	1 in 207
\$30	1 in 234
\$40	1 in 572
\$50	1 in 375
\$75	1 in 500
\$100	1 in 288
\$200	1 in 9,231
\$600	1 in 60,000
\$10,000	1 in 540,000
\$350,000	1 in 1,350,000

HOMEWORK

\$30 ticket "SUPER MAX THE MONEY"

Prize	Odds
Free ticket (\$30)	1 in 10
\$40	1 in 17
\$50	1 in 13
\$60	1 in 17
\$100	1 in 39
\$200	1 in 150
\$300	1 in 400
\$500	1 in 203
\$600	1 in 612
\$1,000	1 in 3,529
\$5,000	1 in 40,000
\$50,000	1 in 1,680,000
\$200,000	1 in 3,360,000
\$10,000,000	1 in 3,360,000

1. Find the expected value of one ticket of Super Max the Money



2. a. Come up with a price for the ticket so that your expected value would be positive.

b. Why did you pick that number?

c. What would your expected value be with that ticket price?

3. Fill in the table below

	\$1 "Quick 7s"	\$5 "Atlanta Falcons"	\$30 "Super Max the Money"
Expected value of winning with one ticket			
Expected winnings of one ticket if someone gave you the ticket for FREE			