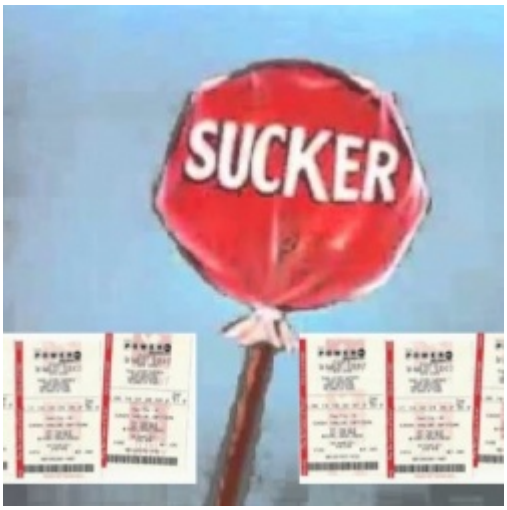
Published on *American Council on Science and Health* (https://www.acsh.org)

Powerball Is For Suckers

By Josh Bloom — September 6, 2018



You Are What You Play. Original Photo: YouTube [1]

The odds of winning the Powerball lackpot with a single ticket are 1 in 292,201,338 [2]. You are *never* going to win it. Before you argue with me, let's have a multiple choice quiz:

Q: How many times in a row do you have to flip a coin and have it come up either heads or tails *every time* to equal the odds of winning Powerball?

a) 1

b) 292,210,338

c) You can't find a coin

d) Another number

The correct answer, as you may have guessed, is (d). That number is 28 **(1)**. Think about it. Stand there with a nickel and try to flip it and have it come up heads 28 times in a row. Impossible. It's hard enough to do it 5 times (1 chance in 32). That will take you a few hours. Then try doing it 23 more times *after* that. No way.

Yet, people incinerate hundreds or thousands of dollars every year in hope of chasing something that is never going to happen.

LET'S TEST YOUR KNOWLEDGE OF PROBABILITY

To have a real idea of what you're up against requires an elementary knowledge of statistics and probability, something most educated people don't have, and those with a poorer education will have even less often. Let's now do a true or false test. (Powerball numbers are in **bold**)

1. True or false? If you flip a coin and get heads 20 times in a row, the chances of you flipping and getting heads on the 21st flip are 50:50.
2. True or false? I just bought a ticket and had the computer pick 6 random, ordinary looking numbers. The chances of me getting those numbers from that computer are the same as me winning the jackpot.
3. True or false? If the number 17 comes up in 10 straight drawings it is just as likely to come up in the 11th drawing.
4. True or false? If the numbers 1,4,15,16,42, and **22** win the jackpot on Wednesday they are just as likely to win the following Saturday.
5. True or false? The numbers 7,9,21,36,49, and **22** are just as likely to come up as 1,2,3,4,5, and **6**.
6. True or false? You are better off playing 32,33,34.35,36, and **6** than 1,2,3,4,5, and **6**.

The correct answer to all 6 questions is "true." Here's why.

1. For the chances to be anything other than 50:50 on flip #21, the coin must have a memory of what happened on the first 20 flips and decide that it's time to come up tails. Coins have no memory. If you doubt this, then there's a decent chance that you believe in homeopathy - quackery based on water molecules having memory. Both involve believing in magic.
2. Every time you by a ticket and have the computer pick, it spits out 6 random numbers. The odds of you getting a ticket with those 6 numbers are 1 in 292,201,338, exactly the same as the odds of the ping pong ball machine spitting out 6 random numbers. You have witnessed a 1 in 292,201,338 event, except you won't give it a second thought because it won't be the *desired* 1 in 292,201,338 event.
3. This is identical in concept to question #1. The ping pong balls don't remember (or care) how many times they have popped out in the past. Ping pong homeopathy does not exist.
4. Same concept. The odds of 6 random numbers coming out of the machine are 1 in 292,201,338, even if those 6 have come up in the previous 5,000 drawings.
5. If you buy 1,2,3,4,5, and **6**, people will say you're wasting your money because those will never come up. They are both right and wrong. You are wasting your money, but those 6 will come up as often as any other 6 numbers.
6. People often play birthday numbers, as if the date on which they exited a uterus 40 years ago has any bearing on what number exits the machine. So you should never pick numbers less than 32 (except for the Powerball - it only goes as high as 26) because your chance of having to split the prize with others is higher while the chances of winning are the same.

MISCELLANEOUS THOUGHTS

- When I tell people that they might as well flush their money down the toilet because they will never win (2) they invariably say "Well, someone is going to win it." That may or may not be true, but *you're not*, so who cares if they do. There are 292,201,338 possible outcomes and only one of these will win. Your odds are still 28 heads in a row.
- It's a pretty good bet that most of the people who are reading an article on a science site will be more educated than people who do not, but some (many?) of you will get some of these questions wrong.

THE LOTTO PREYS UPON THE POOR AND UNEDUCATED

- People who are less educated will be less able to understand how bad their chances are and be lured in by false hope.
- Lottos are inherently evil. They are just another way to suck more money from people without calling it a tax. But they disproportionately prey upon the poor, who also tend to be less educated. If you walk around New York during the time of a large jackpot you will see hordes of *obviously* poor people waiting at newsstands to throw away tens or even hundreds of dollars that they cannot afford to waste, while chasing a false dream. If this isn't a regressive tax, then what is?

NOTES:

(1) It's actually a bit worse. The odds of flipping heads 28 times in a row are 1 in 2^{28}, or 268,435,456. Winning the Powerball jackpot is a bit harder.

(2) This pertains only to the Powerball jackpot prize. There are smaller prizes for matching fewer numbers. The smaller the prize, the more likely it is that you will win.

(3) For a different take on lotteries see Two Lotteries Worth More Than $300 Million [3], which was written by my colleague Dr. Chuck Dinerstein last year.
