

THE LOTTERY

NAME: _____

DATE: _____

PERIOD: _____

Many of you are familiar with a lottery game called *Powerball*, in which players must match 5 random numbers (these numbers are usually between 1 and 55, inclusive) in any order, and 1 Powerball number (which is between 1 and 42, inclusive). Today you will be investigating a similar lottery. We will do Part I as a class. In Part II you will work with your group to discuss and analyze the results.



THE GAME:

Consider a state lottery called *LOTTO 47*. Twice a week, players select six different numbers between 1 and 47, inclusive. The State Lottery Commission also selects six numbers from 1 through 47. Selection order doesn't matter, but a player needs to match all six numbers to win the Lotto!




PART I:



Step 1: For 1 minute, write down as many *different* sets of six numbers as you can (order does not matter, e.g. 1,2,3,4,5,6 is the same number combination as 2,1,3,6,4,5). Write only numbers between 1 and 47, inclusive. Each set of 6 numbers you write will be considered a *lottery ticket* which you have purchased for \$1.

To help you generate sets of 6 numbers quickly, we will use the *Probability Simulator* App on the graphing calculator. Follow the directions below to access the application:

Press  , scroll down to **Prob Sim** and press  .

Scroll down to 6: Random Numbers and press  .

Press  to SET the numbers to 6, the range to 1-47, and Repeat to NO, pressing  after each setting. Press  for OK.

Press  to DRAW the 6 numbers. The calculator will generate 6 different numbers for you. Continue to press  each time you want to generate another set of 6 numbers.

Step 2: Next, everyone stands up.

Step 3: Mrs. Bertsch will generate a set of six random numbers on the calculator, one at a time. After the first number is generated, any person who does **NOT** have that number written anywhere in **any set** sits down.

Step 4: Repeat Step 3 until no one is standing or until six numbers have been generated. (If a number repeats itself, we will skip it and generate another number.)

PART II:

1. What does it mean if someone is still standing after all six numbers have been called?

2. What is the probability that any one set of six numbers wins? 2) _____

3. At \$1 for each set of six numbers, how much did you invest during the 1 minute? 3) _____










4. *Estimate* the total amount invested by the entire class in 1 minute. Explain how you determined this estimate.

5. Estimate the probability that someone in your class wins. Explain how you determined this estimate.

6. Estimate the probability that someone in your school would win if everyone in the school participated in this activity. Explain how you determined this estimate. (We currently have about 1,200 students enrolled here at North.)
-
-
-

7. If each of the possible sets of six numbers are written on 7) _____ 1-inch strips of paper, and all the strips are laid end-to-end, How long will the line of strips be? Please use appropriate units and show all work below.

8. Suppose you are playing a *Powerball* game in which you must match 5 numbers from 1 to 55 inclusive and the Powerball (1 number selected from the numbers 1 to 42, inclusive) to win the grand prize. The *Powerball Prizes and Odds* table below was found At http://www.powerball.com/powerball/pb_prizes.asp. Can you figure out how the probabilities of winning were calculated (the website inadvertently calls it *Odds* instead of *probabilities*)? Please explain (with work) on the following page.

Match	Prize	Odds
	Grand Prize	1 in 146,107,962.00
	\$200,000	1 in 3,563,608.83
	\$10,000	1 in 584,431.85
	\$100	1 in 14,254.44
	\$100	1 in 11,927.18
	\$7	1 in 290.91
	\$7	1 in 745.45
	\$4	1 in 126.88
	\$3	1 in 68.96

The overall odds of winning a prize are 1 in 36.61.
 The odds presented here are based on a \$1 play (rounded to two decimal places).
Why isn't the chance of winning \$3 at 1 in 42? [Click here for FAQ.](#)

9. Grand Prize (all 5 numbers and the Powerball correct):

10. \$200,000 (all 5 numbers correct, Powerball incorrect):

11. \$10,000 (4 numbers and the Powerball correct):

12. \$100 (4 numbers correct, Powerball incorrect):

13. \$100 (3 numbers correct, Powerball correct):

14. \$7 (3 numbers correct, Powerball incorrect):

15. \$7 (2 numbers correct, Powerball correct):

16. \$4 (1 number correct, Powerball correct):

17. \$3 (Powerball correct):