

Can I Get Some Pi?

Pi is a mathematical constant. It can be defined as the ration of a circle's circumference to its diameter. A circle's diameter is the measurement from one side to another. The circumference is the measurement around the outside of the circle. If we draw a circle with a diameter of 1, then the circumference is 3.14159265...a number known as **Pi**. Pi is written using the Greek symbol π .

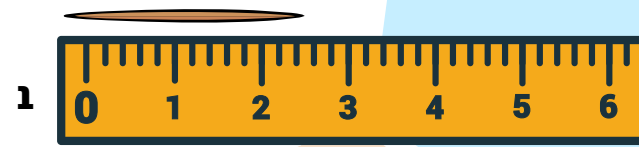
π
3.1415

Materials:

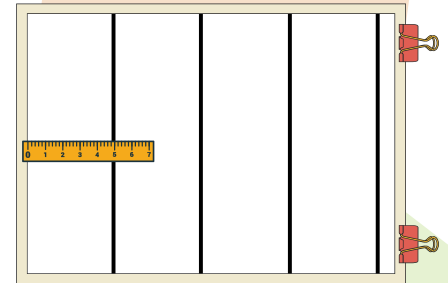
- 100 Toothpicks
- Large Poster Board
- Paper
- Pencil
- Ruler

Procedure:

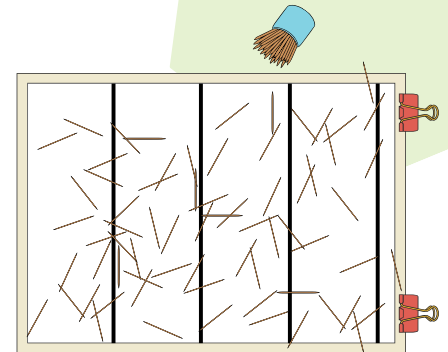
1. Using your ruler, measure the length of a toothpick **and double it**. *This number is important! Write it down for the next step.*
2. Using the number you just calculated and your ruler, start at one end of your poster board and make a vertical line each time you measure your number.
3. Next, randomly dump your toothpicks onto the board. Make sure they are spread out and not clumped together. One way to make this easier is to put them all in a cup and pour them out onto the board.
4. Count how many toothpicks are touching or crossing the lines on your board.
5. Math time! You are going to use this formula to calculate a number that is close to pi.



2



3, 4



$$\frac{100}{\text{Number of Toothpicks Used}} = \frac{\text{Number of Toothpicks Touching Or Crossing A Line}}{\text{Number of Toothpicks Used}}$$

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6. To calculate the average from your trials, add all of your results together and then divide by the number of trials you did. Use the table on the next page to help you with this calculation.

The more trials you do, the closer your average will be to π .

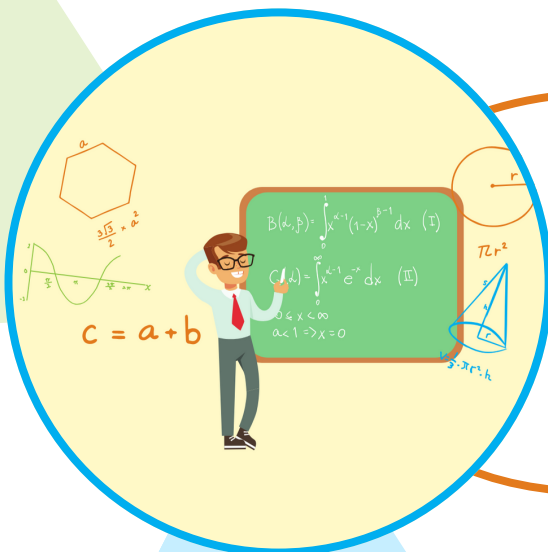
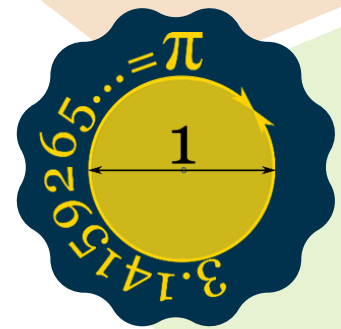
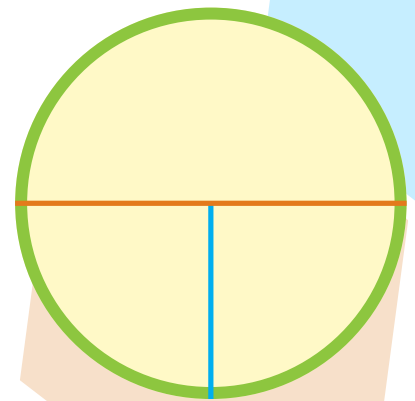
$$\pi = 3.14$$

Trial #	# of Toothpicks Used	# of Toothpicks Touching or Crossing a Line	Result
1	100		
2	100		
3	100		
4	100		
Average	Add your result column together, then divide by the number of trials you did to find the average .		

WHAT'S HAPPENING?

A circle's **diameter** is the measurement from one side to another. The **circumference** is the measurement around the outside of the circle. And the **radius** is the measurement from the center to one side. This experiment is one of the oldest problems in the field of geometric probability.

The experiment shows the relationship between a circle's radius, diameter, circumference, and the value of pi. The **Law of Large Numbers** states the more trials you do, the closer your average will be to the overall average – or in our case, π .



DID YOU KNOW?

A **mathematician** is someone who studies math. If you liked exploring this pi activity, maybe mathematics is for you!