INSTRUCTIONS FOR APPROXIMATING PI

Below you will find instructions for dropping toothpicks on paper in order to approximate $\pi$.

1. Get a box of toothpicks (if you don’t have toothpicks, you can use any short straight objects all of the same length) and carefully count how many you have. We will call this number $N$. The more toothpicks you have the better.

2. Carefully measure the length of a toothpick (we will call this length $L$).

3. Take a sheet of paper and draw parallel lines at distance $L$ from each other (see Figure 1).

4. Randomly scatter the toothpicks on the paper.

5. Carefully count the number of toothpicks that cross one of the lines on the paper. We will call this number $M$.

6. Go to https://www.math.fsu.edu/~ballas/#outreach and scroll down to the “Wisdom of the masses” form and input $N$ into the “Number of trials” field and $M$ into the “Number of successes” field. You can also enter your email if you would like to be emailed information about the current estimate.

7. Repeat as often as you would like. The more data we get the better our approximation will be!

![Figure 1](attachment:image.png)

**Figure 1.** Parallel lines on paper and 3 toothpicks for the experiment. In this example there are 2 successes