

# Buffon's Needle Suggestions

This is a simulation of dropping a needle on a lined sheet of paper and determining the probability of the needle crossing one of the lines. The remarkable result is that the probability is directly related to the value of Pi. By using calculus, one can prove (as people first discovered in the eighteenth century) that the probability of a hit is  $2/\text{Pi}$ , where Pi is defined as the ratio of a circle's circumference to its diameter. To calculate Pi from the needle drops, the computer program finds experimental probability:

$$\text{Experimental Probability} = (\text{total \# of hits})/(\text{\# of drops})$$

On the other hand, we have (approximately):

$$\text{Experimental Probability} = 2/\text{Pi}$$

We can use this fact to conclude that:

$$2(\text{total \# of hits})/(\text{\# of drops}) = \text{Pi (approximately)}$$

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**Activity 1** Click on the "Get New Needle" button repeatedly and observe what happens to the experimental evaluation of Pi.

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**Activity 2** Run many (1,000 or more) trials and observe experimental evaluation of Pi. Make the number of trials larger and observe the value of Pi. What happens? Why?