Verifying Classical Probabilities

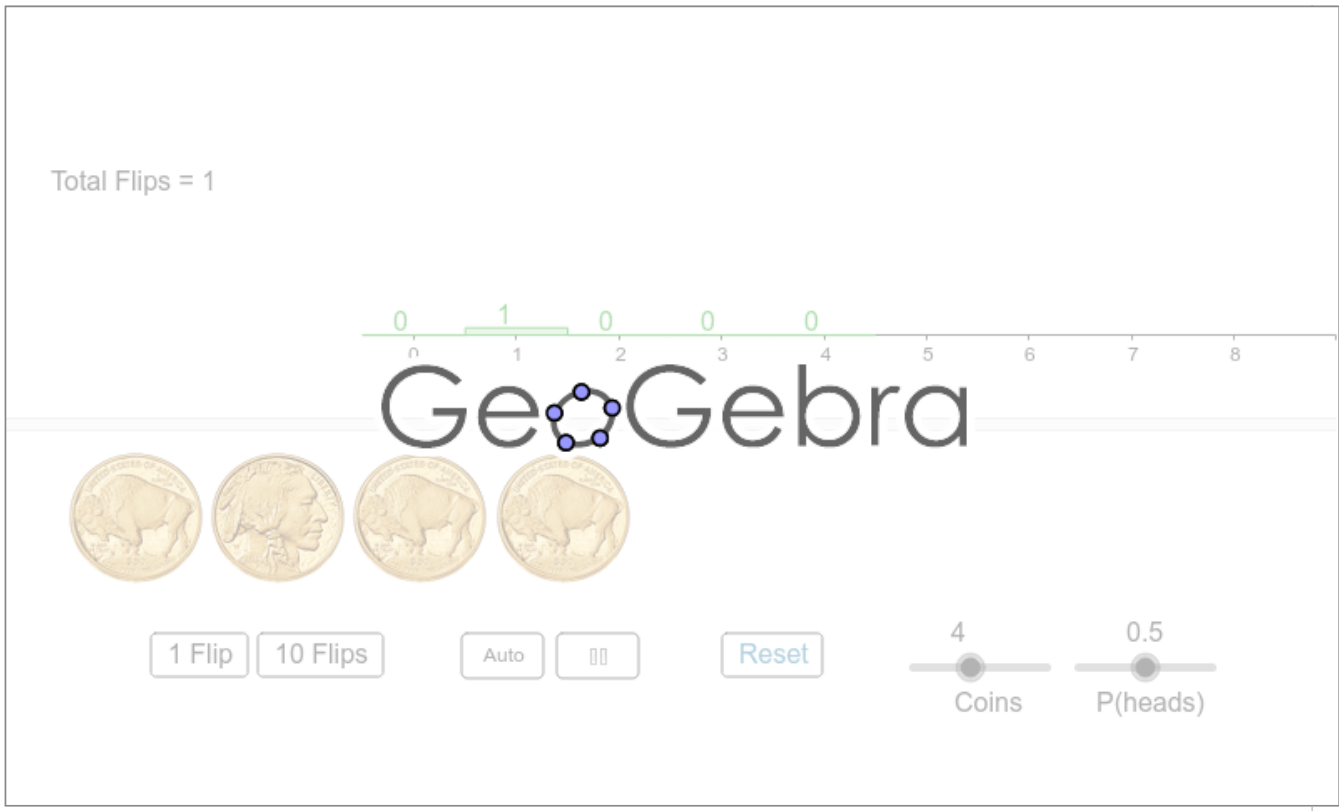
A Second Question

After doing this experiment, an important question naturally comes to mind. **How would we know if the coin was not fair?** Certainly, classical probability methods would never be able to answer this question. In addition, classical methods could never tell us the actual P(H). The only way to answer this question is to perform another experiment.

The next activity will allow you to do just that.

Purpose

The purpose of this activity is to experiment with an activity that simulates flipping an unfair coin.



>

a. Make sure **Coins = 1** and **P(heads) = 0.2.**

b. Press the **Auto** button and watch the count of heads and tails change.

c. Press the **Pause (II)** button once **Total Flips** is over 100 or so.

d. Record the total number of Heads (1's) and the total number of flips.

e. Calculate P(H) (Number of heads / Total Flips) when Total Flips is about 100.

f. Press the **Auto** button again to continue the flips.

g. Press the **Pause (II)** button once Total Flips is over 1,000 or so.

h. Record the total number of Heads (1's) and the total number of flips.

i. Calculate P(H) (Number of heads / Total Flips) when Total Flips is about 1,000.

Learn By Doing (1/1 point)

What happened to P(H) as the number of flips increased from 100 to 1,000?

Your Answer:

About 100, P(H) = 20/105 = 19.04%
About 100, P(H) = 199/1010 = 19.70%

It becomes closer and closer to 20%

Our Answer:

As the number of flips increased from 100 to over 1,000, the proportion of heads (1's), or P(H), will consistently stay close to the preset probability of 0.2. Since P(H) is not near 0.5, this is not a fair coin.

Resubmit Reset

So, these types of experiments can verify classical probabilities and they can also determine when games of chance are not following **fair** practices. However, their real importance is to answer probability questions that arise when we are faced with a situation that does not follow any pattern and cannot be predetermined. In reality, most of the probabilities of interest to us fit the latter description.

Let's Summarize

1. Probability is a way of quantifying uncertainty.

2. We are interested in the probability of an event—the likelihood of the event occurring.

3. The probability of an event ranges from 0 to 1. The closer the probability is to 0, the less likely the event is to occur. The closer the probability is to 1, the more likely the event is to occur.

4. There are two ways to determine probability: Theoretical (Classical) and Empirical (Observational).

5. Theoretical methods use the nature of the situation to determine probabilities.

6. Empirical methods use a series of trials that produce outcomes that cannot be predicted in advance (hence the uncertainty).
