
This tutorial covers one kind of probability. It talks about theoretical probability. Theoretical probability is also called the a priori method or classical model. Now with probability, you're talking about the chance that something's going to happen, how likely it is. And when looking at the theoretical model, it's telling us how we're going to find out that likelihood. With a theoretical model, we're taking the ratio of the equally likely ways an event can occur and dividing it by all the possible outcomes.

So we talked about before, an event is a set of outcomes, and an outcome is one specific thing that could happen. So we'll go through a couple of examples to clarify theoretical probability, as well as events and outcomes. So here, just a reminder, theoretical probability is the ratio of the event happening, how many different ways there are for that to occur, divided by all the possible outcomes. So another way of writing ratio is a fraction, and I've modeled that there.

So in our first example, we're looking at the event being rolling a 2. And we're rolling a 6 sided die, and so are possible outcomes are 1, 2, 3, 4, 5, or 6. So we can see that the denominator, all the possible outcomes, there are six different outcomes. And how many different ways are there to roll a 2? There's just one way, so 1. So the theoretical probability of rolling a 2 is 1 out of 6.

Now, if instead we're looking at the theoretical probability of rolling an even number, we're still talking about our 6 sided die here, so we still have six possible outcomes. So that's still going to be our denominator. Then how many different ways can we roll an even number? We could get a 2, 4, or 6. So there's three possible ways to make that happen, there's three equally likely ways that are event of getting an even number is fulfilled. So we say 3 out of 6. Now we can also simplify, we can write this as $\frac{1}{2}$.

The next set of questions talks about drawing cards from a deck. If you don't know very much about decks of cards, it's easy enough to find a layout of all of the different cards possible. But you should know that there's 52 cards in a deck, that there are 13 in each suit, and that there are four suits. There are clubs, spades, hearts, and diamonds. And they're either red or black cards.

So the chance of drawing a black card, we need to look at the event or all the possible outcomes. Now there are 52 possible cards, so that's how many possible outcomes we can have, 52. Now of those 52 cards, how many of them are black? And if you're looking at that picture of all the different cards in a deck or sorting through one in your hand, you can go through and find out that 26 are

black. You could again simplify this down to $1/2$.

Now the next question talks about drawing a diamond, so that's our event, is drawing a diamond. How many different ways can you draw a diamond? Well, there are 13 diamonds in the deck. So 13 different ways of that happening out of the total, out of 52. And then again, we can simplify this down to $1/4$.

We could also start to think about this in a different way. We could say, I know there are four suits, so there's four possible things there. There are four possible outcomes for suit, and I know one of those suits is a diamond. So one event, one diamond, out of the four suits. So even though we're thinking about it in a slightly different way, we're still arriving at the same answer.

So this has been your introduction to the theoretical model, the theoretical probability model, also known as the a priori method or the classical model, that looks at the ratio of how many ways the event can occur out of the total possible number of outcomes. Thank you.