
Hi. This tutorial covers a type of graph called a piechart. So let's take a look at a study that we can get some data from. So in the 2011 study, "MetLife Survey of the American Teacher," 1,001 teachers from around the country were randomly sampled. They were asked what race slash ethnicity would they identify themselves as? The following table summarizes their responses.

OK, so if we see that-- we had the categories here. So the categories were broken down into White, Black slash African-American, Hispanic and Other. So there were 751 white teachers in this study, 123 black slash African-American teachers, 74 Hispanic teachers, and 53 teachers that classify themselves as a different race or ethnicity than the three here.

All right, so this represents a qualitative data set. So qualitative data can be nicely graphed using a piechart. So notice that a piechart is a circular graph where each data category is represented with a sector in the circle. So what is sector is-- it's kind of like a pie piece of your circle, where each pie piece will represent a different category.

So the measure of the central angle of each sector equals the category's relative frequency times 360 degrees. So remember what a relative frequency is, is what proportion of that category it is out of the total. So this gives you a percentage, or a proportion.

So if you multiply that by 360, that'll get you the correct angle to make your sector. And then put that definition into a formula. The central angle of a sector equals the relative frequency times 360. So let's use that formula to make a piechart for our race and ethnicity data.

I think it's helpful to write all of this down in a table. So we have our frequencies here. And then we're going to calculate the relative frequencies, and then the central angles. So we're going to calculate relative frequency by taking your frequencies and dividing them by n , which was 1,001.

We're then going to calculate the central angle of the sector by multiplying the relative frequency times 360. OK, so what I'm going to do-- I'm going to do those on the calculator-- and zoom in a little bit so that you can see. So what I'm going to do is take my frequency.

So the first frequency was 751. I'm going to first divide that by 1,001. That represents my relative frequency. I'm going to round that to the nearest thousandth, and then I'm going to take that times 360 to get the angle measure. So that ends up being 200 and-- about 270 degrees. I think I'm going to round all of these to the nearest degree.

Now, my next frequency is 123. So I'm going to take 123, divide it by 1,001, and then I'm going to multiply that answer by 360. So the relative frequency was 1.23 multiplied by 360. That ends up being about 44 degrees.

OK, my next frequency is 74. So I'm going to take 74 divided by 1,001. That gives me point 0.074. And then I'm going to multiply that by 360. And this is going to give me about 27 degrees. OK, and then the other category had a frequency of 53, so it's 53 divided by 1,001 times 360. And so this ends up being 0.053, and about 19 degrees.

OK, so these will represent how large I'm going to draw those central angles when I make my pie graph. So now let's use the previous table to make a pie chart. To make a pie chart, a protractor should be used to accurately measure the central angles. Excel can also be used to make a pie chart.

OK, so what you're always going to do is start with a circle. OK, so I drew a circle in advance here. And let's give it a label. So this is going to be Race slash Ethnicity of US Teachers. And sometimes I'll like to just put the sample size here so the reader knows how big of a sample we took. So n equals 1,001.

So now I'm going to, again, use my central angles to split these up into the different pie pieces. So notice that I have the center of my circle marked. So I'm going to center my protractor on that. And let's flip this around. And our first-- the white category has a central angle of 270 degrees.

So what I'm always going to do is just start with this reference line. So I'm just going to go straight out across, and this is really going to represent 0 degrees. And my first angle needs to be 100, and-- or, excuse me. It needs to be 270 degrees.

So what I need to do is I need to go all the way around. So that would represent 180 degrees. Now I need to go an additional 90 degrees to get to 270. Now, another way to do this is that I can just mark this at 90 here, and then I'm going to draw a line up here.

So what that means is that this is a 90-degree angle here. That central angle is 90 degrees, which means this whole angle here is 270 degrees. So I'm going to mark this as the white category. And what I like to do, then, also is to write this as a percent. So white represents 75%.

Now, this other 25% is going to be broken down into my next three categories. So the next category I'll do is the Black slash African American category, which had a central angle of 44 degrees. So what I'm going to do, again, is center my protractor on this reference. I'm going to put it on the reference line, centering it at the center of the circle. And I'm going to measure up to 44 degrees.

So this is 0 down here, so I measure up. I look on the bottom numbers here, so that's 40. 45 is this longer mark here, so 44 is about there. OK, I put a little mark there. And then I'm going to draw my line here, which is going to represent my Black slash African American category.

And I'm going to mark down what the percentage here was, which this was 12.3%. And then really I just need to draw one more line, because that's going to split this piece up into the two other categories. So I'm going to make my Hispanic category next, and that's going to represent 7.4% of the data, which is about 27 degrees.

OK, so now what I'm going to do is I'm going to center my protractor, now, on this line, and I'm going to measure 27 degrees from here. So 27-- so again, this is 0. This is 20. This is 30. So 25, 26, 27 will be about here. And then I'm going to draw a line here. And then I'm going to mark this as Hispanic, and this was 7.4%.

Now, what I can do-- if I can't quite fit the name in here, since this is a smaller sector, I can always draw an arrow, and I can put this as other. And other represented 5.3%. All right, so that represents the piechart for the ethnicity data. Sometimes what you'll see is they'll color in the sector.

So I'd need four different colors for the four different categories, and then I could make a little key off to the side, which color represents which category. So this represents the piechart for the data from the MetLife study. OK, like I said before, Excel can also do piecharts. So this is one that I did ahead of time.

The rounding might be a little bit different, but it's pretty close. So notice that they used colors here. So they used blue, red, yellow, and green. So blue represented the white population. That's also marked here as white. Black/African American, 12%. That was red. Hispanic, 7%, which was yellow. And other was 5%, which was the green category here. So again, these can also be constructed using the Excel program.

All right. So that is your tutorial on piecharts. Thanks for watching.