This tutorial covers line charts. Line charts are similar to histograms. They both refer to quantitative data. Now, this quantitative data is data that is numerical. It can be measured. It can be used in arithmetic computations.

Once you have your quantitative data collected, it's placed into intervals. With these intervals, sometimes it's a range from 5 to 10, and then you'd want to find out how many pieces of data fall in between 5 and 10. Other times the interval's only going to be 1. So the interval could be 5, and all the pieces of data that you have in your set that are the number 5, you'd want to count that up.

That count-- the count of how many pieces of data fall in that interval-- gives you the frequency. Now, that frequency is what you use to determine the height. In this case, with a line chart, we're talking about the height of the dot-- how high you should place it. In the histogram, it gives you the height of the bar.

Once you have your dots, you need to decide whether it's going to be connected in between the dots or not. If the dots are left separated, that implies that there's no values in between each dot, which would imply that it's discrete data. If the dots are connected, that implies that all the values in between are possible, and that the data is continuous.

This example of a line chart shows a line chart for when the data is discrete. If we look along the bottom, the x-axis is labeled number of glasses of lemonade. So you could sell 0 glasses, 1, 2, 3, 4, 5, 6. But it doesn't make any sense that you might sell half a glass, so you wouldn't have any value for 1 and 1/2, or 2 and 1/2. So that's why the data points are not connected, because the data is discrete, and so the values in between 0 and 1, or 1 and 2-- those wouldn't make any sense. So we can't have earnings for 2 and 1/2 glasses, so there shouldn't be anything filled in there.

Now, the way we would read this chart is that we would find the number of glasses. So let's say we sold 1 glass. We follow the 1 up till we hit the dot, and then we follow back to the x-axis to see where it hits. Now, if we look up and trace back, it hits at the 16.

So if you sell 1 glass of lemonade, you would earn $16. If you sold four glasses, you go over to the $4, follow up, and track back. If you sold 4 glasses, you sold $19 worth of lemonade. We'll see another example.

In this example, we are going to make the chart ourselves. We have our data up here. Shows the numbers of hours skating-- 0, 1, 2, 3, 4, 5, 6-- and the amount of money earned-- $10 through $28. So the first thing we need to do is properly label our chart-- our graph-- and our axis. I'm going to slide this back behind me so we have enough room.

Now, our x-axis is going to be the number of hours skating. So I need to go from 0 up to 6-- so 1, 2, 3, 4, 5, 6. Now, I didn't write a 0. This point right in here represents 0 for the x-axis and 0 for the y-axis. That's not typically written on, so I'm going to erase that again. Now, the other thing we need to do is label what these stand for. We need to write that this is the hours skated.

Now, on the y-axis, that's going to be our amount of money earned. So again, we're going to label our axis. And this time it's earnings. Sometimes they write up and down, like this. And then make a dollar sign so we know it's measured in dollars.

Now, we have to go from 10 up to 28. I'm not going to want to count by 1's this time, because it's going to take me too long to write out all 28 numbers. So instead we can count by 2's, 5's, 10's-- whatever we want. We also don't have to label every line. We can skip lines if we want to.

The thing that's important is that we stay consistent. So if I mark off this line as 2, then this one has to be 4, 6, 8, 10. Whatever I pick, I have to stick with. I'm going to count by 5's-- 5, 10, 15, 20, 25, 30. And as soon as I pass 28, I've got enough data. I have enough numbers on there to cover all of my data.

So our first point is going to be 0 hours and $10. So 0 hours and $10. The next point is 1 hour and $13. Now, for this point, there's no 13, but I know 13 is between 10 and 15, so I can estimate. Then we're going to have 2 hours and $16-- again, I'm estimating-- 3 and $19, 4 and $22, 5 and $25, 6 and $28.

Now, would we want to connect the points with a line, or leave them unconnected? Now, in this example here, someone is skating and earning money for how much they skate. So would it make sense that if you skated half an hour, you got a little bit more? Yeah, that could be the way it works. It could be that you get a certain amount of money for every minute you skate, and this is just showing the hours.

So if we could get paid for a fraction of an hour-- for 15 minutes, 10 minutes, 5 minutes, whatever it is-- then we would connect the points with a line. If you imagine the problem that you only get paid when you do a full hour, then no, we shouldn't connect the line. So depending on how you interpret what's going on, that will change how you make the graph. Now, I'm going to interpret this as meaning that yes, you can earn money for partial hours, so I'm going to connect the points in a line.

Example here looks at multiple line charts. So multiple line charts is a way of comparing different pieces of data, different data sets that are similar, by placing them all in one graph. This graph here is showing, for your age, what is the expected age of death?

So if you are 20 years old and you're still healthy and you're still alive, when would you expect that death would happen? And it has three different lines on it. This red line at the top shows the expectations for females in Germany in 1997. This blue line just below shows the expectations for males in Germany in 1997. And there's a line on the bottom that shows the expectations for 1691 in Breslau, which is a city that's now technically not part of Germany, but was part of olden times Germany.

So what we can determine here is we can look at how the lines compare to each other at different points to draw some conclusions from this. So we can see that the red line is always above the blue line. That means that females in Germany in 1997 always had a longer expected life than the males, because for this person at 40, the males would be expected to live to about 75, maybe a little bit more. The females would be expected to live to about 81, 82-- somewhere in there. And that pattern holds all the way across.

We can also compare between the two time groups. We can say, how does Breslau in the 1690s compare to the 1990s? And for all age groups, there's a lower life expectation. So for the 20-year-olds, if you lived back in 1691, you would expect to make it to about 55. But in 1997, they're expecting to make it to 75 or 81, depending on your male versus female.

We can also see that there's a sharp increase for the 1691 group. So if you are a baby and you're 0 years old or 1 years old, you could expect, on average, to make it to about 18. But if you've made it to 18, you've made it past all those childhood diseases, all those issues that affect babies a lot more than adults, then you can expect to live to about 50.

One last kind of line chart is a frequency polygon. A frequency polygon is a line chart that's made by connecting the midpoints of the tops of histogram bars. So here we have a histogram showing the heights of black cherry trees. Now, the midpoint of each of these bars is the point in the middle.

So here I'm going to place a dot at each of the midpoints of the bars. Now, because our data falls in between these two dots-- there's some values that are 64, and some values that are 71-- I'm going to connect them. And I'm actually going to delete out the chart below, because our line chart no longer has that. But we do still need our axes.

So now that we have this set up better, I'm going to connect the dots. And again, you could use a ruler-- and should use a ruler-- to do this. So here is our frequency polygon. Here is our line chart made from our histogram. This has been your tutorial on line charts.