I'm not a bot

What is a polar diagram

Choose “Paste Special.” In the tiny Paste Special dialog box that appears, do the following: Under “Add cells as,” choose “New series.” Under “Values (Y) in,” select “Columns.” Check the “Series Names in First Row” and “Categories (X Labels) in First Column” boxes. Download Now Polar, or `Radar' charts are a form of graph that allows a visual comparison between several quantitative or qualitative aspects of a situation, or when charts are drawn for several situations using the same axes (poles), a visual comparison between the situations may be made. The circle is at a radius of 3, with the origin as the center. Find us on Updated 4 years ago • 5 min read Polar graphs are a two-dimensional coordinate system commonly used in navigation and studying a quantity by directions. Polar diagram with a circle and a line. Let’s change that by reducing the Doughnut Hole size. In the same way, the angle is 180° and 270° for the left x-axis and bottom y-axis. Let’s start with the x-axis values first. Move the point r to a known radius. The polar coordinates of the points P1 to P6 Point Radius Angle P1 3 30° (or π/6) P2 4 150° (or 5π/6) P3 3 180° (or π) P4 4 240° (or 4π/3) P5 5 270° (or 3π/6) P6 2 330° (or 11π/6) Equations In the following diagram, there is a line and a circle. Also, don’t forget to check out the Chart Creator Add-In, a powerful tool for building mind-blowing advanced Excel charts and graphs in just a few clicks. Set the Doughnut Hole Size to “10%.” Step #9: Set up the chart grid. The angle is 90° for the top y-axis. Repeat the exact same process to compute the X and Y values for the second company, adjusting the formula to use the data in the Griffin Ltd column: =H2*SIN(F2/180*PI()) =H2*COS(F2/180*PI()) Step #6: Set up the second helper table for the polar plot grid. Thanks to trigonometry, you can make the transition happen by using the two special formulas you are about to learn in a few seconds. Step #13: Remove the gridlines, the axes, and the irrelevant legend items. Step #2: Compute the Angle (theta) values. The grid values (the green area or O2:Z11) – These values will split the future data rings into equal parts, outlining the plot grid. Set up a separate dummy table as follows: Notice how the helper table starts with a dummy row (E2:H2)—this determines the reference angle. Step #3: Compute the Radius values. Let’s talk about each element of the table a bit more in detail: Month – This column contains the qualitative categories derived from your original data. Suppose some company generated $250,000 in May. Type “Start” in the first cell (E2) and copy the categories (in our case, the months) right below it (E3:E14). So, the equation is r = 3, and it is independent of theta. For the record, this article is based on the tutorial created by Jon Peltier. Fortunately, the worst is behind us as it won’t take a single formula to put the table together. The header row (the red area or O1:Z1) – This contains all the category names derived from the original data table, just placed vertically. Here r = 15 and θ = 30°. So, the equation is θ = π/3. And that’s where the COUNTA function comes into play. Since there is no radius term in the equation, it is independent of the radius. Polar graph with the points P1 to P6 The point P1 is located at 30° and a radius of 3. We will take the following graph as an example of our explanation. Angle (Theta) – This column contains the theta values responsible for drawing the spokes where the actual values will be placed. Go to the Insert tab. As one full circular rotation equals 360 degrees, to pull off the task, you have to divide 360 by the number of categories in your dataset (in our case, twelve months). It’s time to move on to turning the polar coordinates into the relevant x- and y-axis values. The example shown here plots the strategy development style of an organisation based around the six labelled poles. Whenever we measure an angle, we use a reference line from which the angle is measured. Now that the groundwork has been laid, add the x and y values from the first helper table to the chart. Step #11: Change the chart type for the inserted data series. The line passes to the origin and is tilted at an angle of 60° (or π/3). Highlight all the x- and y-axis values illustrating the CSAT scores of the first company (Simpson Ltd) as well as the header row cells (I1:J14) and copy the data (right click and select Copy). Right-click on the vertical axis. Here’s how you do that quickly and easily. In the below figure, the reference line is the right x-axis. You need to follow a few simple steps. Points The following graph has some random points. Start with setting up the polar plane by creating 10 doughnut charts stacked on top of each other: Highlight all the grid values from the second helper table (O2:Z11). Once the chart axes pop up, modify both the horizontal and vertical axis scale ranges for the chart to accurately reflect the data plotted on it. Choose “Change Series Chart Type.” Once there, change the chart type for Series “Simpson Ltd” and Series “Griffin Ltd” to “Scatter with Smooth Lines and Markers.” Step #12: Modify the horizontal and vertical axis scales. In the cartesian coordinate system, we define the position of a point by x and y, which are perpendicular distances from both axes, while in the polar coordinates, a point is identified by r and θ. The polar plot will be made up of 10 data rings, each radial point (the distance between the inner and outer edge of a ring) representing a ten percent increment on a scale from 0 to 100. Step #4: Copy the last Radius values into the helper row. To do that, double-click on each element, then right-click on it again, and choose “Delete.” Step #14: Add data labels. Fill in the cells with percentages as shown in the screenshot. The same equation in the cartesian coordinate system would be y = tan(π/3) × x for the line and x2 + y2 = 32 for the circle. To find the Radius values for the first company (Simpson Ltd), enter this tiny formula into cell G3 and copy it into the remaining cells (G4:G14): =B3/10 Now, by the same token, calculate the radii for the second company (Griffin Ltd): =C3/10 At this point, you may be thinking to yourself, “What if my data type differs? Step #8: Reduce the Doughnut Hole size. To find your radius, divide $250,000 by 50,000. Step #5: Calculate the x- and y-axis values for each company. As simple as that. Yes, you heard it right. Right-click on either of the series representing the actual values (either Series “Simpson Ltd” or Series “Griffin Ltd”). You can read and extract the data from a polar graph using PlotDigitizer. The angle −210° means the angle is measured in the opposite direction to the direction of the graph, which is anticlockwise. First, select any empty cell and build an empty doughnut chart by following the steps outlined above. Navigate to the Home tab. PlotDigitizer is data extraction software that can extract data from several types of graphs, including polar. In the cell adjacent to the helper table (I2), enter the following formula: =G2*SIN(F2/180*PI()) Copy this formula into the remaining cells below it (I3:I14). Uncheck the “Show Leader Lines” box. In the Edit Series box, select all the grid values in the first row (O2:V2) and click “OK.” As you may have guessed it, rinse and repeat for each row to get the same 10 rings plotted on the chart. Based on the direction of the measurement of the angle, we categorize polar graphs as anticlockwise and clockwise. The angles 150° and −210° represent the same position. Right-click on the outer ring (Series “10”) and choose “Add Data Labels.” Step #15: Customize data labels. Wave goodbye to functions and formulas because you can now start building the polar plot itself. The polar plot comes in handy when the analyzed data has a cyclical nature. At an angle of 360°, we reach the same reference line, completing the entire circle. In the same way, we can calculate the polar coordinates for the rest. However, here’s the rub: Excel doesn’t support this chart type—in fact, it can’t even read polar coordinates—meaning you will have to build it from scratch. Set the Width to “5 pt.” Rinse and repeat for the rest of the rings. Click the “Insert Pie or Doughnut Chart” button. Unlike radius, theta is directional. Basically, all you need to do here is replace the default data labels with the category names from the table containing your actual data. Selecting the graph type in PlotDigitizer Step 3: Calibrating the graph Now, drag and drop the point O to the origin of the graph, place the point θ to any known angle. It is a non-directional parameter; it means it does not have direction. Between three and eight attributes can be plotted on each chart. Anticlockwise Anticlockwise, as the name says, the angle is measured anticlockwise, opposite to the way in which the hands of a clock move. To build the plot, you need to compute the polar coordinates first and, once there, convert them to the x- and y-axis values used by Excel to create the chart. Many more than eight becomes confusing. As an example of alternate data, if we were to analyze the revenue mentioned before, this column would go from $50,000 to $500,000. If an angle is negative, then the direction of the measurement of the angle is opposite to the direction of the graph. Copy this formula into cell F3: =360/COUNTA($A$3:$A$14) With that formula in cell F3, use this other formula in cell F4 to add up a given Angle value to the sum of all the theta values that go before it in the column: =F3+360/COUNTA($A$3:$A$14) It is important to lock the cell range (A3:A14) to easily copy the formula into the remaining cells. Different companies' strategy development styles are reflected in the shape of the hexagon drawn to link the plotted points. We start measuring the angle from this line, and the angle is 0° for all points on the right x-axis. Choose “Doughnut.” Excel should give you a set of 10 rings as a result. Choose “Format Axis.” Once the task pane appears, define the new axis scale ranges: Go to the Axis Options tab. For illustration purposes, let’s assume you set out to analyze the data for eight months instead. Now, shift the labels around a bit by placing them along the rim of the outer ring in the order shown on the screenshot below. Select the chart area. Complete the table by copying the r values at the very bottom (G14:H14) of each column into the respective dummy cells (G2:H2). Extracting data from graphs Step 5: Exporting the extracted data The extracted data can be exported to other file formats, e.g., CSV, MATLAB, JSON, MS Excel. Then, add up that number as you go along from zero to all the way to 360. Understanding polar coordinates The polar coordinate system consists of two parameters: radius and theta. Take a quick look at it: Essentially, the table is comprised of three elements: The qualitative scale (the yellow area or N2:N11) – This reflects the value intervals based on your actual data. As you see, all the rings have been squeezed together away from the center. At last, you have gathered all the necessary chart data—that was pretty intense. Similarly in a change situation where 'before' and 'after' results can be graphically compared. So, the coordinates are 3, 30°. We want to determine the coordinates (radius, angle) of each of these. We wish to determine the equations of these curves. Clockwise In the clockwise polar diagram, angles are measured in the direction of the hands of a clock, like in the following figure. Benefits Q&A on PPC advertising Get expert advice Great PPC discussions Stay updated with PPC news Quick support on tools Discounts and special offers This tutorial will demonstrate how to create a polar plot in all versions of Excel: 2007, 2010, 2013, 2016, and 2019. Radius (r) is the distance between the origin and a point on a polar graph. Sometimes Excel fails to read your data the right way. Under “Fill,” choose “No fill.” Under “Border,” select “Solid line.” Click the “Outline color” icon to open the color palette and select light gray. Here, we have placed θ at 30°. Clockwise polar graph Directions As mentioned earlier, the angle has direction. CSAT Simpson LTD (Radius) and CSAT Griffin LTD (Radius) – These columns contain the radius values illustrating the performance of each company throughout the year. Anticlockwise polar graph In the previous diagram, the angles are reported in both degrees and radians. And the respective polar coordinates are recorded on the left side panel. In just the same way, plug this formula into cell J2 to find the y-axis values and execute it for the rest of the cells (J3:J14) as well: =G2*COS(F2/180*PI()) Important note: Keep in mind that the header row cell (J1) of a column with y-axis values (column J) will act as the series name, meaning the value in that cell will go to the chart legend. Click “OK.” Repeat the process to add the chart data linked to the second company (Griffin Ltd). The plot enables you to quickly assess the good and bad months for each company, which facilitates better decision making. Download Now A polar plot is used to define a point in space within what is called the polar coordinate system, where rather than using the standard x- and y-coordinates, each point on a polar plane is expressed using these two values: Radius (r) – The distance from the center of the plot Theta (θ) – The angle from a reference angle The plane itself is made up of concentric circles expanding outward from the origin, or the pole—hence the name. Right-click on any data label and select “Format Data Labels.” When the task pane opens, replace the values by doing the following: Go to the Label Options tab. You need yet another helper table. Now, change the chart type of both the newly-added series representing the actual values. Step #7: Create a set of doughnut charts. Step 4: Extracting the data from the graph After calibrating the graph, we can see the coordinates of the cursor below the zoom panel. Select “Format Data Series.” In the task pane that pops up, change the default Doughnut Hole Size value to make magic happen: Switch to the Series Options tab. In this in-depth, step-by-step tutorial, you will learn how to turn your raw data into a polar plot in Excel from the ground up. You can start tracing the red curve in the figure by clicking on the curve. The polar diagram is anticlockwise, so the direction is kept anticlockwise. Finally, change the chart title, and you’re all set! Download our free Polar Plot Template for Excel. Just pick a number out of thin air and copy it into all the cells within the range. Scales for each attribute are arranged radially and the points plotted on each radius are joined to generate a shape that can be visually compared with the same plot for another situation. In the same task pane, transform the rings into a grid by following these simple steps: Go to the Fill & Line tab. Basically, it counts the number of cells that are not empty within the specified range. To work around the issue if this happens to you, follow a few straightforward instructions to stack your charts manually. It has a free online app. The center is the origin, with zero radii. Clean up the plot by removing the chart elements that have no practical value whatsoever: the gridlines, the axes, as well as all the legend items—save for the two that you actually need (marking the company information). Set the Minimum Bounds value to “-10.” Change the Maximum Bounds value to “10.” After that, jump to the horizontal axis and do the exact same thing. Calibrating the polar graph Enter the values of θ and r in the side panel. A polar graph Step 1: Uploading the polar graph image Visit and upload or drag-drop the image. Right off the bat, outline a helper table where all the calculations for your chart will take place. Like the cartesian system, the polar coordinate has two variables (radius and theta) to uniquely define a point. These are far simpler equations; most equations will have both r and θ in them. Entering the values of the point r and the point θ You can use the zoom panel (or magnifier) to improve the accuracy of markings. As we gradually move toward the end of our grand Excel adventure, it’s time to add the data labels representing each qualitative category in your dataset. How do you adjust when comparing, for instance, the revenue generated by companies as opposed to CSAT scores?” Simply put, you have to analyze your actual data, define the equivalent to one radial point (say $50,000), and divide all the values in your dataset by that number. Highlight the category values from your original data table (A3:A14). Other graphs are XY, ternary, pie/doughnut, bar, column. Examples of polar graphs Let us take some basic examples to better understand polar graphs. Theta (θ), or better known as an angle, defines the angular position of a point from the reference line. Click the “Paste” button. In this step, our aim is to evenly map out the spokes based on the number of categories in the dataset. This will have to be done manually by dragging each title to the proper position. Step #16: Reposition the labels. Step #10: Add the chart data. Click “OK.” Uncheck the “Value” box. Download our free Polar Plot Template for Excel. Upload the polar graph to PlotDigitizer Step 2: Selecting the graph type By default, the graph type is XY, so we have to change it to polar. Then, right-click on the chart plot and choose “Select Data.” After that, in the Select Data Source dialog box, click the “Add” button. Since CSAT scores are also measured on the percentage scale, simply divide each CSAT score table by 10. Now execute the formula for the rest of the cells in the column (F5:F14) by selecting F4 and dragging down the fill handle. This can be achieved by a selection menu from the bar of the window. In the below polar graph, 150° and −210° reach the same position. Getting started Since CSAT scores are commonly expressed as a percentage scale, consider the following table: Step #1: Set up a helper table. Right-click any data ring. How to read and extract data from a polar graph using PlotDigitizer? Check the “Value From Cells” box. You should always type “0” into the first cell (F2) of this column. In a gap analysis situation, the `desirable state' and the `present state' data can be plotted on the same chart to demonstrate graphically the gap between them. As an example, the chart below compares the customer satisfaction scores (CSAT), a metric that illustrates a customer’s satisfaction with a brand or product, of two organizations throughout 2019: Simpson Ltd and Griffin Ltd. If you already have your r and theta values figured out, skip this part and scroll down to Step #4. Use Polar Graphs (also known as Web or Spider Charts) in your data stories because they can display multiple variables without ...