

Example: Graphing the Tangent Function**Problem:**

Make a table of values and graph the function y equals tangent of x . Find the domain, the range, and the y - and x -intercepts.

Solution:

Using your calculator, you can find all of the corresponding y -values to the x -values listed. Notice that we are using multiples of 30 degrees like we did with the sine curve.

Let's start with the positive x -values.

The tangent of 0 degrees is 0.

The tangent of 30 degrees is 0.577.

The tangent of 60 degrees is 1.732.

When you enter the tangent of 90 degrees you get an error. We will talk about what this looks like on the graph in a minute.

The tangent of 120 degrees is negative 1.732.

The tangent of 150 degrees is negative 0.577.

The tangent of 180 degrees is 0.

The tangent of 210 degrees is 0.577.

The tangent of 240 degrees is 1.732.

When you enter the tangent of 270 degrees you get an error again.

The tangent of 300 degrees is negative 1.732.

Now let's fill in the negative x -values.

The tangent of 0 degrees is 0.

The tangent of negative 30 degrees is negative 0.577.

The tangent of negative 60 degrees is negative 1.732.

When you enter the tangent of negative 90 degrees you get an error again.

The tangent of negative 120 degrees is 1.732.

The tangent of negative 150 degrees is 0.577.

The tangent of negative 180 degrees is 0.

The tangent of negative 210 degrees is negative 0.577.

The tangent of negative 240 degrees is negative 1.732.

When you enter the tangent of 270 degrees you get an error again.

The tangent of negative 300 degrees is 1.732.

Now let's plot all of these points. First look at the x -value that gave us errors. The function does not have a value at these x -values. We note these on the graph with vertical dotted lines. These are called asymptotes and are a reminder that the function does not have a value there.

Now plot all of the rest of the points.

The last step is simply to draw the actual tangent curve. Keep in mind that the curve cannot cross the blue dotted lines because it does not have value there. Instead, the curve will get closer and closer to each asymptote as it increases or decreases.

The whole tangent function looks like this.

Take a look at the graph and find the domain. Remember that the domain is all the possible x -values. In this graph, you can see that x cannot equal 90 degrees, 270 degrees, negative 90 degrees, or negative 270 degrees. What this means is that the domain is all real numbers EXCEPT the odd multiples of 90 degrees.

Looking at the graph again, we can find the range. We can see that the function extends up and down indefinitely. What this means is that the range is all real numbers.

This curve crosses the y -axis at y equals 0.

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This curve crosses the x-axis at x equals 0, x equals 180 and x equals negative 180. The x-intercepts are all multiples of 180 degrees.

Please keep in mind that we have graphed just one part of the tangent curve. This graph repeats itself over and over again every 180 degrees.