

USING DESMOS

Desmos is a free online interactive graphing calculator program that can be used to carry out many of the same calculations and operations that can be performed with a graphing calculator, and more: graph a function (including piecewise-defined functions), make a table of values for a function, fit a line to a data set, and make a dynamic graph with a slider. The web address for Desmos is

www.desmos.com

On the home page, you can explore on your own by choosing from many examples.



Just Add Sliders

Make your graphs more dynamic with sliders. Now with animations!



Tables of Data

From pre-algebra to statistics, tables are your most loyal ally in the battle to organize and visualize your data.



Restrictions

Domain and range restrictions are your trusted tools for making incredible art with equations.



Regressions

Best-fit line? Done. Quadratic? Exponential? Sinusoidal? Absolutely. If you can write the equation, we'll try to regress it.

Below, examples of the following are given.

Example 1: [Graph a Function](#)

Example 2: [Graph a Piecewise-defined Function](#)

Example 3: [Make a Table of Values for a Function Formula](#)

Example 4: [Create an Interactive Graph with a Slider](#)

Example 1: GRAPH A FUNCTION

Graph the quadratic function

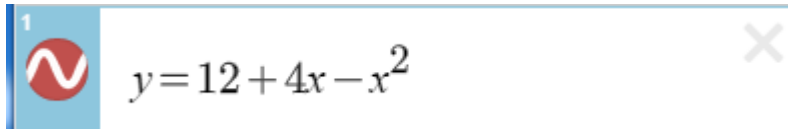
$$y = 12 + 4x - x^2$$

in the graphing window $[-4, 8]$ by $[-2, 16]$.

Function formulas are entered on the far left-side of the Desmos window in the boxes numbered 1, 2, etc. For the given function, enter the following into box 1.

$$y = 12 + 4x - x^2$$

On the screen, you will see the following in box 1.

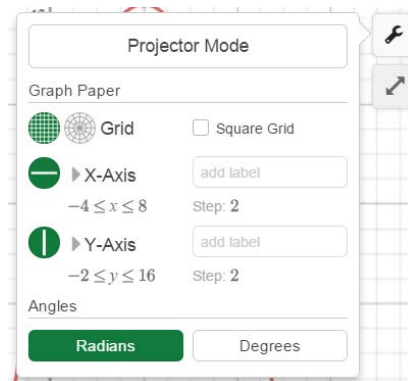


(Note: x^2 displays as x^2 .)

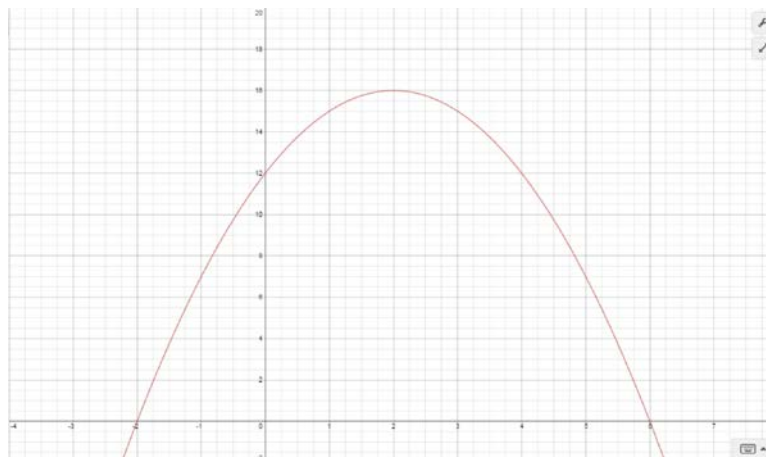
The graphing window may be changed by clicking on the “wrench icon” in the far upper right hand side of the screen.



Just click on the numbers shown for the X-axis or Y-axis to change their values. Then click outside of the box to close the graph settings window.



The resulting graph is shown in the following figure.



Example 2: GRAPH A PIECEWISE-DEFINED FUNCTION

Graph the piecewise-defined function.

$$f(x) = \begin{cases} x^2 & \text{if } x \leq 1 \\ 1 - x & \text{if } x > 1 \end{cases}$$

The template for a piecewise-defined function with three rules is as follows.

$$y = \{ \text{first domain: first rule, second domain: second rule, third domain: third rule} \}$$

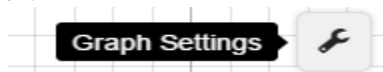
For the given function, enter the following into box 1.

$$y = \{ 1 \leq x: x^2, x > 1: 1 - x \}$$

On the screen, you will see the following in box 1.
(Note: $1 \leq x$ displays as $x \leq 1$ and x^2 displays as x^2 .)

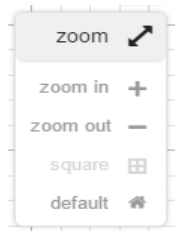
A screenshot of a graphing calculator's input box. The box contains the piecewise function definition: $y = \{ x \leq 1: x^2, x > 1: 1 - x \}$. The input box has a blue header with a red 'v' icon and a close button (X) in the top right corner.

The graphing window may be changed by clicking on the “wrench icon” in the far upper right hand side of the screen.

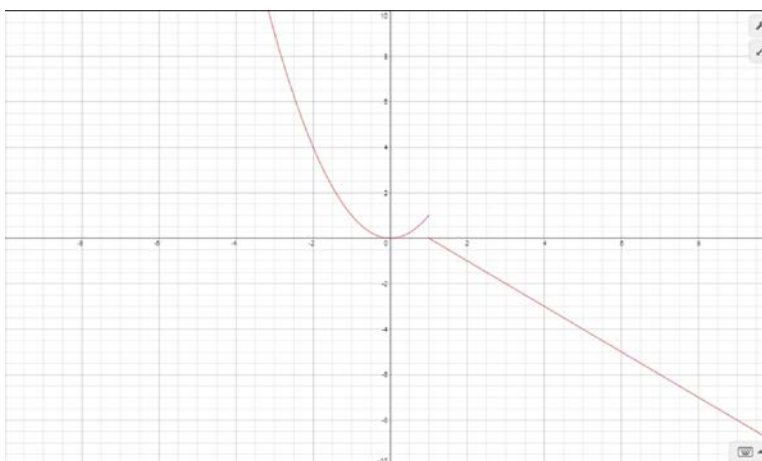


Just click on the numbers shown for the X-axis or Y-axis to change their values.

You can also zoom-in or zoom-out on the graph by clicking on the “2-sided line icon” in the far upper right hand side of the screen.



The following figure shows the resulting graph in the window $[-5, 5]$ by $[-10, 10]$.



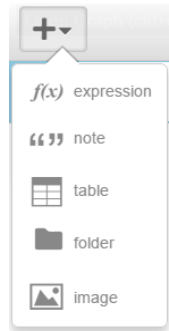
Example 3: Make a Table of Values for a Function Formula

Make a table of values for

$$y = x^2$$

for the values $x = 1, 1.5, 2, 2.5$ and 3 .

First, click on the + button (Add Item) on the left side of the Desmos window and a drop down menu will appear.

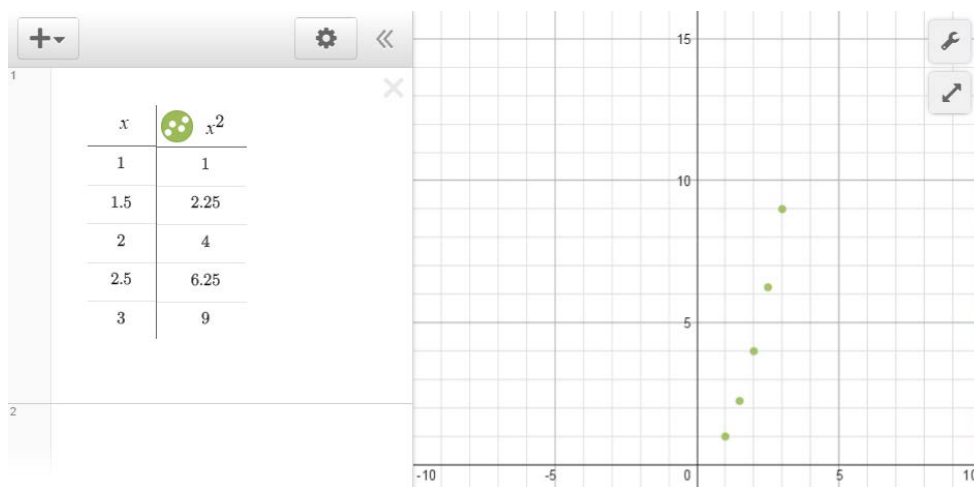


Select the table option from this menu – the following figure will appear in box 1.

A screenshot of a new table created in Desmos. The table has two columns labeled x_1 and y_1 . The first row has the value 1 in the x_1 column and a vertical bar in the y_1 column. The subsequent rows have the values 2, 3, 4, and 5 in the x_1 column and dashes in the y_1 column. A green polka-dot circle is next to the y_1 header.

x_1	y_1
1	
2	----
3	----
4	----
5	----

Replace x_1 by x by just highlighting x_1 with the mouse cursor and typing over it. Similarly, replace “ y_1 ” by “ x^2 ”, and change the x -values as needed. The following figure will appear on the screen.



Observe that the polka-dot circle next to “ x^2 ” is a toggle switch for the matching scatter plot in the graphing window.

Example 4: Create an Interactive Graph with a Slider

Create an interactive graph for

$$y = ax$$

for the values $a = -5, -4, \dots, 4, 5$ in the graphing window $[-10,10]$ by $[-10,10]$.
First, enter the function formula in box 1.



Next, click on the button labeled with “a” in box 1. The following appears in box 2.





You can change the values of a on the slider by just clicking on the number -10 on the slider.



For this example, the values of a range from -5 to 5 with a step of 1 since the x-values constantly increase by 1. Then click outside of the box to fix these values.



Finally, you just click on the forward play button  to start the animation – don't forget about the graphing window if it needs adjusting. To stop the animation, click on the stop button .