

Ten Tips for Desmos™ on the Digital SAT™

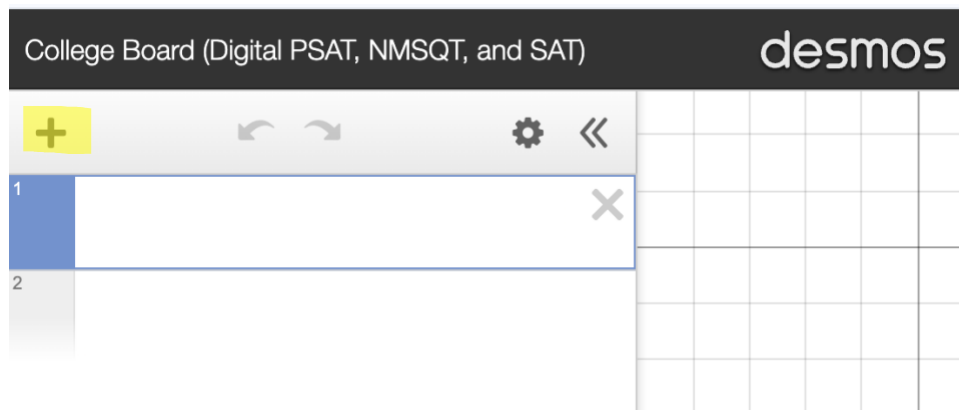
A Desmos calculator is built into the Digital SAT Interface. With capabilities beyond what many handheld calculators can offer, Desmos is an excellent tool that can help save you valuable time on the Digital SAT math section. Go to desmos.com/practice and select the College Board tests to have the exact calculator interface you will have on the SAT and PSAT. Keep in mind that you will need to have a strong conceptual understanding of the math involved in SAT problems so you can effectively use Desmos as a tool. Here are some of the best tricks for utilizing Desmos to make things easier on the math section of the Digital SAT.

1. Linear Regression

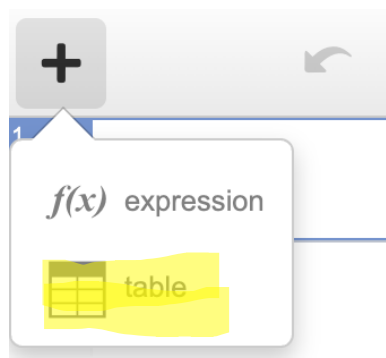
If you are given a problem that presents a sample of values in a linear function, you can use linear regression to find the equation of the best-fit line.

Example: What is the slope and y -intercept of the line formed by the points $(1, -2.5)$, $(-2, -13)$, and $(7, 18.5)$?

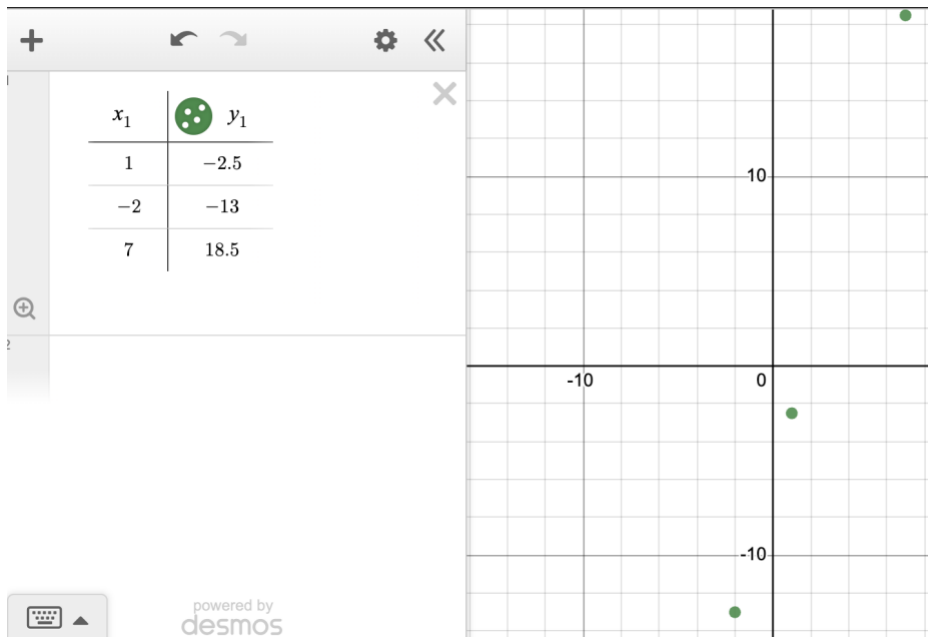
Solution: Start by making a table on Desmos using these values. Click on the + sign highlighted below.



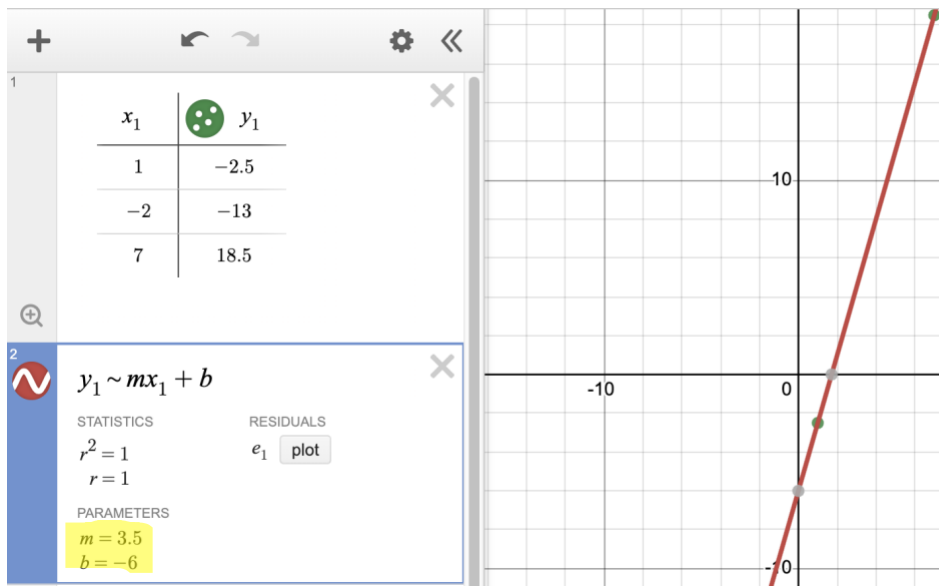
Then select “table”:



Next, enter the points into the table:



Finally, write in the linear regression expression to see a graph of the line and its slope and y-intercept. Be sure you use the \sim mark (found on the keyboard next to the #1 key) and that you put a 1 after both x and y:



The slope is given by m and the y -intercept is given by b . So, the slope is 3.5 and the y -intercept is -6 .

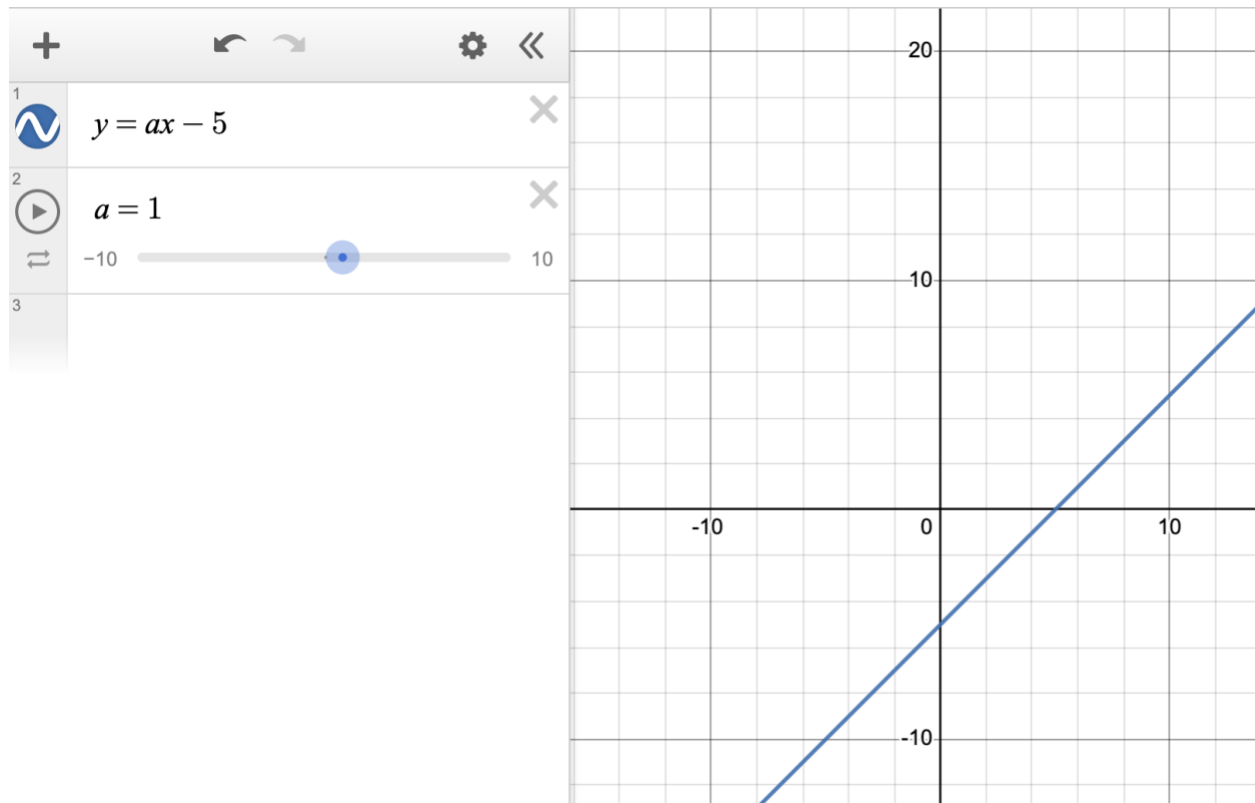
2. Using Sliders to Evaluate Constants

When you insert a letter other than x or y into Desmos, it will give you the option of using that letter as a “slider,” allowing you to try a range of different values for the number.

$$y = ax - 5$$

add slider: a

When you click on “a,” it will then give you a graph and an option to slide the value of a between a range of numbers.



You can also click on the entry where a is and you will be given the option to change the range of the possible values. If you wanted to have an expanded range of values, you could enter it like so:



$$a = 1$$

$$\underline{-100} \leq a \leq \underline{100} \quad \text{Step: } \underline{\hspace{1cm}}$$

Using this feature is helpful on problems that ask you about the value of a constant that would satisfy certain conditions.

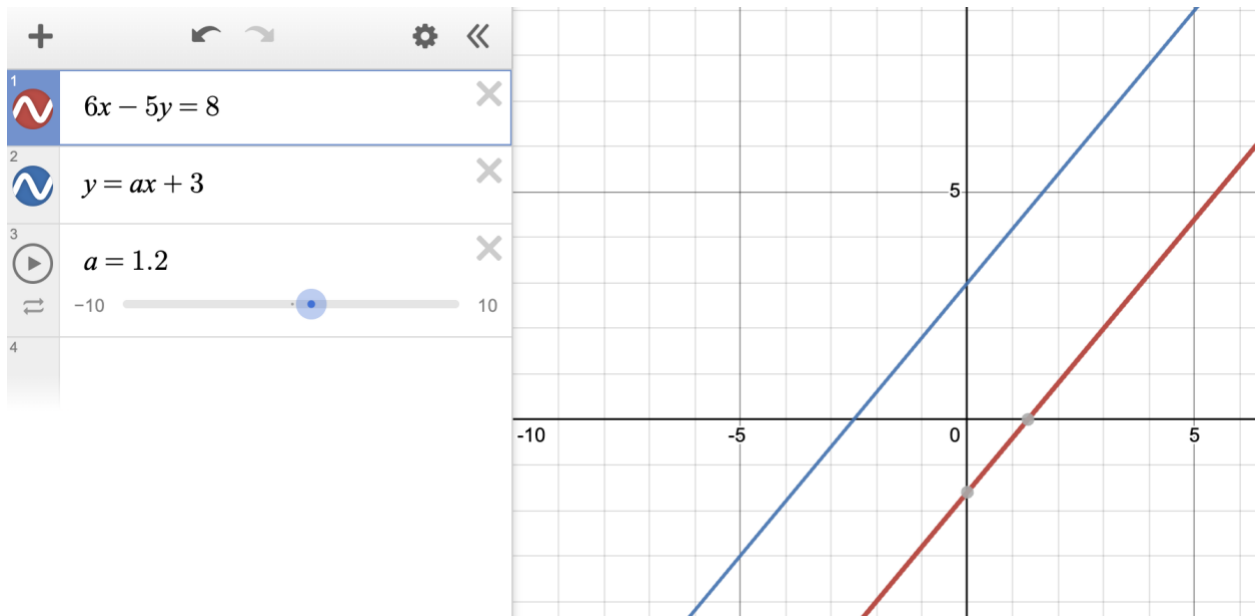
Example: In the system of equations below, what must the constant a equal so that the system has no solutions?

$$6x - 5y = 8$$

$$y = ax + 3$$

- (A) 1.9
- (B) 1.4
- (C) 1.2
- (D) 0.8

Solution: Type in the two equations to Desmos, selecting “add slider” with a . Then adjust the value of a until the two lines are parallel to each other. By definition, parallel lines have no points in common.



Thus, if $a = 1.2$, the two lines will be parallel and will therefore have no solutions. The correct answer is C.

3. Solving Systems of Equations

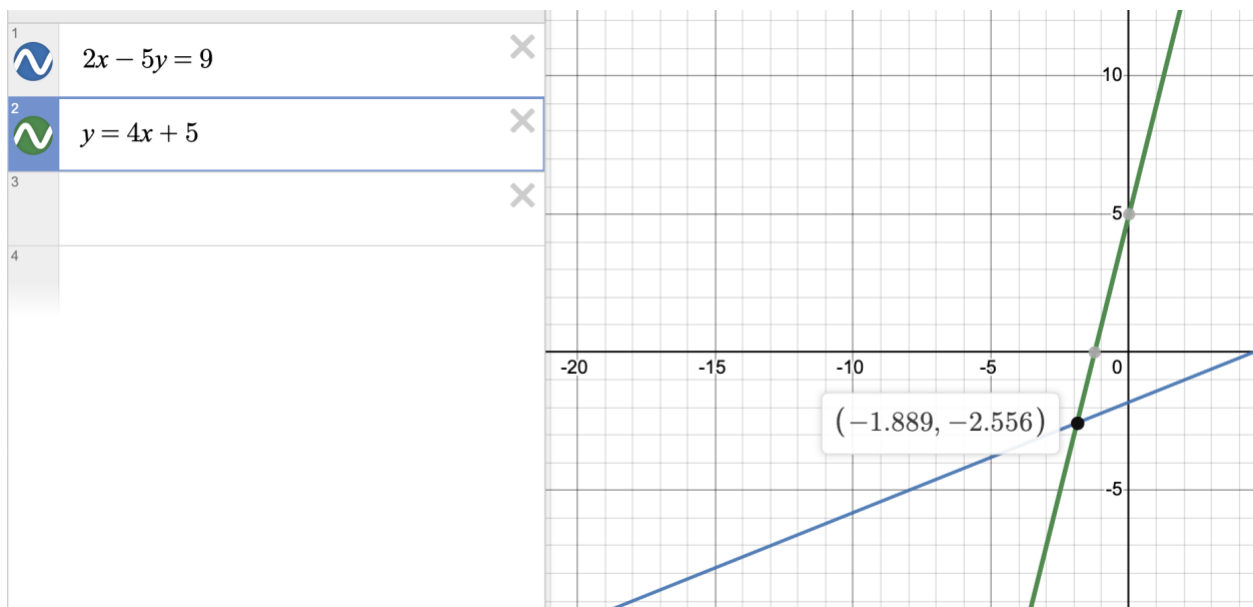
In addition to using methods like substitution and elimination to solve systems of equations, Desmos can be a powerful tool.

Example: What are the solutions to the following system of equations?

$$2x - 5y = 9$$

$$y = 4x + 5$$

Solution: Graph the equations on Desmos to see the point of intersection, which will be the solution to the system of equations.



So, the solution is -1.889 for x and -2.556 for y .

4. Solving Absolute Value Equations

Example: What are the solutions to the following equation?

$$|x - 4| = 9$$

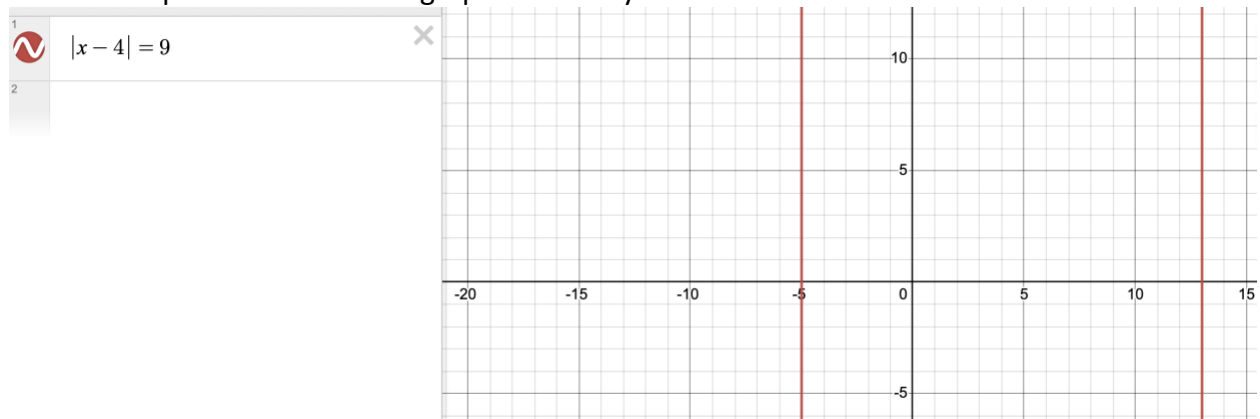
Solution: Graph this on Desmos to see the solutions. Click on the keypad logo on the bottom left of the screen.



Then click on the absolute value symbol to create an absolute value expression:

$$|a|$$

Enter the equation and use the graph to identify the solutions:



Since the graph goes through -5 and 13 , these are the solutions.

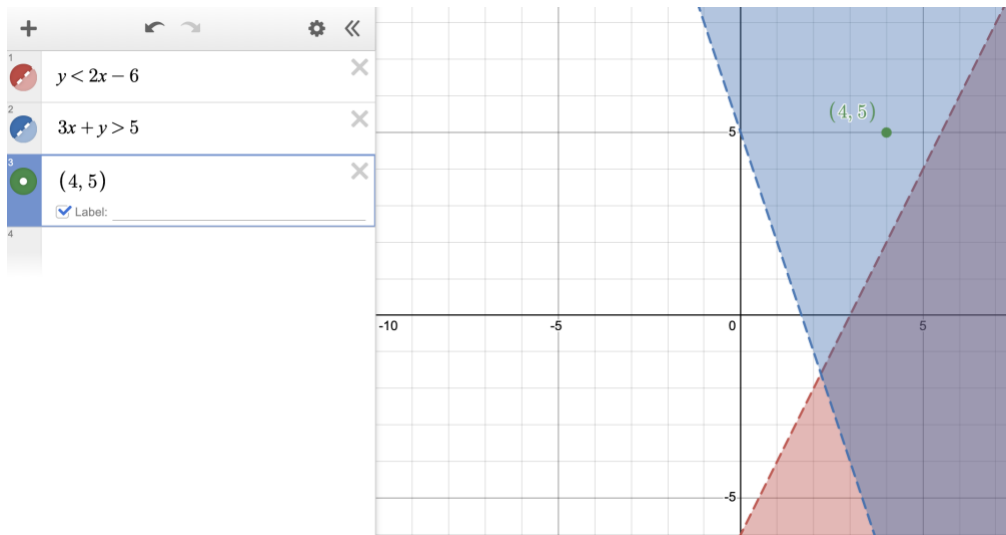
5. Visualizing Inequalities

Example: Is the point (4, 5) in the solution set of the following inequalities?

$$y < 2x - 6$$

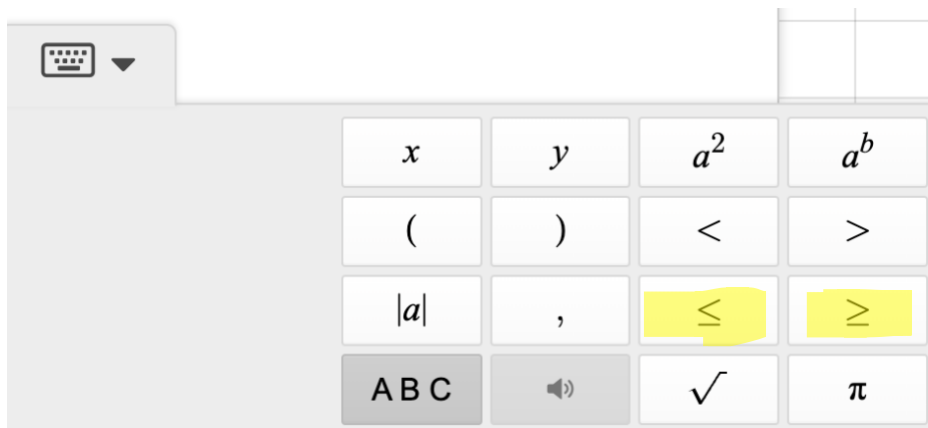
$$3x + y > 5$$

Solution: Graph the inequalities using Desmos.



The more darkly shaded purple portion of the above graph illustrates the solution set of the inequality, where both inequalities would apply. Since (4, 5) is not within this region, it is NOT a possible solution to the system of inequalities.

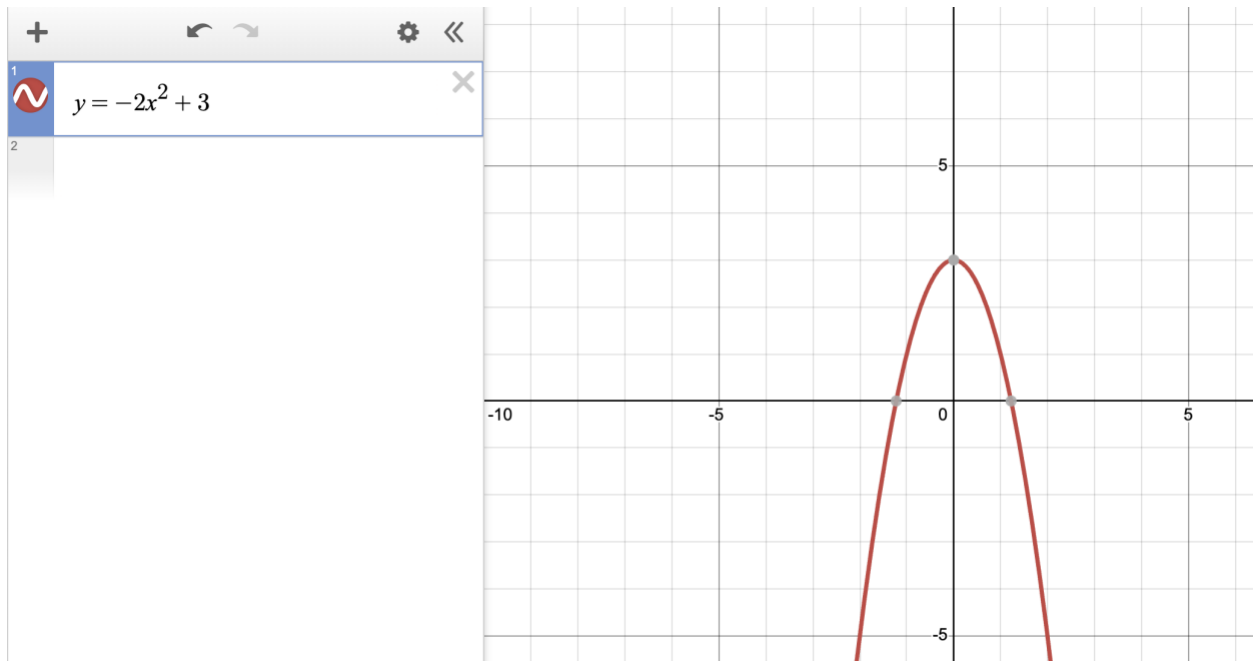
If you need to work with inequalities that indicate an equal sign, you can find them by clicking on the keyboard logo:



6. Working with Parabolas

Example: What is the vertex of the parabola with the equation $y = -2x^2 + 3$?

Solution: Graph the parabola on Desmos.

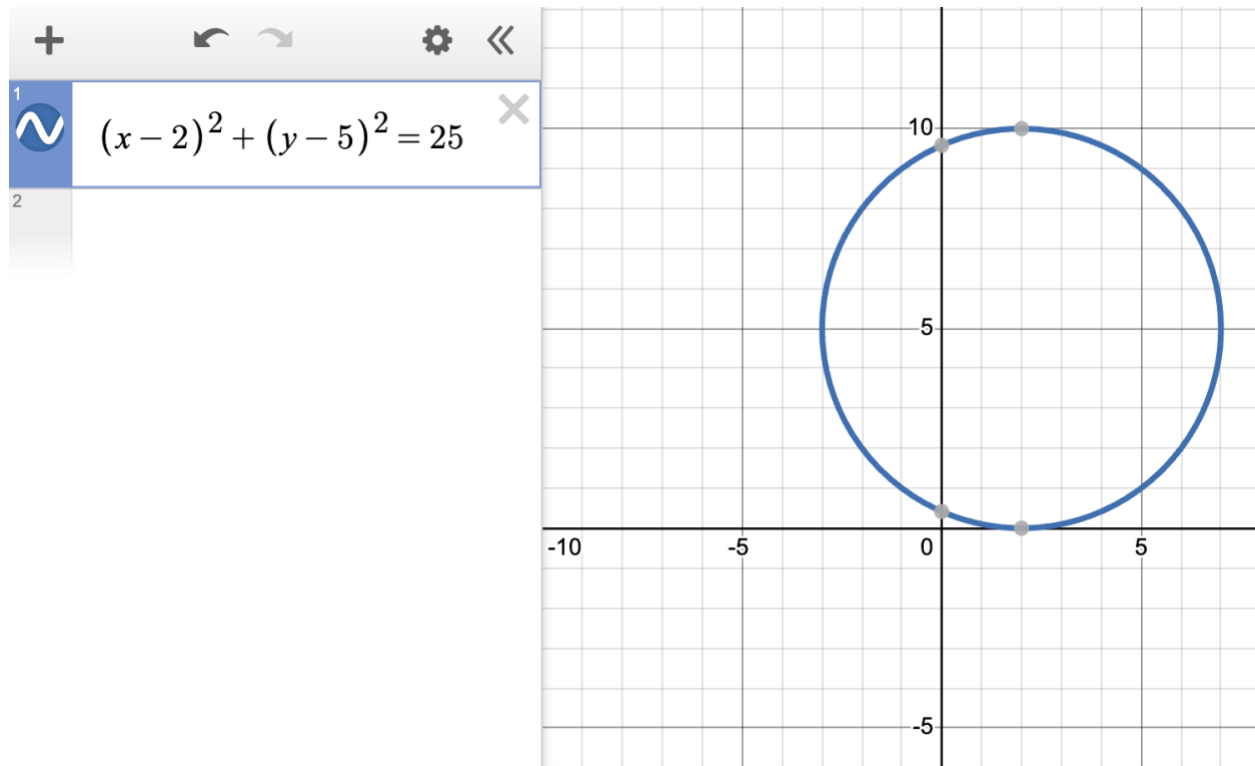


Both the zeros of the parabola (i.e., where the parabola intersects the x-axis) and the vertex are labelled with gray dots. The vertex can be seen to have the coordinates (0, 3).

7. Graphing Circles

Example: What is the graph of the circle with the equation $(x - 2)^2 + (y - 5)^2 = 25$?

Solution: Graph the circle using Desmos.



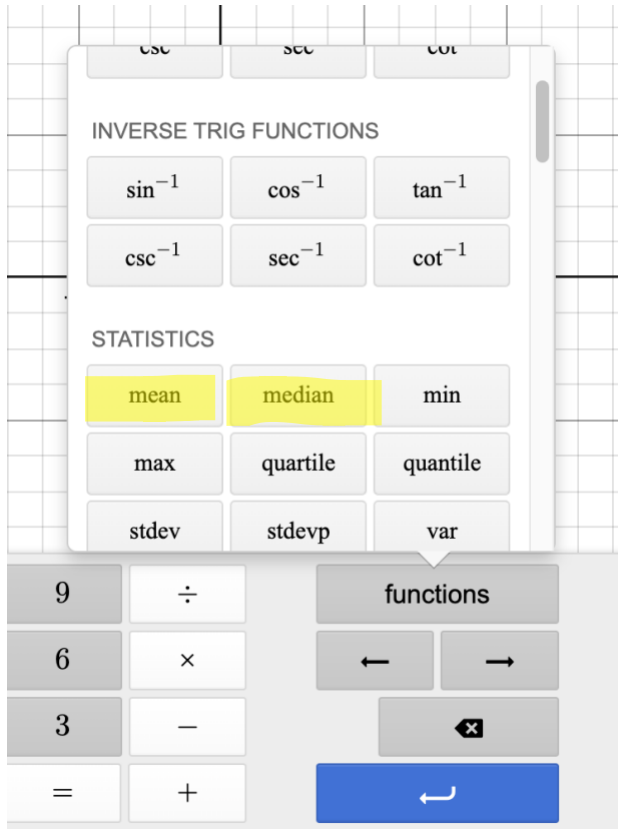
Unlike many graphing calculators, Desmos allows you to clearly see the graph of a circle when you enter its equation.

8. Calculating Mean and Median

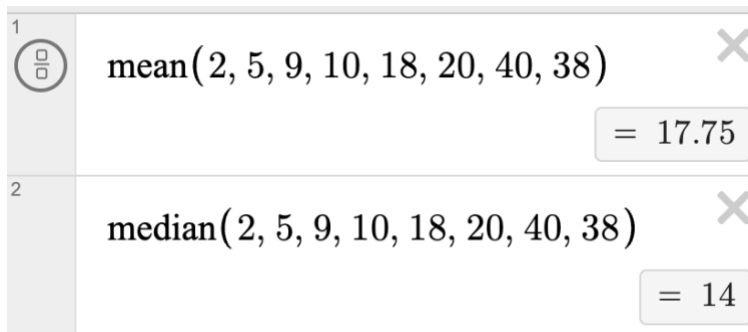
Example: What are the mean and median of the set of numbers below?

2, 5, 9, 10, 18, 20, 40, 38

Solution: Under the functions menu, you can select “mean” and “median”

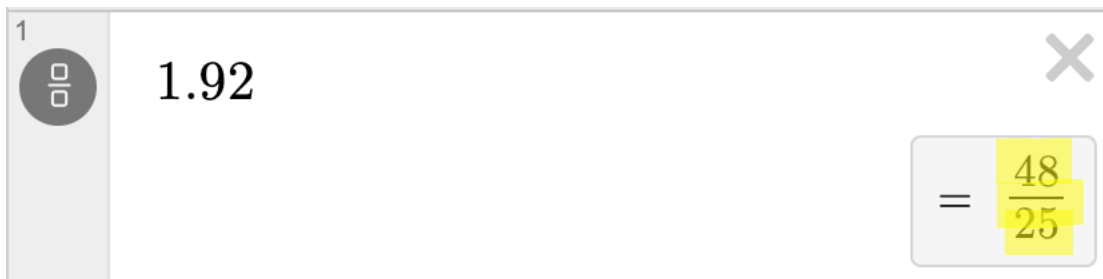


Enter “mean” and “median” into the lines, or you can simply type in the words themselves. Write in the numbers, and Desmos will automatically calculate the mean and median for you:



9. Fraction Shortcut

If you have a number expressed as a decimal, click on the fraction symbol to convert the number into a fraction.



10. Percent Calculation Shortcut

Suppose you want to find 20% of 700. You can simply type in 20, then the % sign, and then the number 700. It will automatically turn what you have written into a 20% of 700 calculation.

