Unlocking the Magic of Desmos

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AGENDA

- What is Desmos?
- Why use Desmos?
- How to use Desmos with your classes?
- Activities
- Questions

OUTCOMES

By the end of this presentation, you will be able to:

- **Know where to find Desmos.**
- **Use some basic features of Desmos.**
- **Know how to complete an activity in Desmos.**
- **Know how to create a basic activity in Desmos.**

What is Desmos?

- **Free website and apps – Online math tools**
- **The Main Website: https://www.desmos.com**
  - **Graphing Calculator: /calculator**
  - **Scientific Calculator: /scientific**
  - **Four-Function Calculator: /fourfunction**
  - **Geometry (New!): /geometry**
- **Create a free account so you can save graphs, create activities, etc.**

What is Desmos?

- The Apps
  - Available for Android and iPhone
  - Graphing Calculator
  - Scientific Calculator
- For this presentation, I will focus on the Graphing Calculator.

What is Desmos?

- https://learn.desmos.com
  - Where you can go to learn how to use Desmos.
- https://teacher.desmos.com
  - Where you can find a number of created classroom activities, as well as make your own.
- https://student.desmos.com
  - Where students go to complete activities.

Why use Desmos?

- It's free!
- It is fast to get to visualizations, especially dynamic ones.
- It is intuitive.
- The learning curve is relatively low, making it pretty easy to use.
- Not limited to graphing using y = .

How to use Desmos with your classes?

- Examples Part 1 – Where Desmos can be used much like the TI-83 graphing calculator, but better.
- Examples Part 2 – Unlocking the "Magic" of Desmos because you can do more exploration with dynamic examples.

Example 1

Graph the function $f(x) = -x^2 + 2x + 8$.

a) **Does the graph open up or open down? Why did we expect this?**

b) **Identify all points of interest (intercepts and vertex).**

c) **Use algebraic techniques to verify your answers from part (b).**

Example 2

Consider the linear equation $y = -x + 3$.

a) **Create a table of solutions for the equation.**

b) **What do you notice about all of the points?**

c) **Graph the equation.**

Example 3

Solve the following system of equations by graphing. Use a graphing utility to verify your solution.

$$x + y = 9$$
$$x - y = 1$$

Example 4

Solve the following system of inequalities by graphing. Use a graphing utility to verify your solution.

$$x + y < 8$$
$$x - y \geq 2$$

Example 5

Let's graph circles, ellipses, and hyperbolas!

- $x^2 + y^2 = 16$
- $\frac{(x-3)^2}{4} + \frac{(y+2)^2}{9} = 1$
- $\frac{x^2}{16} - \frac{y^2}{9} = 1$
- $10x^2 + 9xy + 3y^2 = 144$

Example 6

Consider the following set of data:

X	5	7	10	12	15	18
Y	4	12	17	22	24	29

a) **Find the mean for *x*.**

b) **Find the median for *y*.**

c) **Find the standard deviation for *y*.**

d) **Calculate the regression line and determine the correlation coefficient.**

Example 7

https://www.desmos.com/calculator/zfij6pi8xq

Let's explore the graphs of vertical and horizontal lines. First, our textbook says that any equation in the form x=a, where a is any real number, has a graph that is a vertical line. So let's look at x=2. What do you notice as I move the point up and down the line?

Example 7 (continued)

https://www.desmos.com/calculator/zfij6pi8xq

Now let's look at horizontal lines. Any equation in the form y=b, where b is any real number, has a graph that is a horizontal line. Let's look at y=-3. What do you notice as I move the point left and right on the line?

Example 8

https://www.desmos.com/calculator/wwcstvcjsa

The vertex form for a quadratic function is $f(x) = a(x - h)^2 + k$. Let's explore the effects that a, h, and k have on the graph.

We can similarly explore the absolute value function: $g(x) = a|x - h| + k$.

Example 9

https://www.desmos.com/calculator/pkghdownfu

Let's look at the sine function, $y = a\ sin\ x$, and various positive values of a. What are some things that you notice?

Example 10

https://www.desmos.com/calculator/eejfux5pky

Consider the polar equation $r = 2\ \cos 3\theta$.

Let's see what the graph looks like, and why we only need a domain of $0 \leq \theta \leq \pi$ to get a complete graph.

Example 11

https://www.desmos.com/calculator/xx8svect4q

Graph the parametric equations
$x = t^2 + 1, y = 2 + t$, for $-3 \leq t \leq 2$.
Be sure to indicate the orientation of the curve.
Then, eliminate the parameter and find the equation in terms of x and y.

Example 12

https://www.desmos.com/calculator/godmv5cejt

Graph $f(x) = 0.1x^3 - 0.7x^2 + 0.7x + 1.5$. Then graph its first and second derivatives. Use the first and second derivatives to explain the shape of f(x).

Repeat the exercise using some other functions of your choosing.

Example 13

https://www.desmos.com/calculator/5fkkzphdwr

Graph $f(x) = x^3 - 3x^2 - 24x$. Then graph the tangent line at any point on the curve.

Repeat the exercise using some other functions of your choosing.

Example 14

https://www.desmos.com/calculator/9mcty1xwps

Let's look at the relationship between the definite integral and the area under the curve for a function. Consider each of the following functions:

- $f(x) = 3$
- $f(x) = x$
- $f(x) = x + 2$
- $f(x) = 0.25x^2 + 3$

Let's Complete an Activity

Go to student.desmos.com and type in the class code

4HS4VE

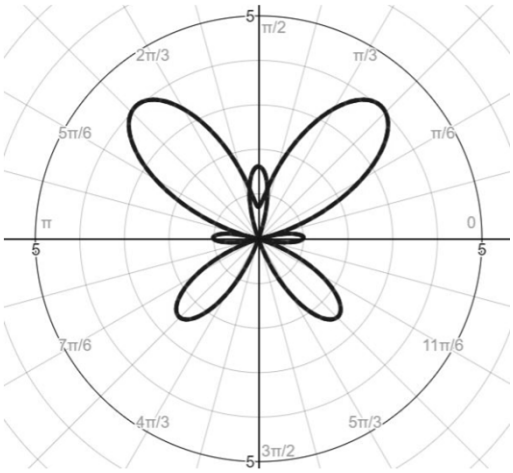
Or follow this link:

https://student.desmos.com?prepopulateCode=4hs4ve

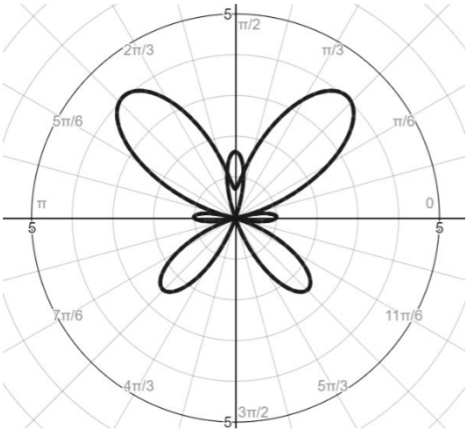
How Do I Create an Activity?

- Go to https://teacher.desmos.com.
- Sign In or Create Account.
- Under “Your Activities”, Click “Custom”.
- Click “New Activity”.
- Give your activity a title.
- Build your activity!

QUESTIONS OR COMMENTS?



THANK YOU!! ☺



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