

# Desmos



Sara Larkin

[sara.larkin@iaedb.org](mailto:sara.larkin@iaedb.org)

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# Agenda

- Overview of Desmos calculators
- Features of the tools
- Accessibility keystrokes
- Demonstration
- Useful links

# What is Desmos?

- Free suite of math software tools
- Already has many embedded accessibility features
- Works with screen readers
- Includes audio or braille input/output

# Desmos Calculators

- What type of calculator does the student need?
  - Four-Function calculator
  - Scientific calculator
  - Graphing calculator

# Tips and Tricks

- Having a numpad is extremely helpful for beginners because it has the basic numbers and operations.
- Resources
  - [Digital Math Calculator Skills Checklists](#)
  - [Desmos Informational Document](#)

# Getting to the Calculator

- Windows Key
- Type chrome or the name of the browser you want to use
- Type desmos.com and press Enter
- Once on the page, press Ctrl+F
- Type four, scientific, or graphing, and hit Enter when on the link for the calculator you want
- The page will automatically start you out in the expression box

# Settings (Wrench Icon)

- All Calculators
  - Large print display
  - Reverse contrast
  - Braille mode (refreshable braille display or ASCII)
- Scientific and Graphing Calculator
  - Radians or degrees for trigonometry
- Graphing Calculator
  - Grid properties

# Four Function Calculator

<https://www.desmos.com/fourfunction>

- Addition (+), Subtraction (-), Multiplication (\*), Division (/)
- Decimals (.)
- Parentheses (shift-9 and shift-0)
- Square root (sqrt) – use right arrow to end root
- Ans key to use previous answer in a new calculation (ans)
- <https://www.desmos.com/fourfunctionshortcuts>

# Scientific Calculator

<https://www.desmos.com/scientific>

- All entry for the four-function calculator PLUS
  - Fraction (frac) – use tab or arrow to move between numerator and denominator
  - Percent (%)
  - Exponent or Superscript (^ or Shift-6)
  - Square root (sqrt), Cube root (cbrrt), Nth root (nthroot)
  - Trigonometry (sin, cos, tan)
  - Pi (pi)
  - Extended functions menu for logarithms, probability, and more
  - <https://www.desmos.com/scientificshortcuts>

# Poll #1

1. How do you type a square root?

- A. Type squar
- B. Type root
- C. Type sqrt

3. How do you type a fraction?

- A. Type fraction
- B. Type frac
- C. Type numerator/  
denominator

2. How do you use the previous answer in a new calculation?

- A. Type answer
- B. Type last
- C. Type ans

4. How do you type an exponent?

- A. Type exponent
- B. Type exp
- C. Type the caret (^) which is shift-6

# Scientific Calculator Posts

- [Paths to Technology Valentine's Day word problems and Desmos Scientific Calculator](#)
- [Accessible, Interactive Math with Desmos](#) (half hour scientific calculator and half hour graphing calculator)

# Graphing Calculator

<https://www.desmos.com/calculator>

- Includes everything on the scientific calculator PLUS
  - Table of values
  - Graphing of functions and inequalities on a coordinate plane
  - Statistics
  - Random number generator  $[\#, \dots, \#].\text{random}$
  - Additional miscellaneous functions
  - <https://www.desmos.com/graphingshortcuts>

# Graphing Keyboard Entry

- Navigating among equations and graphs
  - Focus on the expressions list (Ctrl-Alt-E)
  - Add an expression (Ctrl-Alt-X)
  - Delete the current expression (Ctrl-Shift-D)
  - Add a new table (Ctrl-Alt-T or type table)
  - Audio trace toggle to get to graph or back to equation (Alt-T)
  - Toggle answer between a decimal and a fraction (Alt-Shift-A)
  - Listing of keyboard shortcuts (Ctrl-/)

# Poll #2

1. How do you create a table?

- A. Type table
- B. Type tab
- C. Ctrl-Alt-T

3. How do you delete an expression?

- A. Ctrl-Alt-D
- B. Ctrl-Shift-D
- C. Alt-D

2. How do you add a new expression?

- A. Ctrl-Alt-X
- B. Ctrl-X
- C. Alt-X

4. How do you toggle between equation and graph?

- A. Alt-T
- B. Ctrl-T
- C. Shift-T

# Keystrokes When in the Graph

- Hear graph (H)
- Point of interest (P) – gives the # of points of interest
- Beginning of graph – Home or Fn-Home
- Next point of interest (Tab)
- X coordinate (X)
- Y coordinate (Y)
- Move to origin (O)
- Basic summary of graph (Alt-S)
- Previous Graph – Alt-PageUp or Alt-UpArrow
- Next Graph – Alt-PageDown or Alt-DownArrow

# Poll #3

1. To Hear the graph, type this key.

- A. F
- B. G
- C. H

3. To say the X-coordinate of the point, type this key.

- A. C
- B. P
- C. X

2. To find a Point of interest, type this key.

- A. I
- B. P
- C. Tab

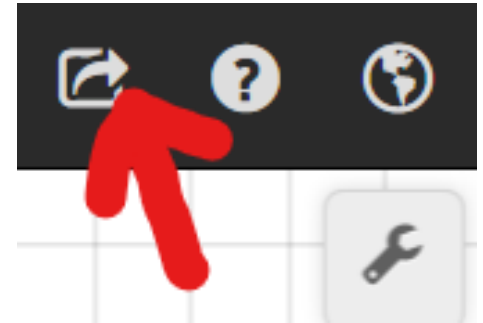
4. To say the Y-coordinate of the point, type this key.

- A. C
- B. P
- C. Y

# Line of Best Fit

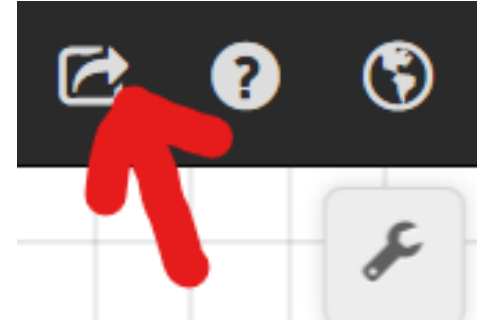
- Make a table of points by typing table
- Enter a coordinate and press tab to go to next coordinate
- Repeat until all coordinates are entered
- Go to the next expression by typing Ctrl-Alt-X
- Type  $y_1 \sim mx_1 + b$
- Tab to slope (m) and y-intercept (b)<sub>17</sub>

# Sharing a Graph through Email



- Go to Share Graph (Ctrl-Alt-S)
- Use one of two options to copy link
  - Ctrl-C
  - Tab to Copy link button and hit Enter
- Paste into an email to teacher or student

# Embossing a Tactile Graph



For graphics embossers only

<https://www.desmos.com/accessibility#embossing-graphs>

- Go to Share Graph (Ctrl-Alt-S)
- Select Export Image button
- Change File Format to Braille Nemeth or Braille UEB
- Tab down to Size and select your graphics embosser (VP Max for Tiger embossers or ETC Romeo/Juliet for Rome 60, Juliet 120, or PageBlaster)
- Follow embossing instructions on the screen

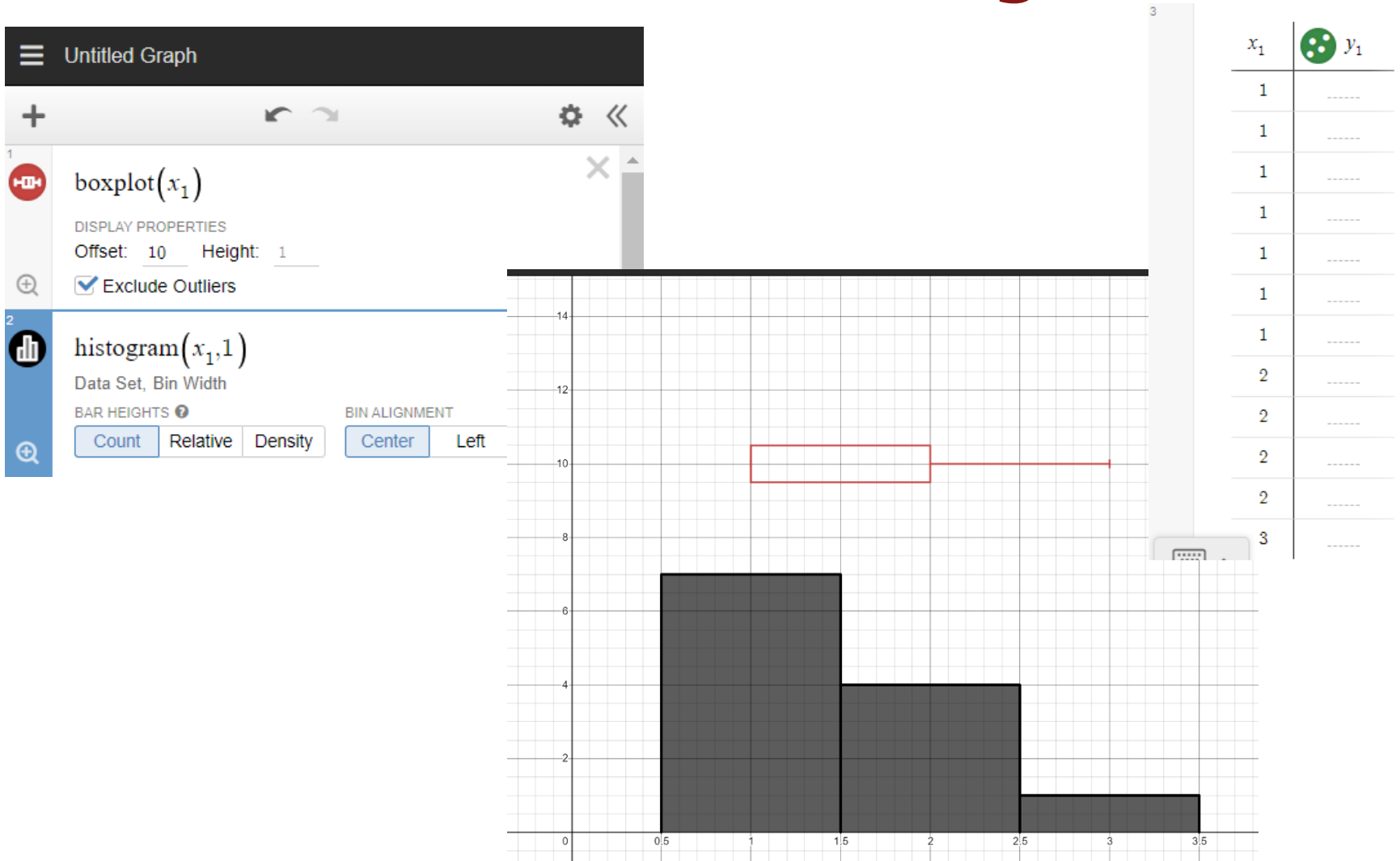
# Graphing Calculator Paths to Technology Posts

- [Exploring Math with Desmos: Getting Started](#)
- [Desmos Audio Tracing: Introducing Sonified Graphs](#)
- [Understanding Desmos: Sonification lessons](#)
- [Using a data table to create a line graph in Desmos Part 1](#) by Jennifer Bliss
- [Thanksgiving Travel Trends math activity: Desmos line graph Part 2](#)
- [Thanksgiving Car Travel Trends activity: Desmos line graph Part 3](#)
- [Thanksgiving Travel Trends activity: Desmos line graphs part 4](#)
- [Desmos: Create a scatter plot graph with JAWS](#)

# Distributions

- Make a table first with only the x column filled in
- Histograms – `histogram(x1,width of bars)`
  - Emboss or hear the graph
- Dot plots – `dotplot(x1,width of bars)`
  - Can be embossed, but audio trace not useful
- Box plots – `boxplot(x1,width of bars)`
  - Can be embossed, but not audio trace
- All of these are better as embossed images

# Distribution Images



# Using Braille

- More information
  - <https://www.desmos.com/accessibility#braille>
- Video for getting started
  - <https://learn.desmos.com/braille>
- Most of the students I work with tend to just prefer the keyboard and then emboss as needed.

# Translation Between Print and Braille

- <https://www.desmos.com/braille-demo/index.html>
- Braille to Formatted Math
  - Check the box for Six Key Input
  - Use SDF and JKL to type in the box under “Braille”
- Formatted Math to Braille
  - Use the keyboard similar to the calculators to type in the box under “Formatted Math”
- Not always perfect, but correct for most expressions

# Digital Classroom Activities

- <https://teacher.desmos.com/>
- To find the activities that are accessible with screen readers, search “screen reader”
- Some are more accessible than others
- Little more of a learning curve on some of these
- Listing of keystrokes for some types of activities

<https://www.desmos.com/accessibility#activities>

# Geometry

<https://www.desmos.com/geometry>

- Students must have an understanding of building geometry graphics first
- Little more of a learning curve
- Listing of keystrokes

<https://www.desmos.com/accessibility#geometry>

# Geometry Paths to Technology Posts

- [Getting started with Desmos geometry shapes](#)
- [Creating an accessible geometry worksheet: Desmos Geometry Tool](#)
- [Desmos Geometry Tool: Points and Lines](#)
- [Desmos Geometry Tool: Circles and polygons](#)
- [Desmos Geometry Tool: Angle BCD with a screen reader](#)

# General Troubleshooting

- JAWS
  - Disable keyboard echo (Insert-2 or Caps Lock-2)
  - Pass-through command (Insert-3 or Caps Lock-3)
- NVDA
  - Toggle browse mode on or off (Insert-Space)
  - Disable character echo (Insert-2 or Caps Lock-2)
  - Disable word echo (Insert-3 or Caps Lock-3)
  - Pass-through command (Insert-F2)
- If using braille, set your input and output to computer braille
- Support, questions, comments, suggestions  
[accessibility@desmos.com](mailto:accessibility@desmos.com)

# Useful Desmos.com Links

- [Accessibility Page](#)
- [Getting started page for graphing](#)
- [Keyboard Shortcuts for All Calculators](#)
- Downloadable Keyboard Shortcuts for graphing
  - [Graphing Calculator Keyboard Shortcuts for Windows \(.docx\)](#)
  - [Graphing Calculator Keyboard Shortcuts for Windows \(.brf\)](#)
  - [Graphing Calculator Keyboard Shortcuts for Mac \(.docx\)](#)
  - [Graphing Calculator Keyboard Shortcuts for Mac \(.brf\)](#)