

Slope Screen

Explore the parameters of the slope formula and how modifying the graph affects the equation or modifying the equation affects the graph..

HIDE the slope formula

DRAG either point to change the slope of the line

Use the point tool to get the integer coordinates of any point

MODIFY the coordinates from within the formula

SAVE a line to compare multiple lines simultaneously

Graphing Lines

Slope $m = \frac{y_2 - y_1}{x_2 - x_1}$

$m = \frac{4 - 2}{4 - 1} = \frac{2}{3}$

Slope is $\frac{2}{3}$

Slope Hide lines

Save Line Erase Lines

Slope-Intercept Screen

Explore the parameters of the slope-intercept form of a line.

Simplified equation of line

DRAG the blue point to change the slope of the line

DRAG the pink point along the y-axis to change the y-intercept of the line

MANIPULATE the slope and/or y-intercept from the equation

SHOW reference lines of $y=x$ or $y=-x$

Graphing Lines

$y = mx + b$

$y = \frac{8}{-4}x + -3$

Slope $y = x$ $y = -x$ Hide lines

Save Line Erase Lines

Point-Slope Screen

Explore the parameters of the point-slope form of a line.

DRAG the purple point and see the point within the equation of the line change

DRAG the blue point to change the slope

MANIPULATE the purple point and/or the slope from the equation

The screenshot shows a coordinate plane with a line passing through points (-2, -1) and (3, -2). The equation of the line is $(y + 2) = -\frac{1}{7}(x + 3)$. A control panel on the right shows the general form $(y - y_1) = m(x - x_1)$ with input fields for $y_1 = -2$, $m = -\frac{1}{7}$, and $x_1 = -3$. Below the panel are checkboxes for "Slope", "y = x", "y = -x", and "Hide lines". The bottom navigation bar includes "Graphing Lines", "Slope", "Slope-Intercept", "Point-Slope", "Line Game", and "PhET".

Game Screen

Challenges are random within each level, but increase in difficulty.

Levels 1-2 Set the Point, Set the Y-Intercept, or Set the Slope, by manipulating either the equation or the graph

Levels 3-4 Make the equation or Graph the Line

Levels 5-6 Make the Equation, Graph the Line, or Put Points on Line

The screenshot shows a "Choose Your Level" screen with six levels. Level 1 has 1 star, Level 2 has 2 stars, Level 3 has 3 stars, Level 4 has 4 stars, Level 5 has 5 stars, and Level 6 has 6 stars. Three challenge examples are shown in callouts:

- Level 1: "Your Equation: $(y - 0) = \frac{1}{3}(x - 0)$ "
- Level 2: "Your Equation: $y = \frac{2}{3}x + 0$ "
- Level 3: "Your Equation: $y = \frac{1}{1}x - 3$ "

Other callouts show a graph with a line and a point, and a graph with three points. The bottom navigation bar includes "Slope", "Slope-Intercept", "Point-Slope", "Line Game", and "PhET".

Complex Controls

McGarry, May 2015

The screenshot shows the equation $(y - 4) = \frac{-6}{0}(x - 3)$ with a large red 'X' over it, indicating an invalid or complex control. The control panel below shows input fields for $y_1 = 4$, $m = \frac{-6}{0}$, and $x_1 = 3$. Buttons for "Save Line" and "Erase Lines" are visible.

- If two points are stacked vertically on any screen, the slope will be undefined and a red x will appear over the equation.

Insights into Student Thinking

- Students may have difficulty with the game, particularly Set the Equation challenges, if they do not use the point tools.

See all activities for Graphing Lines [here](#).

For more tips on using PhET sims with your students, see [Tips for Using PhET](#).

