

Basic Linear Equation

We know when students are just beginning their study of algebra, the basic concepts can be difficult to grasp. These activities are written for teachers to use in their basic algebra classes.

When you find other helpful exercises, add these to your own eActivities.

This file includes eActivities on:

- 01: Estimation $y=ax$ – Find the equation that best fits the data.
- 02: Rate (Slope) – Now, find the rate of change for these lines.
- 03: Graph $y=mx+b$ – With the graph and equation linked, change one and the other also changes.
- 04: Intersection on the x-, y-axis – Find the y-intercept and root of a line using the ClassPad.
- 05: Slope-Intercept Form – Write the equation in slope-intercept form by examining the graph.
- 06: Intersection of Two Lines – See the four different ways to find the intersection of two lines.
- 07: Parallel and Perpendicular Line– Using the Construct function, draw the lines and find the equations.
- 08: Slope and Point– Determine the equation when you know the slope and point.
- 09: Two Points – This time, find and graph the equation when you know two points on the line.
- 10: Standard Form – Change the equation to the Standard Form to obtain more, useful information.
- 11: Solve Equation with Absolute Value– Find the equation, both algebraically and with the Solve function.

01: Estimation $y=ax$

Find the equation that best fits the data.

Estimation $y=ax$

<Example>
[Length Time]
2.0 29
2.5 55
3.0 67
3.5 68
4.0 90

Open the Table --->

Select columns A and B, then tap Graph/Scatter to plot the data.

Drag the equation on the table and drop it on the

	A	B	C
1	2.0	29	$y=15x$
2	2.5	55	
3	3.0	67	
4	3.5	68	
5	4.0	90	

02: Rate (Slope)

Now, find the rate of change for these lines.

Rate (Slope)

Rate (Slope)
$$= \frac{\text{Vertical change}}{\text{Horizontal change}}$$

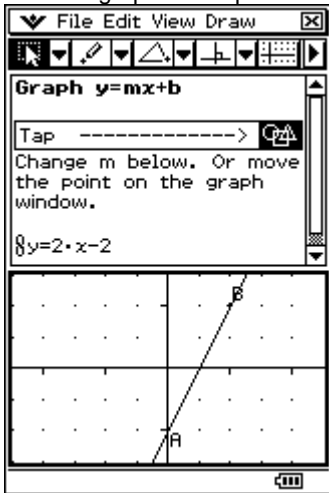
<Example>
Find the rate for each interval.

Graph ----->

Rate(AB) = $\frac{2-0}{1-0}$ Rate(AB) = 2
Rate(BC) = $\frac{3-2}{3-1}$ Rate(BC) = $\frac{1}{2}$

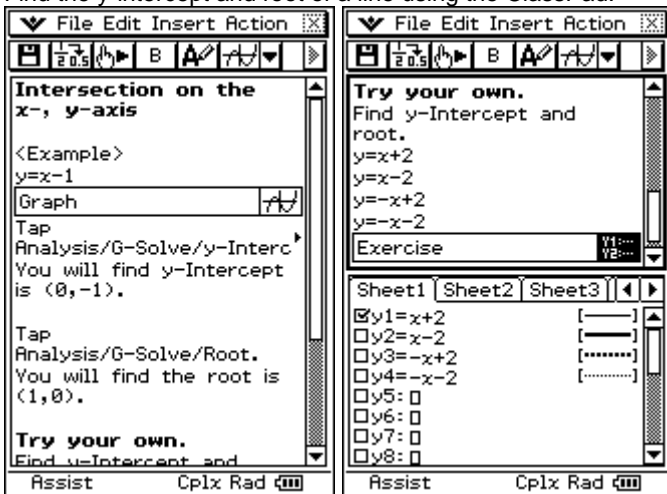
03: Graph $y=mx+b$

With the graph and equation linked, change one and the other also changes.



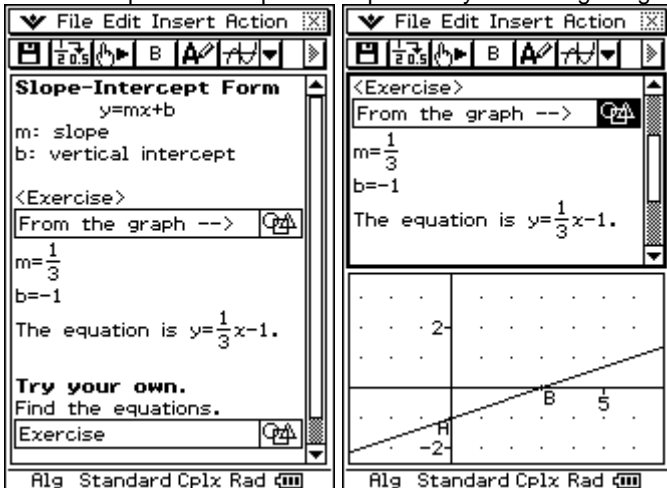
04: Intersection on the x-, y-axis

Find the y-intercept and root of a line using the ClassPad.



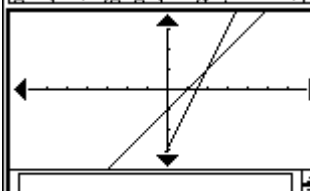
05: Slope-Intercept Form

Write the equation in slope-intercept form by examining the graph.



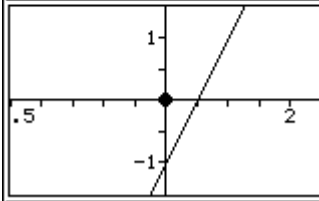
06: Intersection of Two Lines

See the four different ways to find the intersection of two lines.

<p>Intersection of Two Lines</p> <p><Example> $y=x-1$ $y=2x-3$</p> <p>Graph <input type="button" value="Graph"/></p> <p>Tap Analysis/G-Solve/Intersec You find the intersection is (2, 1).</p> <p>Solve it algebraically <input type="button" value="Solve"/></p> <p>Hint on using CAS! <input type="button" value="Hint"/></p> <p>Try your own. Find the intersection. $y=-x+1$</p> <p>Alg Standard Cplx Rad <input type="button" value="Mode"/></p>	<p>Intersection of Two Lines</p> <p><Example> $y=x-1$ $y=2x-3$</p> <p>Graph <input type="button" value="Graph"/></p> <p>Tap</p>  <p>Rad Cplx <input type="button" value="Mode"/></p>	<p>Edit Action Interactive</p> <table border="0"> <tr> <td>$y=x-1$</td> <td>$y=x-1$</td> </tr> <tr> <td>$y=2x-3$</td> <td>$y=2 \cdot x-3$</td> </tr> <tr> <td>$x-1=2x-3$</td> <td>$x-1=2 \cdot x-3$</td> </tr> <tr> <td>ans+1-2x</td> <td>$-x=-2$</td> </tr> <tr> <td>ansx(-1)</td> <td>$x=2$</td> </tr> <tr> <td>$y=x-1 x=2$</td> <td>$y=1$</td> </tr> <tr> <td>\square</td> <td></td> </tr> </table> <p>Alg Standard Cplx Rad <input type="button" value="Mode"/></p>	$y=x-1$	$y=x-1$	$y=2x-3$	$y=2 \cdot x-3$	$x-1=2x-3$	$x-1=2 \cdot x-3$	ans+1-2x	$-x=-2$	ansx(-1)	$x=2$	$y=x-1 x=2$	$y=1$	\square	
$y=x-1$	$y=x-1$															
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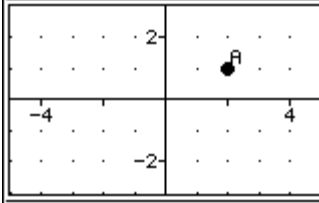
07: Parallel and Perpendicular Line

Using the Construct function, draw the lines and find the equations.

<p>Parallel and Perpendicular Line</p> <p><Example> Find the parallel and perpendicular lines for $y=2x-1$ that passes thru the origin.</p> <p>$y=2x-1$ <input type="button" value="Graph"/></p> <p>Select point A and the line. Next, tap Draw/Construct/Parallel. You will find the equation $y=2x$.</p> <p>Select point A and the line. Tap</p> <p>Alg Standard Cplx Rad <input type="button" value="Mode"/></p>	<p>File Edit Insert Action</p> <p>the origin.</p> <p>$y=2x-1$ <input type="button" value="Graph"/></p> <p>Select point A and the line. Next, tap Draw/Construct/Parallel. You will find the equation $y=2x$.</p>  <p>Alg Standard Cplx Rad <input type="button" value="Mode"/></p>
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08: Slope and Point

Determine the equation when you know the slope and point.

<p>Slope and Point</p> <p><Example> Find the equation. slope=-1 ; (-2,-2)</p> <p>Substitute the slope in $y=mx+b$. $y=-1x+b$</p> <p>Substitute (-2,-2). $-2=-(-2)+b$</p> <p>$-2=b+2$</p> <p>ans-2 $-4=b$</p> <p>The equation is $y=-x-4$.</p> <p>Graph <input type="button" value="Graph"/></p> <p>Alg Standard Cplx Rad <input type="button" value="Mode"/></p>	<p>File Edit Insert Action</p> <p>Ex-1 <input type="button" value="Solve"/></p> <p>Graph <input type="button" value="Graph"/></p> <p>slope=-$\frac{1}{3}$; (2,1)</p> <p>Ex-2 <input type="button" value="Solve"/></p> <p>Graph <input type="button" value="Graph"/></p>  <p>Alg Standard Cplx Rad <input type="button" value="Mode"/></p>
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09: Two Points

This time, find and graph the equation when you know two points on the line.

Two Points

<Example>
Find the equation through (2,5) and (4,1).

Slope-intercept form is $y=mx+b$.
Slope = $\frac{1-5}{4-2}$

Slope = -2

Substitute the slope into the equation.
 $y=-2x+b$
Substitute (2,5) into the equation.
 $5=-2 \cdot 2 + b$
 $5=-4+b$

Alg Standard Cplx Rad

File Edit View Draw

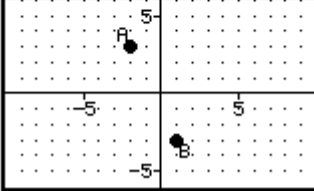
$y=-2x+9$

Graph

Try your own.
Find the equation through (-2,3) and (1,-3).

Ex-1

Graph



Alg

10: Standard Form

Change the equation to the Standard Form to obtain more, useful information.

Standard Form

<Example>
Equation: $5x+4y=20$

Standard form

The equation is changed to the form $\frac{x}{4} + \frac{y}{5} = 1$.

Open the Graph window, drag and drop the equation to the window.

Graph window

Tap the trace button. You find that the line passes through (0,5), (4,0).

Alg Standard Real Deg

Edit Action Interactive

$5x+4y=20$

ans/20

$5 \cdot x + 4 \cdot y = 20$

$\frac{5 \cdot x + 4 \cdot y}{20} = 1$

expand(ans)

$\frac{x}{4} + \frac{y}{5} = 1$

0

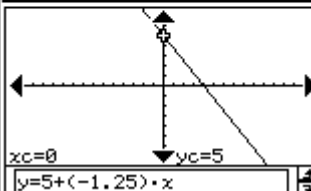
Alg Standard Real Deg

File Edit Insert Action

Graph window

Tap the trace button. You find that the line passes through (0,5), (4,0).

Try your own.
Find the standard form.



$x=0$ $y=5$

$y=5+(-1.25) \cdot x$

Alg Standard Real Deg

11: Solve Equation with Absolute Value

Find the equation, both algebraically and with the Solve function.

Solve Equation with Absolute Value

<Example>
Solve $|2x-3|=8$.

Calculator

The solution set is $\left\{x = \frac{11}{2}, x = -\frac{5}{2}\right\}$.

Hint on using CAS

Try your own.
Solve $|2x+3|=8$.

Ex-1

Alg Standard Cplx Rad

Edit Action Interactive

$|2x-3|=8$

absExpand(ans)

$2 \cdot x - 3 = 8$ or $2 \cdot x - 3 = -8$

$(2 \cdot x - 3 = 8) + 3$

ans/2

$2 \cdot x = 11$

$x = \frac{11}{2}$

$(2 \cdot x - 3 = -8) + 3$

ans/2

$2 \cdot x = -5$

$x = -\frac{5}{2}$

0

Alg Standard Cplx Rad

File Edit Insert Action

The solution set is $\left\{x = \frac{11}{2}, x = -\frac{5}{2}\right\}$.

Hint on using CAS

Try your own.
Solve $|2x+3|=8$.

Ex-1

Solve $|3x-21|=15$.

Ex-2

Solve $5+|3x-21|=15$.

Ex-3

Alg Standard Cplx Rad