

GeoGebra Schools workshop (Paul Robinson, Ciaran O'Sullivan IT Tallaght, 2017)

Websites

Geogebra Homepage: <http://www.geogebra.org/cms/>

Geogebra Forum: <http://www.geogebra.org/forum/>

Community of Geogebra users, bug reports and feature requests

Geogebra Wiki: <http://www.geogebra.org/en/wiki/index.php/English>

Collection of re-usable teaching resources

University of Limerick: <http://www.ul.ie/cemtl/resources.htm>

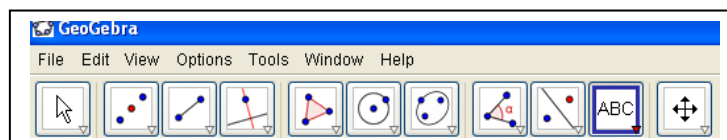
Excellent GeoGebra step by step demos, particularly suited to second level.

Getting Started:

Go to Programs then Maths Apps then GeoGebra.

At home /school go to the GeoGebra Homepage: <http://www.geogebra.org/cms/>
and Click on Download. Download a free stand-alone version for PC or Android (phone).

The main thing to get used to in using GeoGebra is where the command you want is on the drop down menus.



First Geogebra file: for graphing any line: Using $y = mx + c$

1. Put on sliders for m and c :



Click on the *slider tool* then on the drawing pad. Call it m and set its values from -5 to 5 in steps of 0.5.

Repeat for a slider called c with values from -5 to 5.

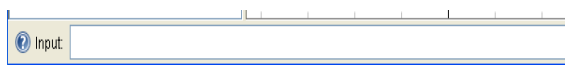
Right click the sliders if you want to change their properties



click on the *object selection tool* if you want to move the sliders around.

2. Put on the line:

In the Input Line at the bottom of the screen,



simply type $y = m \cdot x + c$.

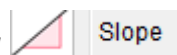
3. Put on the point $(0, c)$:

Type $(0, c)$ at the Input Line. We will colour it red - right click either the point or its listing in *Dependent Objects*. Go down to *Properties*.

4. Put on the Slope icon:



From the drop down menu on the *Angle Tool* select the *Slope Tool* and click on the line in the *Drawing Pad*.



Explorations

1. As you move the m and c note how the line moves and the equation changes.
2. Slide m to $m = -1$ and see what happens.
3. Slide c to $c = 4$ and see what happens.
4. Note that each *Dependent Object* has been given a name. Hover the mouse over each dependent object and see what it says.

What roles do m and c play in describing the line?

Second Geogebra file : for graphing any quadratic: using $y = ax^2 + bx + c$

Go to File, New and create a New file.

1. Put on sliders for a, b and c:



Click on the *slider tool* then on the drawing pad. Call it a and set its values from -5 to 5 in steps of 0.5.

Repeat for a slider called b with values from -5 to 5.

Repeat for a slider called c with values from -5 to 5.

Right click the sliders and change their properties: Change the colour of a to red, b to blue and c to green. Also change the thickness of the sliders



click on the *object selection tool* if you want to move the sliders around.

2. Put on the curve:

In the Input Line at the bottom of the screen simply type $y = a \cdot x^2 + b \cdot x + c$

Explorations

1. As you move the a, b and c sliders note how the curve moves and the equation changes.
2. Slide a to a = -1 and see what happens.
3. Slide a to a = 6 and see what happens.
4. Slide b to b = 5 and see what happens.
5. Slide c to c = -5 to see what happens.
6. After spending some time moving the slider for c and looking at how the graph moves and the equation changes can you write a sentence to describe the effect of changing the c value:


In the **Input** line at the bottom of the screen type $y = a \cdot (x-b)^2 + c$.

Repeat the Explorations above and see do notice any differences.

Third Geogebra file : for graphing any cosine wave $y = \cos(wx + p)$...and animating it:

Go to File, New and create a New file.

Draw the curve $y = a \cdot \cos(w \cdot x + p)$ where a, w and p are allowed to change using slider controls.

1. Colour the curve red
2. Colour each slider and change their thickness. Now adjust the sliders for a, w and p note how the curve moves and the equation changes for each change.
3. Right click the drawing pad, go to Object Properties and then click the small button  under Preferences. Change the x-axis Distance to π .

Animating it:

4. Note that GeoGebra has made the cosine wave into a function e.g. $f(x)$. To add a point that will stay on the curve, put on a slider called t and a point $(t, f(t))$.
5. Animate each slider by right clicking it and choosing *Animation On*.

