

GeoGebra 4

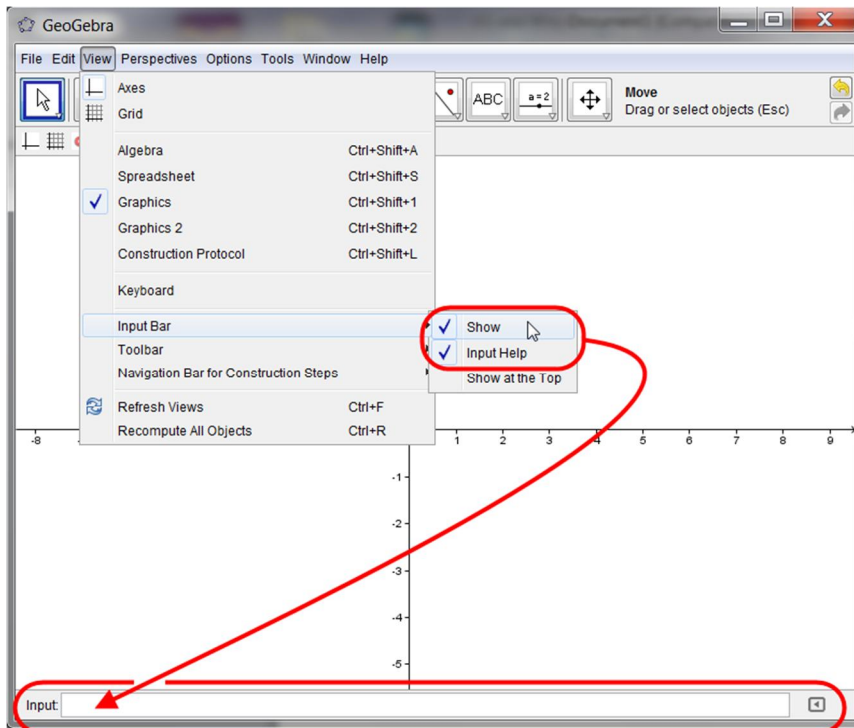
Introduction and Point Plotting

GeoGebra basics

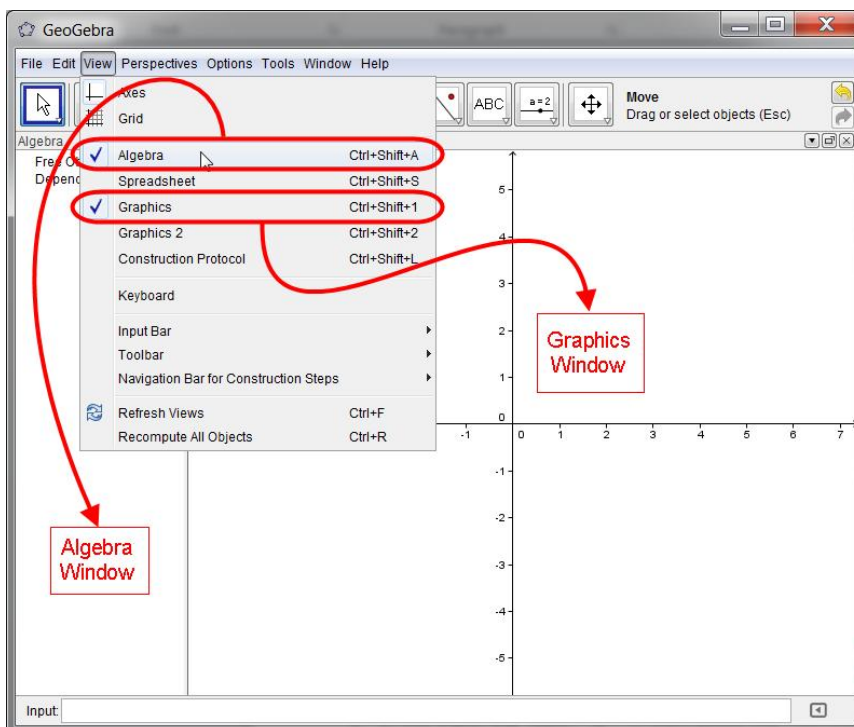
Setting up the Interface

Steps required:

- If not visible then show the "Input Bar", through the "View" option on the Toolbar.




- Make sure that the Algebra Window and Graphics Window are both visible, again through the "View" option on the Toolbar.

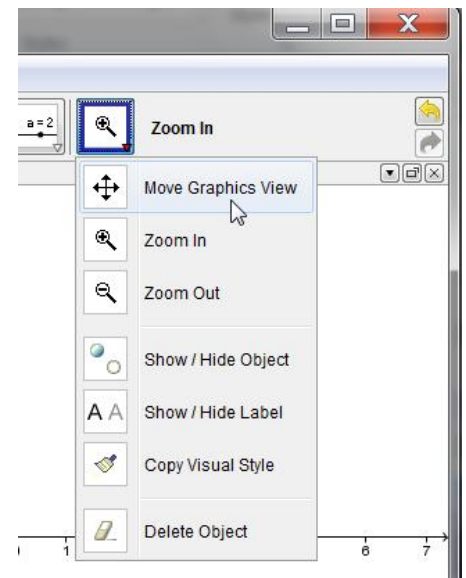


Moving the Axes

The Slow method:

- If the “Move Graphics View” icon  is visible as the face on the last Icon set on the Toolbar then click on it to select it
- Next, click the Left Mouse Button anywhere on the Graphics Window, hold it down and then drag the mouse. You should see the axes moving around the screen as you drag the mouse

Notice that if you cannot see the “Move Graphics View” icon on the last icon set on the Toolbar then click on the little arrow at the bottom right of whichever icon picture is visible. You will notice that as you move the mouse towards this little arrow then it will change colour from white to red. Once it is red you can click the left Mouse Button to see the full set of GeoGebra Tools associated with this icon in the resulting drop-down menu.




The Quick method:

- Regardless of which Tool is currently selected from the icons in the Toolbar simply press and hold down the <CTRL> key and then click and hold down the Left Mouse Button whilst over the Graphics Window. Dragging the mouse will now drag the axes.

Selecting or Dragging Objects using the “Move” Tool

The Slow method:

- If the “Move” icon  is visible as the face on the first Icon set on the Toolbar then click on it to select it. If another Tool is selected on this first icon then click on the white/red triangle and select the “Move” option from the resulting drop-down menu.

The Quick method:

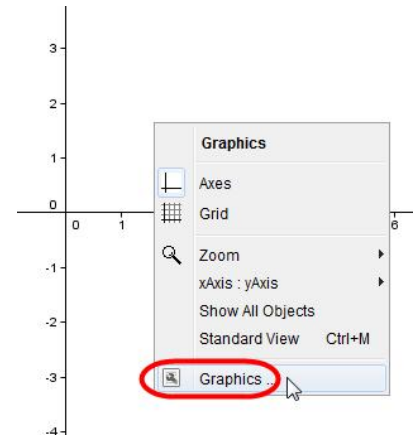
- Regardless of which tool is currently selected from the icons in the Toolbar simply press the Escape Key <esc>.

Selecting and dragging objects within the Graphics Window will now be possible

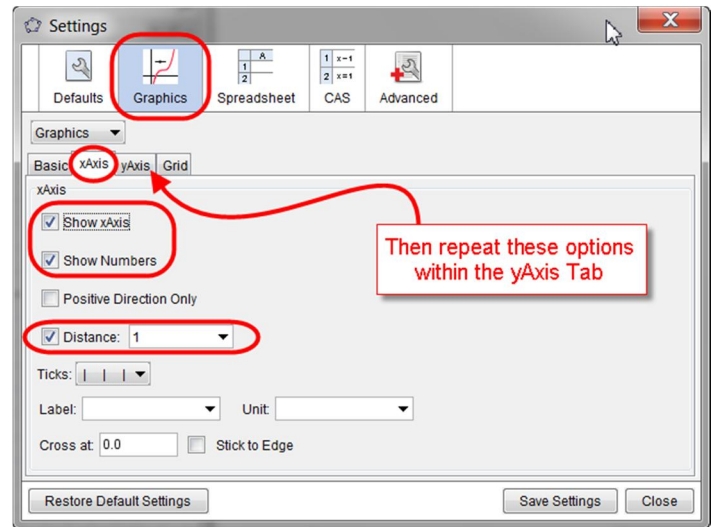
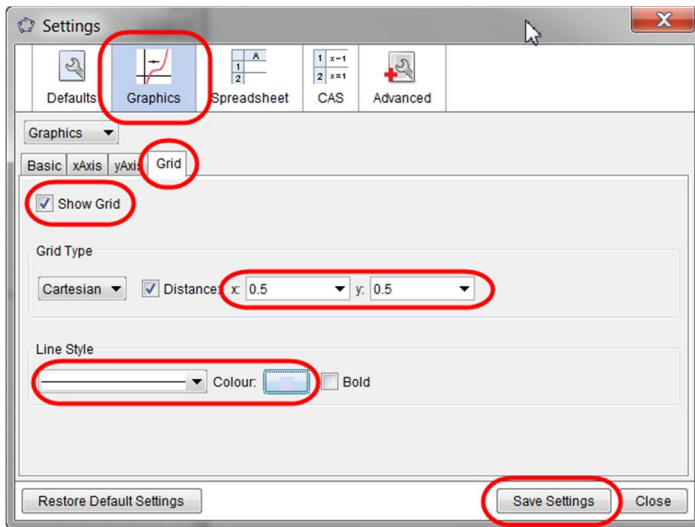
Modifying the Axes Scales and Gridlines

Steps required:

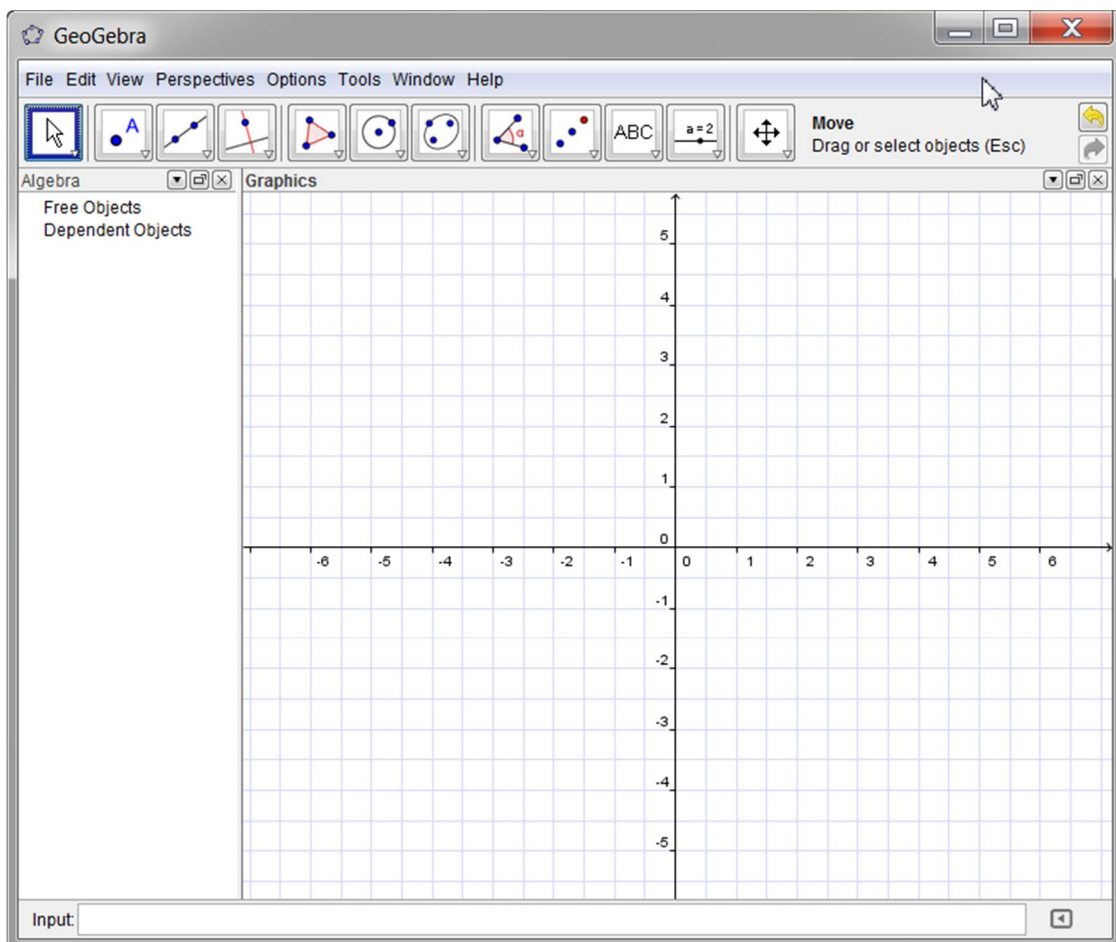
- Click the Right Mouse Button anywhere in the Graphics Window.
- From the drop-down menu select the “Graphics...” option



Fill out the resulting dialogue box selecting the Tabs as shown below:



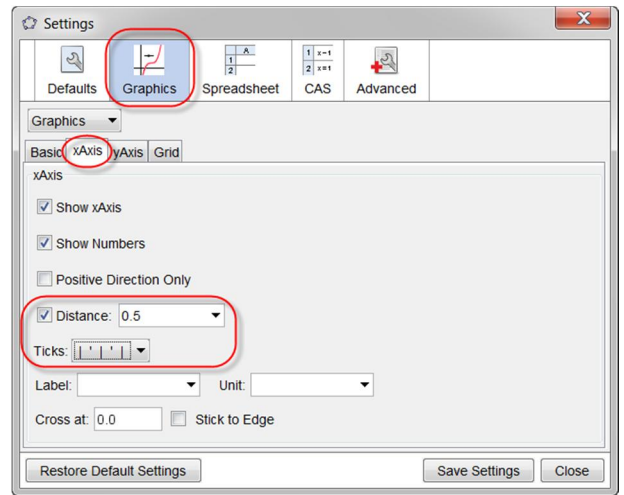
The result of these selections will look something like this:



Task 1: Setting up a Number Line

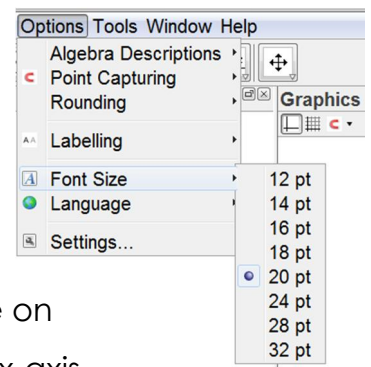
Axes modification

- Click the Right Mouse Button anywhere in the Graphics Window.
- From the drop-down menu select the "Graphics..." option and then:
 - From the xAxis Tab modify the x-axis as shown here to the right.
 - From the yAxis Tab hide the y-axis
 - From the Grid Tab hide the grid




Axes Font size modification

- From the "Options" Toolbar Menu select the "Font Size" option of 20 pt (points)



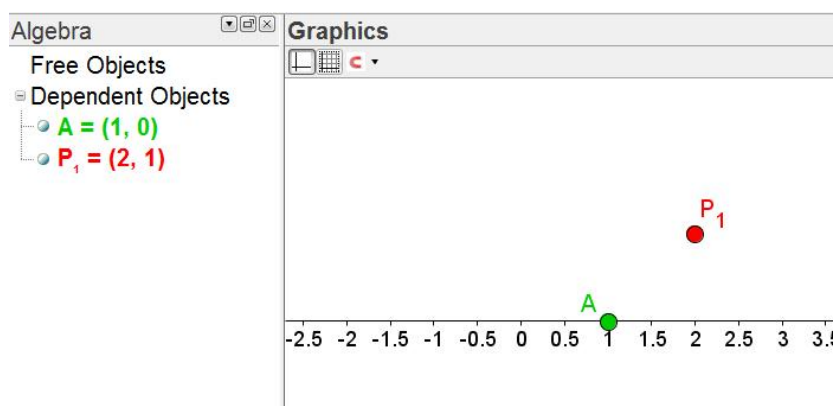
Next, from the 2nd icon set on the Toolbar select the Point Tool

Icon . With this selected position the mouse pointer anywhere on top of the x-axis and then click to place a moveable point on the x-axis.

With the point selected press <CTRL>+E to open its Properties dialogue box. From here increase its size and alter its colour.


Type the following in the Input Bar at the bottom of the GeoGebra window. This will plot a point, with the name P_1 (the subscript entered using an underscore), having dependence upon the x-coordinate of your original point, A , on the x-axis. It will hopefully look something like the picture below:

Input: $P_1 = (x(A)+1, 1)$



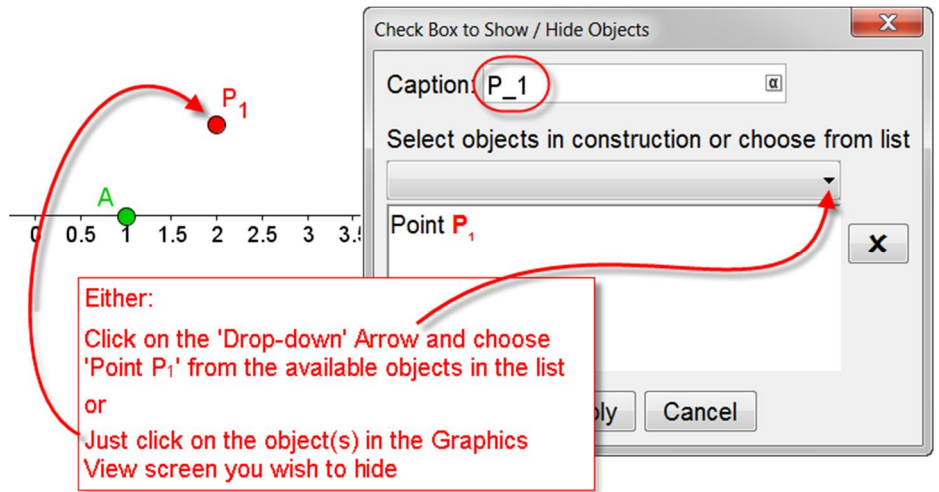
Move the point A to see the connection between the two points visually.

Hiding Objects

From the 11th Icon set choose the “Check Box to Show/Hide Object” 

Name the caption of the Check Box P_1 .

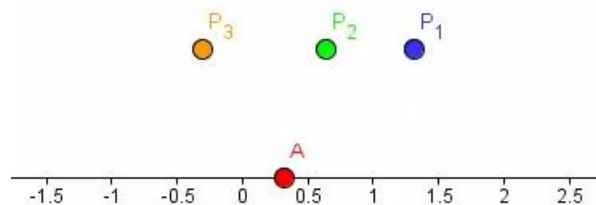
Use one of the methods described here to the right to select your point P_1 to be the object to hide.



Create two more points, P_2 and P_3 by using the following formulae in the Input Box:




You may now have a picture like the following below:



Creating a Slider for a point having a variable linear connection to A

A Slider is a very useful Tool as it can be used to define and thereafter, vary the value of a parameter that may be used within any construction/curve in GeoGebra.

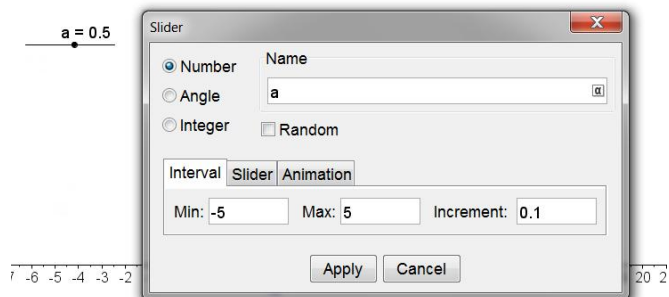
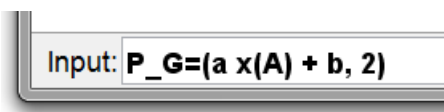
Method

- If the “Move” icon  is visible as the face on the penultimate Icon set on the Toolbar then click on it to select it. If another Tool is selected on this icon then click on the white/red triangle and select the Slider option from the resulting drop-down menu.
- Next, left mouse click within the Graphics Window at the point where you wish your slider to go

You will then see the Slider dialogue box displayed thus:

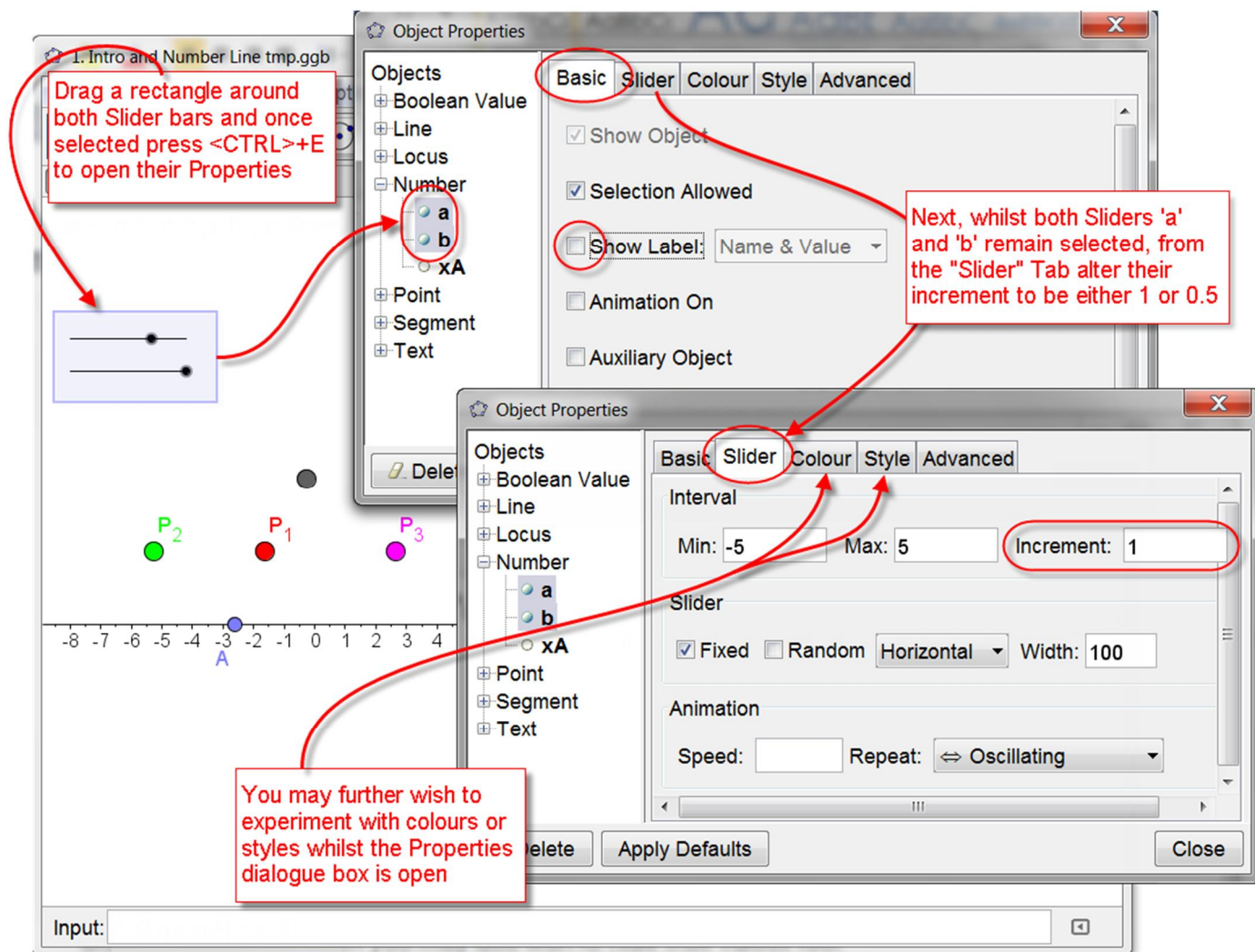
Click on "Apply" and then create a second Slider called 'b' underneath your 'a' Slider.

Next, create another point by typing the following into the Input Bar:



You will see that this new point P_G depends not only on the x-coordinate of point A but also on the parameter Sliders 'a' and 'b'. Vary the values of each and observe how the point P_G moves. You may find it quite difficult to determine the relationship between points P_G and A if the values of the sliders 'a' and 'b' were not shown. To make the problem more accessible to students you may wish to restrict the range of numbers that 'a' and 'b' take. This can be done from within their properties by altering their "increments" to more manageable values such as 1 or 0.5. Whilst their properties dialogue boxes are open you may also wish to hide their values too.

To alter Slider properties follow the diagram below:




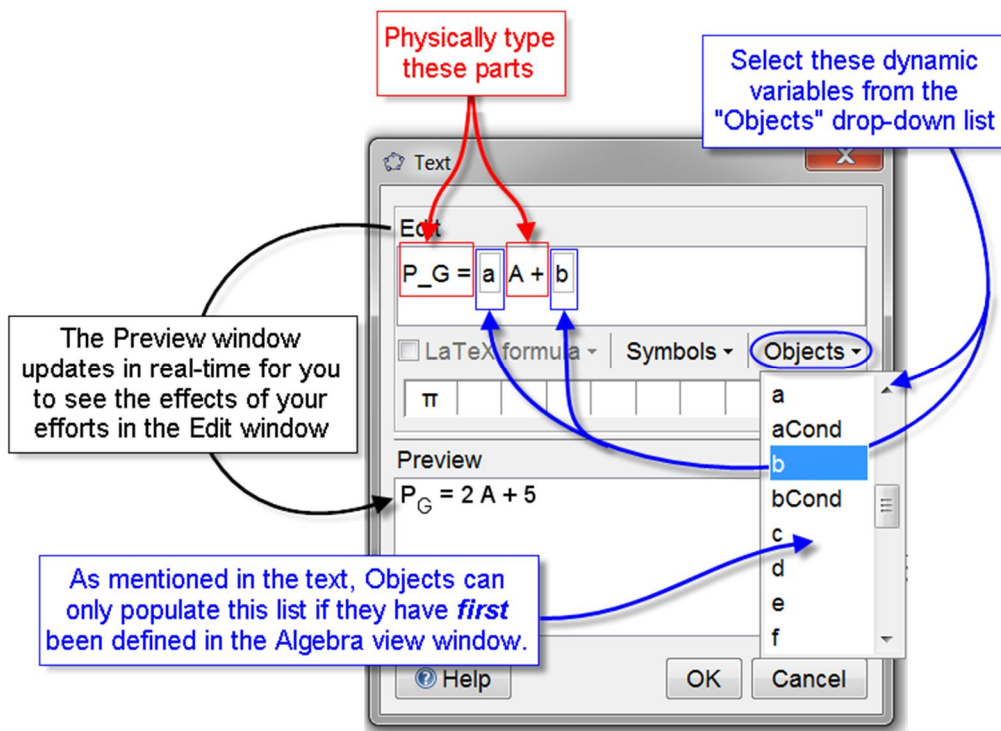
Creating dynamic text for the point P_G

Creating dynamic text has been revolutionised within GeoGebra version 4 – it is SO much simpler now!

The most important thing to remember is that any text that you would like to see dynamically change *first* has to be defined as an object within the Algebra view window. Its value can automatically be put into the Algebra view when the object is created or if it is defined either as an object or relation via the Input Box.

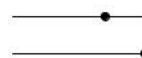
Method

- Click on the Insert Text icon  from the 10th icon set and then either click on a space in the Graphics window if you don't wish your dynamic text to move around the screen, or click on an object to fix your dynamic text to that object so that it moves (and updates its value) as the object moves.
- Fill out the Text Dialogue box as shown in the diagram below:

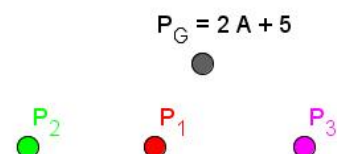


Your Graphics window may look something like this now:

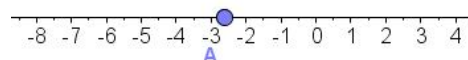
You may wish to create a "Show/Hide" button to hide the P_G text.



As you alter the values of 'a' and 'b' what do you notice with how the text on point P_G behaves?



Look on the following page for a method to improve how the text is displayed for all values of 'a' and 'b'



First define new functions P_GText, aCond and bCond thus:

Input: `P_GText = If[a ≥ 0, "", "P_G = "]`

and

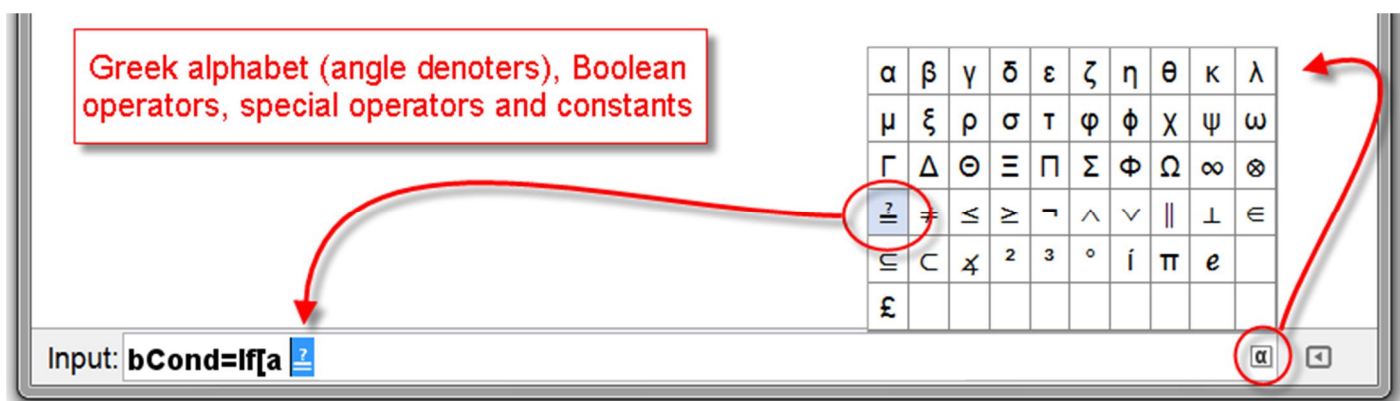
Input: `aCond=If[a > 0, a " A", If[a < 0, " - " abs(a) " A", ""]]`

and

Input: `bCond=If[a ≥ 0, "", If[b > 0, " + " b, If[b < 0, " - " abs(b), ""]]]`

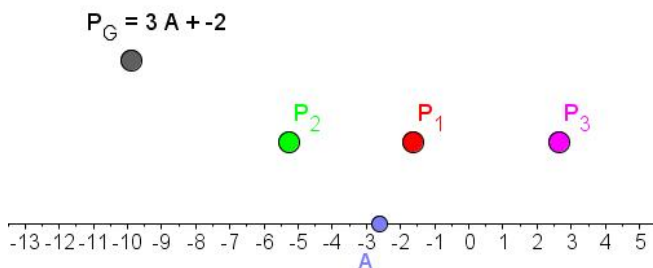
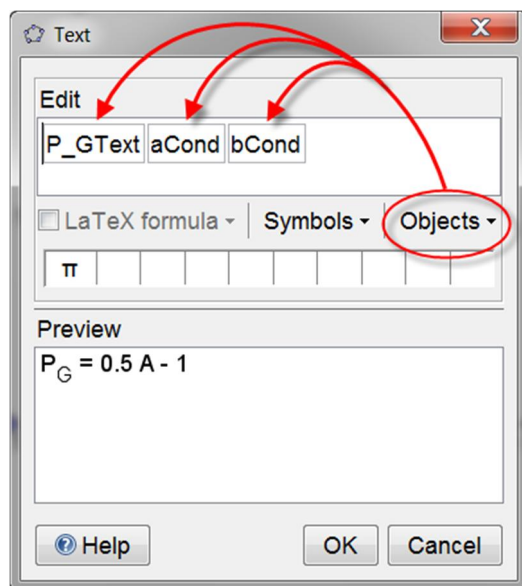
Note that the Boolean 'EQUAL' operator needs to be selected from special text drop-down menu, the icon to which appears to the right edge of every text input box once the cursor is clicked in the box. **You cannot simply use the '=' sign from the keyboard.**

For example, when typing in the 'bCond' from above, the 'EQUAL' Boolean operator was selected as shown below:



With 'P_GText', 'aCond' and 'bCond' thus defined we may then re-do (or Right-click and Edit) the dynamic text for P_G with the following choices from the "Objects" drop-down list in the Text Dialogue box – as shown to the right here.

Once done this should remove the "messy" labelling as shown below:



$$P_G = 3 A - 2$$

Giving instead:

