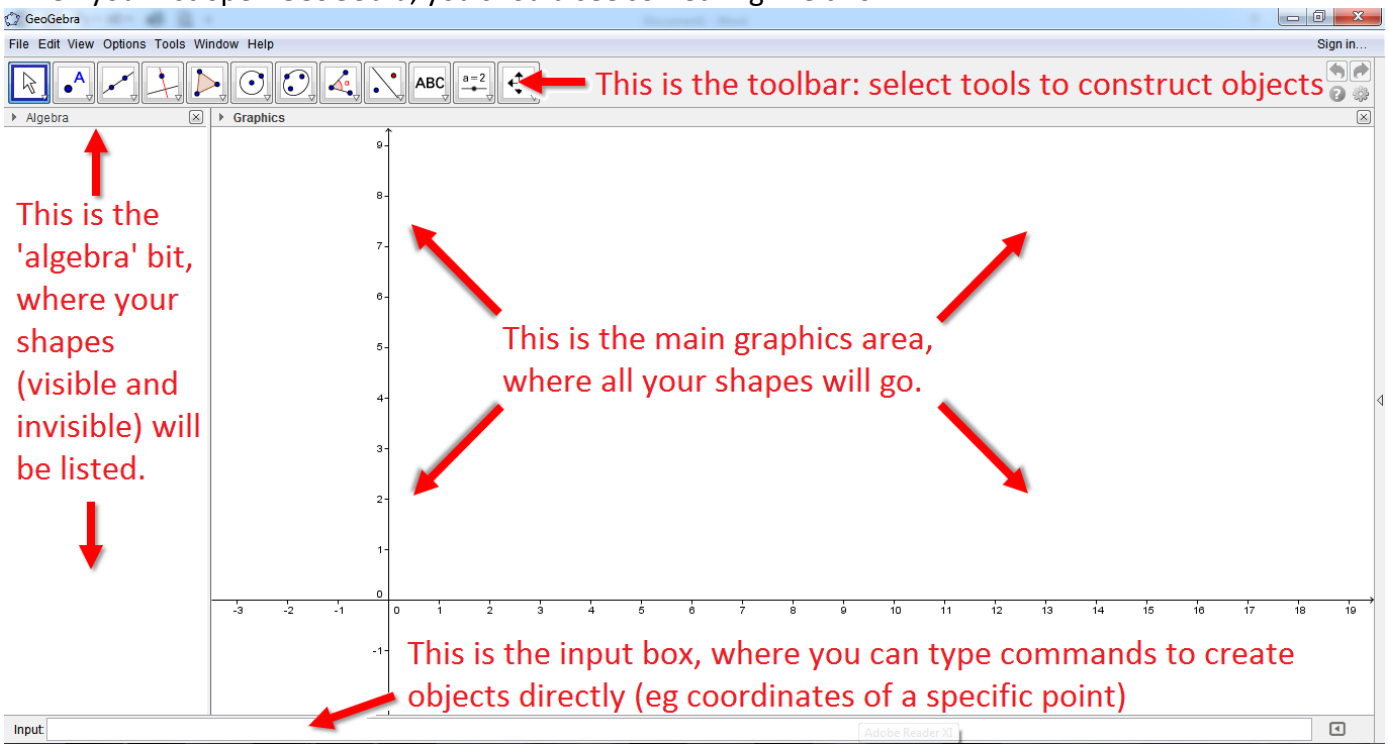
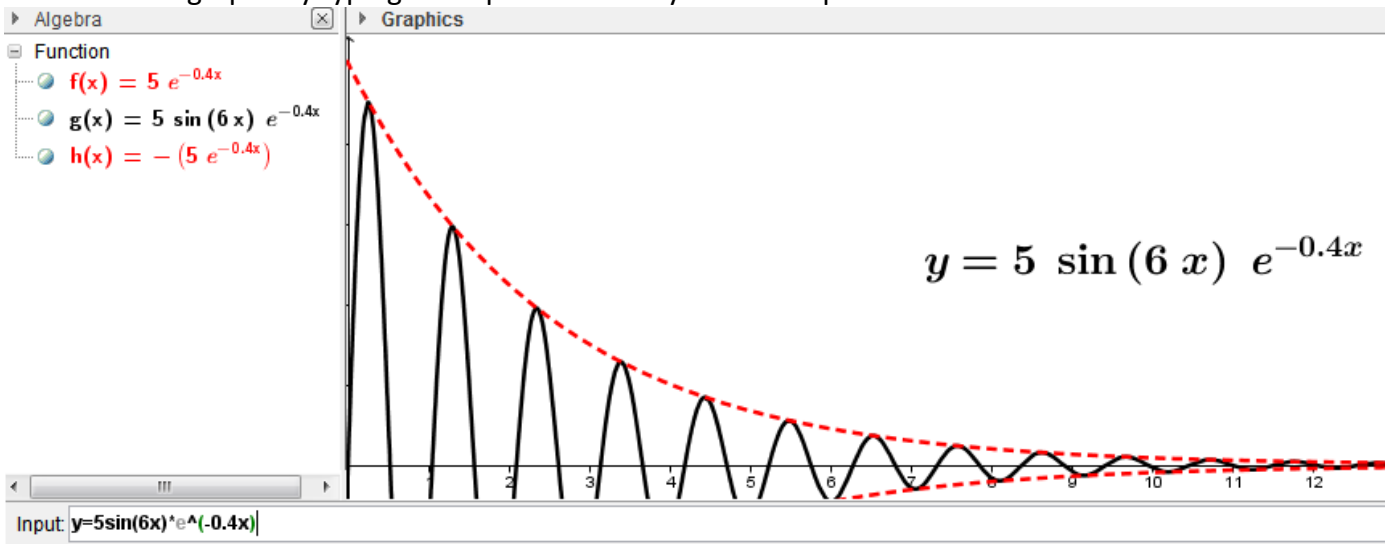
Introduction to GeoGebra

GeoGebra is a completely free program which allows the user to draw geometric and algebraic objects (shapes and graphs), and investigate their properties quickly and easily. It can be downloaded from www.geogebra.org, where you can also use a web-based version of the program, or browse GeoGebra files others have created.

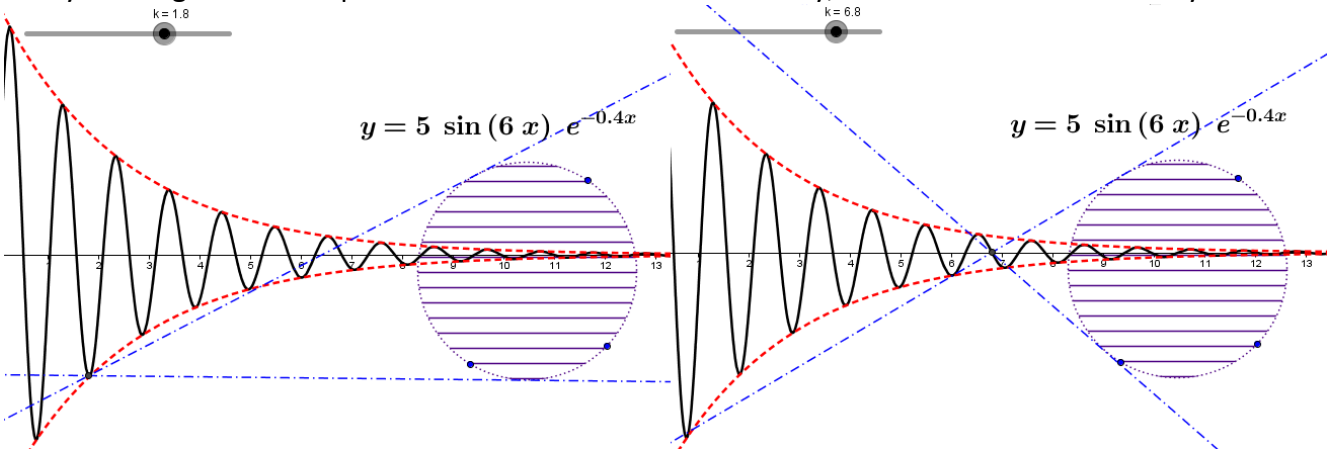
When you first open GeoGebra, you should see something like this:



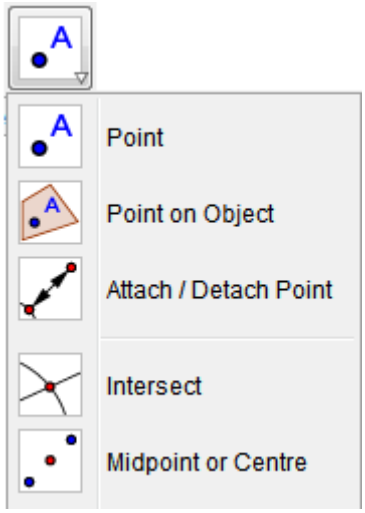
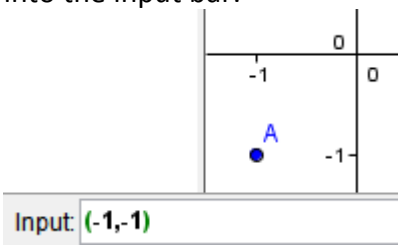
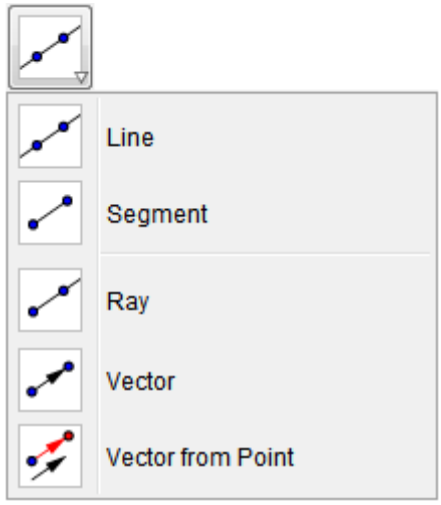
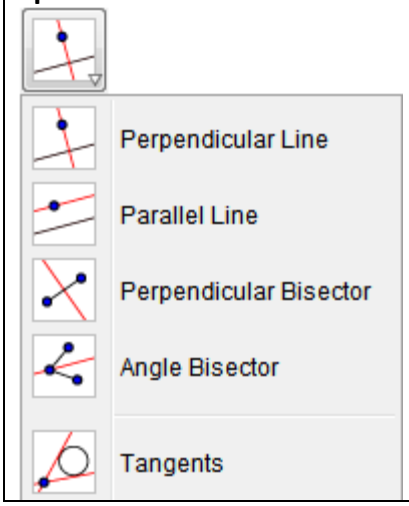
You can draw graphs by typing the equation directly into the input bar:

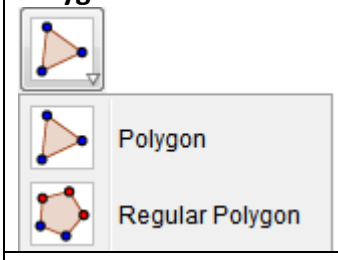
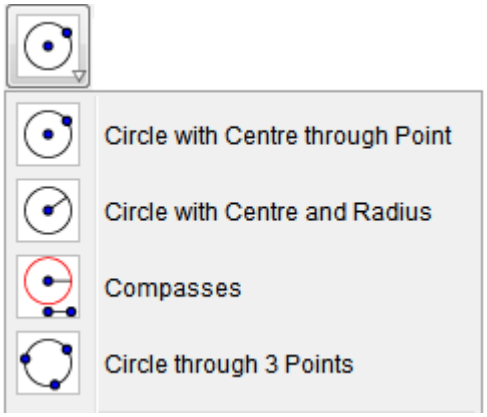
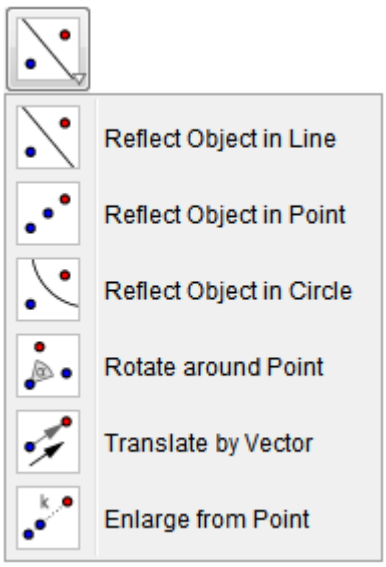
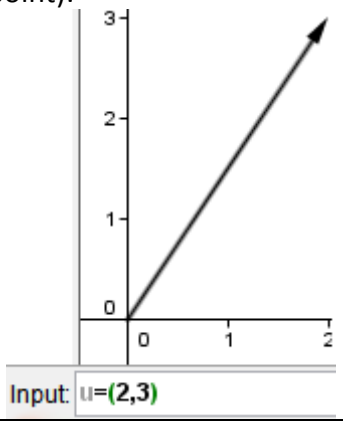


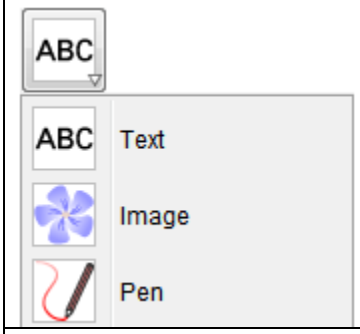
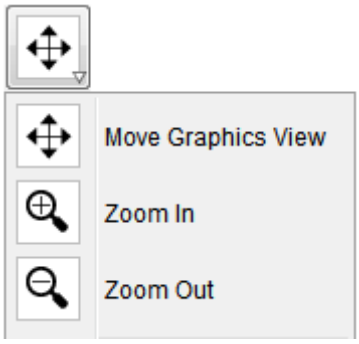
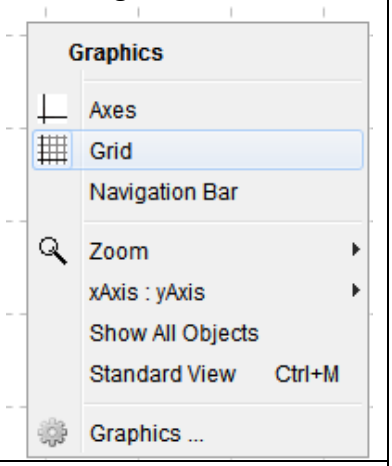
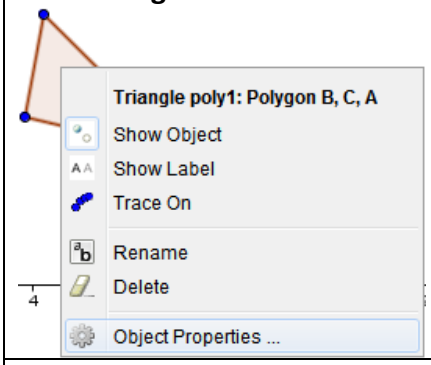
And you can generate shapes and common constructions easily, and on the same canvas if you want:



The basic functions are fairly easy to pick up, so you are encouraged to play around with the program and get a feel for how it works, but below is a rough guide to some of the most commonly used tools:

Tool	The Basics	Advanced
Selecting / Moving 	Click this arrow to select any objects or points, or to move them to a new position.	If you can't grab something you think you should be able to, it may be because you've still got a different tool selected. Click on the arrow, then try again.
Point 	Click on the 'point' menu on the toolbar, then click anywhere in the graphics view. This will create a free point which you can reposition later. Select 'Point on Object' if you want your point to always remain on the object you originally place it. For instance, on the edge of a circle. Select 'Midpoint or Centre', then click on two points or a line segment to pinpoint the middle.	Free points can also be created by typing coordinates directly into the input bar:  Select 'Intersect', then click on two lines that cross, to make a point that will always be where they cross, even if the original lines are moved later.
Line 	Click 'Line', then on any two points to make a line through them. The line will change if you move the points. If you don't already have points, you can click in a free space to generate a point automatically. Click 'Segment' and then two points to produce a line segment (one that ends at each point) rather than an infinite line.	Click 'Ray' to draw a half-line, first selecting the end point, then the point through which you want the line to go. To draw a vector, click 'Vector', then the start and end points for your vector. To draw the same vector from another point, choose 'Vector from Point', choose a point, then select the vector you require.
Special Line 	Click 'Perpendicular Line', then a point for it to go through and a line for it to be perpendicular to. Click 'Parallel Line', then a point for it to go through and a line for it to be parallel to. Click 'Perpendicular Bisector', then two points (or a line segment) to automatically cut it in half at right angles.	Click 'Angle Bisector', then choose three points (or two lines) to bisect the angle between them. Note that if you choose two lines, two lines will be created (one bisecting the acute angle between your lines, the other the obtuse one). Click 'Tangents', then choose a point and a circle to draw the two possible tangent lines to that circle.

Tool	The Basics	Advanced
Polygon 	Click 'Polygon', then select points (or just click in blank spaces) for the corners of your polygon. To complete the shape, click on the first point.	Click 'Regular Polygon' to generate a polygon which will always have equal sides and equal angles. Choose two points, then enter the number of sides required.
Circle 	Click 'Circle with Centre through Point', then a point (to be the centre) and another point (to be on the circle). Click 'Circle with Centre and Radius', click a point (to be the centre) and type in a number for the radius.	Click 'Circle through 3 Points' to draw the circle which passes through three given points. They can be points already in your construction or new points created as you make the circle. The circle will automatically change as the three points are moved.
Angle 	Click 'Angle' and then three points. The angle *anticlockwise* from the first to the third point (with the second as the corner point) will be shown on the diagram.	Click 'Angle with Given Size', then click two points and enter the value (choose clockwise or anticlockwise as well) to generate a third point at the desired angle from the first one (turning around the second).
Transformation 	Click 'Reflect Object in Line', then select an object (can be a point, a line or a whole shape) followed by a line. The reflection generated will change when the line changes or when the original shape changes. Click 'Rotate about Point', select an object, then a point and then enter an angle to rotate by. Click 'Enlarge from Point', select an object, then a point of enlargement and then enter a scale factor.	Click 'Translate by Vector' to move an object, first clicking the object, then the vector. Note: vectors can be defined by using the 'Vector' command in the Line menu or by typing directly into the input bar (you will need to use lower case to distinguish from a point): 

Tool	The Basics	Advanced
Annotation 	Click 'Text', and click anywhere to enter your own labels and annotations to your work. Click 'Pen' to draw freehand shapes.	Click 'Image', and click anywhere to import an image file, or use the main 'Edit' menu and select 'Insert image from clipboard'.
View Changes 	Click 'Move Graphics View' to drag the entire canvas around. This allows you to construct shapes beyond just the area visible, or examine graphs that go beyond the current screen. You can also use 'Zoom In' or 'Zoom Out' to change the view.	By right-clicking on the canvas, you can choose to show or hide the graph axes and the grid lines. 
Formatting 	Everything (points, lines, shapes, vectors, text) can be formatted by right-clicking and selecting 'Object Properties'. The colour, thickness of lines and shading of objects can all be altered.	Objects can be hidden by right-clicking and then selecting 'Show Object' (toggles hidden and not), and labels can be shown or hidden similarly.
Modifications 	Insert a 'Slider' if you want to be able to easily change a particular number. The slider will automatically be given a value (eg a), and instead of entering numbers (for instance, for the radius of a circle), you can enter a and have that property change when a changes.	To make it easier for other users to show or hide objects (or make other changes), a 'Check Box' can be used. When you insert one, you are given the chance to select objects that will only be visible when the box is ticked.

Go to www.GeoGebraTube.org for ideas or to try out some programs people have already made.