

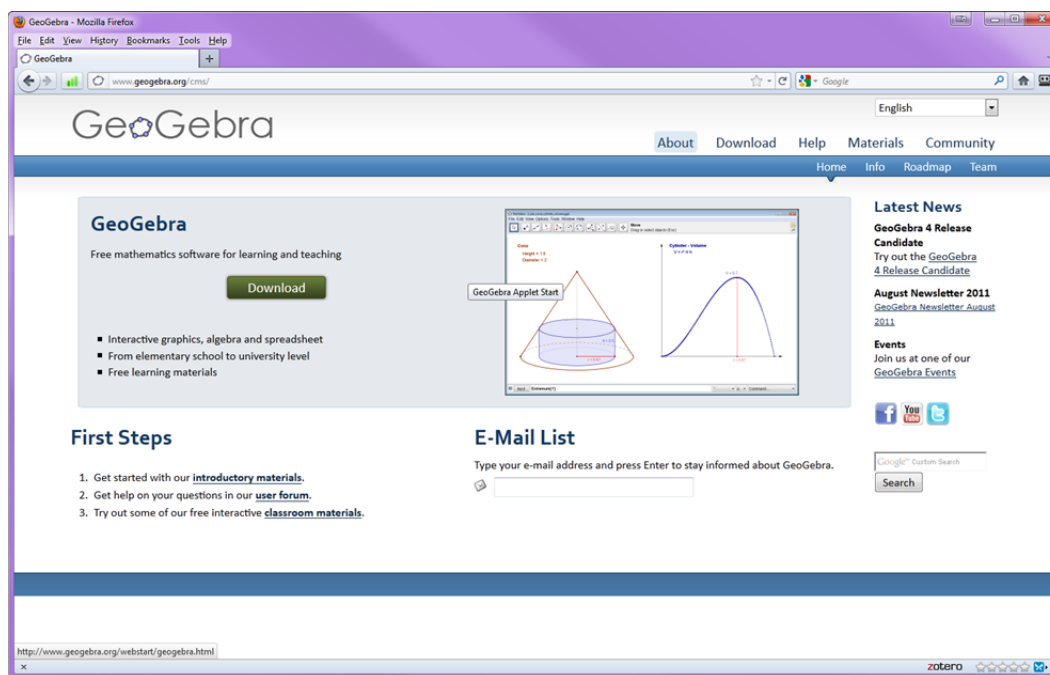
Getting Started with GeoGebra

Downloading and Installing

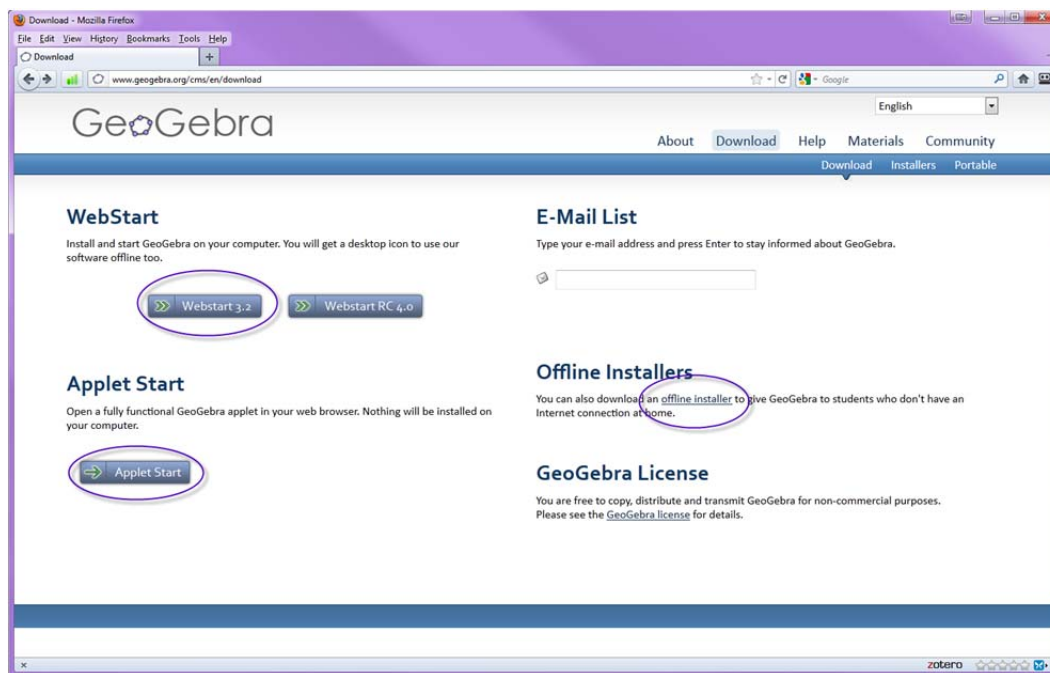
Downloading GeoGebra

GeoGebra is an open source application and is freely available for non-commercial use. There are currently versions available for Windows, Mac OS X, Linux and other java-enabled platforms.

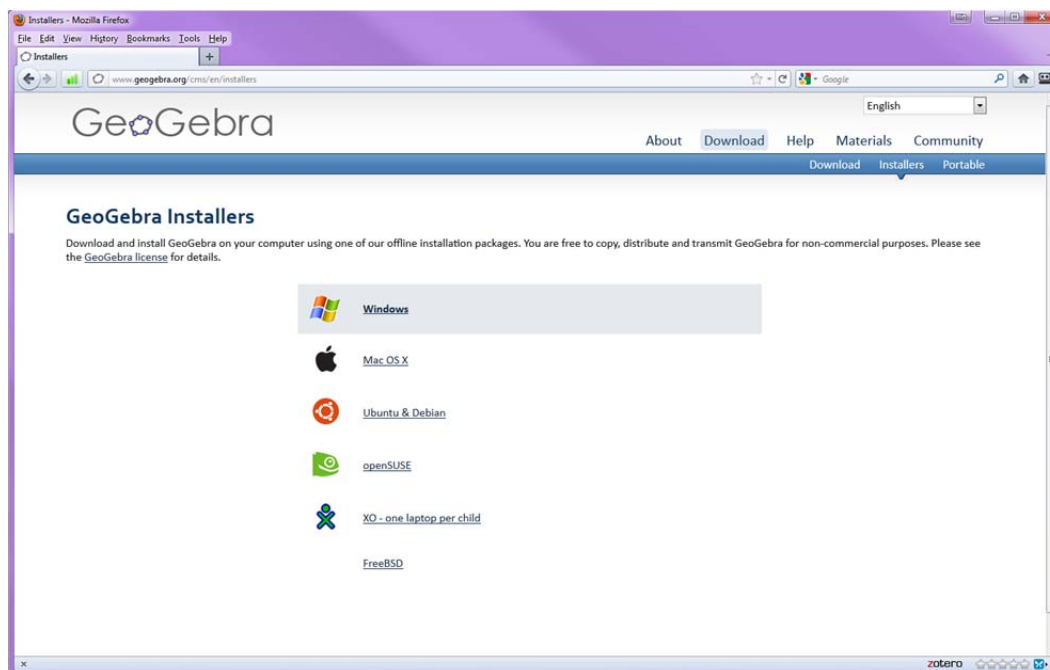
To start GeoGebra go to <http://www.geogebra.org> where you will see links to [Download](#).



Clicking on Download will take you to the point where you can choose WebStart, Applet Start, or Offline Installers.




The **Webstart** option downloads the necessary java files to your computer and starts the application immediately. The advantage of choosing this option is that the application is always up to date. The **Applet Start** opens a *GeoGebra* applet in your web browser and nothing is installed on your computer. Choosing the [Offline Installers](#) takes you to a page where you can download a file to your computer which you must then install. The big advantage here is that you can continue to work off-line and do not need an active internet connection. There are versions for Windows, MacOS, and Linux.

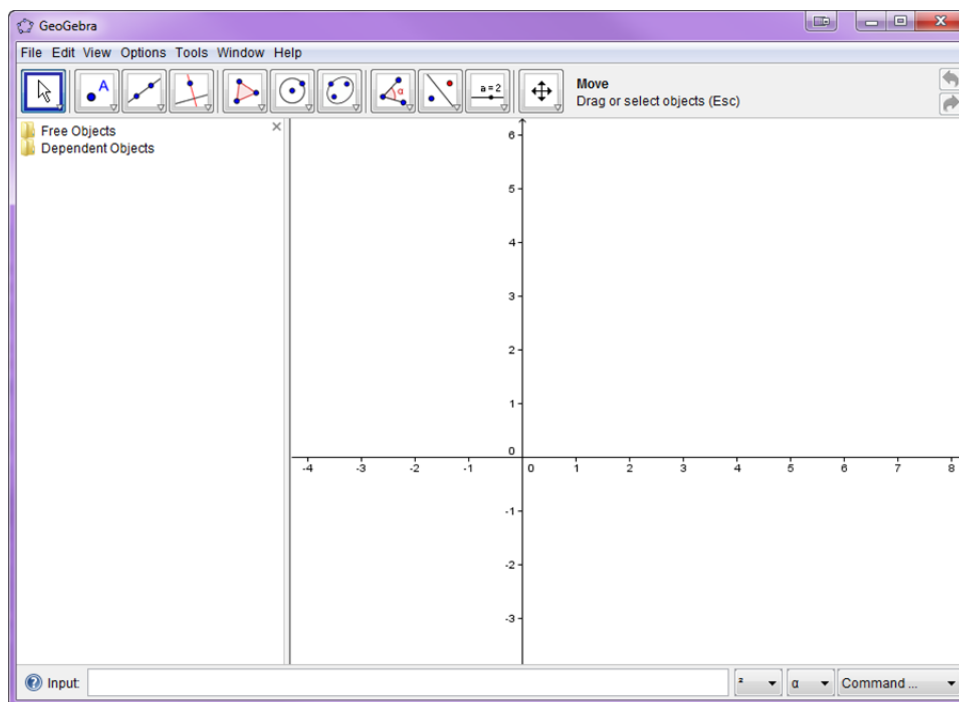


Installing *GeoGebra*

The installation process is very straightforward. After you have downloaded on a Windows machine or on a Mac just double-click the downloaded file. If you are using Linux, you know how to install the software. An Install Wizard will guide you through every step. I would strongly advise you to select the typical configuration when given a choice. Full instructions are given on the *GeoGebra* site.

Running *GeoGebra*

Double click the GeoGebra icon  on your desktop to start the application. You will be presented with a launch screen as shown below. The buttons along the top, the clear space at the left, the drawing pad at the right, the input field, symbols (2), Greek letters (α) and the Command menu are common to all systems.



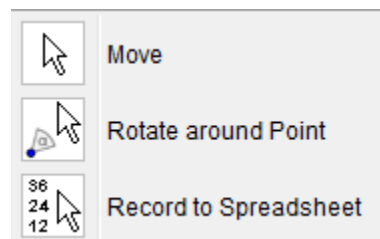
The button menu along the top contains a submenu of actions. By clicking on the down-pointing arrow at the bottom right corner of any of these buttons the submenu is displayed. The following section explains each of these submenus in more detail.



The *GeoGebra* Toolbar

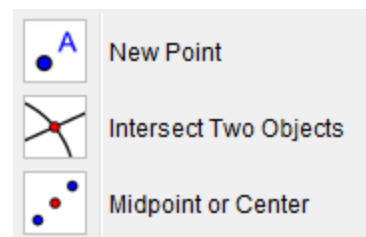
Move

The first button here allows you to select a previously drawn object and move it around the drawing area. The second button in this menu allows you to select a point as a center of rotation and rotate any object around it. The third button allows you to move an object and to record a sequence of its values in the Spreadsheet View.



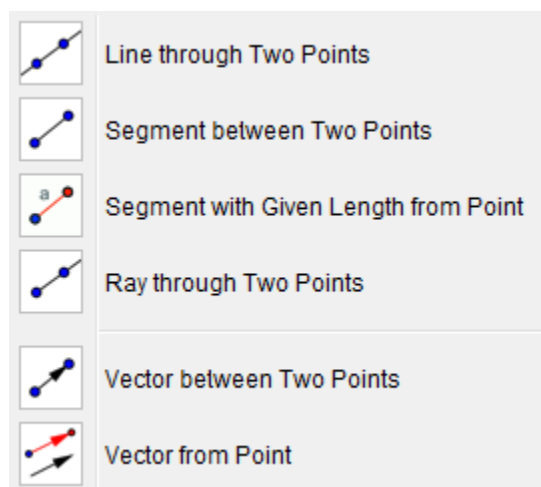
New Point

The three buttons in the next menu allow you to construct different types of points. The first button allows you to put a point anywhere in the drawing area. The second button allows you to select two different curves and find their point of intersection. The third button constructs the midpoint of a line segment.



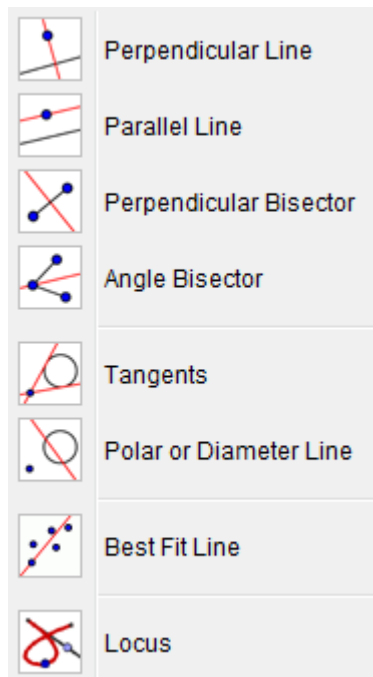
Line through two points

The next tool has six different buttons. These construct different types of lines and vectors. The first button draws an infinite line through two selected points. The second button draws a line segment between two selected points. The third button draws a line segment of a given length from a specific point. The fourth button draws a ray through two points. The fifth button draws a vector between two points. The sixth button allows you to draw a vector parallel to a given vector.



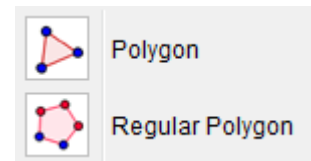
Perpendicular line

There are six buttons under the Perpendicular line tool. These allow you to draw specific types of lines. The first button allows you to draw a line perpendicular to a given line. The second button draws a line parallel to a previously constructed line. The third button, the Perpendicular bisector, is used to bisect a line segment. The fourth button, Angle bisector, bisects a previously constructed angle. The fifth button is Tangents. This button can draw tangents to a circle, a conic or the graph of a previously defined function. The sixth button is the Polar or diameter line button. The seventh button creates the best fit line for a set of points. The last button allows you to select a point B that depends on another point A and whose locus should be drawn. Then, click on point A to create the locus of point B .



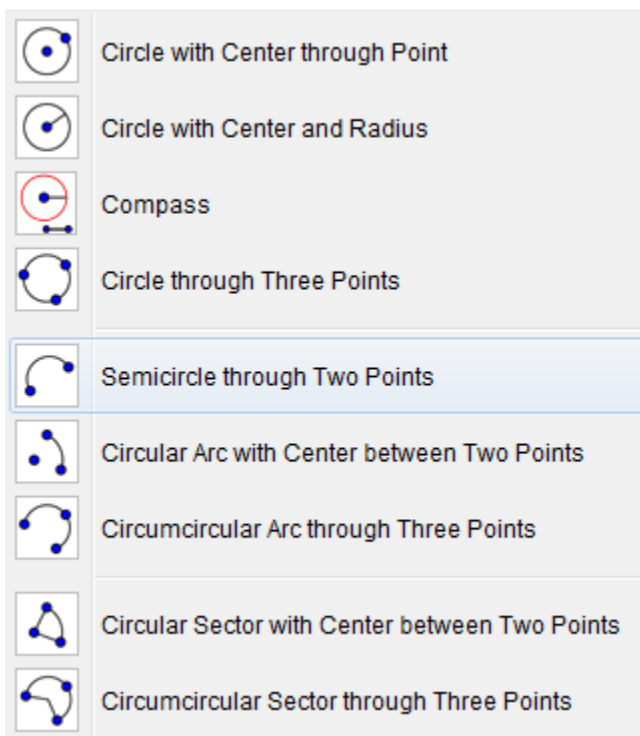
Polygon tool

The first button allows you to construct a closed polygon. The second button, the regular polygon tool, allows you to draw a regular polygon.



Circle with center through point

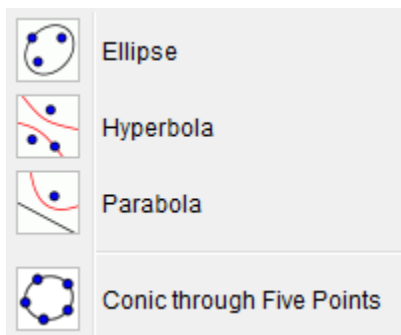
The nine buttons in the next menu allow you to construct circles, arcs, sectors and conics. The first button, Circle with center through point, works by either clicking on the point you want to be the center of the circle or clicking on some blank space to create such a point. Release the mouse button. Move the mouse and you will see a circle in the process of construction. When you click the mouse again the circle is finished. The second button in this menu is Circle with center and radius. Click on the required center. A menu appears asking you for the radius. Enter the required value and press the Return key. The desired circle is drawn. The third button is called Circle through three points.



Select this tool and click on three different points. The circle through these points is constructed. The fourth button, Semicircle through two points, does exactly what it says. Click with it in two different places to construct the semicircle with that line segment as diameter. The fifth button here is Circular arc with center through two points. Click somewhere with this button to construct the center of the circle. Click again to create the first point of the arc. If you move the mouse anti-clockwise you will see an arc being constructed. When you click again the arc is completed. The sixth button, Circumcircular arc through three points, draws an arc through any three points. To use this button click in three different places. Three points and the arc passing through them are constructed. The seventh and eighth buttons do for sectors what the fifth and sixth buttons do for arcs. The final button, Conic through five points, works by allowing you to select 5 different points on the screen. It then calculates and plots the conic section passing through all 5 points.

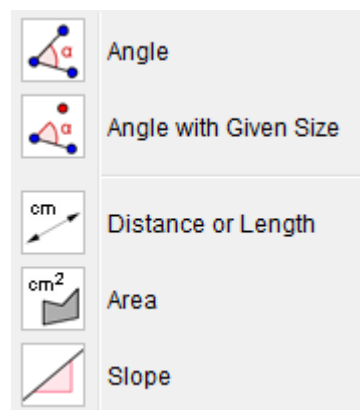
Conic tool

This tool allows you to create certain conics. The first button, Ellipse tool, allows you to construct an ellipse by selecting the two foci of the ellipse. Then, specify a third point that lies on the ellipse. The second button, Hyperbola tool, allows you to construct a hyperbola by selecting the two foci of the hyperbola. Then, specify a third point that lies on the hyperbola. The third button, Parabola tool, allows you to construct a parabola by selecting a point (focus) and the directrix of the parabola. The last button, Conic through Five Points tool, allows you to selecting five points and produces a conic section through these points, as long as no four of the five points are collinear.



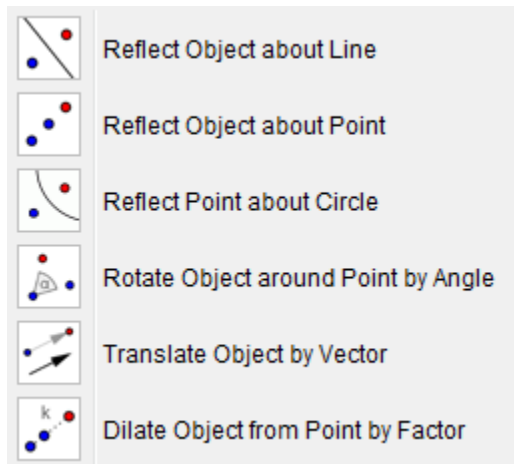
Angle

The five buttons in this menu deal mainly with measurement. The first button, Angle, is used to construct and measure the angle between three points. The second button is Angle with given size. Select this tool and click to create the vertex of the arm of an angle. The next click gives the point at the angle. At this point a menu appears where you will be asked to select angle size and direction. The third button, Distance or length, has several functions. If you use this button and click on two previously constructed points it will give you the distance between them. The function of this button is to measure the length of a line segment. The fourth button is called Area. Use this button on a polygon, circle or conic to display the area of the figure. The fifth button, Slope, will display the slope of a selected line or line segment.



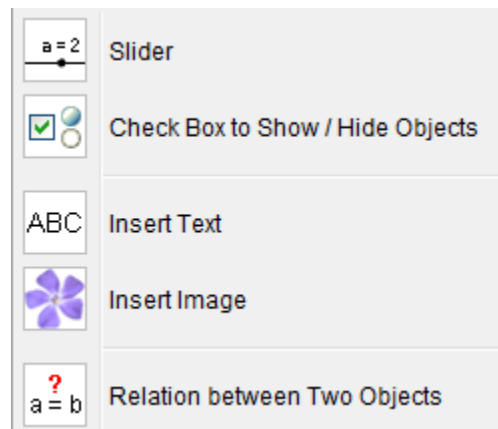
Reflect object

These six buttons are concerned with geometric transformations. The first button, Reflect Object about Line reflects an object across the chosen line. The second button, Reflect Object about Point, performs a central symmetry. Select the object that you want to perform the symmetry on, choose the center of symmetry, the mirror image is then constructed. The third button, Reflect Point about Circle, allows you to invert a point about a circle. Select the point you want to invert. Then, click on a circle to specify the mirror/circle of inversion. The next button, Rotate object around point by angle, needs you to select the object to be rotated and the center of rotation. A menu will then appear asking for the size of the angle. You can enter a number or the variable name of a previously constructed angle. The default rotation is counterclockwise. Translate object by vector performs the translation of an object while Dilate object from point by factor performs a dilation.



Insert text

There are five buttons in this menu. The first, Slider tool, allows you to create a slider for a number or an angle. There is a dialog window that opens for you to specify different parameters. The second button, Check Box to Show/Hide Objects tool, creates a check box that allows you to show and hide one or more objects. The third button, Insert text allows you to place text anywhere on the page. When you select this tool and click on the drawing pad a menu appears. The button with the degree symbol helps you to enter mathematical symbols while the button with α on it contains the Greek alphabet. These two allow you to enter most things that you will need. The Insert image button allows you to import various types of images into your worksheet. Once the image is imported it is treated as an ordinary object and you can use various tools on it. In particular, all the geometric transformation tools will work. This allows you to prepare an image in your favorite drawing application and then use it in GeoGebra. The Relation between two objects button tells you the relation between a limited set of objects. It will let you find out if two objects are equal, if a point lies on a line or a conic, or if a line is tangent or secant to a conic.



Move drawing pad

Most of the buttons under this tool are self explanatory. The Move drawing pad button allows you to drag the whole drawing pad wherever you like. The Zoom in button zooms in on portions of your drawing. The Zoom out button zooms out on portions of your drawing. The Show / hide object is a little more complicated. Use the button to click on the object that you want to show or hide. Nothing appears to happen. Now select any other tool. At this point the change you wanted occurs. If you click on an object with the Show / hide label button the label will disappear or appear. The Copy visual style button is a very convenient one. Suppose that you have drawn a diagram where you assigned a particular color to an object. Later you may want to use the same color on another object, maybe a descriptive piece of text. If you use this style to click on the first object it will apply that object's style to the object you click on next. Delete object deletes any object you click on when using it. Be very careful before you use this tool.

It will delete not only the object you select but also any objects that depended on the selected object during their construction. Unless you are sure that you want to delete an object it is usually a much safer option to hide it.

