

The Geometer's Sketchpad

Help Contents

Click any of the highlighted topics below for help on that topic. When you use the regular version of the program, you can press the F1 key while the mouse is over any command in the menus or any tool in the Toolbox to get help on that command or that tool.

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Sketchpad Help

The regular version of *The Geometer's Sketchpad* includes a help file containing hundreds of pages of detailed information on all aspects of the program. (Due to space limitations, the help file is not provided on this demo disk.)

Sketchpad's help information is fully cross-referenced and indexed by keywords so you can easily move between related topics, and so you can quickly access the additional help Sketchpad provides on menu commands, the toolbox, sketches and scripts. Sketchpad help also includes a section on shortcuts, a detailed description of the new features in Version 3, and a summary of all the construction commands.

Commands

The Geometer's Sketchpad has nine main menus and a quick menu. When you use the regular version of the program, you can click the name of any menu below for information about the items on that menu.

You can also press the F1 key while the pointer is over any menu command to get help on that command.

| | |
|------------------------------|---|
| <u>File menu</u> | Open, save, and print sketches and scripts |
| <u>Edit menu</u> | Undo and redo actions, use the Clipboard, select objects, create action buttons, and show or hide the Toolbox and Clipboard |
| <u>Display menu</u> | Control the appearance of objects in your sketch |
| <u>Construct menu</u> | Construct new geometric objects based on the objects in your sketch |
| <u>Transform menu</u> | Apply geometric transformations to selected objects |
| <u>Measure menu</u> | Make various measurements on the objects in your sketch |
| <u>Graph menu</u> | Create axes and plot measurements and points |
| <u>Work menu</u> | Make a script from your sketch, manipulate windows, and play scripts |
| <u>Help menu</u> | Use the help system |
| <u>Quick menu</u> | Use the right mouse button for quick access to commands on the other menus |
| <u>Control menu</u> | Use the box at the left end of window title bars to manipulate windows. |

Sketchpad Help

The regular version of *The Geometer's Sketchpad* includes a help file containing over 150 pages of detailed information on using the program's menus. (Due to space limitations, the help file is not provided on this demo disk.)

Sketchpad's help information is fully cross-referenced and indexed by keywords so you can easily move between related topics, and so you can quickly access the additional help Sketchpad provides on the toolbox, sketches and scripts. Sketchpad help also includes a section on shortcuts, a detailed description of the new features in Version 3, and a summary of all the construction commands.

The Toolbox

On the left side of the sketch window is the Toolbox, containing tools for creating, selecting, and transforming points, circles, and straight objects (segments, lines, and rays). The Toolbox also includes a Text tool, an Information tool, and a Script tool.

Click with the mouse on any tool to highlight it and make it the active tool. You can also use the keyboard to choose tools.

The Toolbox contains:

Selection Arrow tools:

Translate tool

Rotate tool

Dilate tool

Point tool

Compass tool

Straightedge tools:

Segment tool

Ray tool

Line tool

Text tool

Object Information tool

Script Tool

In addition, at the bottom of the window you will find a Tool Status Box.

When you use the regular version of Sketchpad, you can get help on any tool in the toolbox by pointing the cursor at the tool and pressing F1.

Sketchpad Help

The regular version of *The Geometer's Sketchpad* includes a help file containing dozens of pages of detailed information on the toolbox. (Due to space limitations, the help file is not provided on this demo disk.)

Sketchpad's help information is fully cross-referenced and indexed by keywords so you can easily move between related topics, and so you can quickly access the additional help Sketchpad provides on menu commands, sketches and scripts. Sketchpad help also includes a section on shortcuts, a detailed description of the new features in Version 3, and a summary of all the construction commands.

Sketches

Sketch windows are used to create and manipulate geometric drawings. Sketches contain objects such as points, circles and lines, related to each other in ways that you determine when you create the objects.

Sketches and Dynamic Geometry

Your ability to change objects dynamically is the most important feature of Sketchpad. Once you have created an object, you can move it, rotate it, dilate it, reflect it, hide it, and change its label, color, shade or line thickness. No matter what changes you make, Sketchpad maintains the mathematical relationships between the object and the other objects to which it is related. This is the principle of dynamic geometry, and is the basis of the power and usefulness of *The Geometer's Sketchpad*.

Click on any of the topics below for more information:

[Sketch Windows](#)

[Sketch Objects](#)

[Creating Objects](#)

[Selecting Objects](#)

[Appearance of Objects](#)

[The Clipboard](#)

Sketchpad Help

The [regular version](#) of *The Geometer's Sketchpad* includes a help file containing dozens of pages of detailed information to help you construct and manipulate sketches. (Due to space limitations, the help file is not provided on this demo disk.)

Sketchpad's help information is fully cross-referenced and indexed by keywords so you can easily move between related topics, and so you can quickly access the additional help Sketchpad provides on [menu commands](#), the [toolbox](#), and [scripts](#). Sketchpad help also includes a section on [shortcuts](#), a detailed description of the [new features](#) in Version 3, and a summary of all the [construction commands](#).

Scripts

Scripts are textual recordings of geometric constructions and transformations. When you record a script, every step you perform to construct or transform a geometric object is recorded. When you play a script, the same constructions and transformations are played back, creating new geometrically equivalent objects.

Every script is based on certain given objects, which are the minimum set of objects required to do the constructions and transformations. Every script also includes a list of steps, which describe the constructions and transformations which produce new or changed objects from the givens.

More information is available on:

[A Sample Script](#)

[The Script Window](#)

[Opening a Script](#)

[Creating a Script](#)

[Saving a Script](#)

[Playing a Script](#)

[Script Givens](#)

[Script Comments](#)

[Recursive Scripting](#)

[What Can Go Wrong?](#)

[Script Tools](#)

[More About Scripts](#)

Sketchpad Help

The [regular version](#) of *The Geometer's Sketchpad* includes a help file containing dozens of pages of detailed information to help you construct and manipulate scripts. (Due to space limitations, the help file is not provided on this demo disk.)

Sketchpad's help information is fully cross-referenced and indexed by keywords so you can easily move between related topics, and so you can quickly access the additional help Sketchpad provides on [menu commands](#), the [toolbox](#), and [sketches](#). Sketchpad help also includes a section on [shortcuts](#), a detailed description of the [new features](#) in Version 3, and a summary of all the [construction commands](#).

Shortcuts

The Geometer's Sketchpad allows you to use a number of shortcuts to make your work faster and easier. You can also use normal Windows shortcuts with Sketchpad.

Keyboard shortcuts

Use the Shift key to modify the actions of various menu items and tools.

Use the Ctrl key to temporarily change any tool to a Selection Arrow.

Use the Tab key to temporarily change any tool to the Text tool.

Use F1 for help on any menu command or tool.

Use the F4 through F9 keys to choose tools from the Toolbox.

Use the arrow keys to choose tools from the Toolbox.

Use Shift+Ctrl+> and Shift+Ctrl+< to change font sizes.

Use the Ctrl key with keys 1 through 9 to apply custom transformations.

Use the Ctrl key with keys 1 through 9 in the Calculator to choose a measurement from the Value menu.

Use the keyboard interface to select and construct objects in your sketch directly from the keyboard.

Mouse shortcuts

Use the right mouse button to choose from the Quick menu.

Menu shortcuts

Use the Measure Ratio command as a shortcut for measuring two lengths and dividing them with the Calculator.

Windows shortcuts

Use accelerator keys to choose and execute menu items immediately. Accelerator keys are available for many of Sketchpad's menu items, and are listed to the right of each menu item for which they are available.

Use the keyboard to choose any menu item. Press the Alt key, then the underlined letter of the menu you want to choose from, then the underlined letter of the item you want to choose.

Use the Tab key in dialogs to move from item to item.

Program removal shortcut

Use the program uninstal.exe to remove The Geometer's Sketchpad and the sample files from your disk.

Sketchpad Help

The regular version of *The Geometer's Sketchpad* includes a help file containing several pages of tips to allow you to use the program more quickly and easily. (Due to space limitations, the help file is not provided on this demo disk.)

Sketchpad's help information is fully cross-referenced and indexed by keywords so you can easily move between related topics, and so you can quickly access the additional help Sketchpad provides on menu commands, the toolbox, sketches and scripts. Sketchpad help also includes a detailed description of the new features in Version 3 and a summary of all the construction commands.

New Features in Version 3

The Geometer's Sketchpad has evolved to meet the increasing needs of the tens of thousands of teachers and students who have been using it. Version 3.0, the third incarnation of the software, incorporates important new features and a myriad of small improvements. The aim has been to make the program both easier to use and more versatile. Here are some of the most important changes:

Arcs, Arc Segments, and Sectors

You can now construct arcs by three points, by a circle and two points on the circle, or by a center and two points. Given an arc, you can measure its arc angle and arc length. From an arc you can construct an arc segment or a sector. Arc segments and sectors are filled and may be colored and shaded in all the ways that polygons can. You can measure areas and perimeters of arc segments and sectors, and you can place points on their perimeters.

See also:

[Arc on Circle](#)

[Arc Through 3 Points](#)

[Construct Arc Sector](#)

[Construct Arc Segment](#)

Analytic Geometry

Sketchpad 3.0 allows you to create a coordinate system and measure the coordinates of points, the equations of lines, and the equations of circles. You can drag the origin of the coordinate system and dynamically change the unit length. The axes of the coordinate system are Sketchpad objects on which you can construct points and which can be used to construct parallels and perpendiculars. Coordinates of points are available for use in calculations, as are parameters that define the equations of lines and circles. The coordinate system has a grid that you can show or hide, and dragging can be constrained to snap to the grid if desired. You can set the coordinate grid to be either rectangular or polar, and you can display both forms of coordinates for a point simultaneously.

See also:

[Coordinates](#)

[Equation](#)

[Graph Menu](#)

Graphing

Measurements, calculated values, and data can be plotted in the coordinate system. For example, you can measure the side length and area of a square and use these two values as an (x, y) pair to plot a point. The point will move as you drag the side of the square and, with tracing turned on, will trace a parabola. You can use the calculator to build any mathematical expression you like as a function of the x-coordinate of a point on the x-axis and use the result to find the y-coordinate of the function. In combination with dynamic, constructed loci, you now have a powerful tool for exploring algebra within a dynamic geometry environment. You can type in coordinates for individual points and constrain these points to remain at these fixed coordinates. You can import data from other applications and plot this data as points in the coordinate system. Tables generated within Sketchpad can also be used to plot points.

See also:

[Graph Menu](#)

Marked Measurements for Transformations

In previous versions of Sketchpad you could create transformations of objects that depended dynamically on marked vectors, angles, and ratios. In Version 3, transformations can depend dynamically on measured or computed values. You can, for example, measure an angle, use the calculator to compute one-third of that angle, and use the result of the computation to construct a trisector of that angle. Marked measurements open up whole new worlds of geometry that were difficult or impossible to reach previously.

See also:

[Mark Distance](#)

[Mark Angle](#)

[Mark Ratio and Mark Scale Factor](#)

Locus Construction

In previous versions of Sketchpad, you could trace an object and this allowed study of curves and envelopes. But the trace would disappear as soon as you went on to do anything else in the sketch. In Version 3 you can construct a locus of one object driven by a point on some path. A locus constructed this way responds dynamically to dragging in the sketch. So, for example, a locus of a point constrained to lie on a parabola shows the entire parabola and changes as you drag the focus or directrix. Constructed loci in combination with plotting measurements and calculations can be used to create dynamic graphs.

With the proper geometric construction or calculation, you can create almost any mathematically defined shape and investigate its behavior as the construction parameters change. You can even place points on a locus and use them to drive an animation or to construct another locus.

See also:

[Locus](#)

Script Tools

You can now specify a special directory where Sketchpad will look for scripts to add to the toolbox as script tools. Whereas scripts played from a script window require you to select the script's givens before you play the script, script tools act like other tools in the toolbox in that they allow you to specify the givens interactively. A script tool for drawing the circumcircle for a triangle will allow you to create new points or match existing points as the vertices of the triangle, and once you've specified two of the three vertices, it will show you the circumcircle you're about to construct as you move the cursor around in the sketch.

See also:

[Script Tool](#)

Mathematical Notation

Sketchpad now uses mathematical notation for measurements and calculations. You can set the default to Math Format or Text Format and you can control the format of individual measurements or calculations.

See also:

[Calculate](#)

Enhanced Calculator

The calculator can display expressions as you create them either in Math Format or in Text Format. There are now three pop-up menus in the calculator: one for values, one for functions, and one for units. Many new mathematical functions have been added, and you can now use decimal fractions as part of your expressions. The Units pop-up menu allows you to specify the units of a part of your expressions. Sketchpad will show you the unit of an expression as you build it. Finally, you may select a measurement

directly from the sketch with the mouse while the calculator is open.

See also:

[Calculate](#)

Enhanced Labeling Options

Labels for objects may be longer than in previous versions and you may subscript them. A group of selected objects may be relabeled simultaneously in a specified sequence. You now have control over the labeling sequence Sketchpad uses as it creates new objects. Whereas in previous versions the only way to force Sketchpad to begin the labeling sequence over again was to open a new sketch, now the label sequence will start from scratch if you Undo All.

See also:

[Relabel and Label Options](#)

Customizable Menus

Using Preferences, you can specify which menus are available in Sketchpad. This gives you the ability to simplify the program by getting rid of some of the menus, or to restrict the available commands to a subset in order to explore what can and cannot be accomplished with that subset.

See also:

[More Preferences](#)

Keyboard Interface

You may now accomplish a great deal of construction and selection through a [keyboard interface](#). Keyboard commands and assistance appear in the [tool status box](#) at the bottom of the sketch window.

Other User Interface Improvements

Numerous small changes make this version of Sketchpad even easier to use than previous versions. Some of the changes are listed here.

Automatic change to text tool

When using the Selection Arrow tool, if the arrow is positioned over an object's label, the tool changes automatically to the text tool. This makes it much easier and more intuitive to reposition a label or change a label.

Tool status box

Sketchpad now gives you cues as to what tool you have chosen and what object you are about to select or construct using a [tool status box](#).

Large text for calculator, scripts, and axes

The [More Preferences](#) dialog box now allows you to specify larger type to be used for display text in the calculator, in script windows, and on axes. This is particularly useful for classroom demonstrations.

Specifying objects for use in transformations

You may now double-click on a point to specify that it be used as a marked center for rotation or dilation or double-click on a straight object to specify that it be used as a mirror for reflection. While a transformation dialog box is open, you may click on objects and measurements visible in the sketch to specify that they be used as part of the transformation.

Simplification of labels in scripts

It is no longer necessary to specify that a label be used in a script. Givens always get the label of the original object. Objects created in the course of a script will show with their actual

labels if you change the label.

Changes and Omissions in the Manual

A few new items and changes did not make it into the manual. See Addenda for a list of these items.

Sketchpad Help

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Construction Help

| Command | What it constructs: | What you must select: |
|------------------------------------|--|---|
| <u>Point On Object</u> | A point on the selected object(s) | One or more segments, rays, lines or circles |
| <u>Point At Intersection</u> | A point where two objects intersect | Two straight objects, two circles, or a straight object and a circle |
| <u>Point At Midpoint</u> | The midpoint of the segment(s) | One or more segments |
| <u>Segment/Ray/Line</u> | The segment(s), ray(s) or line(s) defined by the points | Two or more points |
| <u>Perpendicular Line</u> | The line(s) through the selected point(s) and perpendicular to the selected straight object(s) | One point and one or more straight objects, or one straight object and one or more points |
| <u>Parallel Line</u> | The line(s) through the selected point(s) and parallel to the selected straight object(s) | One point and one or more straight objects, or one straight object and one or more points |
| <u>Angle Bisector</u> | The ray which bisects the angle defined by three points | Three points (select the vertex second) |
| <u>Circle By Center And Point</u> | The circle with the given center and passing through the given point | Two points (select the center first) |
| <u>Circle By Center And Radius</u> | The circle with the given center and with a radius equal to the length of the given segment | A point and a segment |
| <u>Arc By Three Points</u> | The arc passing through the three given points | Three points |
| <u>Arc On Circle</u> | The arc on a circle extending counterclockwise from the first point to the second | A circle and two points on the circle's circumference of the circle |
| <u>Polygon Interior</u> | The polygon interior defined by using the given points as its vertices | Three or more points |
| <u>Circle Interior</u> | The interior of a circle | One or more circles |
| <u>Sector Interior</u> | The interior of an arc sector | One or more arcs |
| <u>Arc Segment Interior</u> | The interior of an arc segment | One or more arcs |
| <u>Locus</u> | The locus of an object | One geometric object and one point constructed to lie on a path |

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Help Topic not Available in Demo Version

If you were using the regular version of *The Geometer's Sketchpad*, you would now be looking at a page containing information about the item on which you clicked. The demo disk does not include Sketchpad's extensive help file, so the topic you requested is not available.

Click the *Back* button above to return to the previous topic.

Sketchpad Help

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The Geometer's Sketchpad, Regular Version

This is a free demonstration version of *The Geometer's Sketchpad*, created for use only in teacher-training workshops and for similar training purposes. This version does not provide certain capabilities of the program, such as saving of sketches and scripts, copying and cutting to the clipboard, printing, and the full help file. Federal copyright law prohibits the use of this demonstration version with students.

The regular version of *The Geometer's Sketchpad* provides the features missing from this demo version, and is the only version which should be used with students. *The Geometer's Sketchpad* is available for purchase from Key Curriculum Press (1-800-995-MATH), and can be obtained as a single-user program, as a ten-user lab pack, or as a network/school site license.

Due to its limitations, this demonstration version of Sketchpad should not be used for evaluation or review purposes. For such uses, Key Curriculum Press makes the full-featured version of the program available on a 30-day free preview basis.

