

# Geometer's Sketchpad

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Geometer's sketchpad is a computer program that helps to visualize and simulate geometrical constructions. It works somewhat like other drawing programs like Paint, in that you can choose different objects to construct and use the mouse to place them in the sketch. Here are some useful commands:

## 1 The Toolbox

The toolbox looks something like this when all the tools are fully expanded:



Figure 1: The full toolbox



The selection tool allows you to select points, lines, line segments, etc. by clicking on them with the left mouse button.



The point tool allows you to make a point anywhere in your sketch simply by clicking the left mouse button.



The compass tool allows you to make a circle by left clicking where you want the circle's center and then expanding the circle to the desired radius, then left clicking again.



The straight edge tools allow you to make lines, rays and line segments.



To make a line, use this tool. Left click once to make one point, then click again to make the line that passes through those two points.



To make a ray, use this tool. Click once to make the starting point of the ray, then click again to make the ray starting at the first point and passing through the second.



To make a line segment, use this tool. Left click where you want the segment to start, then click where you want it to end.

## 2 The Display menu

This menu allows you to change how your sketch is displayed. The two options we're most interested in are:

- **Hide [Object]** — Select an object like a point or line. This option makes that object invisible.
- **Label ...** — Select an object (or group of objects) you want to label. This option lets you choose how to label it (or them).

## 3 The Construct menu

Here are the options in the construct menu. To use them, click the selection tool, then select an object (point, line segment, whatever). Then go to the Construct menu and choose which action you want to perform.

- **Point on [Object]** — This places a point on the object you've selected. For example, if you've selected a line segment, this option will place a point somewhere on the segment.
- **Midpoint** — Places a point at the midpoint of a line segment
- **Intersection** — If you've selected two lines, or two line segments, or whatever, this constructs a point at the intersection of the lines.
- **Segment** — If you've selected two points, this option constructs the line segment between them.
- **Ray** — If you've selected two points, this constructs the ray starting at the first point you selected and passing through the second point.

- **Line** — Constructs the line passing through two selected points.
- **Parallel Line** — If you’ve selected a line and a point, this constructs a line passing through the point and parallel to the line.
- **Perpendicular Line** — Select a point and a line. Then this option constructs a line perpendicular to the original line and passing through the point.
- **Angle Bisector** — Select three points that determine an angle. Then this option constructs the ray that bisects the angle.
- **Circle by Center+Point** — Select two points. This option constructs a circle centered at the first point and passing through the second.
- **Circle by Center+Radius** — Select a point and a line segment (they don’t necessarily need to be touching). This option constructs a circle centered at the point with a radius of the same length as the line segment.
- **Arc on Circle** — Select a circle and two points on the circle. Then this constructs the arc connecting the two points along the circle.
- **Arc through 3 points** — Select three points. Then this option constructs the arc through those points.
- **[Object] Interior** — Select a shape (like a circle or triangle). This option constructs the interior of the shape.

## 4 The Measure menu

Using Sketchpad, you can measure various lengths, angles, etc. Here are a few options you may use in the Measure menu.

- **Length** — Select a line segment. This option measures its length.
- **Distance** — Select two points. This option measures the distance between the two.
- **Perimeter** — Select a shape. This option measures the length of its perimeter.
- **Circumference** — Select a circle. This option measures its circumference.
- **Angle** — Select three points. This option measures the angle they define.
- **Area** — Select a filled-in shape. This option measures its area.
- **Radius** — Select a circle. This option measures its area.

And, of course, the most important menu option of all ...the “Undo” option. If you mess something up, choose “Undo” from the Edit menu.