Geometric Constructor (3-D) Tool Help File v1.1

The Geometric Constructor (3-D) tool contains three tabs: Construct, Compute, and Compare.

Construct Tab

On the Construct tab, you can view several types of 3-D figures or solids.

There are two palettes of icons to choose from on the Construct tab: Construct 3D figures and Construct 3D figures from 2D base. From the Construct 3D figures palette, you are able to add several types of solid figures to the activity area such as prisms, pyramids, cylinders, cones and spheres. You are also able to choose several composite figures to add to the activity area; where one solid is inscribed inside another. Using the Construct 3D figures from 2D base palette, you can add figures to the activity area by first clicking on the icon of a 2D base in the palette, then the solid you want to add to the activity area with the chosen base.

You can have up to three figures on the workspace at any time. All figures are drawn as right solids when added to the activity area. You can erase figures by clicking the eraser button, which is located under the activity area. Each time you click the eraser button, figures will be erased in the reverse order that they were created.

Once you have one or more figures in the activity area, you can change several of the figure's characteristics. You can choose to resize or adjust the view and skew of any figure in the activity area by selecting one of the tabs in the lower right corner of the tool. To select a figure to manipulate, click on the figure. When a figure is selected, the figure will have a black outline. Only one figure can be selected at a time.

Depending on the figure, you can resize several dimensions of that figure in the activity area using the Resize figure tab. Some of the dimensions that are possible to adjust are height, length, width, side, or radius: each dimension may be adjusted in increments of tenths from 1.0 to 10.0. As you move a dimension slider or type in the input box to the right of each of the dimension sliders, the solid will be updated in the activity area in real time.

You can also adjust a selected figure by rotating it or skewing it using the Adjust figure tab. On the Adjust figure tab, there are two options, Rotate and Skew. When using the Adjust figure tab, only the selected figure will appear in the activity area. While using the Adjust figure tab, the selected figure's dimensions cannot be changed, and the figure will the same dimensions as before you clicked on the Adjust figure tab.

By default, Rotate is selected, and this feature allows you to rotate the view of the current figure so that you can see all of the vertices, edges or lateral area(s) of the figure. Using your cursor you can select any lateral face or lateral area of your figure, and the figure will rotate around the base or bottom–most point of the figure. The direction of your cursor determines the direction and amount of rotation of the figure. All labeled vertices will update to reflect the relative change in position of the figure.

You can also adjust the selected figure by selecting the Skew feature. To skew a figure in the activity area, you click and hold on one of the top-most bases, vertices, or points. The direction of your cursor as you skew the figure determines the amount of skew from the top of the figure. You can rotate a skewed figure.

If you click the Resize figure tab after you have clicked on the Adjust figure tab, a message will appear that notes that you will lose all the adjustments to the rotation and skew of the figure. By clicking OK, you will return to the activity area as it was before you clicked on the Adjust figure tab.

At any time you can click the Reset All button at the bottom of the screen to start over. Note that by clicking the Reset All button, you will lose all current work the tab.

Compute Tab

On the Compute tab, you view the calculations of several measurements related to a figure. To use the Compute tab, you must first select a figure on the Construct tab, and then click on the Compute tab.

In the Compute tab, on the left-hand side of the screen, you can view the measurements of the Base Area, Lateral area, Surface area and Volume of your selected figure, where each measurement is relevant. For each measurement, the relevant formula equations for each measurement, including variables are shown on the left-hand side. The first line of the measurement includes the general equation for calculating that specific measurement for that specific figure. The next line shows the equation with substitutions for the variables such as height and radius with the values that are chosen from the sliders at the lower right.

You can also you the Resize figure and Adjust figure tabs in the Compute tab. Each tab works just as they do in the Construct tab. By default, when you first open the Compute tab, each selected figure has a specific value for each of the available dimensions like height and radius, regardless of the dimension of the figure as it appeared on the Construct tab. While viewing the selected figure, each of the dimensions available for that figure can be updated using the Resize figure tab. As the value of each dimension is updated, the values of the measurements that are selected on the left-hand side of the screen will update as the variables are manipulated. Adjusting the rotation view or skew of any figure in the activity area in the Compute tab will not update any of the measurements on the left-hand side of the screen.

Just below the activity area is an option to show the net of your figure. When you click on the Show net check box, the selected solid moves to the lower left of the screen, and the net of the figure appears to the right of the solid, taking up most of the activity area. The net shows a cut away view of the solid with the relevant measurement variables labeled to relate the values to the formulas on the left-hand side of the screen. The solid in this view also shows where those variables are derived from in the net. While using the Show net feature, the default values of the dimensions of the figure are used and cannot be changed, as the Resize figure and Adjust figure tabs are disabled when the net for a figure appears on screen. While using the Show net feature, the figures are not necessarily to scale with the original figure, but are for presentation purposes of relating the net to the original solid. You cannot erase figures while in this tab. Clicking the Show net box again removes the net, and you can continue manipulating the figure.

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Compare Tab

On the Compare tab, you can apply a similarity ratio to a figure to compare the measurements of the modified figure against the measurements of the original figure. To use the Compare tab, you must first select a figure on the Construct tab, and then click on the Compare tab.

On the Compare tab, the screen is split into two views of the same figure, Figure 1 and Figure 2. Figure 1 on the left is the figure you selected, with its default dimensions. The dimensions of any selected figure cannot be changed from the default in Figure 1. Figure 2 is the same figure as Figure 1 with a similarity ratio applied to it.

You can change the value of the similarity ratio slider below Figure 1, or by typing a value in to the input box at the right of the slider. You can change the value of the similarity ratio to anywhere from 0.20 to 2.00. As you update the value of the similarity ratio, Figure 2 will be updated to reflect the changes. You can view several measurements of both Figure 1 and Figure in the area below Figure 2. Some of the measurements that can be seen are Height, Radius, Base Area, and Volume, depending on the figure you selected. While Figure 1's measurements will always remain the same, Figure 2's measurements will update in real time based on the changes the similarity ratio on Figure 2.

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