Google SketchUp® 8 for Interior Designers

Studio Companion

Just the Basics

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Section 6
The Basic Entities

Given the amazing images one can create using SketchUp, it is somewhat surprising that there are mainly just eight types of entities that can be added to a model.

They are:

- Edges
- Surfaces
- Annotation
    - Dimensions
    - Test
    - 3D Text
- Components
- Groups
- Guide (reference line)

The next few pages will provide a brief overview of each of these entity types.

Edges

SketchUp is a face-based program, and all surfaces (i.e. faces) must be defined by an edge. This is the fundamental building block of a SketchUp model.
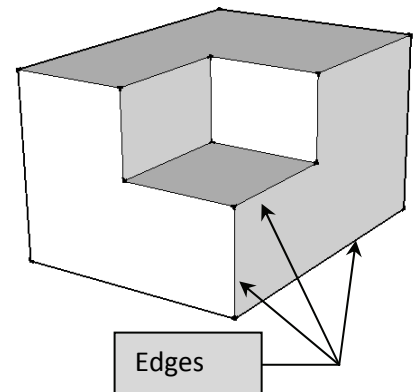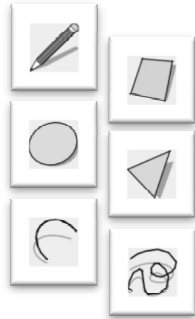
Edges

FIGURE 6.1   Edges pointed out

Edges are created with one of the *Draw* tools:

- Line
- Circle
- Arc
- Rectangle
- Polygon
- Freehand

Edges can be created with very specific length (or radius) or arbitrarily by clicking anywhere within the drawing window. It is easy to snap to one of the three planes (axes) while drawing lines. This makes it possible to draw 3D shapes from a single 3D view (more on this later).

A basic cube has twelve edges. Figure 6.1 has 21 edges and Figure 6.2 has two edges.

Even circles are made up of small edges. When one is being created, the *Value Control Box* (on the Status Bar) lists the number of sides that will be used to approximate the circle. This number can be increased to make larger circles smooth, or decreased to make smaller circles less complex (which can be a burden on model performance).

Later in this chapter you will get some practice drawing edges and editing them.

FIGURE 6.2   Edge pointed out

Edges can be modified with a number of tools. For example, an edge can be scaled, rotated, divided, copied, offset and erased. These tools are accessible from the *Tools* menu, toolbars (which may not be visible yet), right-click menus (when the edge is selected) and keyboard shortcuts.

Edges can also be placed on *Layers* in order to control visibility. A *Layer* can be turned off, making everything assigned to that *Layer* invisible.
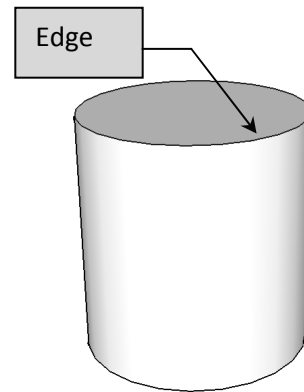
Surfaces

A surface is the second most significant type of entity in SketchUp. You might be surprised to learn that no tool exists to create a surface! They are created automatically when the conditions are right.

What are the conditions in which a surface is automatically created? The simple answer is that **a series of edges form an enclosed area**. When the last edge is drawn which defines an enclosed area, a surface is created. This can be as few as three edges – forming a triangle.

The image to the right (Figure 6.3) shows two examples of three connected edges defining a *surface*. Note the edges can be a combination of straight and curved lines.

FIGURE 6.3
Surfaces defined by at least three edges

If an *edge* is erased, the *surface* is also erased, seeing as it no longer has a boundary.

In addition to *edges* forming a closed perimeter, there is another important requirement a new modeler needs to be aware of; that is, **all the lines forming the enclosure must be coplanar**.
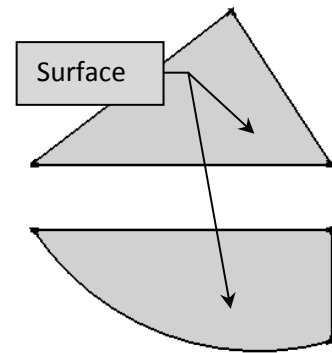
If you don't already know, the easiest way to describe coplanar is to think of all the edges as lines drawn on a flat piece of paper. As long as all the lines are in the same plane (i.e., on that flat piece of paper) a *surface* will be created.

Surfaces may have materials painted on them. They can also be placed on *Layers* in order to control visibility.

FIGURE 6.4
Coplanar on left, not on right

A surface can be deleted; simply select it and press the **Delete** key on the keyboard. The only way to get another surface is to draw a line directly on top of one of the existing *edges*. SketchUp will then create a surface and delete the extra line, as it does not allow two lines to exist directly on top of each other.
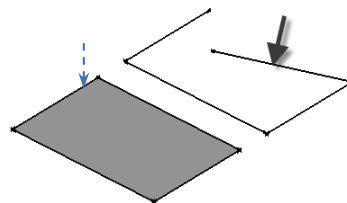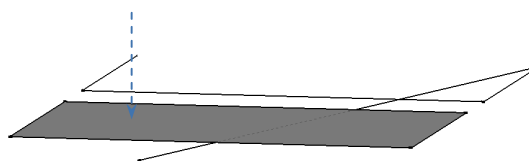
FIGURE 6.5
Another angle of Figure 6.4

Dimensions

Dimensions can be added to your SketchUp model. These are smart entities; they are not sketched lines and manually entered text. A *dimension* entity becomes a permanent part of the model, unlike the *Tape Measure* tool (which is used to list distances without drawing anything).

To place a dimension you simply pick three points; the first two are what you want to dimension and the third is the location of the dimension line and text. SketchUp automatically displays the correct length.

The dimensions are associative, relative to the first two points picked. The dimension will grow or shrink if the geometry is modified. However, if the geometry is deleted the dimension will remain (but is no longer associated to anything).

Dimensions can be tricky in that they may appear correctly and legible from one angle (Figure 6.6a) but not another (Figure 6.6b). But the visibility of a *dimension* can be controlled by *Layers* or by *Scene* (more on what scenes are later).

To adjust various settings related to how dimensions are created, go to **Window → Model info** and then click *Dimensions* in the list on the left.

FIGURE 6.6A   Dimensions added while viewing the model from this angle

Text

SketchUp has a tool which allows you to add notes with leaders (i.e., pointing at something). To place a *Text* entity you make two clicks and then type (or accept the default value). Default value? If you point to a *surface*, SketchUp will automatically list the area of that surface. If an *edge* is pointed to, SketchUp will list its length. An example of each can be seen in the image below (Figure 6.7).

If you don't want a leader, simply click in empty space and you can just type text. The text "Option A" is an example of text without a leader (Figure 6.7).
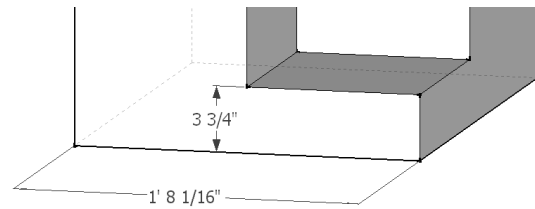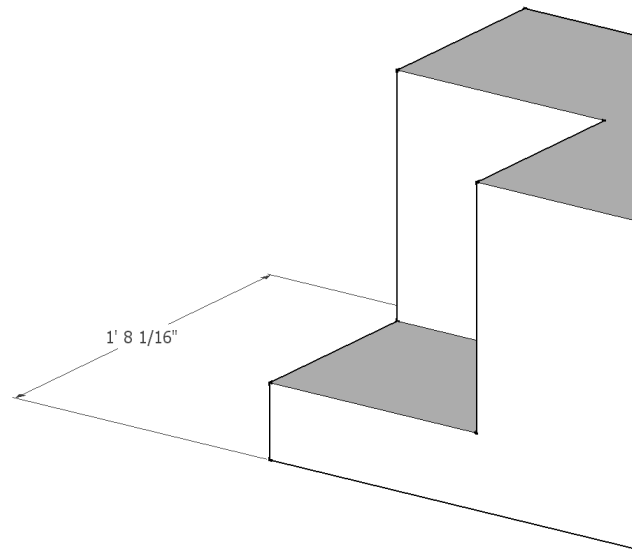

FIGURE 6.6B   One dimension still visible when view angle is changed using orbit
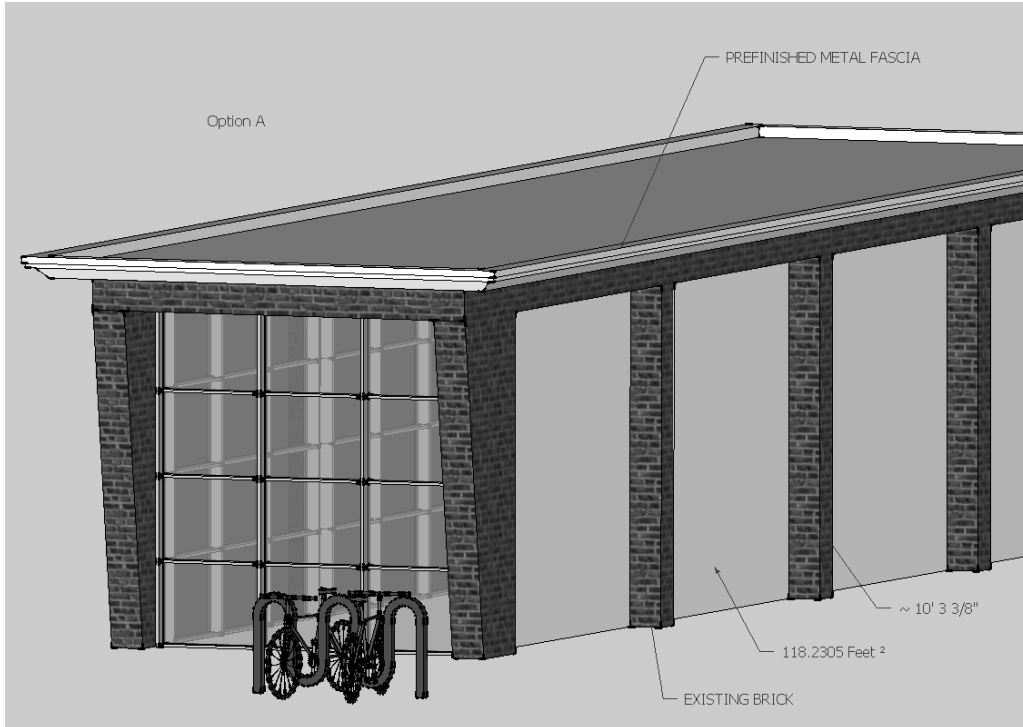
FIGURE 6.7 Notes added using the Text tool

Similar to dimensions, text entities remain visible when the vantage point is changed, using *Orbit* for example. As you can see in the Figure 6.8, this can get a bit messy. *Text* visibility can also be controlled with *Layers* and *Scenes* like *dimensions*.

For the most part, notes and dimensions are left until the end of the modeling or added outside of SketchUp – in LayOut or a CAD program such as AutoCAD or Revit.

When text is right-clicked on, a menu pops up which allows you to change the arrow type and leader (Figure 6.9). These options, plus the ability to change the font, are available via the *Entity Info* dialog. This can be turned on from the *Window* pull-down menu.
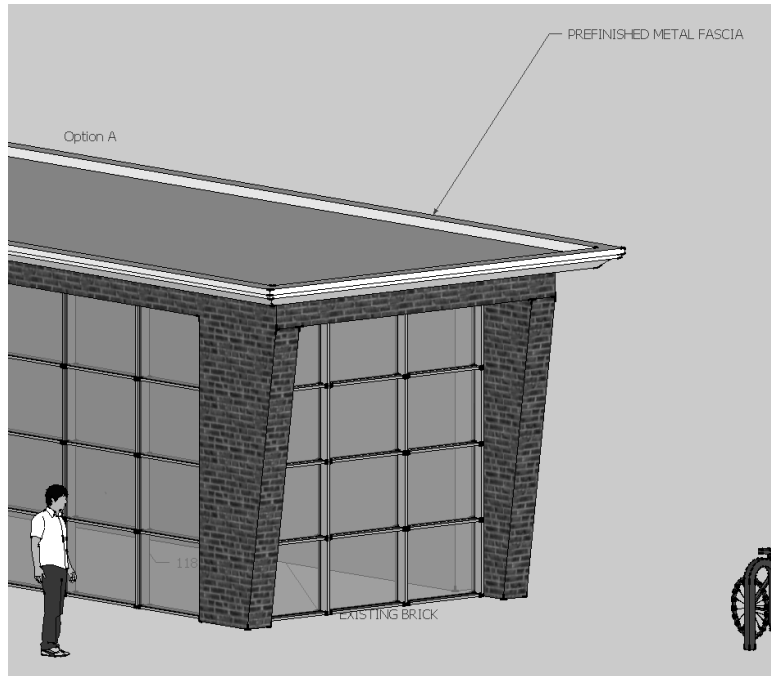
FIGURE 6.8 Notes still visible when model rotated using orbit

The default settings for text can be changed via **Window → Model Info**, and then selecting *Text* from the list on the left.
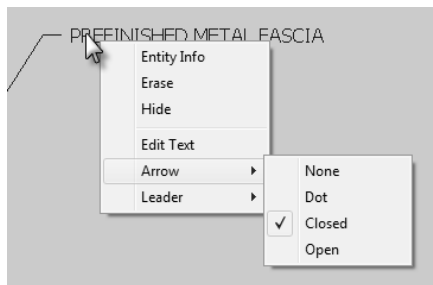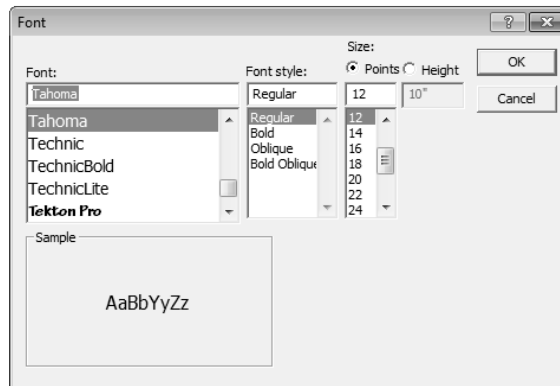

FIGURE 6.9
Right-click options for text

FIGURE 6.10 Changing font for text entity

3D Text

The *Text* tool, just covered, is meant for notes and comments about the model. *3D Text* is meant to be part of the model. This tool is used to model text on signs or letters on the face of a building. Unlike notes created with the *Text* tool, *3D Text* stays right where you put it.

Placing *3D Text* is easy. Select the tool, and the *Place 3D Text* dialog appears (Figure 6.11). Enter your text and select the options desired for font style, height and thickness (i.e. extruded). Click **OK** and then pick a location on a face to place it.

FIGURE 6.11 Adding 3D Text

Once the 3D Text is placed, the *Paint Bucket* tool can be used to apply a material.

FIGURE 6.12 3D Text placed

Once the text is created, it becomes a component that cannot be easily edited (in terms of typing new words).

It is possible to see the properties for *3D Text*, or anything else selected, using the **Entity Info** dialog (Figure 6.13). This can be turned on from the *Window* pull-down menu. The information presented varies depending on what is selected. This dialog can remain open while modeling.
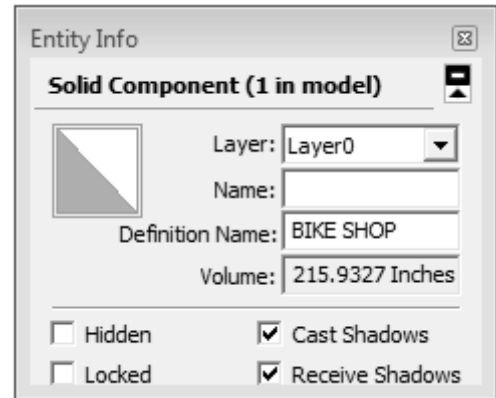

Entity Info

Solid Component (1 in model)

Layer: Layer0
Name:
Definition Name: BIKE SHOP
Volume: 215.9327 Inches

☐ Hidden   ☑ Cast Shadows
☐ Locked   ☑ Receive Shadows

FIGURE 6.13   Entity Info dialog

Components

In SketchUp one can think of *Components* being something like clipart in a word processing program – but clipart on steroids! They are pre-built models which can be reused in your SketchUp model. Some components are flat 2D models while others are complex 3D models. The simple, flat components reduce the resources required of your computer, making it easier to smoothly orbit and inspect your model. For example, many of the trees designers use in SketchUp are 2D due to the number typically needed. If 3D trees were used, the file would be large and unmanageable. The 2D components can be setup so that they always face you – plus they cast shadows (see Figures 6.14 and 6.15).
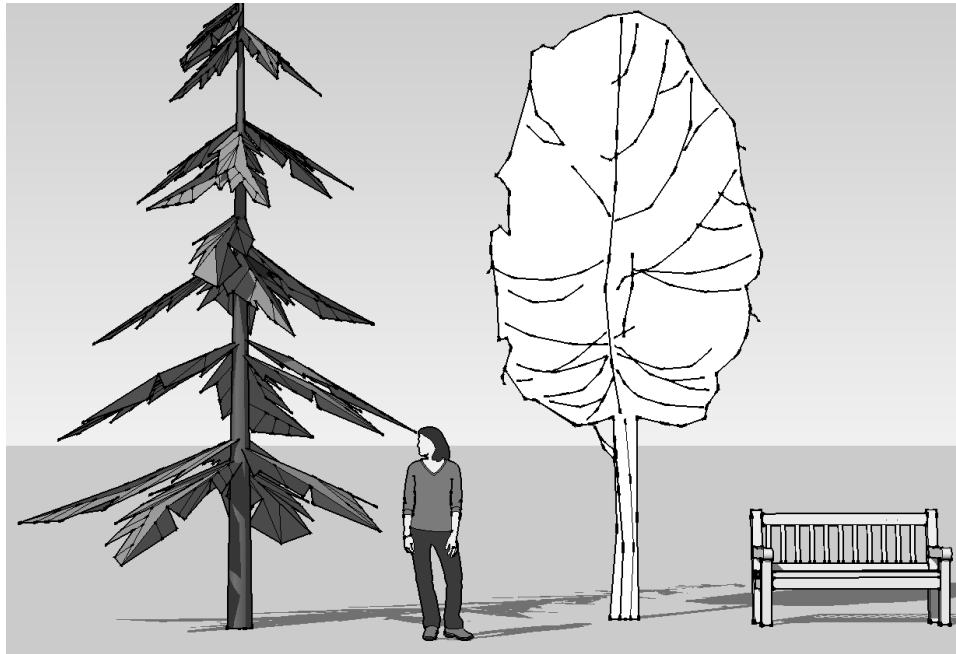
FIGURE 6.14   2D vs. 3D components; two items are 2D and two are 3D.

Right-clicking on a *component* allows you to edit it, explode it (reduce it down to individual entities) and add parameters and parametrics using the advanced ***Dynamic Components*** functionality.

Editing a *component* causes all instances of that component, in your model, to instantly update. You will see an example of this in the next section.
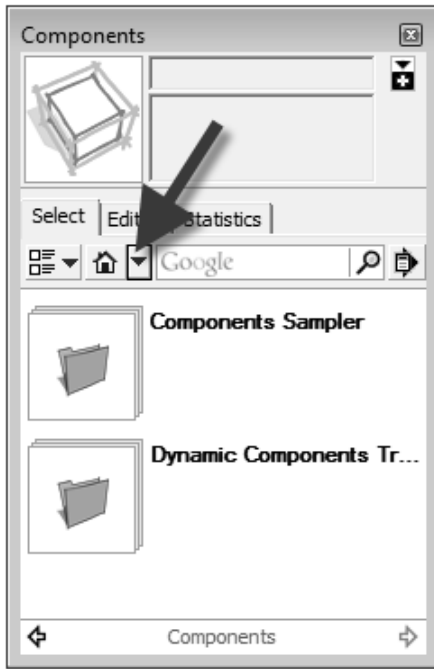
FIGURE 6.15   Rotated view of previous

FIGURE 6.16   Components dialog

One of the truly great things about using SketchUp is the amount of content the designer has access to. Google hosts a site called **Google 3D Warehouse** which has thousands of components ready for the taking.

Some of the content found on *Google 3D Warehouse* is provided directly by Google, while other content comes from manufacturers of products (who hope you will ultimately buy or specify their products) or from end users like you.

Of course, *users beware* on anything one downloads and uses in their design. As a design professional (or would-be, someday, design professional) you are responsible for code and performance compliance. So you cannot just assume the toilet or the door you downloaded is the correct size. You need to double check it with the manufacturer's data sheets. Now, if the content was created by the manufacturers it is highly probable that it is the correct size.
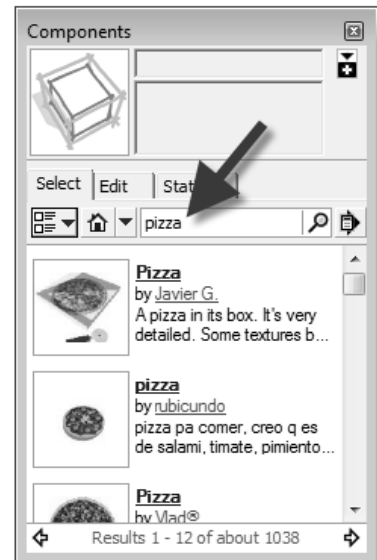
The *Components* dialog (Figure 6.16) is the easiest way to add components to your model. This can be accessed from the *Window* menu. The down arrow highlighted reveals a menu which provides shortcuts to groups of content, such as Architecture, People, Playground, etc.

FIGURE 6.17
Components search

It is also possible to search for components. You may be surprised at what you can find. Figure 6.17 shows some of the results when searching for "**pizza**"! Notice the author of the component is listed directly under the name.

Try a few searches to see what you can find – maybe try goat, newspaper, or snowboard.

See the next section for more on *components*.

Groups

A *Group* is similar to a *Component* in that you can select one part of it and the entire representation is selected (selecting potentially hundreds of entities with a single pick). However, that is about all that is the same between them.

Groups are meant for one-off type items. That is, a unique reception desk, a built-in entertainment center, etc. A *Component* is used when your model will contain many instances of an object.

Both *Groups* and *Components* are easy to create. You simply model something, select it and then right-click (on it). At this point you can select either **Make Group** or **Make Component** (Figure 6.18).

Both *Groups* and *Components* can be copied around the model (using the *Move* tool and holding down Ctrl). They both can also be edited; by right-clicking and selecting "edit" from the pop-up menu.

It is important to note that editing a *Group* only changes the specific *Group* you are editing. But editing a *Component* instantly causes all instances of that *Component* to update (see Figures 6.20 and 6.21). This means SketchUp duplicates all information required to define each copy of a *Group*. A single definition is all that is needed for multiple instances of a *Component*. Of course, this means a file with many copies of a *Group* will be larger than one with many copies of a *Component*.
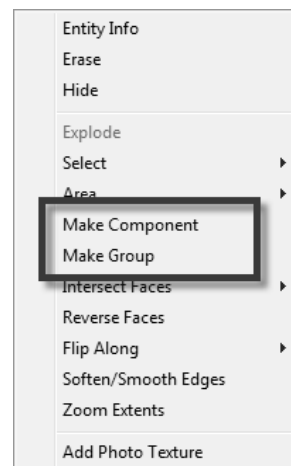

FIGURE 6.18
Right-click menu

The main thing to keep in mind is that *Groups* are quick and require minimal decisions. *Components* can be much more sophisticated and take a lot of time setting up (creating parameters and parametric relationships, and adding formulas).

When you right-click and select *Make Group*, SketchUp just makes it without asking any questions. It can be selected and named via the *Entity Info* dialog if you wish.

When creating a *Component*, the *Create Component* dialog appears (Figure 6.19). Notice the various options:

- Glue to – does the tree stick to the ground or float in the air?
- Always face the camera – this is ideal for flat two-dimensional items.
- Replace selection – turn the current selection into one of the *Components* you are creating.
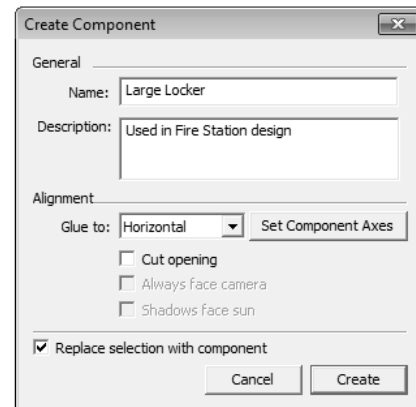
FIGURE 6.19   Right-click menu

The images below compare what happens when a *Component* is edited versus a *Group*. Notice all instances of the *Component* are updated, whereas only the selected *Group* being edited is updated (even though the other *Groups* are copies of the one being edited).
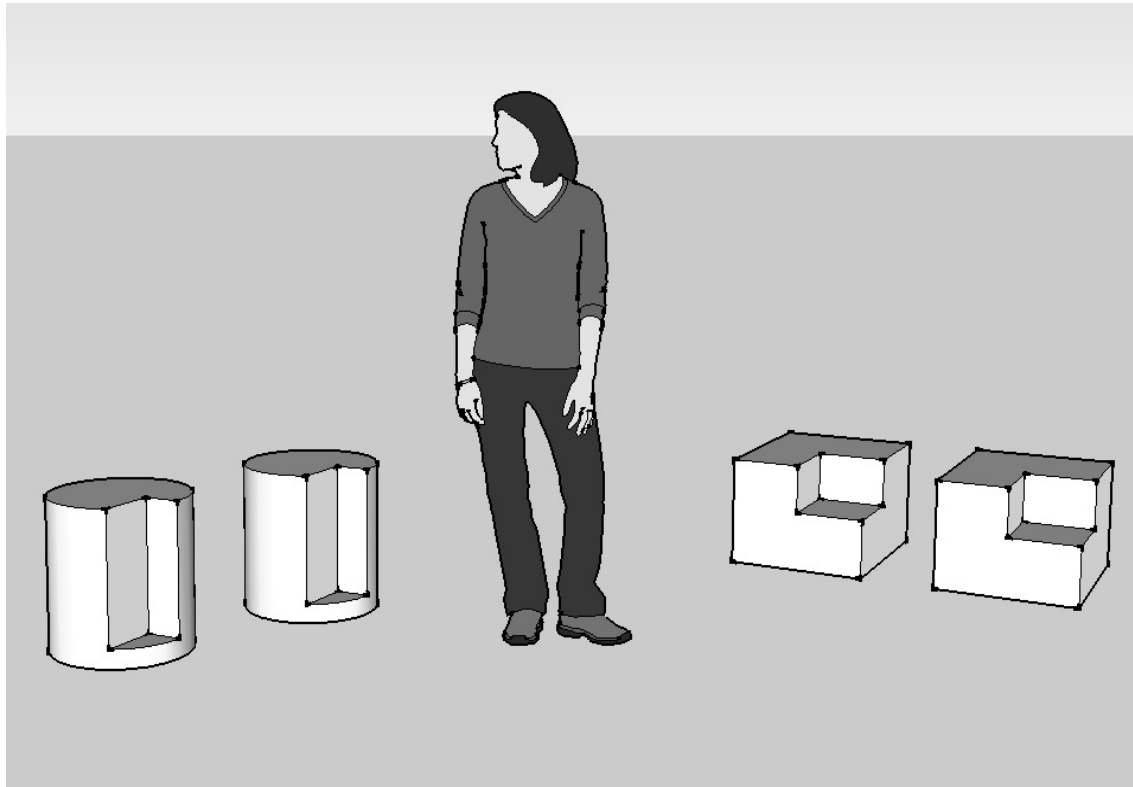
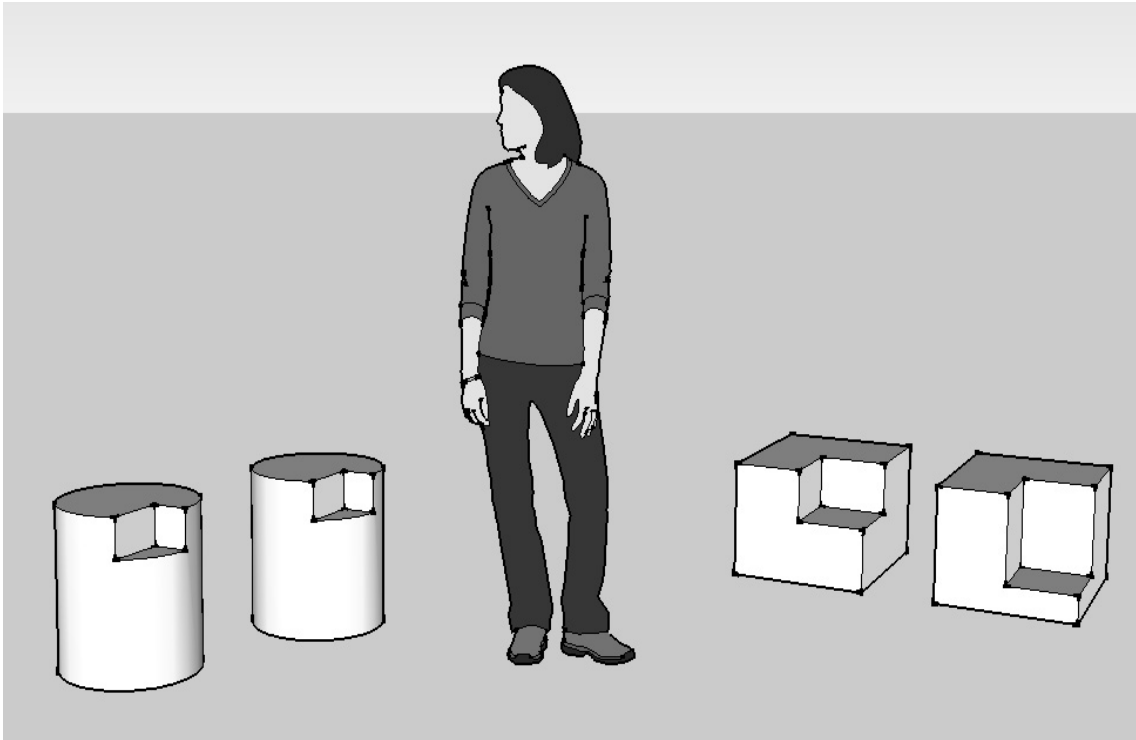**FIGURE 6.20** Components vs. groups – components on the left, groups on the right

FIGURE 6.21 Components vs. groups – all components update, only selected group updates

Guides

Guide lines (or construction lines) are useful for new users and for a general design reference grid. The image below (Figure 6.22) shows the main *Axes* and a few *Guides* at 5′-0″ intervals. These lines are parallel to the main *Axes* and are infinite in length. Note how they converge at the horizon line.

The ***Tape Measure*** tool is used to create *Guide* lines. Follow these simple steps to create one:

- Start the *Tape Measure* tool.
- Click on the *Edge* of any shape or *Axes*.

> *FYI: Clicking on an endpoint creates a Guide Point.*

- Drag the cursor perpendicular to where you want the *Guide*
- Release the mouse to locate the *Guide*.
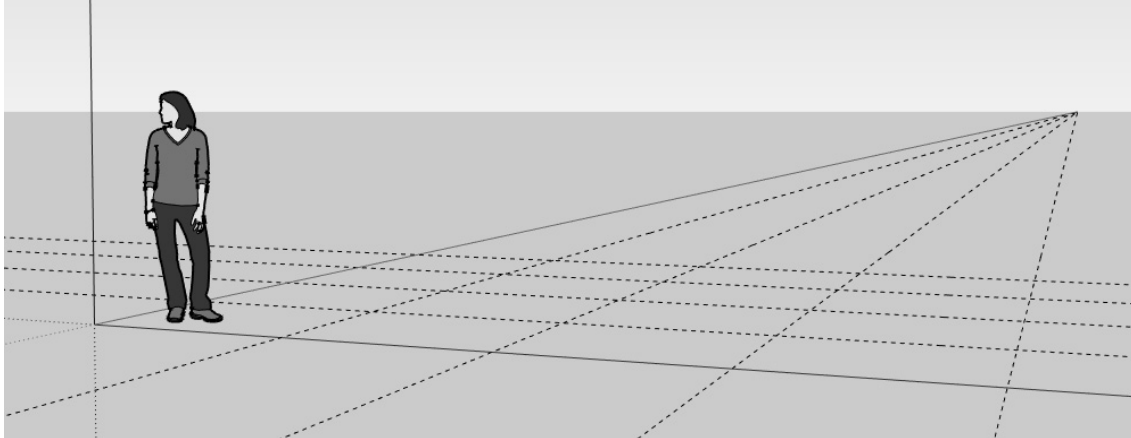- Type in a length to (retroactively) adjust the *Guide* location.

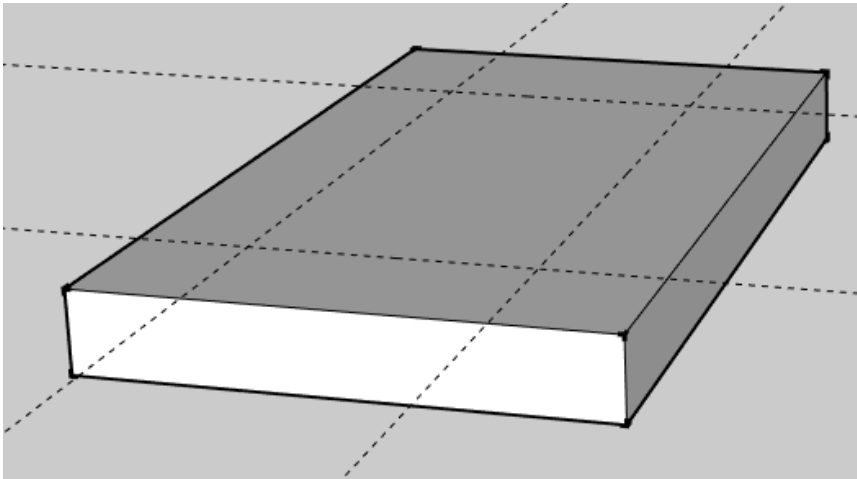**FIGURE 6.22**   Guides added at 5′-0″ intervals

FIGURE 6.23   Guides added on top of a surface

Guides can be selected and deleted. They can also be relocated with the *Move* tool. They can be rotated with the *Rotate* tool as well.

You can quickly hide the *Guides* via the *View* menu (Figure 6.24). Notice the *Axes* can also be toggled off/on here as well.

Guides can also be placed on a *Layer* and hidden. This would allow you to hide some *Guides* while leaving others visible. Simply create a *Layer* using the *Layer* dialog (*Window* → *Layers*). Then select the Guide(s) and switch them to another *Layer* via the *Entity Info* dialog (see page 4-7).

If you can see *Guides* on the screen, they will print. You need to hide them before printing if you do not want them to print.
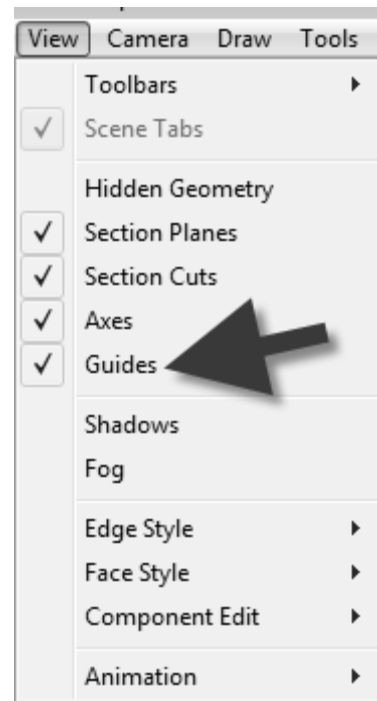

FIGURE 6.24
Guides visibility