# SketchUp Simplified

**The world's most accessible design software lets you plan your woodworking projects with confidence and realism.**

*A s both the staff nerd and a laughably poor design doodler, I was thrilled when Trimble SketchUp (formerly Google SketchUp) was released for free to the public in 2006. (Download it at sketchup.com.) Since that time, a project rarely passes through my shop that isn't first designed in the 3D modeling software. Why? You can visualize a project far better, getting a sense of its size and proportions. You can test and prove various aspects of the project: for example, the clearance for the rotation of the flip-top bench on page 50. And you'll feel far more confident putting blade to wood after modeling in SketchUp—as if you've built the project once already before even setting foot in the shop.*
*Because you can get started with knowledge of only a handful of its tools, SketchUp is one of the least intimidating CAD tools around. But the depth beyond those basics is what makes it a particularly nice design tool for woodworkers.*

Digital Content Manager

**M**ost of SketchUp's basic functions can be handled with just a few tools. Learn these basic tools first; then, add to your repertoire as you grow more confident. Reference the refresher on the *next page* as you practice with specific tools. The following tips work with many of the tools.

▶Keyboard shortcuts (hitting a letter instead of clicking on a tool's icon) speed sketching. As you practice and improve, you'll waste less time hunting for the icons.

▶Many of the tools display "axis inference hints"—colored lines that indicate the direction of the tool action, such as when you move a part across the workspace. When the inference turns red, green, or blue, it means you're moving parallel to an axis. Your keyboard's arrow keys lock the movement parallel to an axis direction: right to the red axis, left to green, and up or down to the blue axis.

▶Most tools for creating or manipulating geometry accept numerical input for precise measurements. For example, with the line tool, click to start a line, drag in the desired direction and type in a number in inches (along with fractions or decimals); then, hit "Enter" for a precise line length. The rotate tool accepts degrees; the scale tool accepts a ratio (1.5 = 150%); the rectangle tool accepts coordinates in the form of "x,y" (ex. 1.5,6 for a 1½×6" rectangle), etc.

▶Often you'll find yourself using a tool to the extreme edge of the window (for example, when measuring an edge that extends off the screen). Many of the tools for creating or manipulating shapes can be interrupted mid-use to pan, orbit, or zoom as necessary for a better view. Then simply switch back to the previous tool to continue your already-in-progress operation.
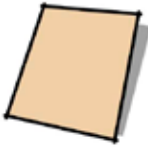
# SketchUp refresher

*Note: Keyboard shortcuts are noted in parentheses.*

## Tools for creating shapes

Quickly go from marking points, to drawing lines, to creating polygons (2D "faces"), to extruding 3D shapes using these tools.

**Line tool (L):** Click between two points to form a line. Drawing a polygon with multiple lines closes the shape, creating a 2D face.

**Rectangle tool (R):** Click between two points to create a rectangle. Or type in precise "x,y" dimensions.

**Push/Pull tool (P):** Click and drag to extrude a 2D face into a 3D shape. The push/pull tool extrudes in a direction at a right angle to the face.

**Tape Measure (T):** Drag guides to precise locations and shapes snap to them. Or click between points to reveal the distance in the measurement field.

## Tools for manipulating shapes

Once you've created shapes, these tools let you position and manipulate them.

**Select tool (Space Bar):** Click or drag a box around items to select components or geometry. Multiple clicks open up "grouped" components. Shift-click to add to—or subtract from—your selection.

**Move/copy tool (M):** Click and drag to move a selected object to a new location. Press the Ctrl key to move a *copy* of the object to a new location.

**Rotate tool (Q):** Click and drag to rotate the selected object. Press the Ctrl key to rotate a *copy* of the object into a new orientation.
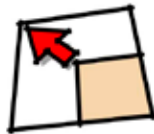
**Scale tool (S):** With this tool, the selected object sprouts "handles" for resizing the object's length, width, or depth. Holding the shift key scales all three proportionally.

## Tools for moving around 3D space

SketchUp creates the illusion that you are viewing a virtual 3D scene through the lens of an imaginary camera. These tools let you control that camera:

**Pan tool (H):** Click and drag to move the camera (your viewpoint) horizontally and vertically to focus on a project part or area.

**Orbit tool (O):** Click and drag to rotate the camera around the scene for viewing various sides of objects.

**Zoom tool (Z):** Click and drag up to zoom closer or down to zoom farther away. This proves useful for focusing on small details.

**Zoom Extents tool:** You'll sometimes find yourself lost inside an object, blocking your view. This tool rescues you. Click it to make the entire project visible again.

The "Large Tool Set" offers several essential-to-woodworking tool options not found in the default basic toolbar. Open it from View→Toolbars→Large Tool Set (or View→Tool Palettes→Large Tool Set, on Mac).

Customize the basic toolbar with your most frequently used tools.

The first time you use SketchUp, choose Window→Preferences (SketchUp→Preferences on Mac) and click on the Template option. Select the option for "Product Design and Woodworking - Inches." This sets your default unit to inches. You only have to do this once; the option will be selected the next time you launch SketchUp.

The Layers window and the Components window can be useful as you build. Open them by selecting "Layers" and "Components" in the "Windows" menu. We'll discuss their functionality later in this article.

The axis keeps you oriented in 3D space: blue for vertical, red for horizontal, and green for depth. Axis inference tools (lines indicating the direction of tool action) turn corresponding colors when they parallel an axis.

Select any tool and tool hints give you brief instructions on its use. These are invaluable as you get started.

The Measurements field displays distance (or angle) as you use a tool freehand. It is also where you type measurements—in either decimal or fraction form—to give precise dimensions to lines and shapes. (To use fractions, add a space between the whole number and the fraction.)
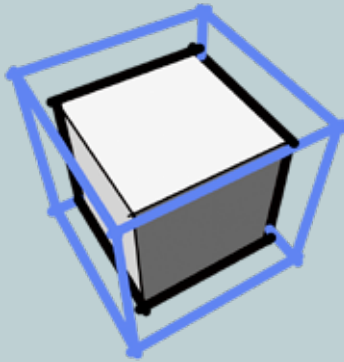
The **Make Component tool (G)** groups selected shapes into a discrete part called a "component." Make a change on one component and that change propagates to all copies of that component.

**T**he equivalent of a project part is a "component" in SketchUp. When you first draw any shape in SketchUp, it is "sticky," meaning that two shapes placed adjacent to one another, as shown at *right*, meld together—often in ways that make further editing difficult, if not impossible.

To combat stickiness, convert a shape into a component as soon as possible. Generally this means as soon as it is three-dimensional (for example, just after you've used the push/pull tool to extrude a rectangle into a block). To do this, right-click on a face of the geometry and choose "Select→All Connected. "Then click on the component icon, *above*. It's a good idea to name and describe the component; then, click "Create" to add it to the list. Double-click a component to focus on it and unlock it for editing.

Aside from shedding their stickiness, components come with one extremely handy property for designing woodworking projects: Changes made to one component are reflected on all copies of that component.

For example, rather than separately creating four table legs, tapering the outer faces of each, and adding mortises to the inner faces, you can create one leg-sized component and duplicate it three times. Flip each component along the red and green axes as necessary by right-clicking and choosing "Flip Along." Then double-click one of the legs (to open the component for editing) and add the tapers and mortises to that leg, *right*; the three others update automatically. Click anywhere outside of the component to close it.
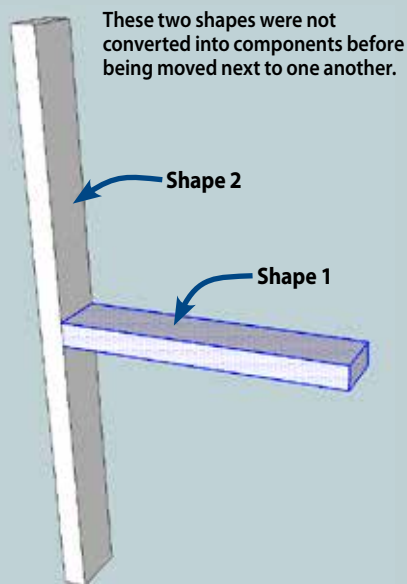
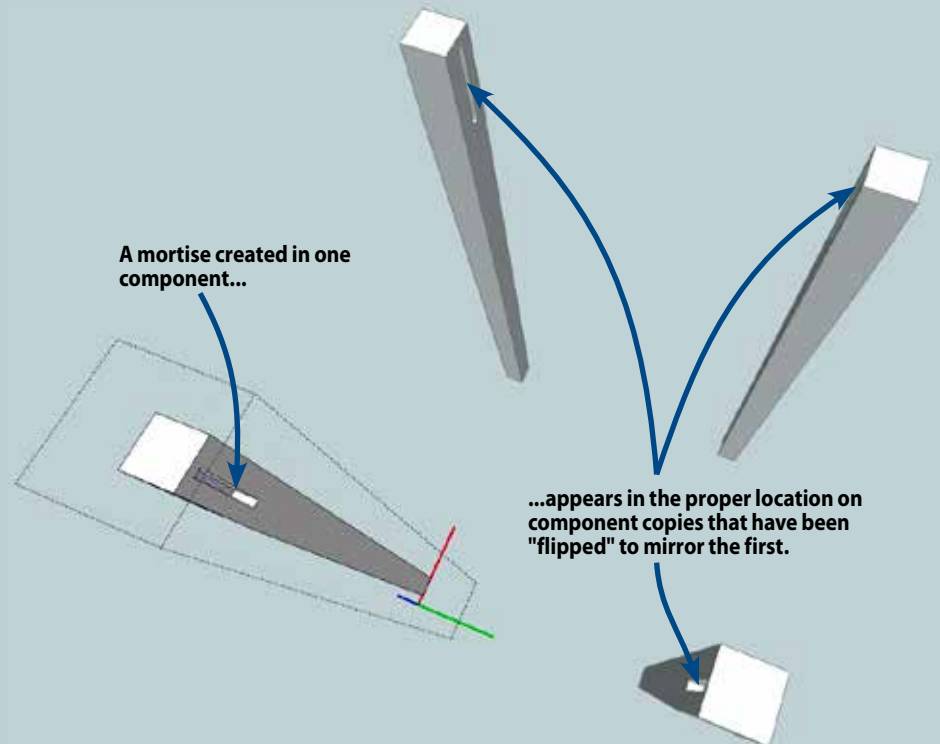These two shapes were not converted into components before being moved next to one another.

**Shape 2**

**Shape 1**
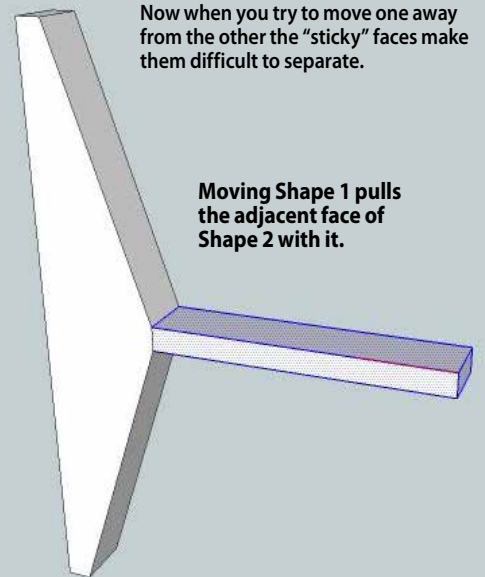
Now when you try to move one away from the other the "sticky" faces make them difficult to separate.

**Moving Shape 1 pulls the adjacent face of Shape 2 with it.**

**A mortise created in one component...**

**...appears in the proper location on component copies that have been "flipped" to mirror the first.**

To add details to one of the components without changing the others, simply right-click the component, and choose "Make Unique." The part becomes a distinct component, and changes made to it are no longer reflected in its former siblings.

Components collect in the components panel. Even when you delete a component from the screen, you can still recover it from there. You can also use the panel to select all instances of a component or replace selected components with a different component.

Group components into subassemblies by selecting related components and choosing "Edit→Make Group." This is useful as you begin to complete sections of your drawing that you'd like to move or rotate together (like a drawer or door). Triple-click an individual component

# SketchUp's built-in router and lathe

The **Follow-me tool** acts like the Push/Pull tool except that it pushes complex geometries around corners and along curves.

**W**oodworking is not all square edges and angles. And your 3D drawings don't have to be either. It's easy enough to create curved or circular parts using the Arc and Circle tools. But one of the more powerful curve-making SketchUp tools is the Follow-me tool, found in the large tool set. With a little setup, this tool acts as either router, *right*—creating profiles along an edge—or lathe, *below*— turning profiles in the round.
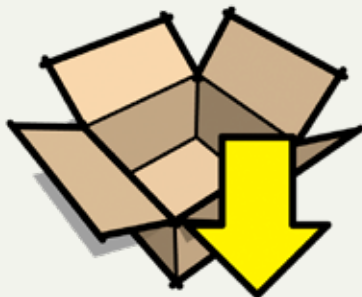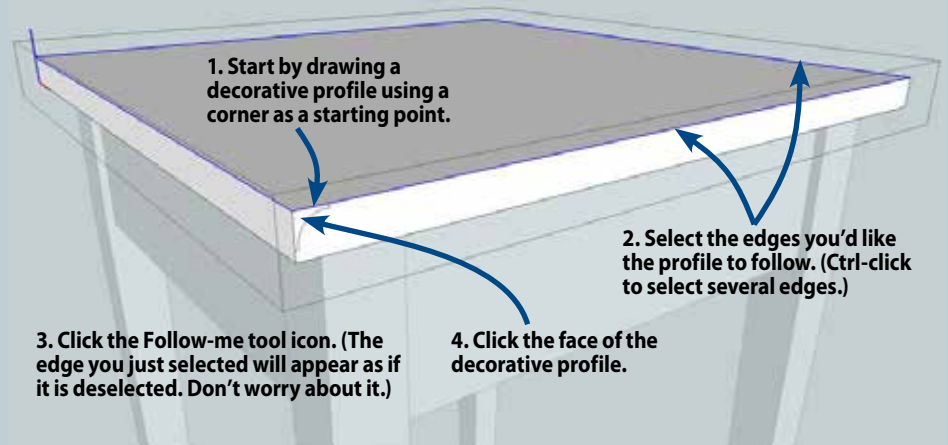
## Free model library: No drawing required

Trimble maintains a huge library of free SketchUp models in its online 3D warehouse. These can be useful as starting points, or for practice at manipulating models. They can also be useful for laying out your shop, *below*. Click the Get Models tool, *above,* to start browsing free models. When you find one you like, download it to your computer or directly into your current project.

Download models with a set of common power tools and rearrange them to fit your ideal shop layout. (Don't forget to download an ideal car while you're there!)
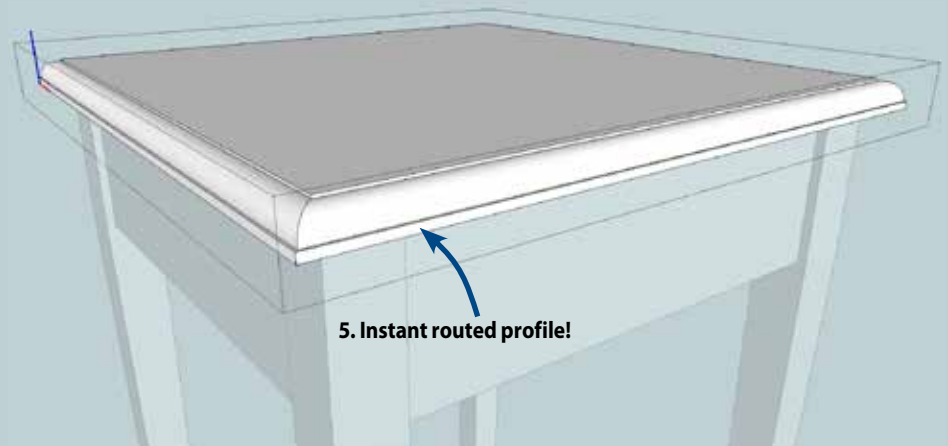
## Routing with the Follow-me tool

that is part of a group to edit it.

**1. Start by drawing a decorative profile using a corner as a starting point.**

**2. Select the edges you'd like the profile to follow. (Ctrl-click to select several edges.)**

**3. Click the Follow-me tool icon. (The edge you just selected will appear as if it is deselected. Don't worry about it.)**

**4. Click the face of the decorative profile.**

**5. Instant routed profile!**

## Turning with the Follow-me tool

**1. Create the desired half-profile of your turning.**

**2. Draw a circle with a radius that matches the radius of the turning's base.**

**3. Select the edge of the circle.**

**5. Click the face of the turning profile.**

**4. Click the Follow-me tool icon. (The edge of the circle will appear as if it is deselected. Don't worry about it.)**

**6. The instant result!**
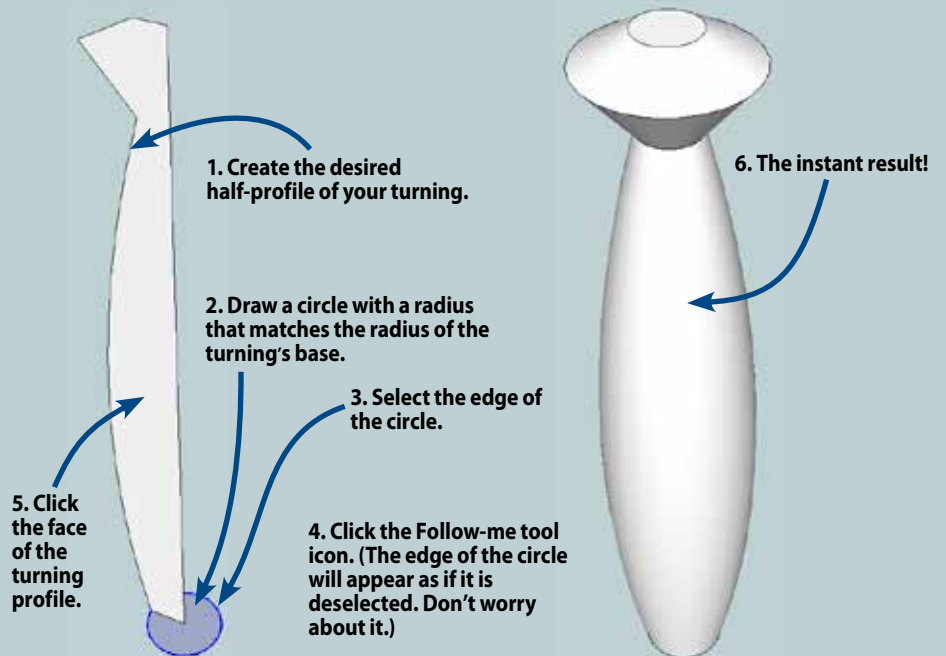
# Textures and photos add (virtual) realism



For a "real-life" sense of your project's look, color in, or "fill," its components using the **Paint Bucket tool (B).**

You'll likely exhaust SketchUp's limited library of built-in wood-grain textures quickly. Fortunately you can add wood grains from your own digital photos. (Or search for "seamless wood texture" on google.com to find free-to-use or for-sale textures that "tile"—or repeat—smoothly.) Follow the steps *top right* and you'll be prompted to choose an image on your computer. Once you've selected a wood-grain image it acts like any other color fill option.
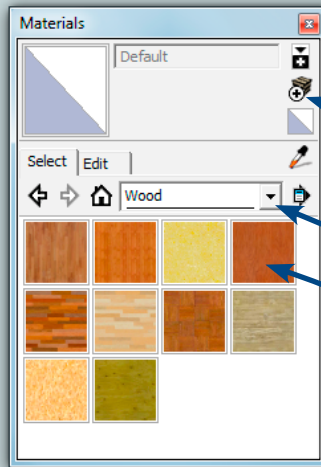


Choosing the Paint Bucket tool opens the Materials panel. Simply choose your color or texture and click on the component or face of an open component to color it.

To add your own image as a texture, click the "Create Material…" button here and select "Use texture image" (or choose "New…" from the "List" drop-down, then "New Texture" from the "Color" drop-down menu on Mac).

Choose "Wood" from the drop-down menu.

Choose the texture you'd like to use here.

Often, you'll need to scale or reposition textures to suit your project as with the rail-and-stile door shown *below*.

Use photos of real-world objects as "one-off" textures (those that don't permanently reside in your materials library). This can be useful for quickly creating an environment for your project, *bottom right*, or for reproducing projects from pictures, *bottom*. Choose photos that have been taken from an angle that is as straight-on as possible.

To apply a one-off texture, choose "File→Import." Navigate to the desired image, choose the "Use as Texture" option from the drop-down menu, and click "Open" ("Import" on Mac). The texture will appear attached to the Paint Bucket tool. Click on diagonally opposite corners on the desired face to place the texture. Reposition as you would any other texture.
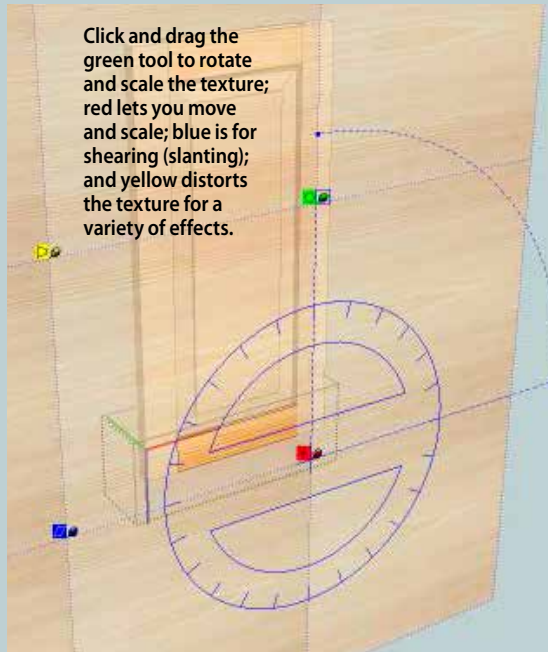
The default, vertical orientation of the texture makes the rails of this cabinet door unrealistic. Within the component, right-click on the rail face and choose "Texture→ Position."



Click and drag the green tool to rotate and scale the texture; red lets you move and scale; blue is for shearing (slanting); and yellow distorts the texture for a variety of effects.



When you're satisfied with the new position of the texture, click outside of the texture to exit the Texture Position tool.





Photos applied to appropriately sized rectangles become "story stick" references for a reproduction. Use the tape measure tool to project critical dimensions for a working model.



**Photo backdrop of client's wall**

**Matt's design**

*WOOD* magazine forum moderator Matt Seiler uses photos to help clients visualize his furniture designs in their actual settings.

**Add detailed measurements with the Dimension tool** by simply clicking one end of an edge, then the other, and dragging away the dimension.

**Choose "Parallel Projection" and "Standard Views→Front" (or your preferred view)** from the "Camera" menu to get a flattened look at your project.

**Check these boxes** to toggle layer visibility on and off.

**Use these buttons** to activate a layer for editing. The active layer cannot be hidden.

**If layers show up unexpectedly when switching between scenes, try creating a blank layer, and using it as the active layer as you switch between scenes.**

**Switch back and forth between scenes by double-clicking them.**

**When you've got everything positioned as you want it, add a scene by clicking the + symbol.**

Now it's time to turn your digital masterpiece design into a real-world masterpiece project. SketchUp has some tools that assist with that transition.

The first you'll want to know about: layers. Think of layers as places to store specific parts of your project. They're useful for controlling the visibility of those parts en masse. If you've just completed a model with SketchUp's default settings, you've been designing your project in the default layer: Layer 0. It's a good place to do your initial design work because Layer 0 can't be deleted, meaning less chance of accidentally losing work.

Now suppose you want to add dimensions to your project. You don't want these cluttering the screen all the time, but they're useful for the build. That's where the power of layers comes in. Create a new layer, label it "Dimensions," select it as the current layer, and add dimensions with the Dimension tool. Because you're working only on the Dimensions layer, you can turn their visibility on and off as needed in the Layers panel.

To print dimensioned drawings for the shop, change the view of the project. Choose "Parallel Projection" from the "Camera" menu, and then select "Standard Views→Front" from the "Camera" menu. The result is a flat, front-on view of the drawing useful for printing.

Think of scenes ("Window→Scenes") as snapshots of your project from different perspectives. Create scenes of often-used perspectives for quick switching, as shown *above*. 🌳

## Exploded layer = easy editing

Another useful layer for tweaking project parts is an exploded-view layer. Copy and paste your entire project into a new layer called "Exploded View" and begin pulling parts away for easy viewing. Create a scene with only the exploded-view layer visible for easy switching. This layer also makes tweaking easy as your project nears completion. You'll have easy access to components normally hidden from view. And since edits to one component propagate to all instances of that component, any tweaks will carry over to the assembled project on Layer 0. Remember to double-check any dimensions you previously added. Most of them will change along with any alterations, but in some cases, they could get left behind.
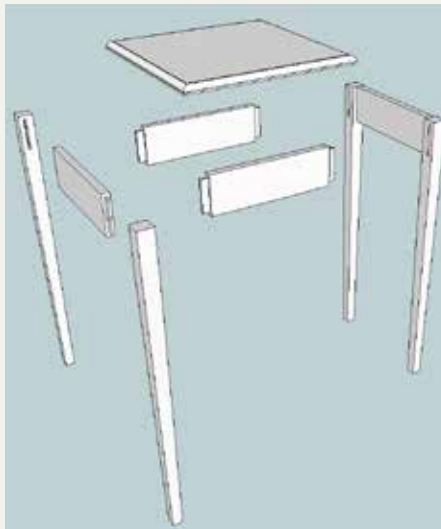
## More Resources

▶ You'll find tons of detailed SketchUp help at Trimble's website, sketchup.com.
▶ Get answers to your questions from veteran SketchUp users in the *WOOD* Online forums at **woodmagazine.com/software**.
▶ For a complete SketchUp project walk-through, visit **woodmagazine.com/napkinholder**.