



Lydia Sloan Cline



SketchUp for Interior Design

3D VISUALIZING, DESIGNING, AND SPACE PLANNING

WILEY

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Foreword

Modeling software is rapidly replacing traditional two-dimensional drafting software as the vehicle for designers to create and communicate. SketchUp has emerged as the modeling program of choice in many diverse fields as a result of its low price and relatively short learning curve. This book is for the beginner who wants to get up and running with it fast.

Why Read This Book?

You may be wondering why you should read a SketchUp book, when there is so much content online. My answer is that the online content, while very good, is not organized. If you don't know what the software's capabilities are, you don't know what to ask or search for. This book leads you through SketchUp in an orderly manner. Its intent is to acquaint you with its many capabilities. Toward that goal, tools and functions are briefly described under their own headings and then used in step-by-step examples.

SketchUp's most popular functions are introduced early, to enable you to quickly do what you want to do with it. Some tools are revisited later to show more complex options. By the time you finish, you'll have been exposed to most of the tools, one or two options for each, and some different approaches for solving modeling problems. You'll then be pointed to a site where you can ask your increasingly complex questions. End-of-chapter links to high-quality online content are also given as a guide through the ocean of Web information.


What's Covered?

Coverage is specific to the interests of interior designers and interior architects: how to model interior spaces, study scale and proportion, test different ideas, present solutions, plan spaces, and generate architectural floor plans, elevations, and sections. There are also examples that show SketchUp combined with other software programs and hand-rendering tools for maximum utility and flexibility.

Knowledge of other drafting software is not needed. However, it is assumed that the reader has basic architectural drafting knowledge, such as what floor plans, interior elevations, perspective, and isometric and section views are. This book shows how to use SketchUp to create those drawings; it doesn't discuss what they are. If you could benefit from a drafting refresher, some resources are listed at the end of this Foreword.

Since PCs are standard in the interior design and architecture fields, screenshots are from a PC. Where operations on a Mac are different, Mac screenshots are added. Pro (the pay version of SketchUp) is also discussed, because Pro is cheaply available to students and schools. While all tools in Make (free) and Pro work in the same way, Pro has additional features needed in a professional work capacity.

Extra Goodies

On the Wiley site there are video tutorials of the book's projects; look for the  symbol on the page. There is also a Homework folder full of files for completing the end-of-chapter exercises and recreating the projects yourself. Download and save the whole folder at once to your desktop so everything will be available when needed. Instructors have an additional folder with answers to the end-of-chapter questions, some project models, and high-resolution images of SketchUp drawings for showing classes how SketchUp is used in the practice of interior design and architecture.

So, let's get started!

The site that contains the videos is: www.wiley.com/go/sketchupforinteriordesign

Further Resources

Cline, Lydia Sloan. *Architectural Drafting for Interior Designers*. Clifton, NY: Cengage, 2007.

Cline, Lydia Sloan. *Drafting and Visual Presentation for Interior Designers*. Upper Saddle River, NJ: Prentice Hall, 2011.

What Is SketchUp and How Do Interior Designers Use It?

What Is SketchUp?

SketchUp is a *polygonal surface modeling program* (Figure 1–1). *Polygonal* means that everything SketchUp creates is made out of polygons (flat shapes bordered by straight lines). *Surface* means that everything it makes is hollow. *Modeling* means that it makes models, which are three-dimensional (3D) digital drawings composed of lines and faces (planes). Collectively, those lines and faces are called *geometry*.

SketchUp is also a *vector* program, meaning it creates vector files with an *skp* extension. A vector file is a collection of lines and curves that scale up or down without loss of quality. Examples are pdfs (Adobe documents) and dwgs (AutoCAD documents). This is as opposed to a *raster* file, which is made with individual pixels and loses resolution quality when enlarged. Examples are jpgs and gifs.

SketchUp is strictly a desktop application, not a Web-based one. It works on both the PC and the Mac. Files made on one platform transfer easily to the other.

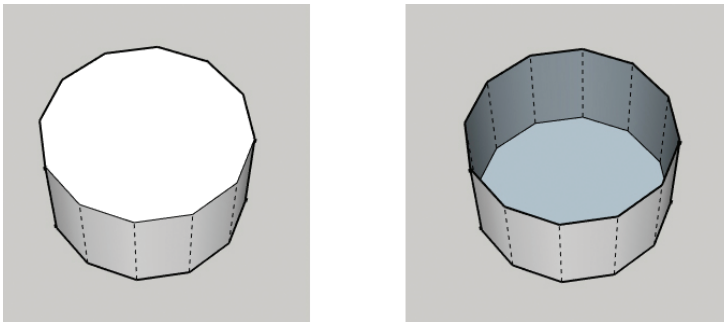


Figure 1–1: All SketchUp models, including circles, are made of polygons and are hollow.

Objective: This chapter discusses what modeling is, what SketchUp is, and how it's used by interior designers.

Concepts and Functions: SketchUp Make, SketchUp Pro, model, solid/surface/wire/polygonal model, polygon, geometry, vector, raster, BIM, attributes, dynamic component, reports, solid modeling tools

Who Uses It?

SketchUp was written as a user-friendly alternative to the complex modeling software common in the architectural field, its original user base. Previous owner Google made it free to the public, which wildly expanded its popularity beyond the original architect user base. Now interior designers, game developers, filmmakers, woodworkers, catalog illustrators, packaging designers, landscapers, and more use it too.

Is It Easy to Learn?

It's probably easier than other industry-standard modeling programs, because it has fewer features and is somewhat intuitive. But "easy" is relative. Like everything else, it still takes practice—you probably didn't make great pencil sketches right away, either.

Know that there are many ways to do the same thing in SketchUp, and no one "right" way. Some ways take a few more steps, but if you make learning it the first priority, efficiency will follow.

What Is SketchUp Used For?

SketchUp is used to electronically sketch ideas three-dimensionally—to "get your doodle on." It's the closest you can get to pencil and tracing paper for thinking out ideas. Since you can "sketch" loosely (meaning without inputting numbers), this software helps you think spatially. Height/width relationships become easy to see; for example, a hallway that seems wide in a floor plan may reveal itself as dark and narrow when the vertical dimension is added. As with a physical foam-core model, a digital model can be studied from any direction. However, SketchUp one-ups the foam-core model with camera tools that let you stroll through the digital model at eye level. Finally, SketchUp models can make the jump to the construction documentation process when the LayOut feature are added.

SketchUp has evolved into two programs: a free, noncommercial one called Make and a commercial product called Pro. Both are owned by Trimble, a company that makes positioning technology products.

The Difference between Traditional CAD Drawings and Models

With traditional computer-aided drafting software such as AutoCAD, the mouse is an electronic pencil with which you basically replicate the hand-drafting process. Three-dimensional (3D) drawings made with AutoCAD are really a collection of two-dimensional (2D) entities that give the illusion of three dimensions. A model, however, is a true 3D object that the viewer can "orbit" around and view from any position. Two-dimensional (orthographic) views are generated from it (Figure 1-2).

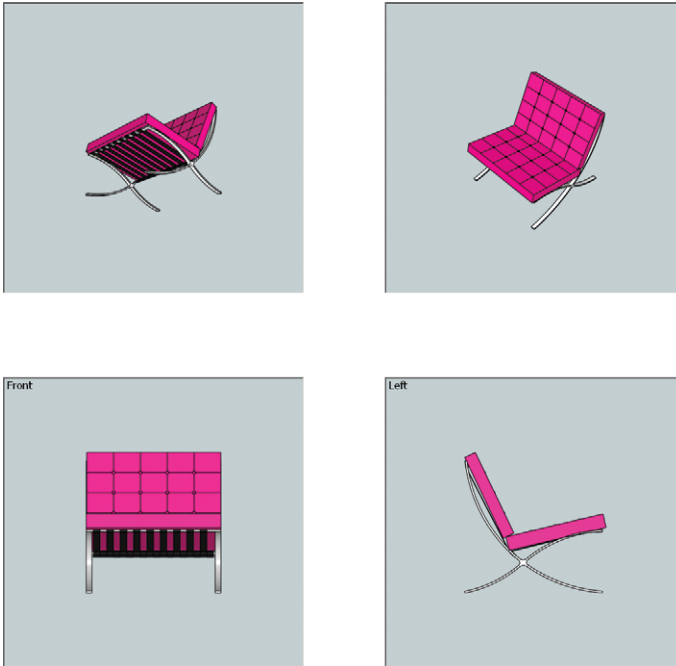


Figure 1-2: The user orbits around a model to view it from any position. Two-dimensional (2D) views are then generated from it.

AutoCAD is not a prerequisite to learning SketchUp; the two programs operate differently. If your computer drafting experience to date is limited to traditional 2D software, you will find that modeling requires a different approach. You may also find that you never want to go back to 2D software once you see the advantages of 3D.

How SketchUp Displays the Model

By default, SketchUp displays the model as a 3-point perspective. That is, all parallel lines converge to left, right, and top or bottom vanishing points. However, it can be set to display as a 2-point perspective, as an *isometric* (3D view in which parallel lines remain parallel), and orthographically (plan, elevation, and section views).

Types of Models

It's helpful to understand the different model types before you learn SketchUp, because this may affect how you plan to use it. Knowing a software program's strengths and limitations affects the time spent on a piece and its resultant quality.

There are three types of models: solid, surface, and wireframe (Figures 1-3).

Solid models are just that: filled solid inside. They contain data such as interior volume, mass, and weight. This enables you to perform tasks such as specifying a constant wall thickness or connecting and curving adjacent edges. Solid model file sizes are large, so they may run and regenerate slowly. *3ds Max* and *form•Z* are two solid modeling programs popular with architects and interior designers.

Surface models are hollow with a thin skin, composed strictly of lines and faces (planes). You can create complex curves and forms, but only surface data—e.g., area—is stored. A surface model doesn't recognize geometry as specific features; for example, where a solid model would recognize a staircase and perform relevant calculations, a surface model just sees the staircase as lines and faces. Surface models are used when the designer is primarily concerned with external form and appearance. Their file sizes are generally smaller than those of solid models, so they run faster. Besides SketchUp, another popular surface modeling program is *Rhinoceros 3D*.

Wireframe models are the simplest. They only contain information about the object's edges and intersections. As the name implies, this model appears constructed from wires. Its file size is very small; hence, it runs quickly. Wireframes can be created or displayed with any modeling software.

BIM, or *building information modeling*, refers to a particular, data-rich type of solid model plus a collaboration process. A popular BIM program used in the construction industry is *Revit*.

No model type is “best”; all have unique advantages. For example, designs that require a constant wall thickness are better drawn with a solid modeler. Designs that require curved, sculpted surfaces are better drawn with a surface modeler.

Older and newer versions of SketchUp can work on the same computer, but Make and Pro cannot. Only one can be installed.

What SketchUp Make (Free Version) Can Do

The free version of SketchUp can do almost everything the commercial version can, such as:

- ▶ Make complete interior and exterior models
- ▶ Add color, texture, shadows, and geolocation information
- ▶ Apply styles that simulate art media, such as pencil and watercolor

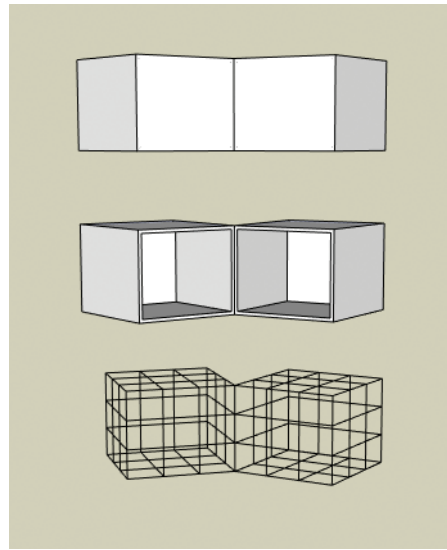


Figure 1-3: Solid, surface, and wireframe models.

- ▶ Make, download, and edit components
- ▶ Download and use dynamic components
- ▶ Download and use plugins (add-on software)
- ▶ Create (low resolution) raster files and animations of the model
- ▶ Import raster files of floor plans to trace, and of real-world materials to apply
- ▶ Export the model to 2D image formats

Pro has additional features that working professionals need.

What SketchUp Pro Can Do

- ▶ *Import AutoCAD (dwg) and Revit (rvt) files* (Figure 1–4). This turns them into SketchUp geometry, which enables precise modeling from existing floor plans (tracing a raster file may be time saving but is not precise). Layers and blocks are also preserved.
- ▶ *Export SketchUp models into formats that can be directly imported into AutoCAD or Revit.*
- ▶ *Create presentation boards and design documents from the model.* This is done with LayOut, a feature that installs with Pro as a separate program (Figure 1–5).



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Figure 1–4: An AutoCAD floor plan imported into SketchUp Pro and partially modeled.

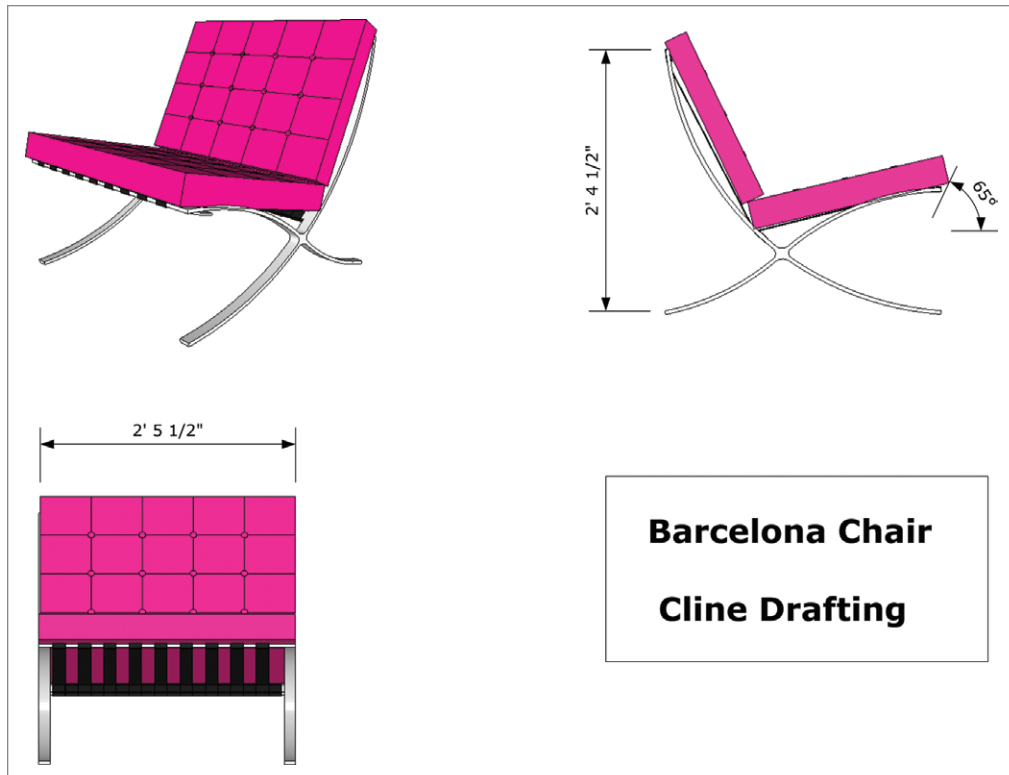


Figure 1-5: LayOut enables you to create a design document from a model.

- ▶ *Make custom line weights and styles, giving the model a hand-drawn appearance* (Figure 1-6). This is done with Style Builder, a feature that installs as a separate program.
- ▶ *Export high-resolution animation and raster files.* These are more suitable for printing and presentation than the low-resolution files the free version is limited to.
- ▶ *Create and edit dynamic components.* These are models programmed to store information and perform specific actions (Figure 1-7). For instance, staircases can add steps when height is adjusted, and cabinets can store price and parts information and open doors with a click.
- ▶ *Perform additive and subtractive modeling tasks, or what engineers call Boolean operations.* This saves steps, making for a faster workflow (Figure 1-8).
- ▶ *Generate reports* such as materials takeoffs (e.g., how much paint to buy based on the area of walls in the model).
- ▶ *Receive upgrades, maintenance, and support on technical problems via e-mail and phone.* Such support is for installation and licensing issues, not tutorials on the software.

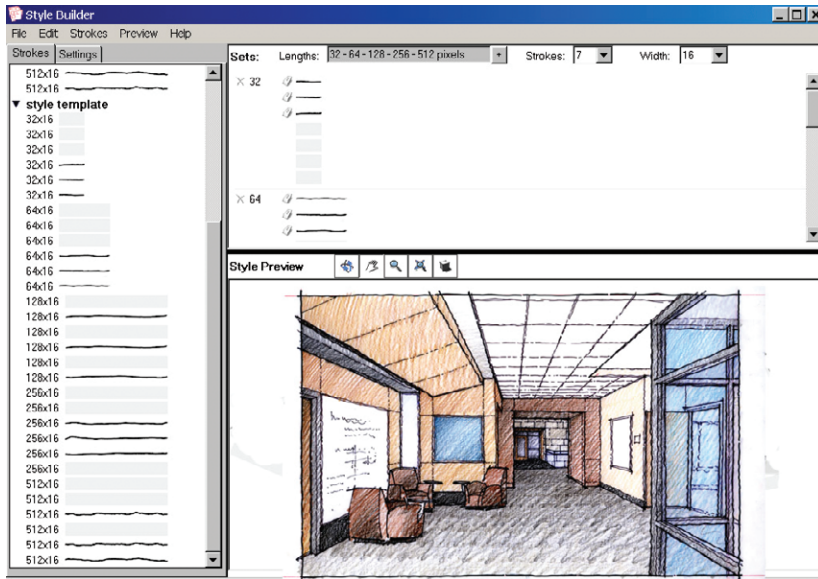


Figure 1-6: Style Builder creates models that look hand-drawn.

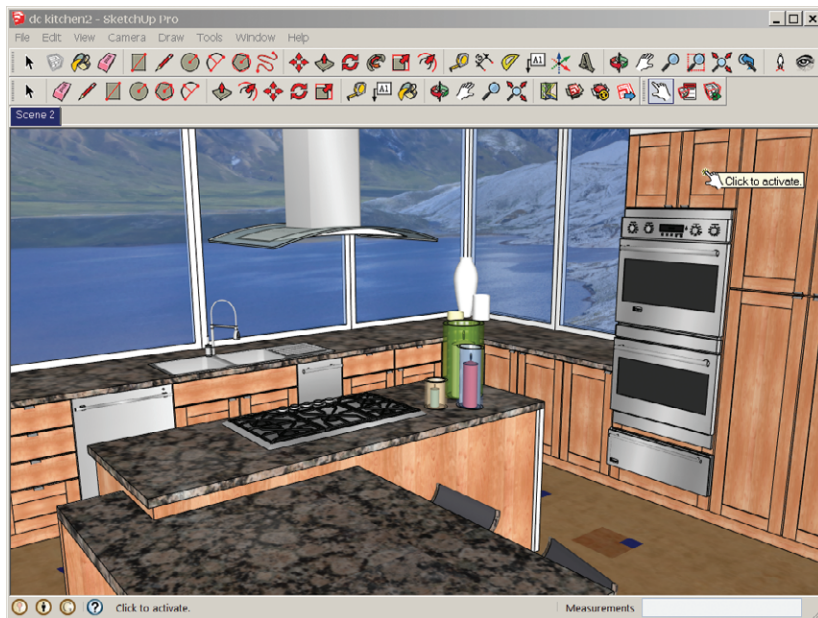


Figure 1-7: Clicking on this dynamic cabinet component makes the door open to show storage options.

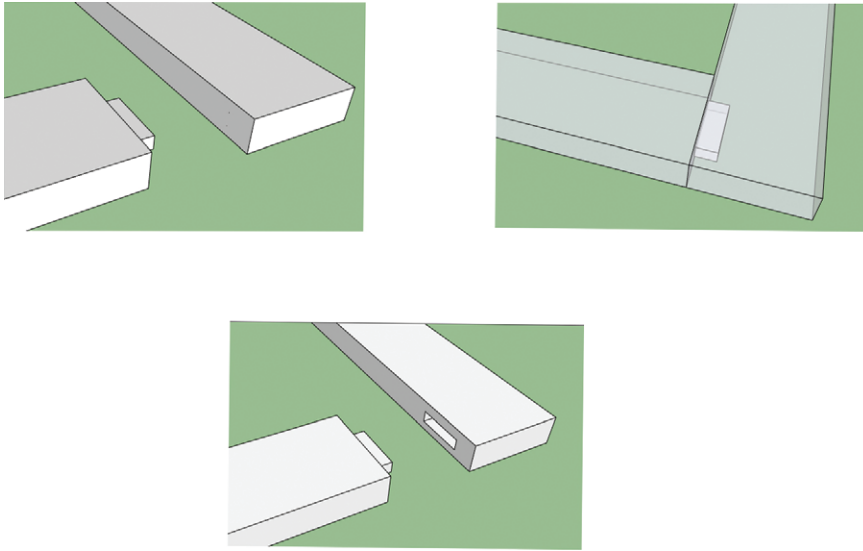


Figure 1-8: With solid modeling tools, a tenon is pushed into a block of wood, then pulled away, revealing a clean mortise joint automatically created.

Purchase Pro

A single, nonexpiring license for Pro costs \$590, which includes a year's maintenance subscription. Upgrading to new versions after one year costs \$95. Offices can buy single-user and network licenses. A single license installs SketchUp on any computer, but only one can run it at a time. With a network license, you pay for the number of seats or *instances* desired (with a 50-seat minimum required for a first purchase). The software can be installed on as many computers as wanted, and the license resides on a server. You can run as many instances of SketchUp as you bought seats for. Network licenses can't be used off-site because SketchUp must detect the license before starting. Thus, if you wanted to bring a laptop to a client presentation, a single-user license would be needed.

Purchase a Pro Educational License

Students enrolled at accredited schools can purchase a \$49 educational version that expires after one year. It is fully functional and doesn't watermark images, but it doesn't permit commercial use. Upgrades during the license's year are free. You can also repurchase the license after expiration if still a student. Obtain it through SketchUp's network of educational resellers; see Further Resources at the end of this chapter.

How Designers Use SketchUp

Following are examples of ways SketchUp can be used by interior designers and interior architects, both by itself and as part of a larger workflow.

- ▶ Solidify a pencil-and-tracing paper floor plan by tracing over it, and then model the traced plan (Figure 1–9).

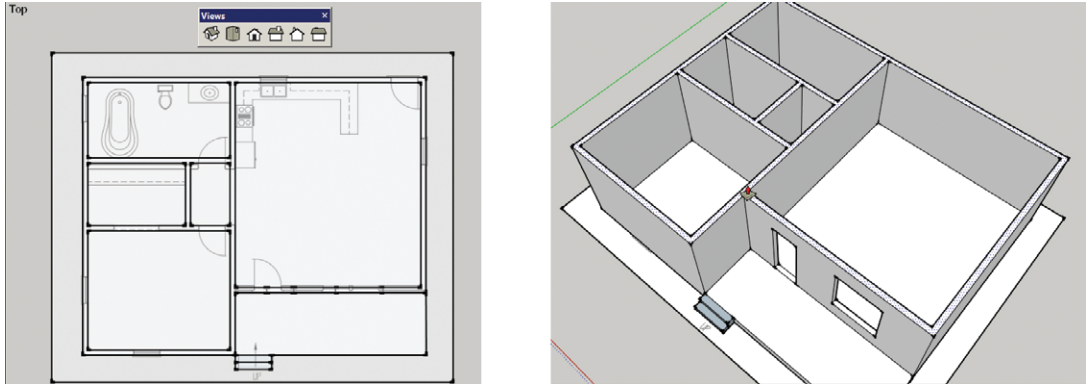


Figure 1–9: Tracing an imported plan and then modeling from it.

- ▶ Import models of specific manufacturer catalog items and use them to space plan (Figure 1–10). This enables seeing if there’s enough room for the furniture before presenting to the client. The SketchUp model scan serves as a ‘fit’ drawing.



Figure 1–10: Ready-made models of Ikea furniture and rugs, downloaded free from the 3D Warehouse.

- ▶ Change the model style to give it an artsy look (Figure 1-11) and make high-resolution PDFs for marketing materials.

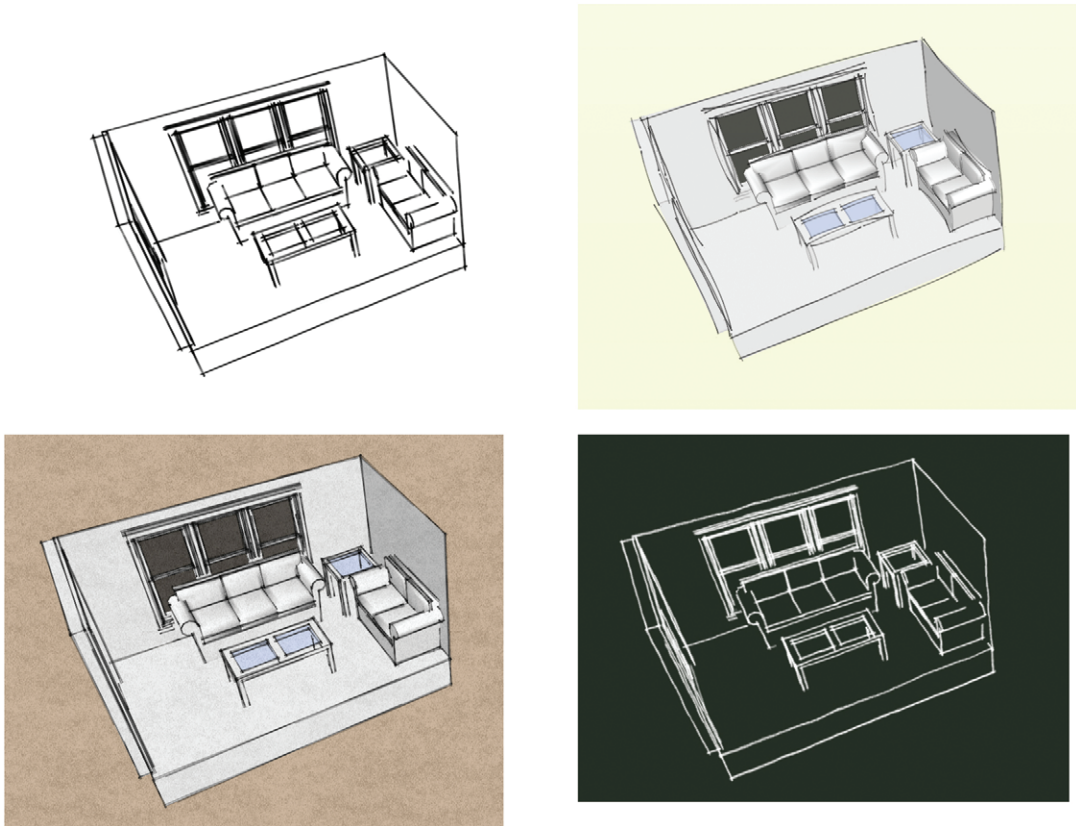
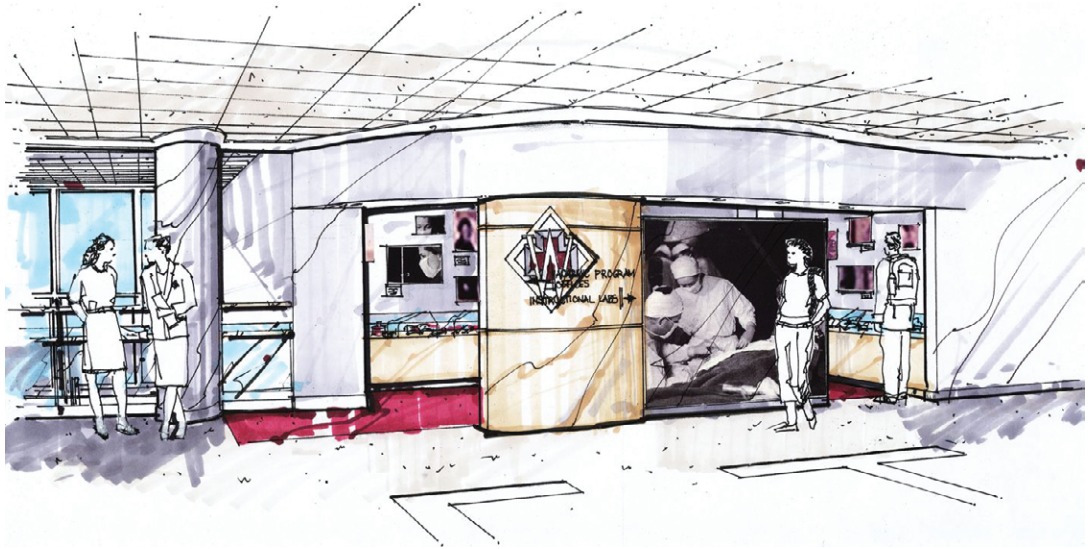


Figure 1-11: Four of the many styles available in free SketchUp.

- ▶ Use a SketchUp model as an underlay over which to trace ideas and adjustments. Print up plans and 3D views of the model, hand-color and scan, and then import them into Photoshop for lighting and text enhancement (Figure 1-12).
- ▶ Show animations and slide show scenes of different options (Figure 1-13). This enables clients to see how the design works before committing to it. Their favorite photos and wall art can also be incorporated.



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Figure 1-12: A SketchUp model was printed up and then used as an underlay for tracing and marker work.

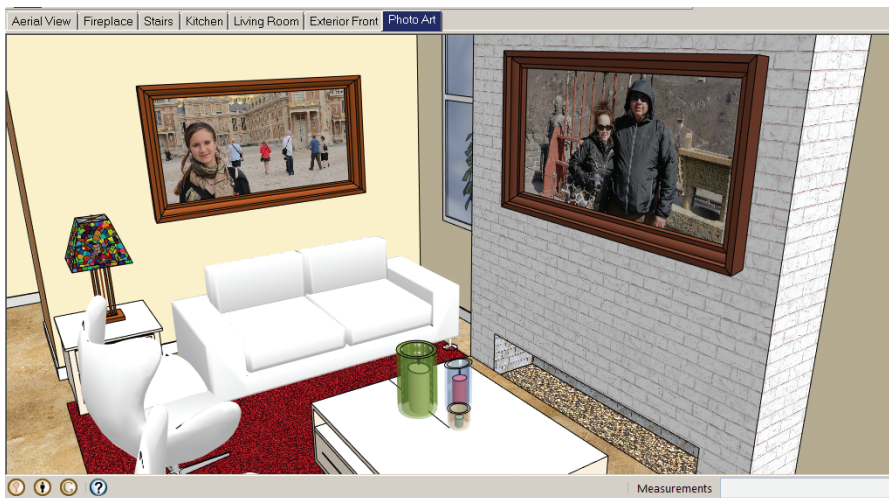


Figure 1-13: Incorporate photos into the model. The tabs at the top are preset scenes of the house for a slide show.

- ▶ Send the model to hands-on clients who want to make suggestions directly on it. Since the software is free, they can download it themselves and experiment with colors, materials, and appliances.
- ▶ Import images of the textiles specified in the design to display in the model (Figure 1-14).

- ▶ Show models of case goods to the tradespeople who will make them, enabling them to see exactly what’s wanted. Then use the LayOut feature to make construction documents from the model. LayOut can also make quick drawings for bid and permit purposes.
- ▶ Maintain a library of manufacturer-supplied dynamic cabinet components. Change the components’ size and configuration as needed, and get instant prices based on each option.
- ▶ Use Style Builder to give an “open to changes” look to the drawings. This makes them appear less like a finished product while also conveying a specific personality and brand identification.

Interested? Come on over to Chapter 2, where we’ll discuss what’s needed to run SketchUp, put it on your computer, and explore its workspace.

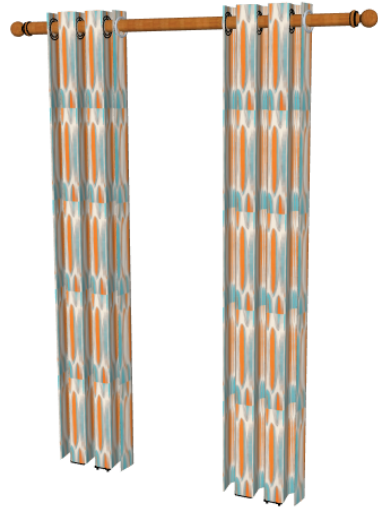


Figure 1–14: Textile pattern applied to a drapery model.

Summary

SketchUp is a surface modeling program used by interior designers for space planning, conceptual design, and client presentations. Users can think through an idea, study design options, and present them creatively. SketchUp has a free version called Make and a commercial version called Pro, which contains functions needed for professional work.

Further Resources

Buy an educational license for Pro here: www.sketchup.com/buy/eduresellers.html

Buy Pro (noneducational) here: <https://store.sketchup.com/>

Cline, Lydia Sloan. *Drafting and Visual Presentation for Interior Designers*. Upper Saddle River, NJ: Prentice Hall, 2011.

Obtain a free eight-hour trial of Pro: www.sketchup.com/intl/en/download/index.html

The Official SketchUp Blog: <http://sketchupdate.blogspot.com/>

@SketchUp on Twitter

SketchUp on Facebook: www.facebook.com/#!/sketchup

Getting Started

In Chapter 1 we discussed what SketchUp is and saw ways interior designers and interior architects can use it. Now we'll discuss what's needed to run it, and peek at its workspace.

Hardware, Operating System, and Browser Requirements

SketchUp is a graphics-intensive program. The more detailed your model, the more processing power it needs. A late-model computer and operating system is needed, specifically:

PC: At least 2+ GHz processor, 2+ GB RAM, 500 MB of available hard-disk space, and a 3D-class video card with 512+ MB of memory or higher. Video card driver must support OpenGL 1.5+. SketchUp Pro requires .NET Framework version 2.0.

Operating System: XP, Vista, Windows 7, 8, and the Internet Explorer 7.0+ browser.

Mac: At least 2.1+ GHz Intel processor, 2 GB RAM, 500 MB of available hard-disk space, 3D-class video card with 512+ MB of memory or higher. Video card driver must support OpenGL 1.5+.

Operating System: Mac OS X 10.7, QuickTime 7, and the Safari browser. Boot Camp and Parallels are not supported.

A keyboard and three-button mouse, with the third button a scroll wheel, is the easiest and most efficient way to use SketchUp. A one-button mouse or laptop track pad is doable but difficult. Three-dimensional modeling requires much more on-screen movement than 2D drafting. A scroll wheel lets you make that movement faster than clicking icons or keyboard shortcuts. Mac users, your one-button mouse can be swapped with any manufacturer's two-button/scroll wheel mouse.

Objective: This chapter discusses what's needed to run SketchUp, how to download and open it, and tours the workspace.

Concepts and Functions: three-button mouse, video card, tablet PC, graphics tablet, digital pen, computer tablet, Space Navigator, splash screen, workspace, menu bar, axes, scale figure, origin, measurements box, instance, viewer, template, Photoshop, Dropbox, Save, Save As, Save A Copy As, Save As Template, backup files

- ▶ If your scroll wheel doesn't orbit or pan, the mouse settings may need adjustment. PC users, go to **Control Panel>Hardware and Sound>Devices** and choose **Printer>Mouse**. Mac users, go to **System Preferences>Keyboard** and choose **Mouse**. Look for a *middle click* wheel setting. If this option isn't there, you may need to install a more recent mouse driver.

The Video Card

The *video card*, also called a *graphics card*, is an electronic board inside the computer that sends information to the monitor. The ones installed in most off-the-shelf PCs and Macs are for general use, not the higher demands of modeling software. Hence, they display SketchUp models with a low-resolution, jagged appearance. Stronger cards, such as the NVIDIA GTX 600 series, are made to handle modeling software's demands. They're typically installed in the computers of college drafting labs and companies that make software models. Higher-end, off-the-shelf computers such as the Dell Precision also have them. If your goal is to print SketchUp models for construction documents and marketing purposes, and make animations for presentations, consider the video card when buying or upgrading a computer.

Figure 2-1 shows screenshots made with a low-end and high-end video card. Most of the figures in this book were made with a high-end one. You might try to discern which ones weren't.

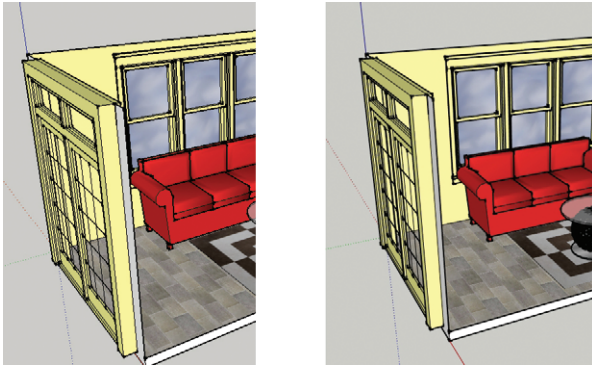


Figure 2-1: The left screenshot was made with a standard card; the right with an NVIDIA GTX-620 card.

The Space Navigator 3D Mouse

A mouse option for both the PC and Mac is Logitech's *Space Navigator* (Figure 2-2), designed for modeling software. It works similar to a game joystick, combining SketchUp's *Zoom*, *Pan*, and *Orbit* navigation tools into one. It also tilts, spins, and rolls. The Space Navigator can be used alongside the traditional mouse.



Figure 2-2: The Logitech Space Navigator 3D mouse moves through the model more efficiently than the traditional mouse, and can be used alongside it.

Speaking of joysticks, you can actually use a Wiimote controller (remote from a Wii game) as a 3D mouse, too. Free GlovePIE software needs to be installed to do this; see [Further Resources](#) at the end of this chapter.

Use a Tablet PC

Although SketchUp was designed to work with a keyboard and mouse, there are some alternatives. One is a *graphics tablet* (not the same as a computer tablet) and digital pen. The tablet's buttons can be programmed to perform multistep functions that otherwise take multiple keystrokes to perform, and the pen may cause less wrist fatigue than a mouse. Examples of graphics tablets are Wacom's Graphire, Intuos, Cintiq, and Bamboo. Pens and graphics tablets are also useful with Photoshop, which some designers import files of their models into for further development.

SketchUp can be operated in a limited manner on a Windows tablet PC. Third-party viewer apps exist for the iPad, iPhone, and Android tablet (Figure 2-3). Those apps let you view, walk

through, and even annotate the model. This is useful for an on-site presentation, e-mailing, or opening from a Dropbox (online hosting) account. Adding PDF files generated from LayOut can turn a tablet PC into a portable portfolio! But heavy-duty modeling is best done on a computer with a keyboard and two-button/scroll wheel mouse.



Figure 2-3: A SketchUp viewer app on an iPad.

Download SketchUp Make

It's time to point your browser to www.sketchup.com and download the program (Figure 2-4). You'll be asked what you'll use it for—select *Personal* for the free version—and what your specific interest, operating system, and e-mail are. The software downloads very fast, even with a slow Internet connection.



You're about to download SketchUp.

Step 1: Let's choose a product

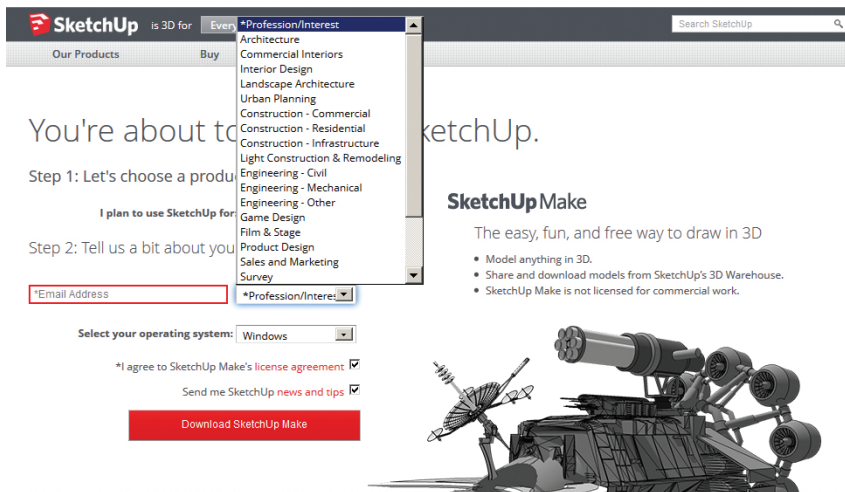
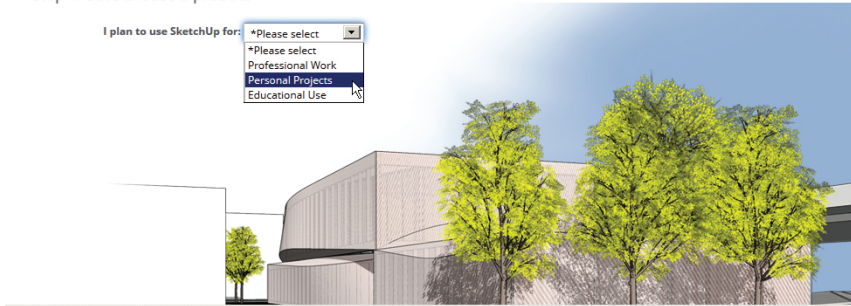


Figure 2-4: The SketchUp download process.

SketchUp installs in Windows Programs and Mac Finder/Applications. Three shortcuts (Figure 2-5) automatically appear on the PC desktop. On the Mac, the SketchUp icons appear in the dock. Right-click, select **Options>Show in Finder**, and then drag the three icons from the Finder window to the desktop, if you want.

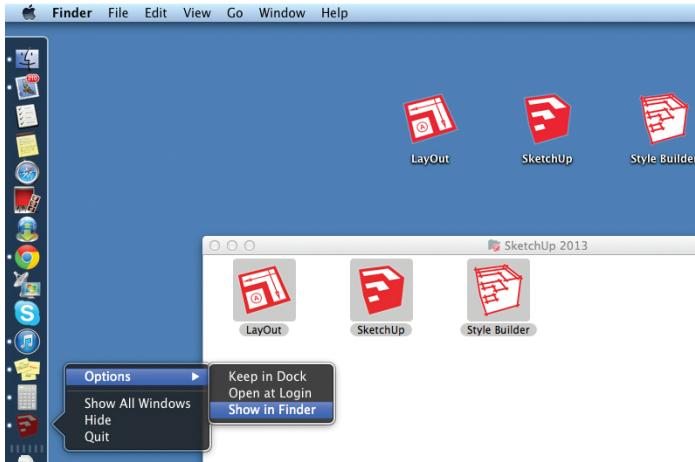
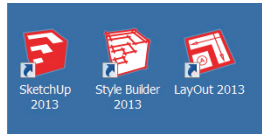


Figure 2-5: On the PC, three shortcuts appear on the desktop after installation. On the Mac, the icons can be dragged from the Finder onto the desktop, if desired.

By default you're given 8-hour trial versions of Pro, Style Builder, and LayOut. After 8 hours of use (the clock isn't ticking while the software is closed), Pro reverts to Make, and the other two stop working.

Click on the SketchUp icon to launch. A splash screen appears (Figure 2-6). As an aside, it has no exit buttons, so if you didn't mean to open it, click **ESC** to cancel. At the bottom is a collapsed window called *Template*. Templates are files with default settings, such as measurement units. Click it.

The template window opens (Figure 2-7), showing multiple choices. Choose *Architectural Design – Feet and Inches*. In this template, all length numbers entered will appear in a feet and inch format. Every number you type means inches, so you don't need to include the inch unit ("). But SketchUp recognizes dimensions in any format as long as you include their unit after the number (e.g., mm, cm, m, or (' for the foot sign).

Finally, click *Start Using SketchUp*. Figure 2-8 shows the screen. Figure 2-9 shows the PC and Mac menu bars and the Getting Started toolbars right underneath. The menu bars are slightly different; Mac users, note that yours starts with a **SketchUp** entry.

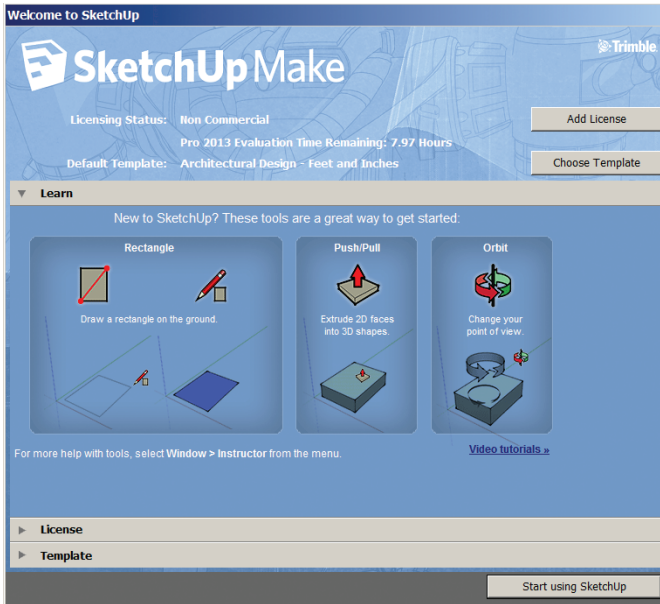


Figure 2-6: The splash screen with the collapsed Template window at the bottom.

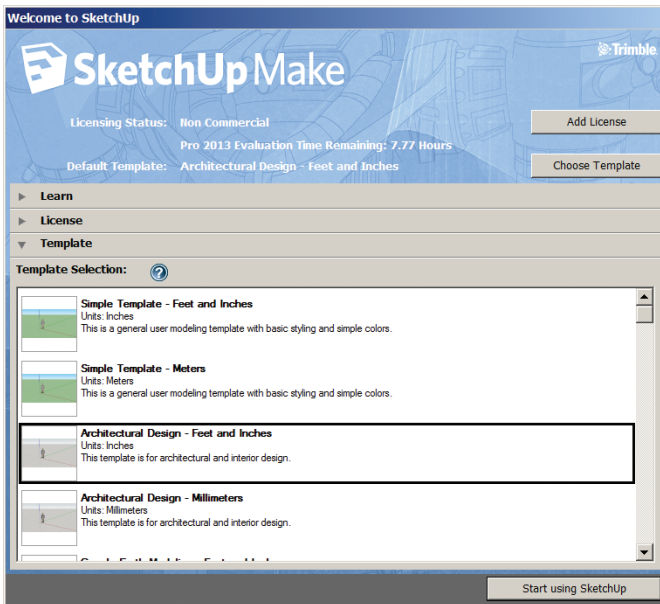


Figure 2-7: Choose the Architectural Design – Feet and Inches template.

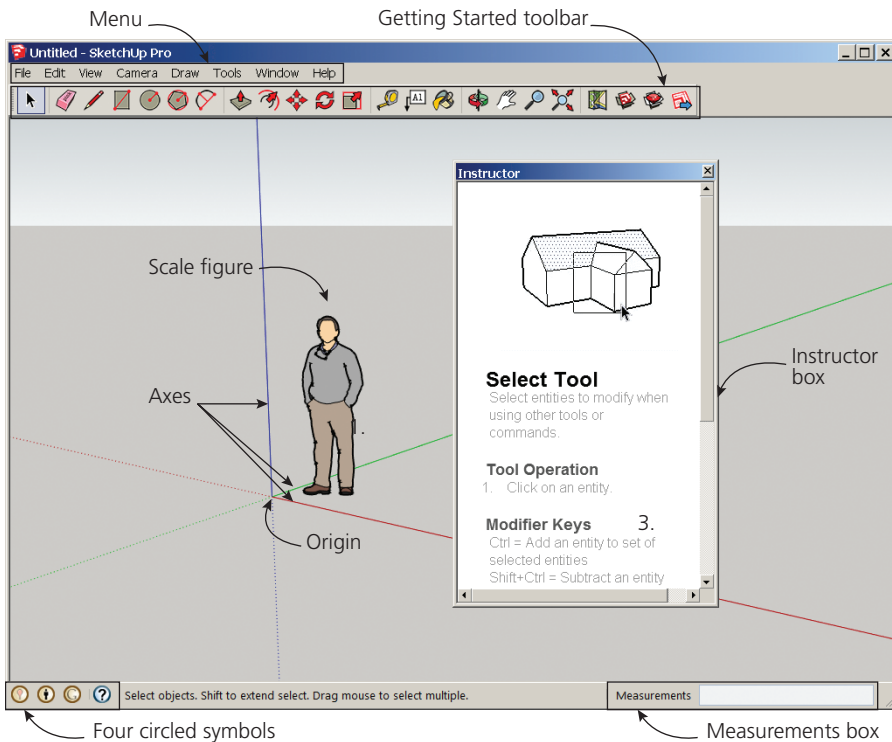


Figure 2-8: The SketchUp screen.

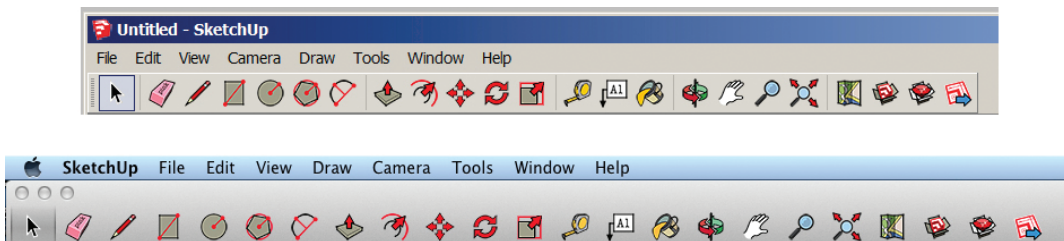


Figure 2-9: The PC and Mac menu bars.



The Workspace

The workspace contains:

The menu bar: This is a horizontal bar at the top of the screen that houses tools and functions. It has eight categories: *File*, *Edit*, *View*, *Camera*, *Draw*, *Tools*, *Window*, and *Help*.

- ▶ **File:** Contains functions that let you open, save, print, import, and export files.
- ▶ **Edit:** Contains standard cut, copy, and paste functions plus SketchUp-specific ones such as making groups and components.