

Digital City: Introduction to 3D modeling

Weixuan Li, 2017

PART I: Install SketchUp and Introduction

1. Download SketchUp

Download SketchUp from their official website:
<https://www.sketchup.com>

- Go to the download page and select 'Education Use' in Step 1.
- In Step 2, fill in your information and choose your operating system.
- In the [Choose your product] menu, select SketchUp Make (free of charge).
- Click [Download SketchUp]

Step 2: Tell us a bit about yourself

Educational Use

*Email

Send me SketchUp news and tips

*First Name *Last Name

*School Name

*You are a...

Select your operating system:

*Choose your product
SketchUp Pro 2017
SketchUp Make

Download SketchUp

Hardware and Software Requirements

2. Installation:

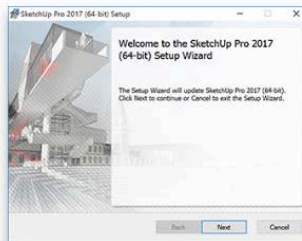
For Windows users:

📄 Installing SketchUp on your PC



Step 1

Double-click the SketchUp .EXE installer file. It's probably in your Downloads folder.



Step 2

Follow the installer instructions (you can do it!).



Step 3

Find the SketchUp icon on your desktop.

For detailed illustration in Step 2 of SketchUp installation, see: <http://designerhacks.com/install-sketchup/>

For video tutorial for installation please see [here](#).

For Mac OS users:

📄 Installing SketchUp on your Mac



Step 1

Double-click the SketchUp .DMG installer file. It's probably in your Downloads folder.



Step 2

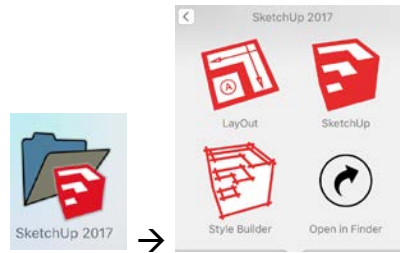
Accept our Terms of Service (please), then drag the SketchUp icon into the Applications folder.



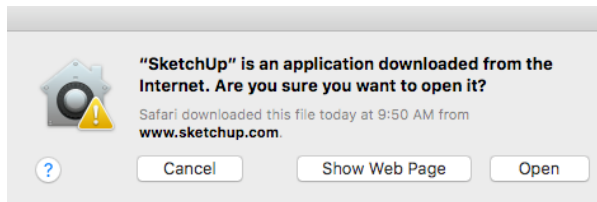
Step 3

Find SketchUp 2017 in your applications folder.

In your [Application] folder, you will find [SketchUp 2017], select [SketchUp]

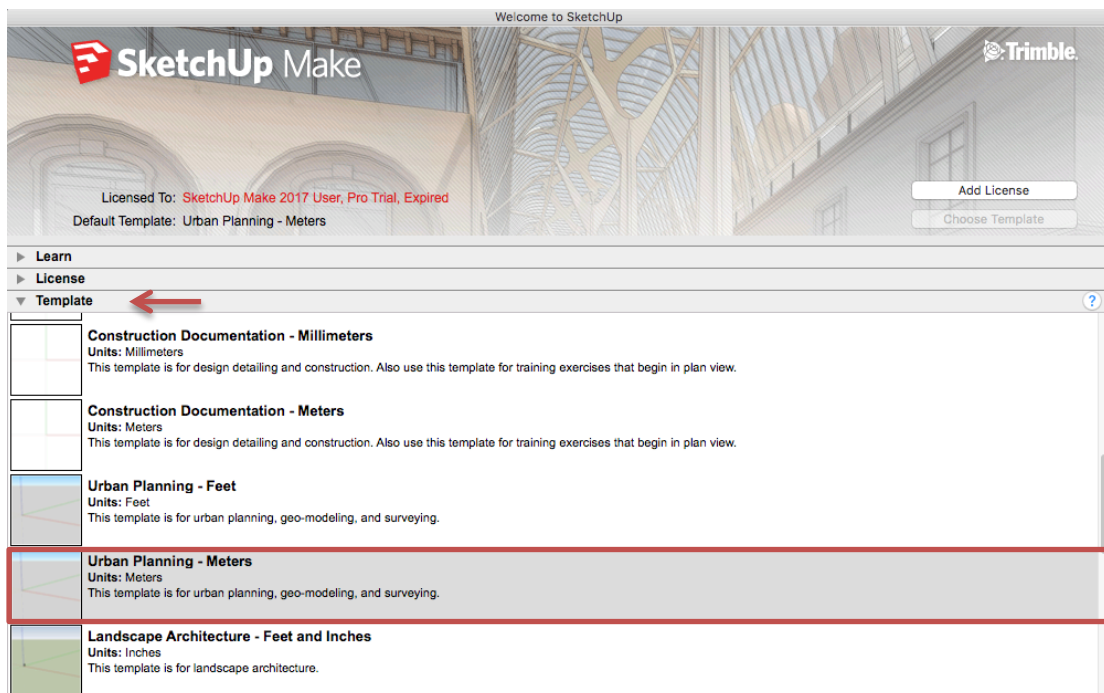


Notes for Mac OS users: Click [Open] if you see this window



3. Launch SketchUp

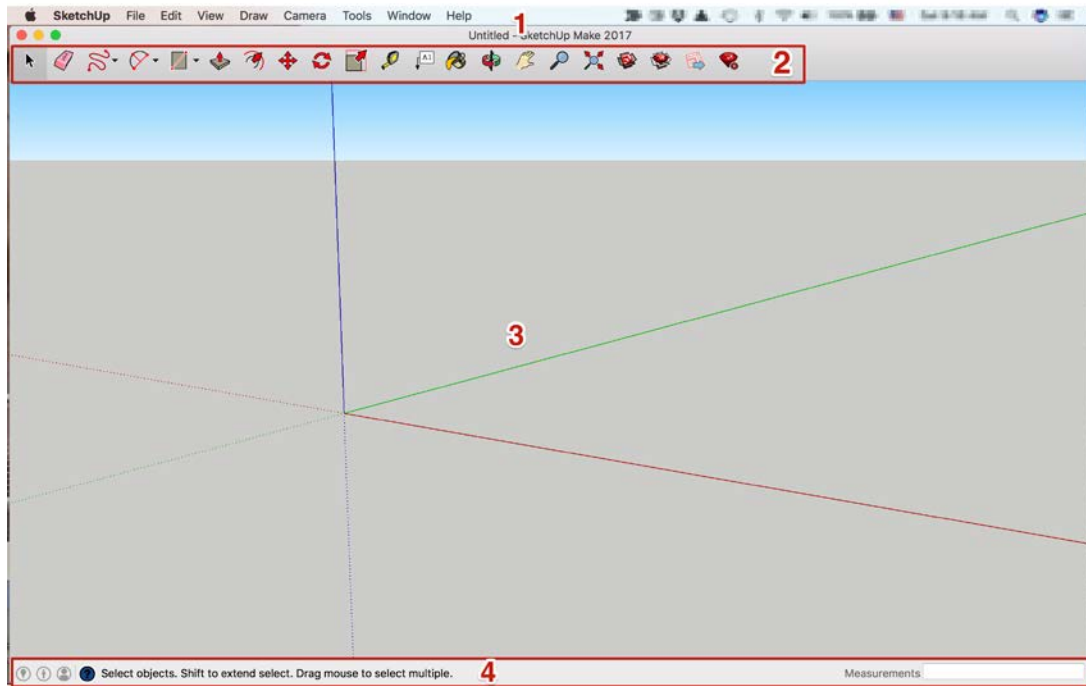
- Launch SketchUp, which will show you the welcome screen
- Scroll down the [Template] menu, select [Urban Planning –Meters] as our template



- Click [Start using SketchUp], which will give you the default

4. Exploring the SketchUp interface

When SketchUp opens, ready for you to start creating a 3D model, you will see a screen that includes the following:



1. Menu and Title bar

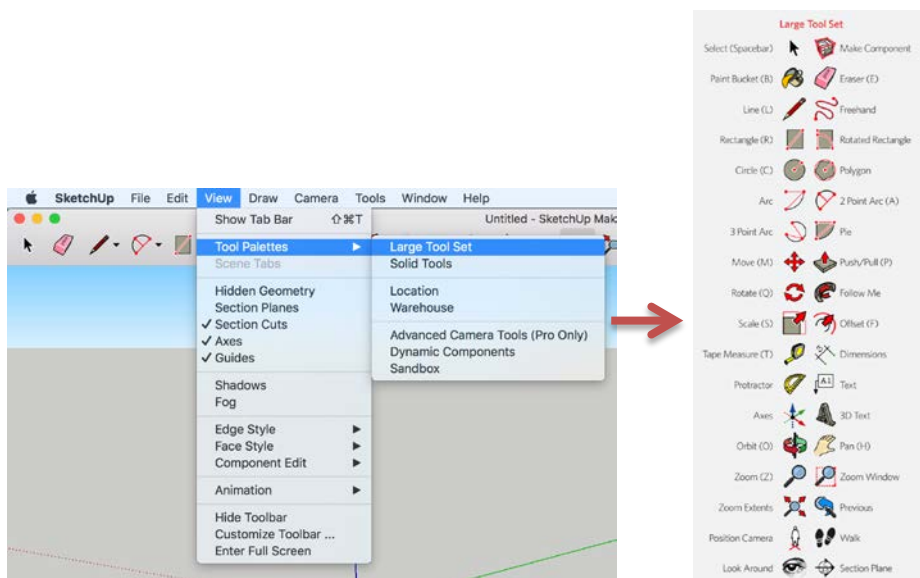
Like other software, the majority of SketchUp tools, commands, and settings are available through the menus on the menu bar at the top of your screen.

Below the menu bar is the title bar which contains the standard window controls (close, minimize, and maximize) and the name of the currently open file. When you start SketchUp, the name of the currently open file is Untitled, indicating that you have not yet saved your work.

2. Getting Started toolbar

When you begin using SketchUp, the Getting Started toolbar is the one you see by default. It contains the basic tools you need to begin creating 3D models.

To display additional toolbars, select **[View] > [Toolbars]**. In the Toolbars dialog box that opens, select the toolbars you want to see and click Close. In Mac OS X, you can display tool palettes by selecting **[View] > [Tool Palettes]**.



3. Drawing area

The drawing area is where you create your model. The 3D space of the drawing area is identified visually by the drawing axes, which provide a sense of direction in 3D space while you work.

The blue, green and red lines stand for Z-, X-, Y-axis respectively)

4. Status bar

When you start working with SketchUp, the two elements on the status bar are the tips in the middle and the Measurements box on the right.

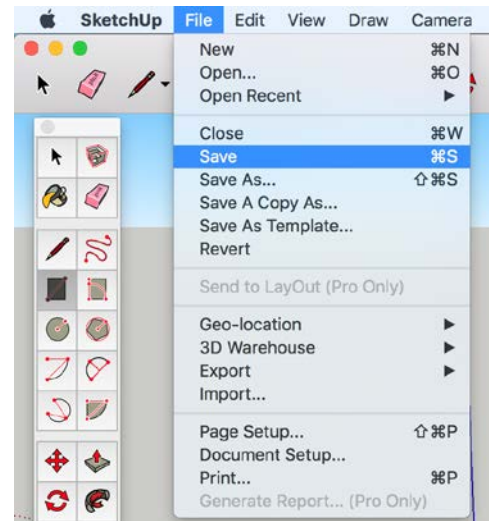
Measurements box: This box is a critical tool for creating accurate models. The box displays dimensions as you draw. You can also use this box to manipulate currently selected entities (such as creating a line that has a specific length) or to create evenly spaced copies of entities (such as columns or housing blocks).

[Tips] In the middle area of the status bar, click the question mark icon to display the Instructor window, which offers basic information about using whatever tool you select in the toolbar. The middle area also displays a brief sentence about using the selected tool. This area is helpful when you're not sure how a tool works.

5. Saving and reopening a model



Always remember to save your project.

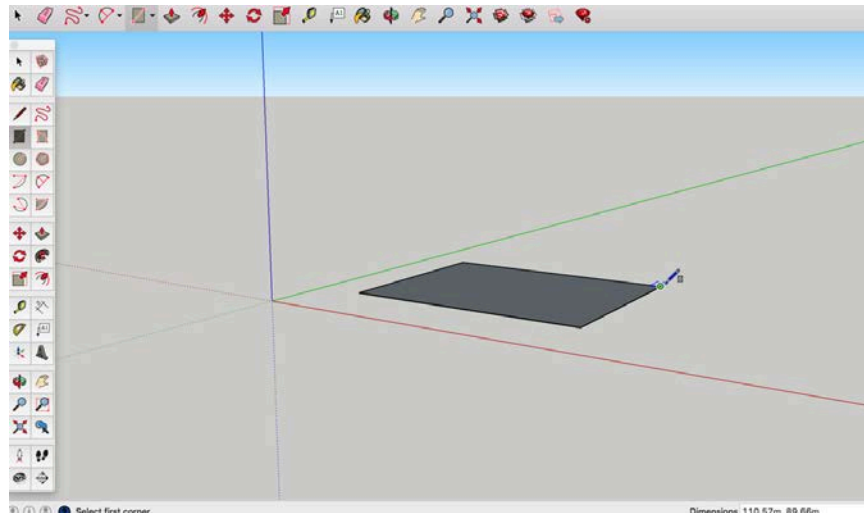
- On the menu bar, select **[File] > [Save]**. If this is the first time you're saving a model, the Save As dialog box appears, as shown here. To save an already saved model with a new name, select **[File] > [Save As]**.
- Use the **[Save In]** area at the top of the dialog box to select where you'd like to save your model.
- In the **[File Name]** box, type a name for your model.
- Click the **Save** button.



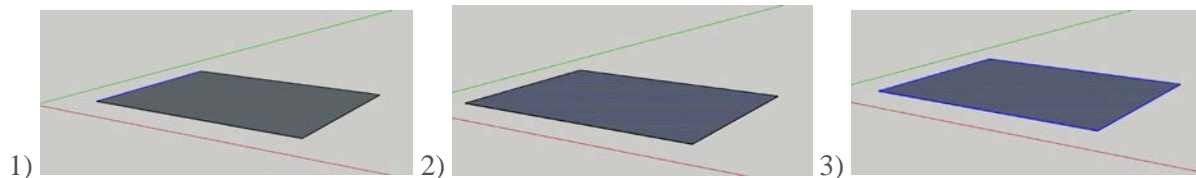
PART II: Creating your first 3D model


I. Create a 2D surface:

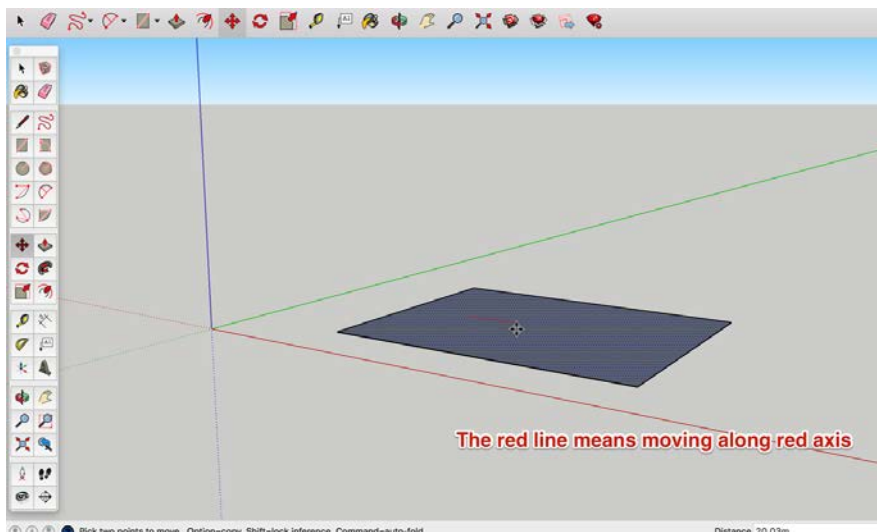
1. In the Getting Started toolbar, select the **Rectangle** tool ()
2. On the ground plane, in the space between the red and green axis, click the **Rectangle** tool cursor () . Then move your cursor to the right and click again. A rectangle appears on the ground, as shown here.




3. Select the **[Select]** tool, you have three ways to select (parts of) your rectangle:
 - 1) Select the boundary lines – click on the boundary
 - 2) Select the surface of your rectangle – click on the surface (shaded after selection)
 - 3) Select all – double click on the surface – selected features will be highlighted in blue

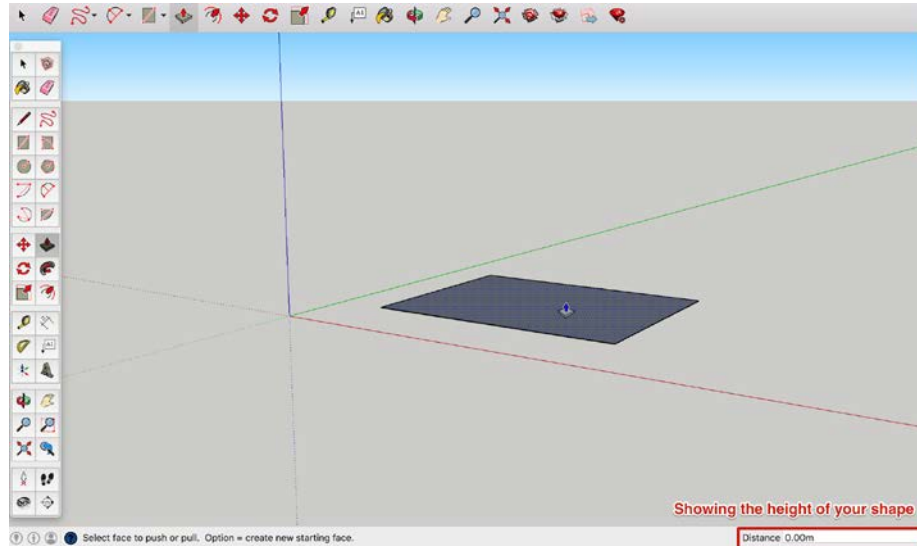


4. Select the **Move** tool () and click the **Move** tool cursor on your rectangle and move it around to your desired location and click again to pin it down.

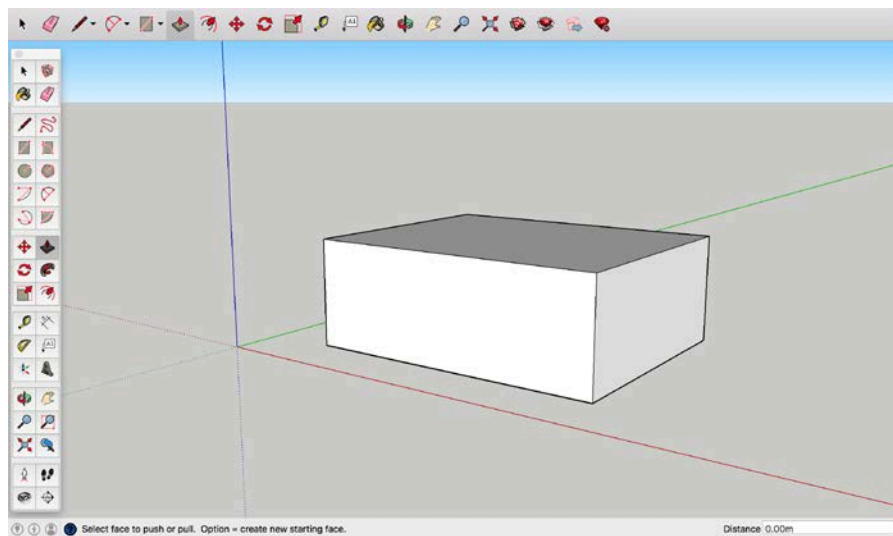


II. Time to go 3D!

1. On the Getting Started toolbar, select the **Push/Pull** tool (), and place the Push/Pull cursor over the rectangle you just created, as shown in the following figure.
2. Click and drag your rectangle up into a 3D shape. Keep an eye on the Measurements box and release the cursor when your shape is about 40 meters tall.




3. Without clicking or selecting anything, simply type **40** and press **Enter**. Notice how the height of your shape changed to exactly 40 meters tall, and the value you entered appears in the Measurements box. (We are drawing a giant cube.)

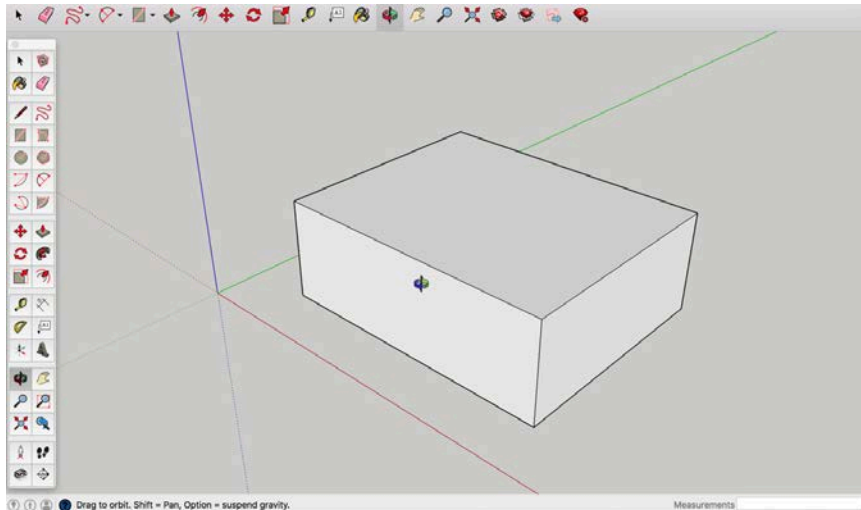


III. Viewing your model


As you create a model in 3D, you need to view it from all sides. In SketchUp, you orbit, zoom, and pan all the time as you draw:

1. **Orbit:** When you orbit, you move around, above, or below your model. Orbiting is like flying around your model Peter Pan–style.


In the Getting Started toolbar, select the **Orbit** tool (). Click anywhere in the drawing area. Move your cursor in any direction to rotate around the center of the drawing area. Notice how the view of your shape changes, as shown in the following figure. **Practice clicking and dragging with the Orbit tool as much as you like. Enjoy the 3D view!**





2. **Pan:** When you pan, you move left, right, up, or down.

Select the **Pan** tool (). In the drawing area, click and drag the cursor in any direction. When you pan, SketchUp's camera (your view) moves vertically or horizontally.

3. **Zoom in and out:** Zoom in to focus on a specific area as you draw, and zoom out to see more of your model.


In the Getting Started toolbar, click the **Zoom Extents** button (). If you orbit around until you lose track of where you are in your model, the Zoom Extents button is a handy way to reorient yourself.


Click the **Zoom tool** () and you can zoom in and out that way. If you have a scroll-wheel mouse, scroll down to zoom out a bit. Working in SketchUp is much easier with a scroll-wheel mouse.

To zoom in on a specific rectangular portion of your model, select the **Zoom Window** tool (), click and drag to make a box appear around the area that you want to zoom in on. When you release the mouse button, everything in the box you drew fills the drawing area.

IV. Modify your model

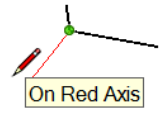

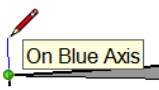
Draw a line:

When your shape is not a rectangle or any of the default shapes, you have to draw it yourselves. You can use the Line tool () to draw edges. Edges form the structural foundation of all models.

Select the Line tool () on the toolbar. The cursor changes to a pencil.

Click to set the starting point of your line. If you click the wrong place, press the Esc key to start over. As you move your cursor around the drawing area, notice the following:


- A line follows your cursor.
- The line length is displayed dynamically in the Measurements box. (The Measurements box uses the units specified in your template.)
- The line that's following your cursor turns red, green, or blue whenever the line is parallel with the red, green, or blue axis, respectively. If you hover for a moment, a ScreenTip appears. If the line is black, it usually means, it runs across more than one axis. – to make sure the position of your line, you can use Orbit or Pan tool to view it from different angle.

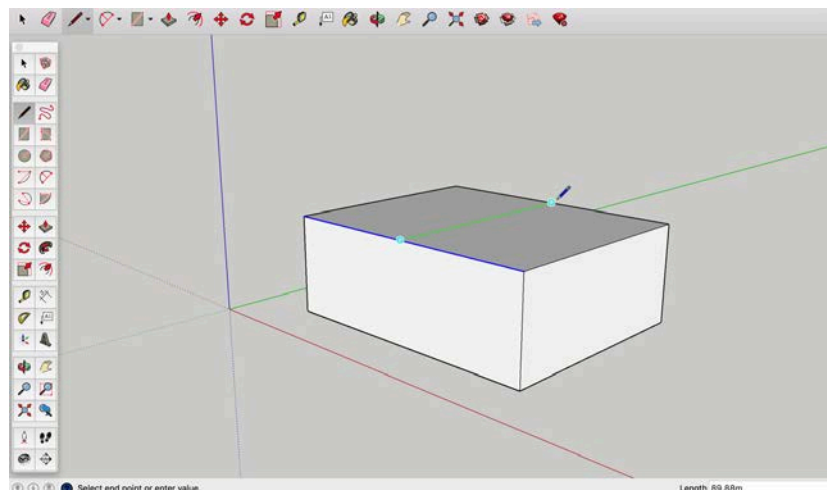
Linear Inference Type	What It Looks Like	What It Means
On Red Axis		Linear alignment to the red drawing axis (Click and drag as you draw to see the inference.)
On Green Axis		Linear alignment to green drawing axis (Click and drag as you draw.)
On Blue Axis		Linear alignment to the blue drawing axis (Click and drag as you draw.)


[Tips] If you want to draw a surface formed by lines, make sure all ends of the line meet, in other words, you need to draw a closed shape to let SketchUp generate a surface automatically. Otherwise, no surface can or will be created.

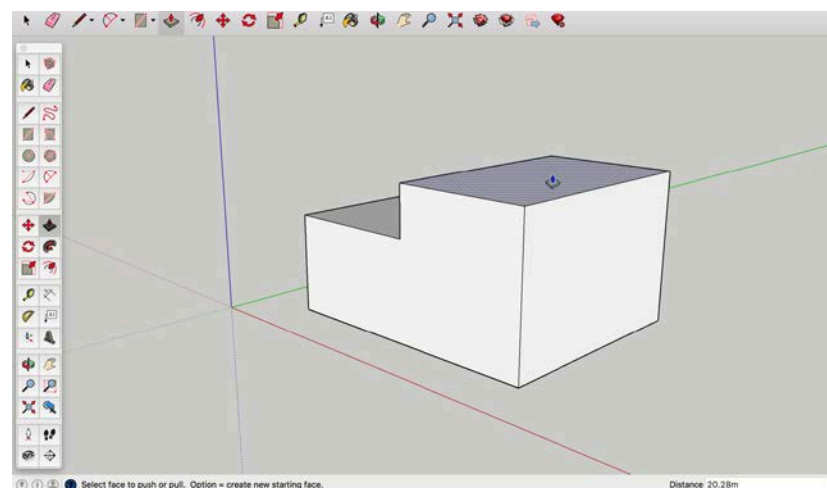
Split a surface:

When you draw a line (or a curve) on an existing surface, you split the surface.


- Select the Line tool () and draw a line across the top surface of your model



- Select **Push/Pull** tool (), then click and drag on either half of your top surface.

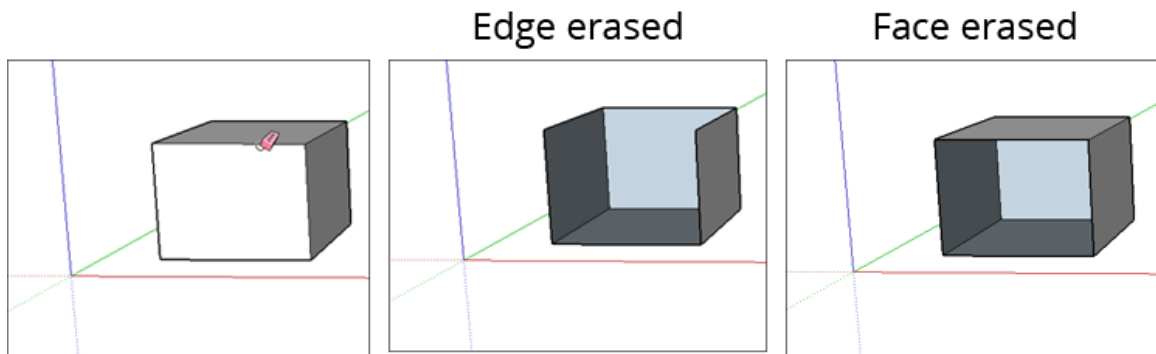


Erase a line:

You can erase an edge or face to create an opening in a shape. To see how erasing an edge affects your model, first select the **Eraser** tool () in the toolbar, and then click an edge:

- **Clicking an edge erases the edge and any face that touched that edge.** You can have lines without a face. However, a face must be completely bound by edges.
- **Context-clicking (selecting) a face and choosing Erase deletes only the face.**

In the figure, you see the original cube and how erasing an edge or face changes the cube.



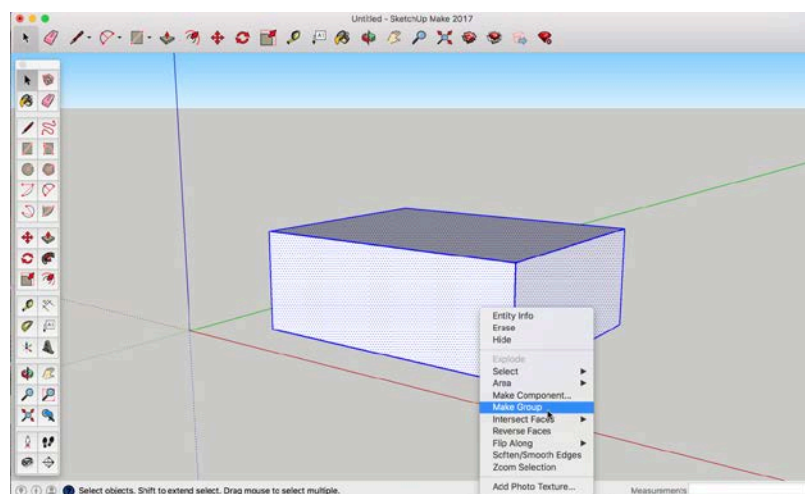
If you accidentally delete a face or other changes that you'd like to keep, simply select **Edit > Undo** from the menu bar. Or press the keyboard shortcut for **Undo**, like other programs, **Ctrl+Z** (Microsoft Windows) or **Command+Z** (Mac OS X).

If you accidentally delete an edge, you can also redraw the line that caused the faces to disappear, and SketchUp will re-create the faces.

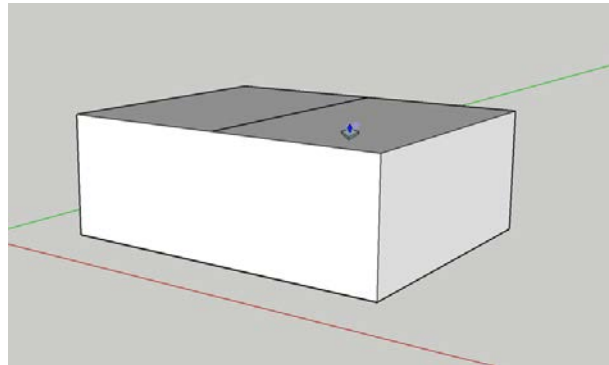
Make a group

As you already saw, drawing a line or deleting a line can cause trouble for the existing shapes. In order to 'protect' your shape, you can use **Group**.

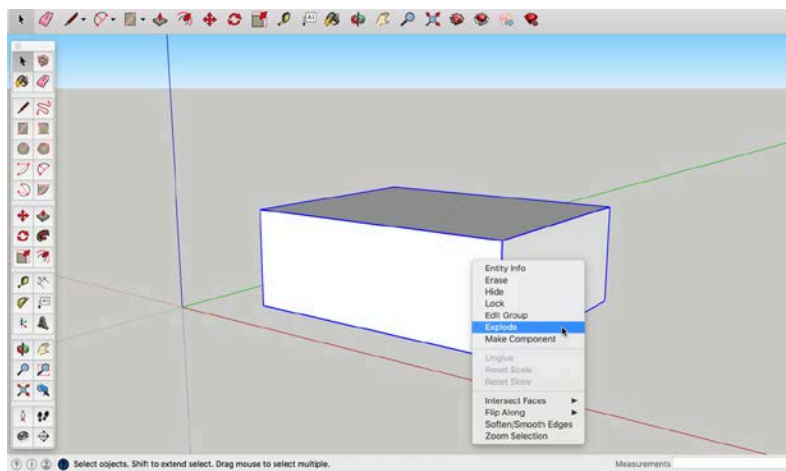
To create a group, select all the shapes you want to include in the group (single click for a line, double click for a surface, and triple click for an object). Then, from the menu bar, choose **Edit > Make Group**. Alternatively, context-right click the selection and choose Make Group.



After making your shape a group, even if you draw a line on the top, it will not split your cubic inside the group. Drawing a line outside the group, even though on the same surface, you cannot use the **Push/Pull** tool to the parts inside the group.



To break up the group, right click to select it and choose **Edit > Group > Explode**.



To edit your shape inside a group, double click on the group to enter the edit mode.

