# SketchUp Exercise

Prepared for the teachers' workshop at Triton College on April 16, 2010.

SketchUP is free from Google just Google it and download to your computer. You can do just about anything with it, but it is especially good for conceptualization of architectural design. There is a professional version that they sell online for $495.00. Students can purchase a one year license for $50.00. But I would recommend using the free version. The major difference between free and pro is the ability of pro to import from and export into AutoCAD.

There are some great tutorials online on the SketchUP web site. There is also an extensive online library of SketchUP premade components which are available directly within the program. SketchUP also plays well with Google Earth allowing you to not only design a building but place it on its actual site.
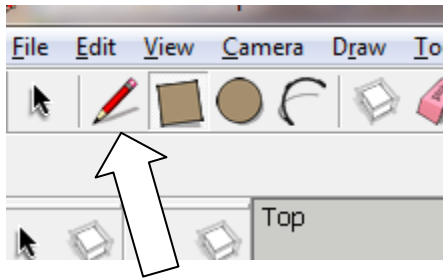
1. Open SketchUP

2. Turn on the "Views" Toolbar: Select the View pulldown menu >Toolbars>Views

3. Turn off perspective view for the start of the project: select Camera pulldown> Parallel Projection

4. Go to the plan view by clicking on the Plan icon:
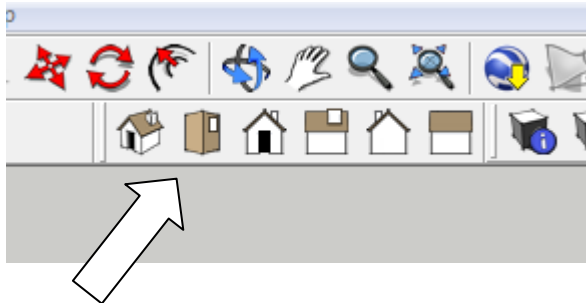

5. Your screen will look like this:
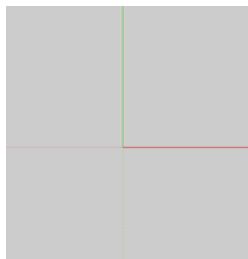
6. Draw a line: Use the pencil tool

7. You can draw in X (green) or Y (red) or Z (blue) direction. If you want to make the line exactly 20'-6" long, pick the start point, then point the cursor in the direction you want to the end point to be located then type in 20'6 on the keyboard. Inputting distances for lines is the same as AutoCAD click a point, then point the cursor in the direction you want to draw the line, then type the distance.

8. Note that the native units of SketchUp are inches, just like AutoCAD, in other words, if you type a distance of 100 and do not put the foot symbol after it (') it will be interpreted by SketchUp as 100 inches.If you mean feet, type the foot mark ('). To separate fractions of an inch from whole inches, leave a space.

Value Control Box (VCB)
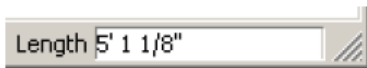
Type in value and press Enter to apply the value to the active tool (no click required).

9. At any time while you are drawing an entity, for example, a line or rectangle, you can type the dimensions in the "VCB" box and the entity will be drawn to those dimensions.

For example:

10. If you want to draw a line that is 9 feet 6 inches long, start to draw the line in the direction you want, then type: 9' 6" (you don't need to click in the "VCB" box in order to type in it, just start typing), and then press Enter.

11. If you want to draw a rectangle that is 6 feet 6 inches wide by 4 feet 6 inches deep, begin to draw the rectangle, type: 6' 6", 4' 6" (again, you don't need to type in the "VCB" box), and then press Enter.

12. As you draw lines when a start or end point of the line aligns with another point, SketchUp will signal graphically by drawing a red, green or blue line from point to point – like the illustration below:
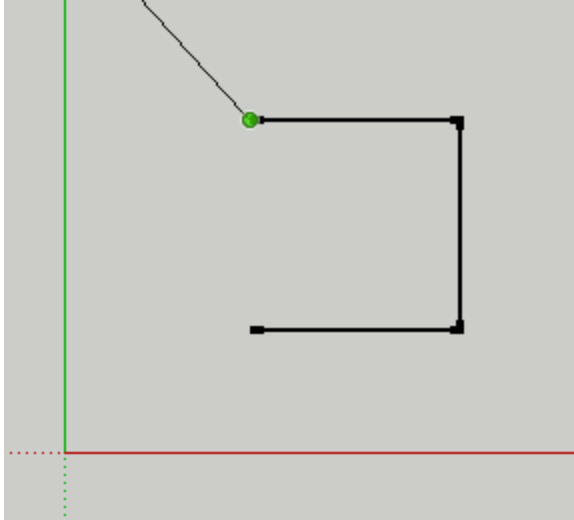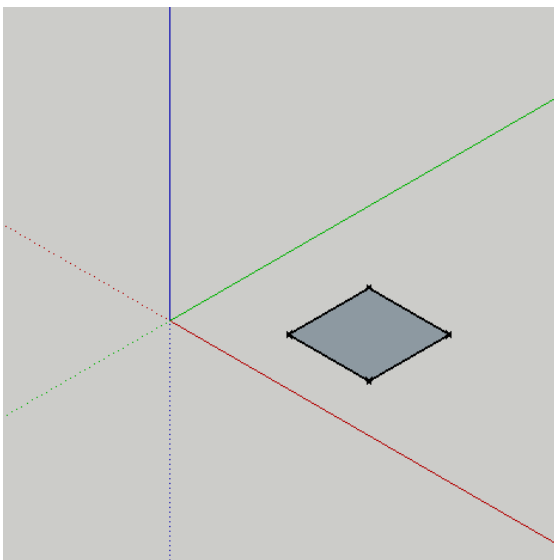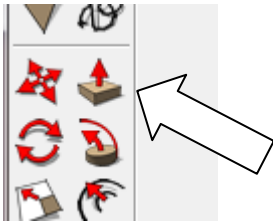
17. Draw a plane

- Draw a rectangle
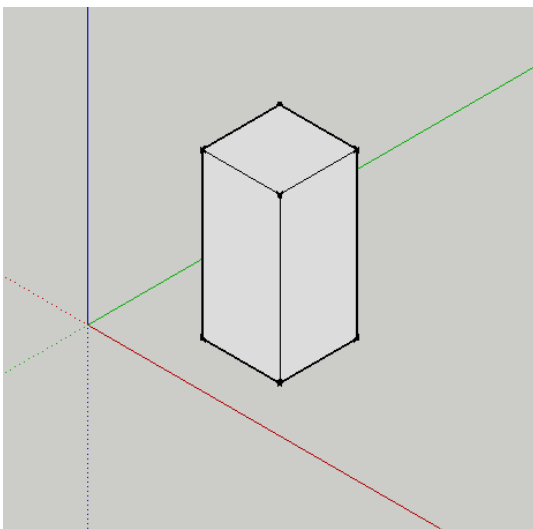- Change to a 3d view: select the isometric icon:
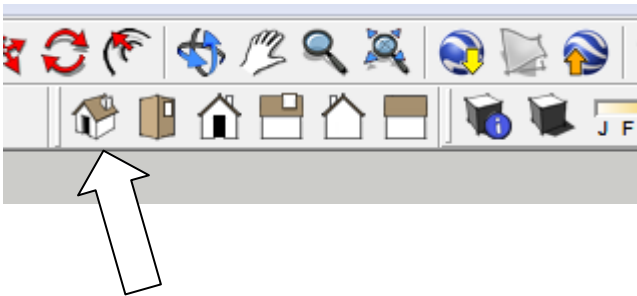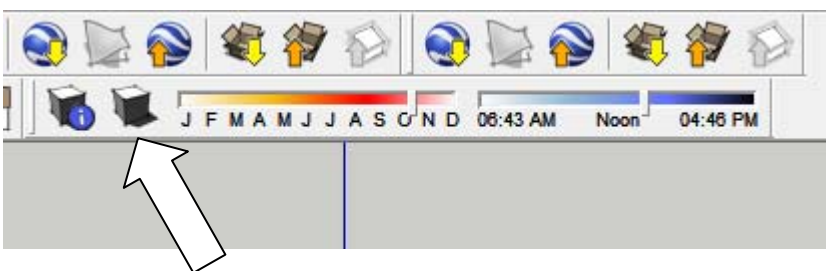

- The drawing will look like this:
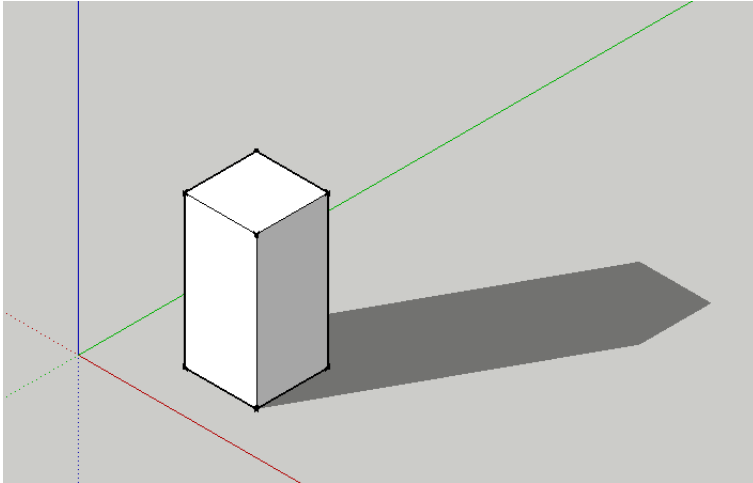
- Select the Push-Pull tool:

- Click the left mouse button on the top face and pull it up. If you want to be precise about the distance, type a number (add the foot mark if you mean feet).
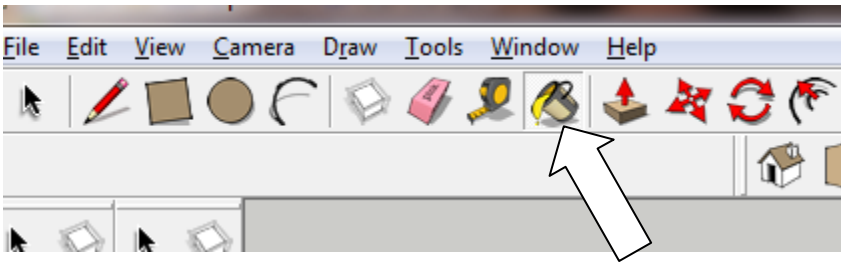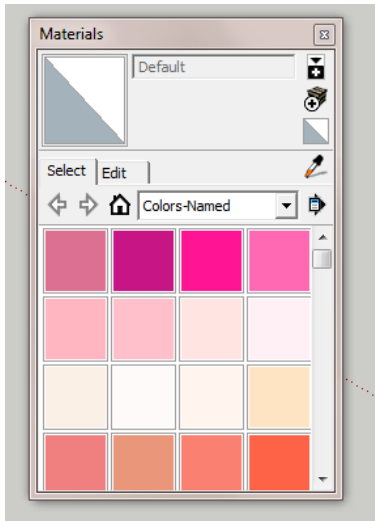

- Turn on shadows:

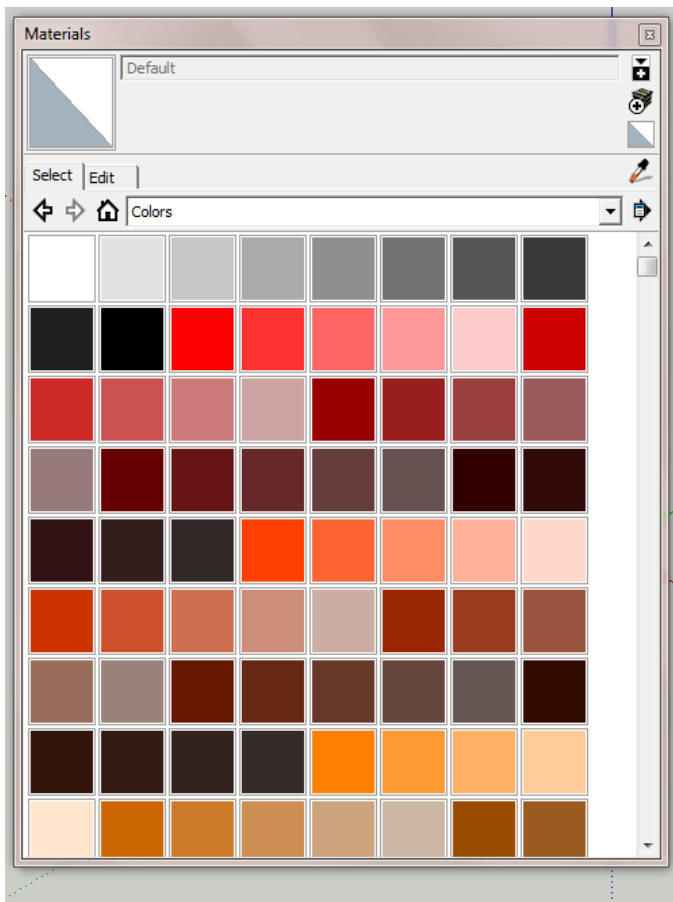- Note that you can set the month of the year and the time of day for setting the sun direction.

- You can change the color of any modeled surface. To do that, select the Paint Bucket:

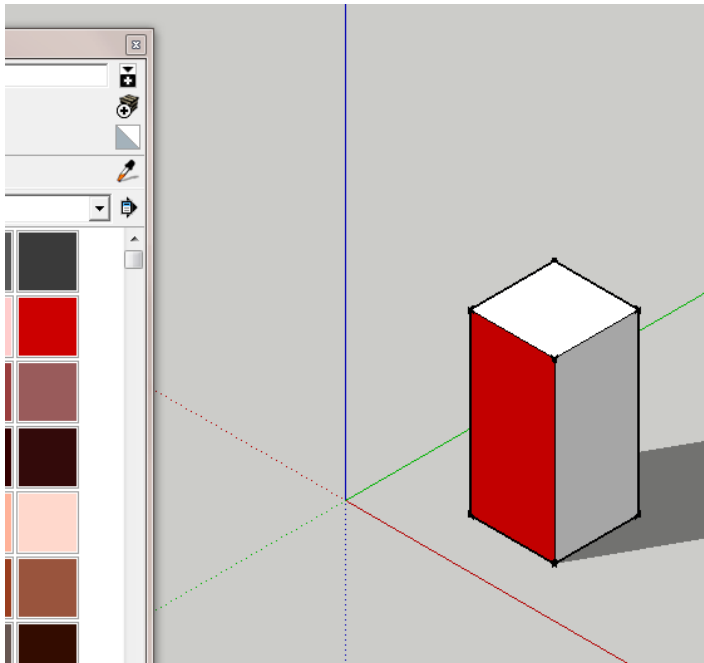- The Materials dialogue box will appear.
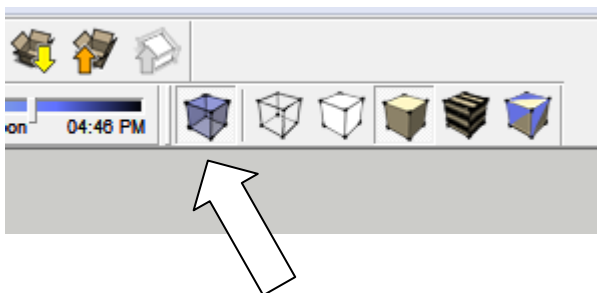

- Select "Colors" from the pull-down list:

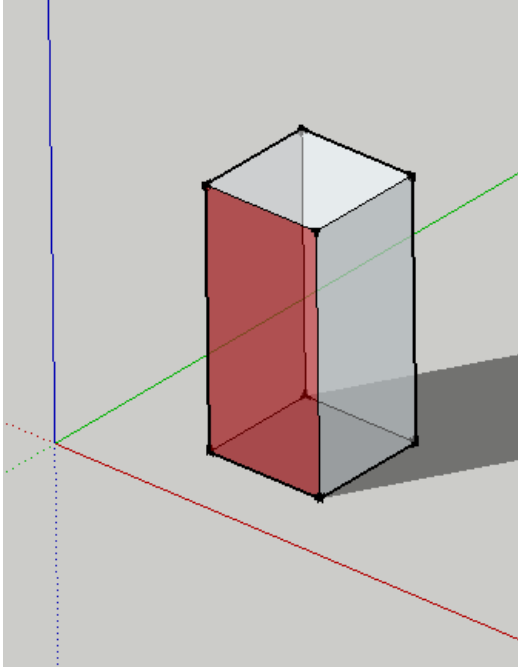- Make sure that "Shaded" button is turned on:

- Select a color from the color palette and pick a plane that you want to color:

- If you turn the X-Ray icon on, also, you can see into the object:

- Other ways of viewing your objects are "Wireframe," "Hidden Line," and "Shaded."

22. To move, scale or rotate an object, first select the whole object using the select tool

23. Then pick the "Move" or "Rotate" or "Scale" tool:

24. To unselect an object that has been selected, hit the Esc key on the keyboard.

25. To lengthen a line, click on the Move tool, click on the end of the line you want to lengthen (there will be a green grip appear) and move it to a new location.

26. Saving: pick the Save icon or select File and then Save. The first time you save you will be prompted for a name for the file as well as a location in which to save it.
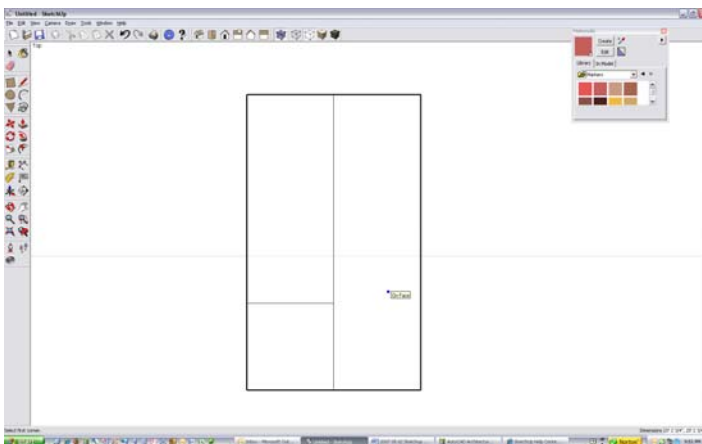
27. Draw a building with a gable roof.

- Draw a rectangle
- Extrude it vertically
- Draw a line down midpoint of one top edge to the other
- Use the Move command to drag that line vertically (along the blue axis)
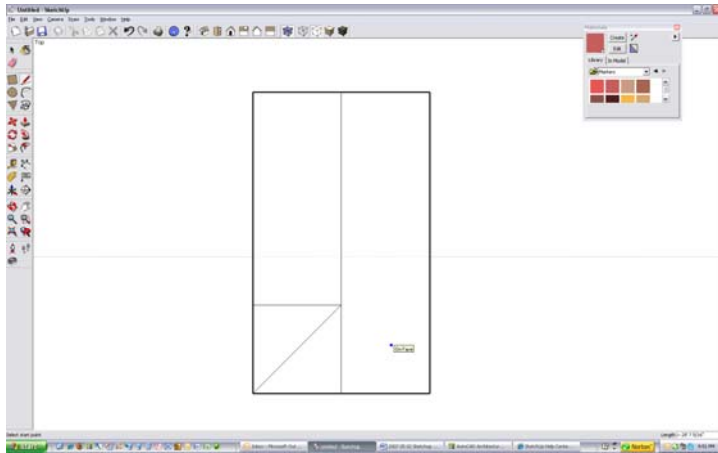
28. Draw a building with a hip roof
- Draw a rectangle
- Extrude it vertically
- Draw a line down midpoint of one top edge to the other
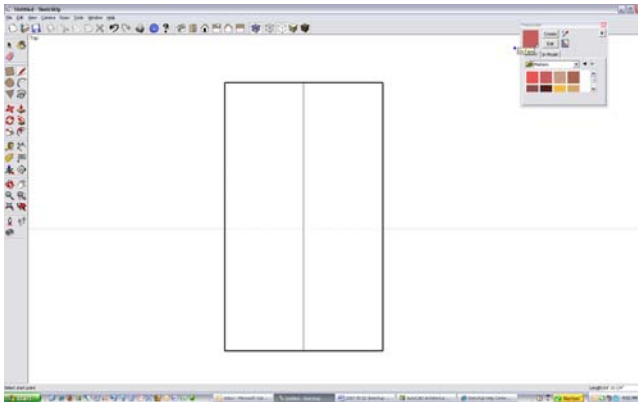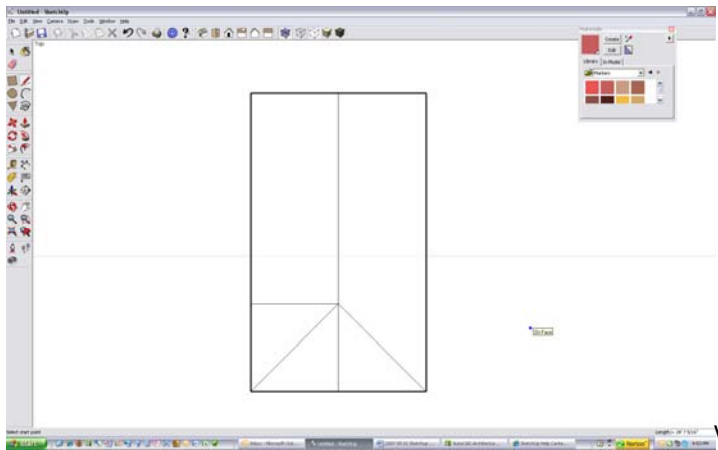

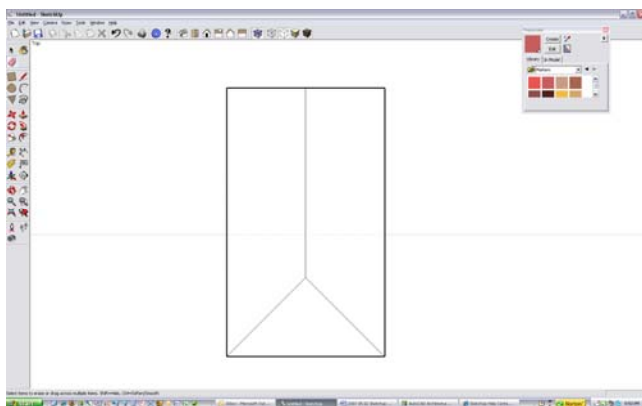Draw a square from one corner to the line

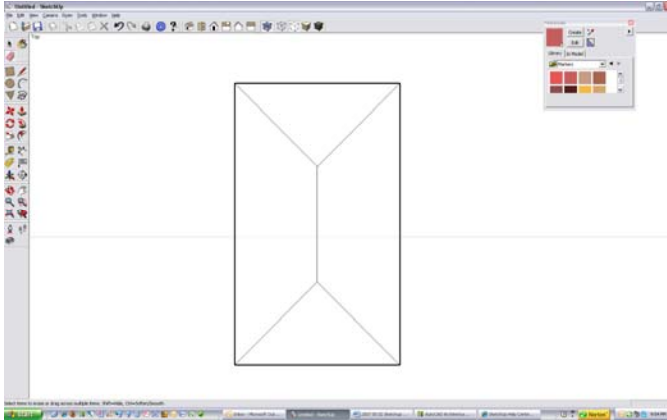Draw the diagonal of the square (45 degrees)
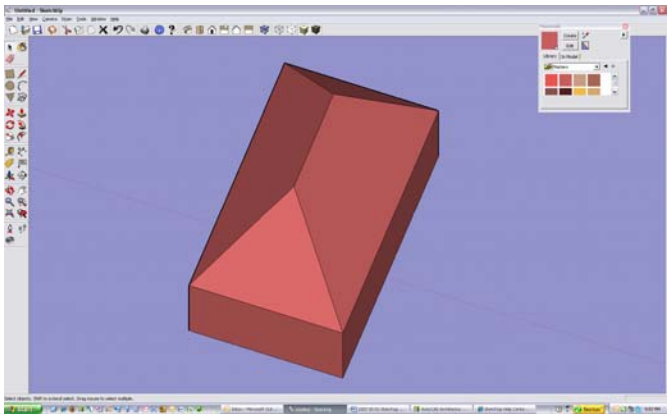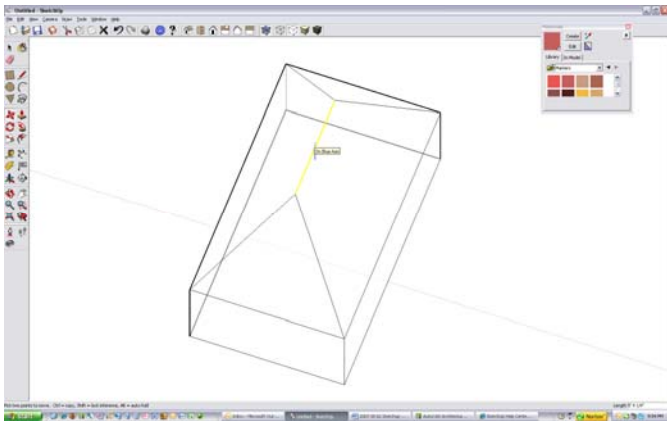
Draw the other diagonal (45 degrees)

Erase the square

Repeat on the other side

Grab the top ridge with the Move tool and move up (along the Blue axis)

Bob's your Uncle

29. Creating Multiple Copies (Linear Arrays)

- The Move Tool can be used to create arrays, or a series of copies of geometry.

- To create multiple copies of one or more entities: Select the "Select" Tool. The cursor will change to an arrow.
- Select the entities to be copied.
- Select the "Move" Tool.
- Press and hold the Ctrl key on your keyboard. This action informs SketchUp that you want to duplicate the selected entities.
- Click on the selected entities to copy.
- Move your mouse to copy the entities. A copy of the selected entities will follow as you move your mouse.
- Click at the destination point to finish your copy operation. The copied entities are now selected and the original entities are deselected.
- Type a multiplier value to create additional multiple copies. For example, typing in 2x (or *2) will create one additional copy (or 2 copies total, the one you manually copied plus one you automatically copied using this step) instead of just one.

30. To draw roads:
- Start with a large rectangle, which will be the ground plane
- Draw lines on it 25' apart.
- Connect the corners
- Draw an arc at each intersection
- Erase the excess
- Make closed at ends to turn into a plane
- Extrude 3' vertically down. (I know this is too large of a curb height, but we want to make a visible depth to the road).
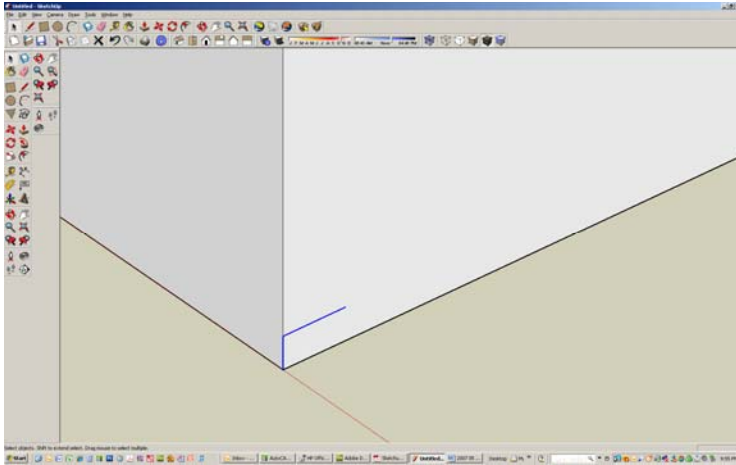
31. How to use the "FollowMe" Tool

Draw a rectangle 30' in the X direction and 40' in the Y direction.
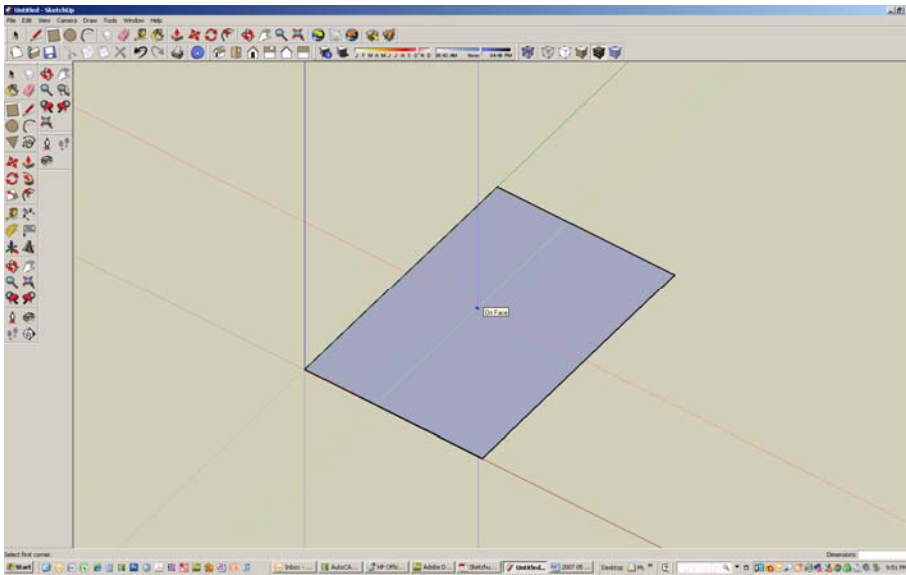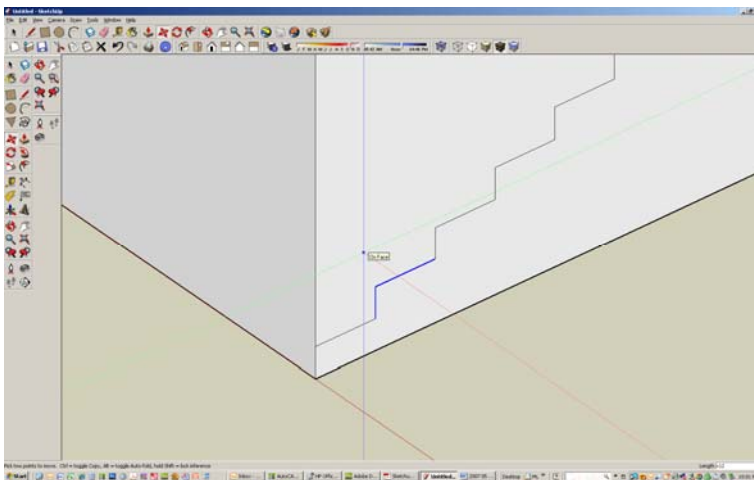

Pull it up 6'
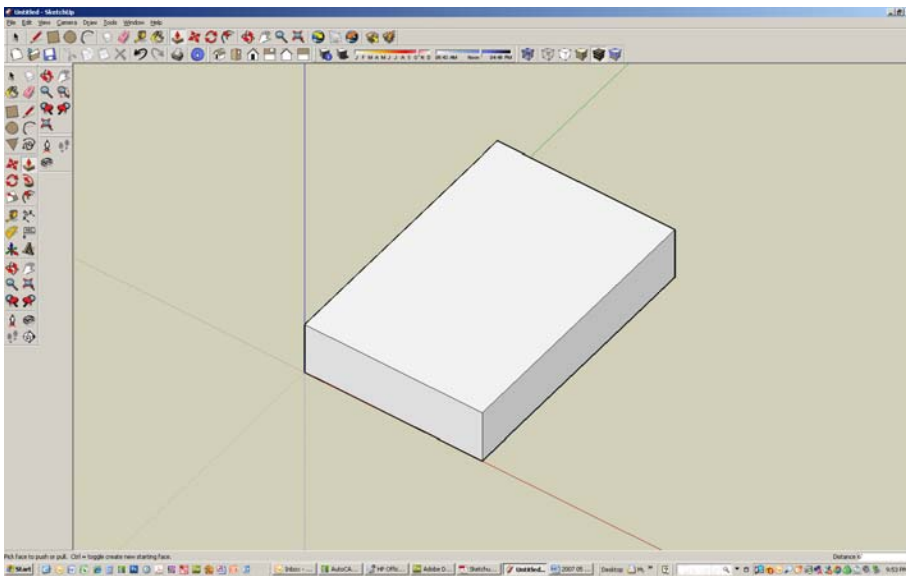
Draw a line 6" up and 12" to right to form the first riser and tread.

Copy these two lines by selecting them first, then select the move command, and pick the first point as the bottom of the riser, the press and hold the control key down and pick the right end of the horizontal line, then type x11. This will array the steps 11 times.
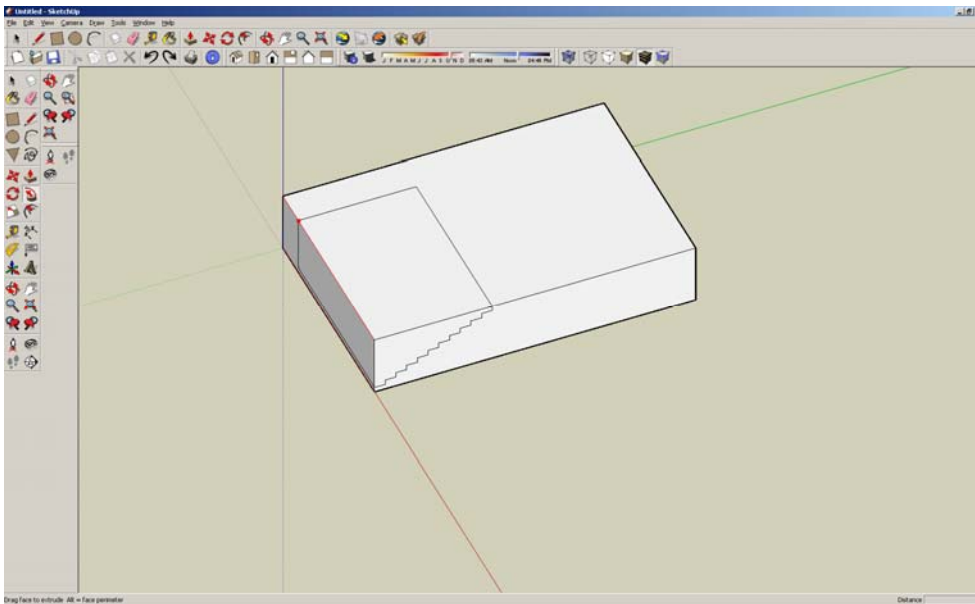

Note that the top portion of the cube can now be pushed and pulled separately from the bottom. That is required to use the FollowMe tool.
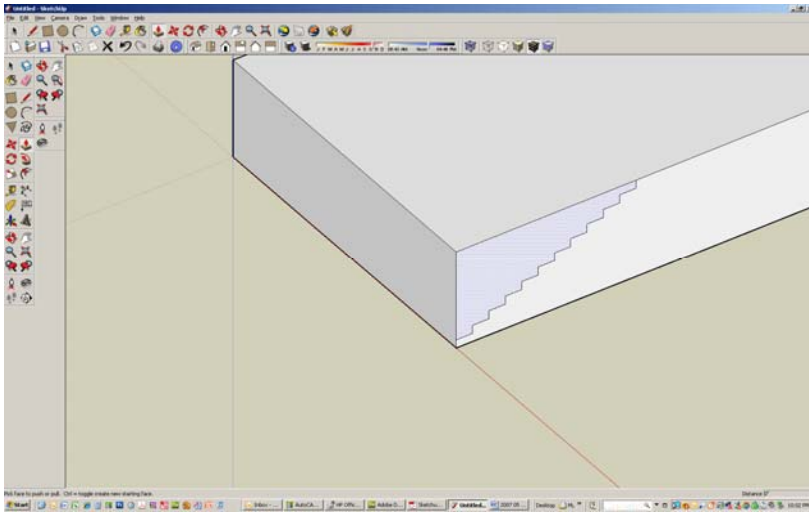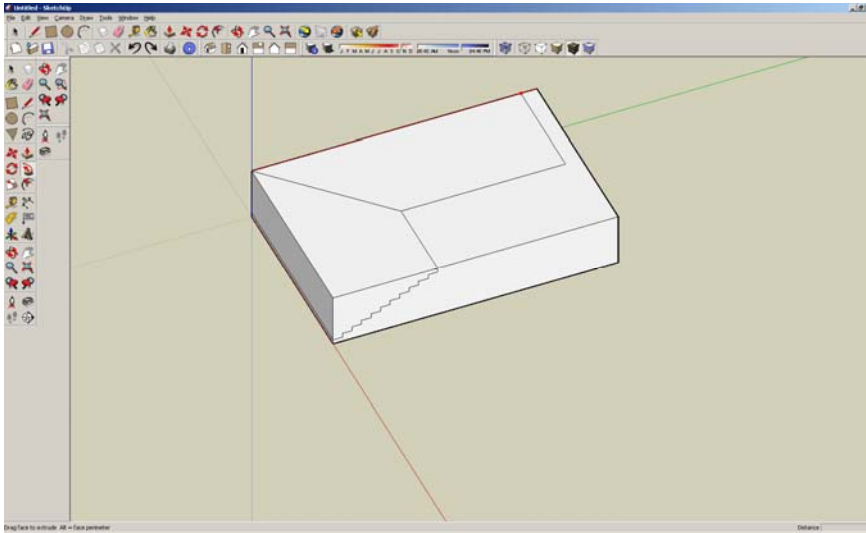
Select the FollowMe tool.

Place the cursor over the top part of the cube above the steps and click with left button.

Place the cursor and follow it along the top edge of the cube – you will see the edge line turn red.
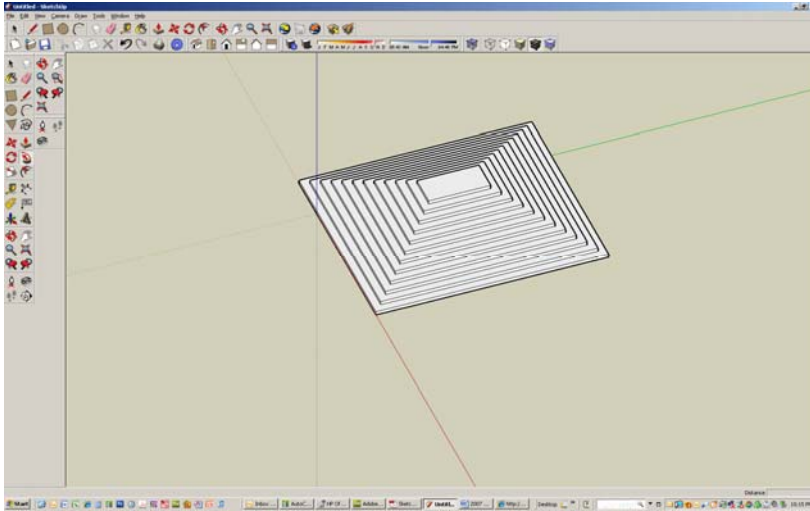
Follow all along the left and far edge:

This is the result:
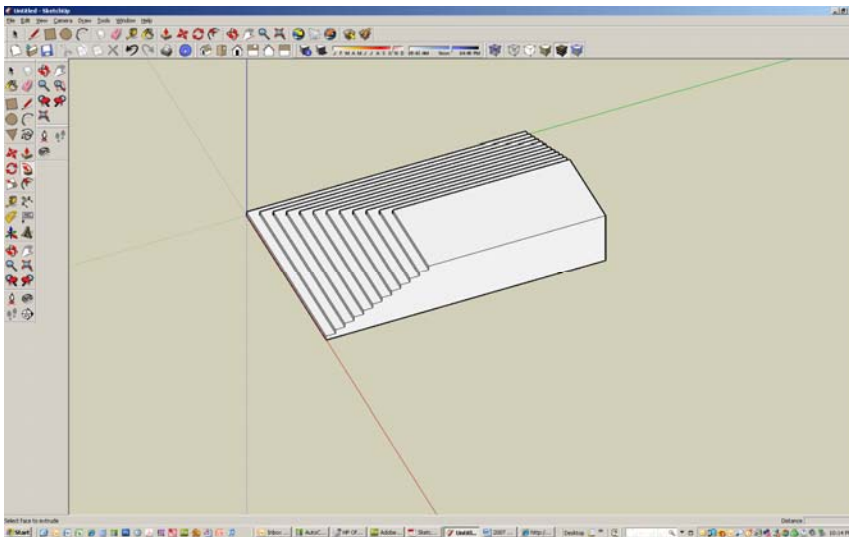
You could follow it all the way around if you had enough width to do stairs all around.

Pretty cool – this takes some practice. So go ahead, practice!

32. This is the "Large Tool Set." It shows up on the left side of the drawing area.

33. Below is an explanation of the tools:

Select Tool Shift = Toggle Ctrl = Add Shift+Ctrl = Subtract Right to Left = Crossing Selection Left to Right = Window Selection	**Move Tool** Shift = Inference Lock Ctrl = Copy Alt = Auto-Fold VCB: Number = Distance
Paint Bucket Tool Shift = Matching Ctrl = Connected Shift+Ctrl = Object Alt = Sample Paint	**Push/Pull Tool** Double-Click = Repeat Ctrl = New Face VCB: Distance
Eraser Tool Shift = Hide Ctrl = Soften/Smooth Shift+Ctrl = Unsoften/Unsmooth	**Rotate Tool** Ctrl = Copy VCB: Number = Angle VCB: Rise:Run = Slope
Rectangle Tool VCB: Length, Width	**Follow Me Tool** Alt = Use Parameter of Surface as Path
Line Tool Shift = Inference Lock VCB: Number = Length	**Scale Tool** Shift = Toggle Uniform Ctrl = About Center VCB: Number = Scale Factor VCB: Number w/ units = Length
Circle Tool VCB: Number+**s** = Segments VCB: Number+**r** = Radius	**Offset Tool** VCB: Number = Length Double-Click: Repeate
Arc Tool VCB: Number = Bulge VCB: Number+**s** = Segments VCB: Number+**r** = Radius	**Orbit Tool** Shift = Pan Ctrl = Free
Polygon Tool VCB: Number+**s** = Segments VCB: Number+**r** = Radius	**Pan Tool**
Freehand Tool Shift = Draw 3D Polyline	**Zoom Tool** Shift = Change Field of View VCB: Number = View Angle VCB: Number in **mm** = Focal Length
Tape Measure Tool Ctrl = Measure Only VCB: Number = Resize Model	**Zoom Window Tool**
Dimension Tool	**Zoom Extents Tool**
Text Tool	**Previous**
Protractor Tool Shift = Measure Only VCB: Number = Angle VCB: Rise:Run = Slope	**Walk Tool** Shift = Move Vertically Ctrl = Run Alt = Walk Through Entities VCB: Number = Eye Height
Section Tool	**Look Around Tool** VCB: Number = Eye Height
Axes Tool	**Position Camera Tool**

34. Shading and view commands:
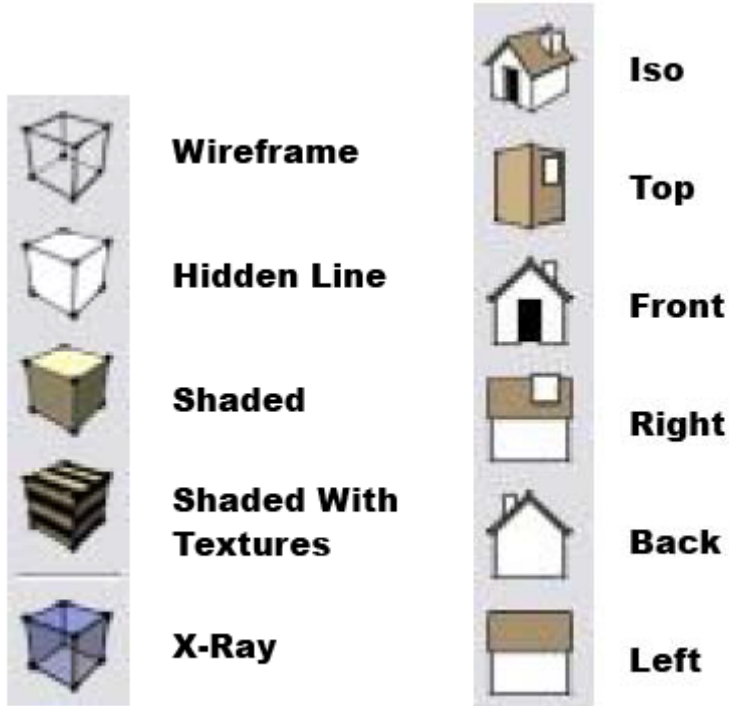
35. **SketchUP and Google earth**

You can place a SketchUp model anywhere on the earth using Google Earth.
Here is how:

Open SketchUP

Open Google Earth and select your site. Zoom in on the area you want to place your model. make sure that you are in plan view by typing R

Draw a model in SketchUp

Import the site from Google Earth by selecting the icon in the SketchUP menu bar with the yellow arrow pointing down.
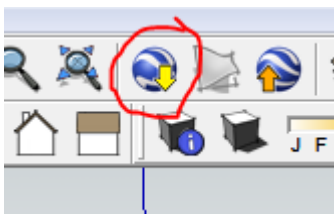
After imported it will have a 2d view of your site in black and white as the background.

If you don't like the background, click on it so the border turns red, then right click and select "unlock" from the context cursor menu. The border will then turn blue. Now select the delete key on the keyboard.

Here is the original 3d image in Google Earth:
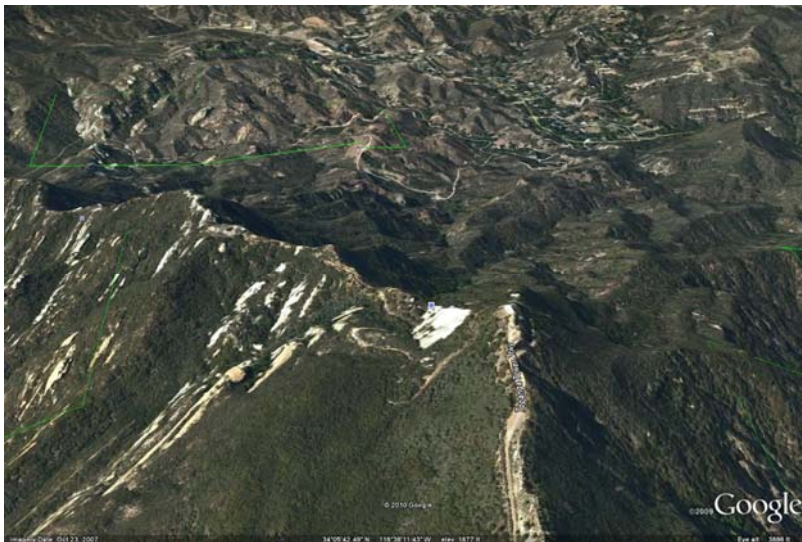
Here is the image SketchUP after importing the Google Earth site to SketchUP:
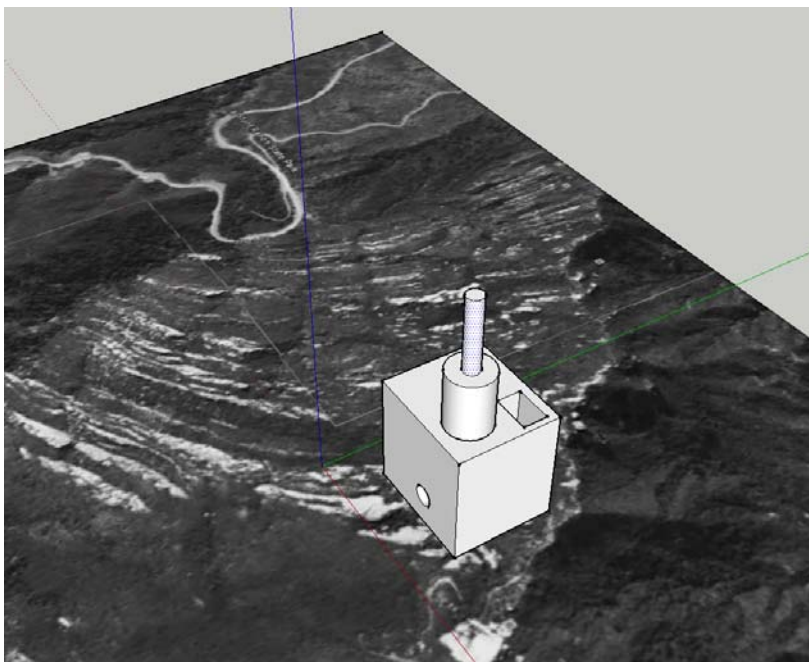
After you have the building designed and want to see how it will look in Google Earth in 3d, export it along with the site to Google Earth by selecting the "Place Model" icon in the SketchUP menu bar with the orange arrow pointing up.

Now here is how your "placed" model will look in 3d in Google Earth:
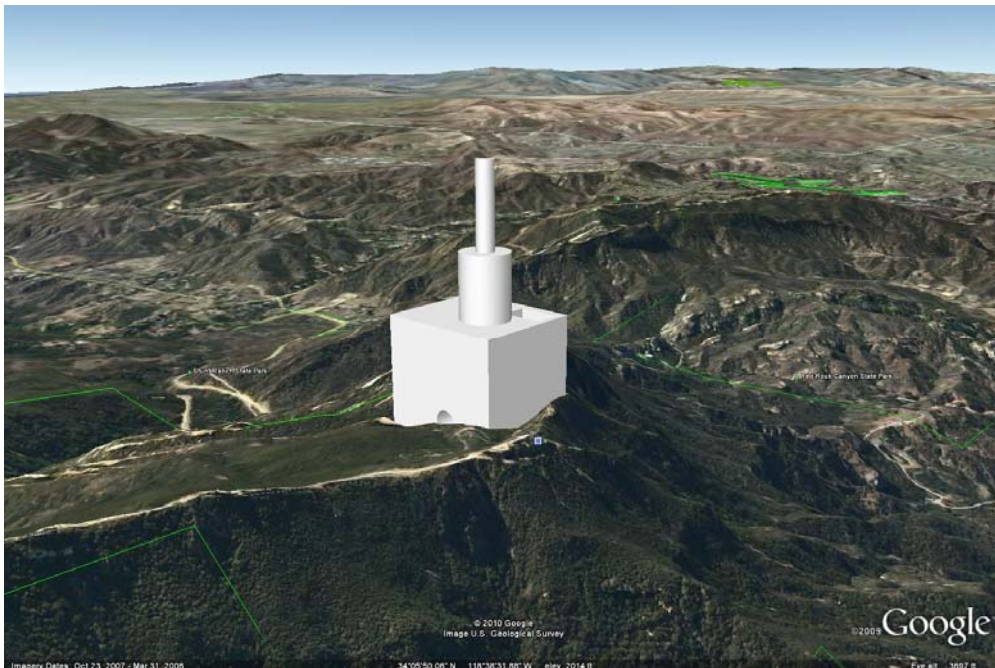
Note that you can continue to make changes to the model in SketchUP and then use "Place Model" again to update it.

36. **Frequently Asked Questions**
37. **Question 1: Why is my model being clipped and sliced as I rotate or zoom in?**

38. This is a known glitch in the software called *Camera Clipping Plane.* First, don't worry; although it can be distracting, this doesn't cause any actual damage to your model.
39. There are several situations in which you might encounter this:
40. One is when the field of view (FOV) is set very wide. You can adjust the FOV between 1 and 120 degrees (the default is 35 degrees in Google SketchUp and 30 degrees in SketchUp Pro). It's easy to unintentionally change the FOV by pressing the Shift key while you are zooming in or out using the Zoom tool.
41. Another situation that can cause clipping is when the Perspective camera mode is turned off. In that case, click the "Zoom Extents" button (it looks like a magnifying glass with four red arrows pointing outward). The camera zooms out to display the entire model, and the clipping is eliminated.
42. A third situation is when the scale of your model is very small or very large. In this case, you can change the scale of your model.
43. This can also happen if your model is very far away from the origin point (the point where the red, green, and blue axes intersect). In that case, you can move your model closer to the origin point. To do this: select all of the geometry in your model, use the Move tool to grab a corner point of the selected geometry that is on the ground plane, start to move the selected geometry, and then type "[0,0,0]" (including the square brackets) in the "Value Control Box" (which is in the lower-right corner of the SketchUp window). This causes the selected point to be moved to the origin point.
44. **<u>I have found that the easiest way to fix it is to simply Zoom Extents (Camera, Zoom-Extents, or Ctrl-Shift-E)</u>**

45. **Question 2: How do I Change the scale of an entire model?**
46. If you have drawn a model composed of many entities, for example, an entire house made of many edges, faces, and other entities, and then want to change the scale of the entire model, there's an easy way to do this:
47. Pick an individual entity that you can use as a reference, for example, an edge that is about six feet long, but that you know you want to be exactly nine feet long.
48. Select the Tape Measure tool and measure that edge from beginning to end. You should see 6' displayed in the "VCB."
49. Type the length you want the edge to be, 9', and then press Enter.
50. A message asks, "Do you want to resize the model?" Click "Yes" to resize the entire model.