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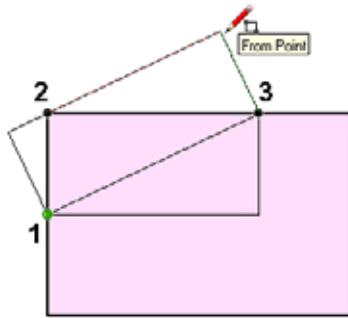
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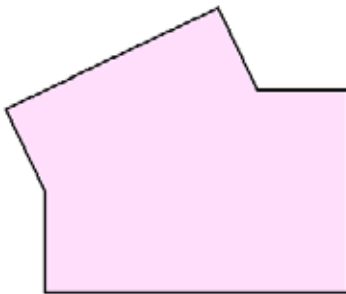
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10. End the rectangle like this, so that one corner is at Point 2, and Point 2 lies on an edge.



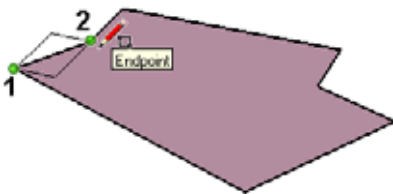
NOTE: Here's another way to create the same rectangle: Click Point 1, hover over Point 3, move the mouse so that corner stays on Point 3, then press Shift to lock this width. Keep Shift pressed and click Point 2. We'll use this method to create another rectangle in a few steps.

11. Erase all the extra lines in the middle to heal the face into one face.

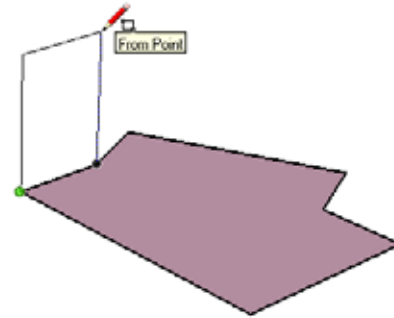


TIP: While in the **Eraser**, you can click and drag the mouse over all the edges you want to erase. (This is sometimes called "sweeping." Each edge you pass over is highlighted. When you release the mouse button, the highlighted edges disappear.)

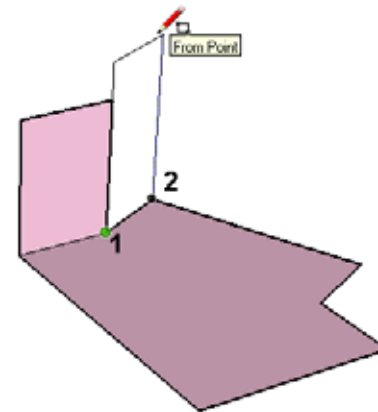
12. Orbit so that you can create some vertical faces. Create the first rectangle by clicking Point 1 and hovering over Point 2.



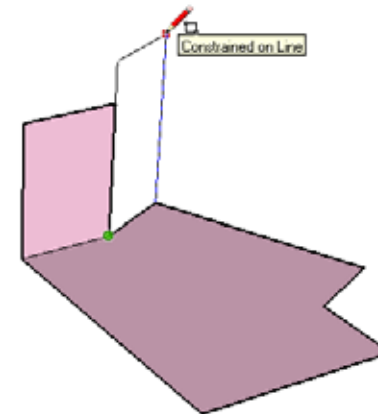
13. Pull in the blue direction and click to create a tall vertical rectangle.



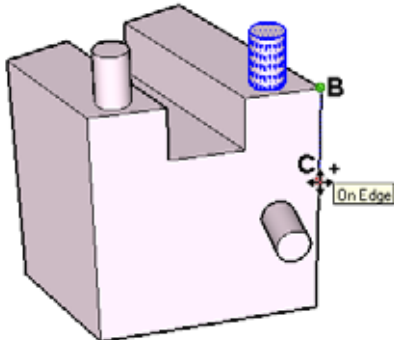
14. For the next rectangle, click Point 1, hover over Point 2, and pull straight up. Don't click yet.



15. Press and hold Shift, which locks the rectangle's width. Also note that the inference changes from **From Point** to **Constrained on Line**.

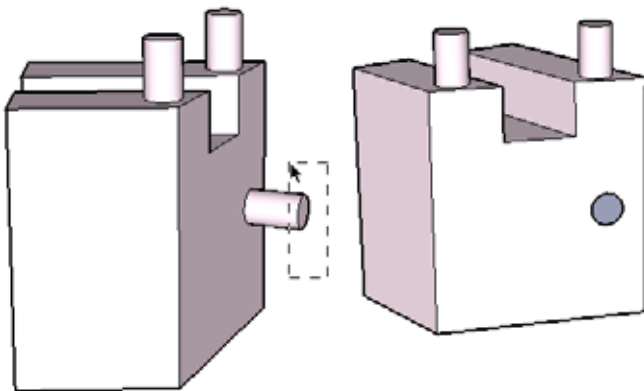


8. The copy should still be selected. Press **Ctrl/Option** again to toggle on copying, and click Point B, then a second point along the vertical edge (Point C). The copy is automatically aligned with the front face.

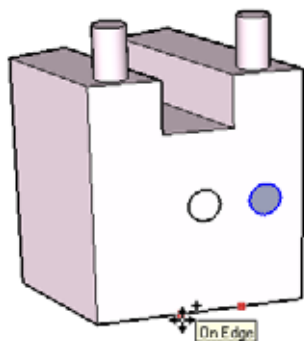


(If the copy doesn't align the way you want, click inside the vertical face to place it where you want.)

9. We want to make a window from this new cylinder. Select the top and sides of the cylinder (leaving the circle along the face) and press **Delete**. This leaves a circular cutout.



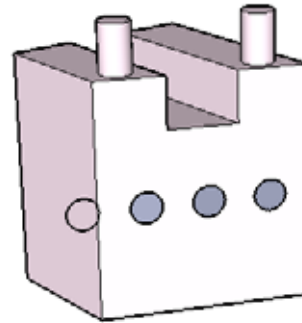
10. Select the cutout circle. Return to **Move** and press **Ctrl/Option**. Click two points along the bottom front to define the copy distance.



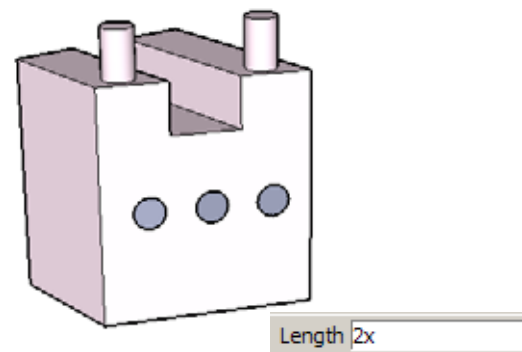
11. One copy is made, but you can make several copies at the same spacing. Type **3x**, which appears in the **Length** field. Press **Enter**.

Length 3x

Now there are three copies (four total windows).

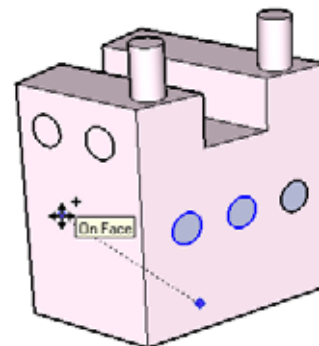


12. In my example, the last copy extends past the face, so no cutout is made. Enter **2x** to remove this copy.

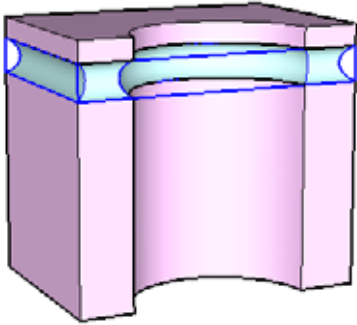


NOTE: You can also enter a number (no "x") to change the spacing between copies. Multiple copies are explained further in Chapter 4.

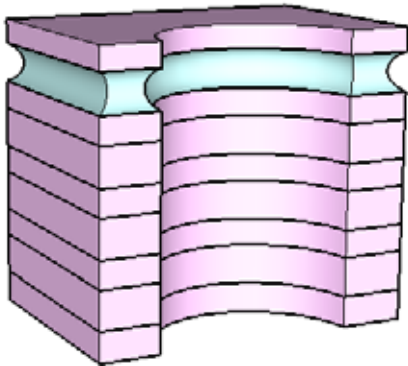
13. Now select two of these windows, and copy them to the side face. The first reference point should be on the front face, and the second point on the side face.



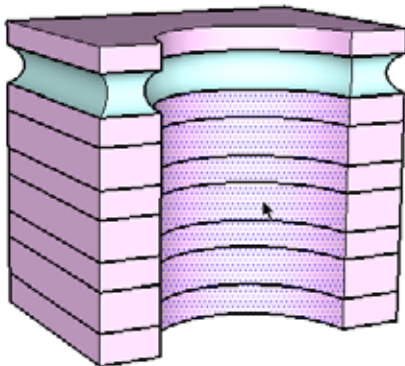
The window row is now surrounded by a bounding box - it is a single object and it is selected.



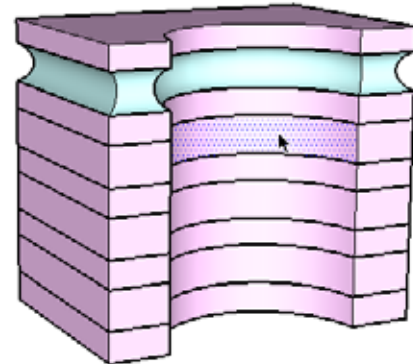
7. While the window component is still selected, use the **Move** tool with the Ctrl / Option key to make a few vertical copies. The curved window faces are inside the building so they can't be seen.



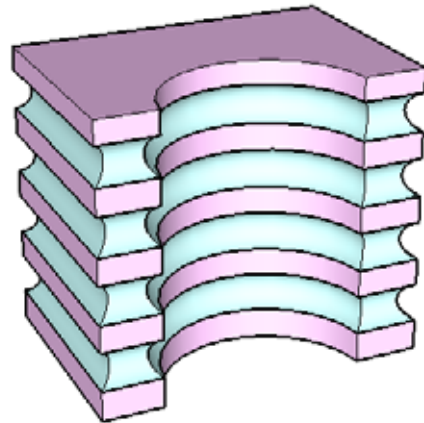
8. To uncover the windows, the walls of the building must be broken. To see that they aren't yet broken, activate the **Select** tool and click on any face - the whole face highlights, including the parts covering the windows.



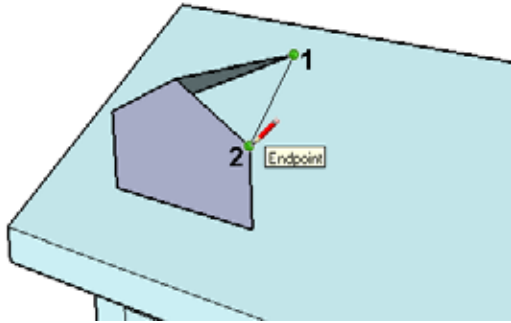
9. The solution: select everything and run **Intersect Faces / With Model**. Now each "stripe" of wall is a separate face.



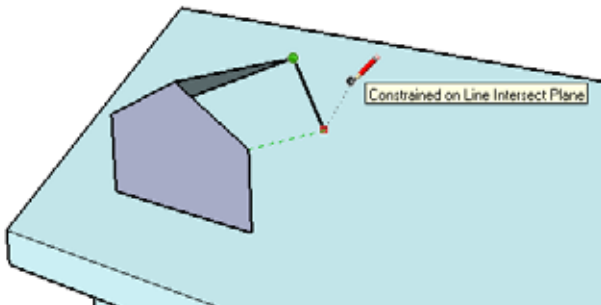
10. Erase faces and edges as needed to uncover the windows.



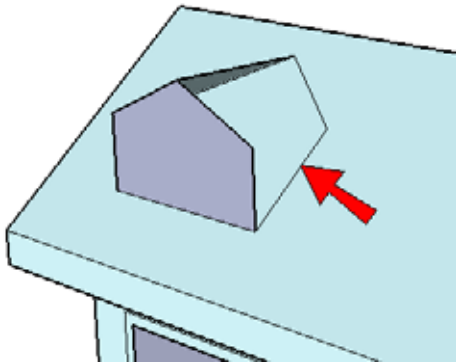
15. Start the next edge where the dormer peak meets the roof (Point 1), and hover over Point 2.



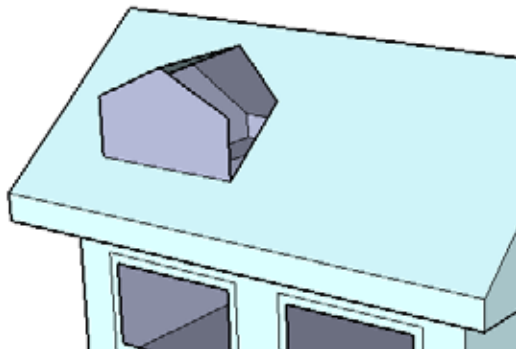
16. Move the cursor in the green direction from Point 2, and press Shift. Then click the roof face.



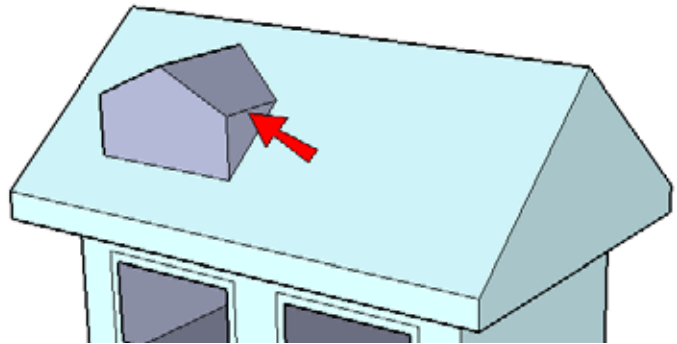
17. Complete the cutout face with this edge:



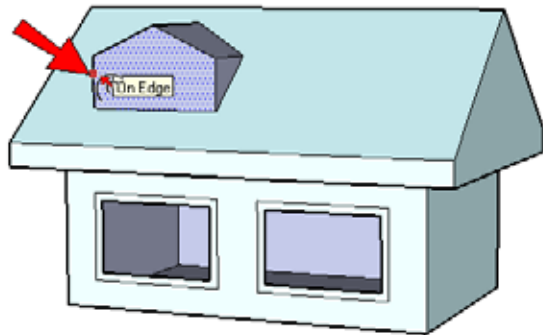
18. Erase the cutout face.



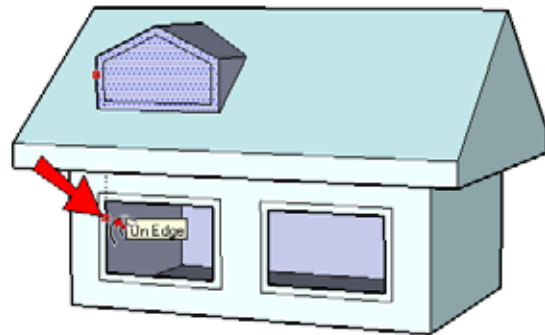
19. Then complete the dormer by adding this edge:



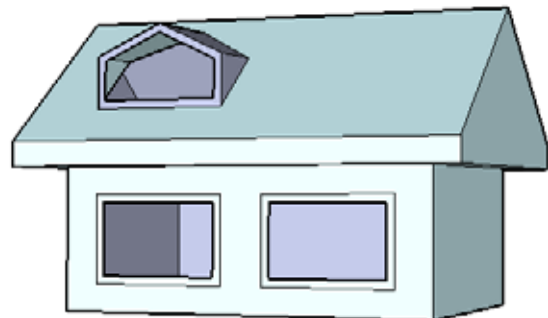
20. The dormer window will have the same frame thickness as the window below. Activate **Offset**, and click the dormer face when the red square is on the left edge.



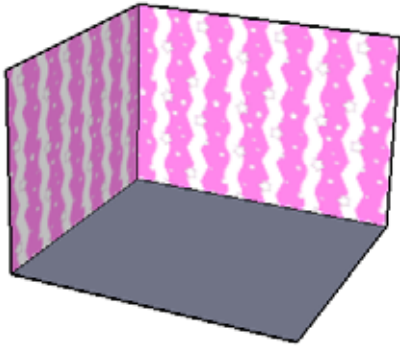
21. For the second offset point, click the left edge of the window cutout below.



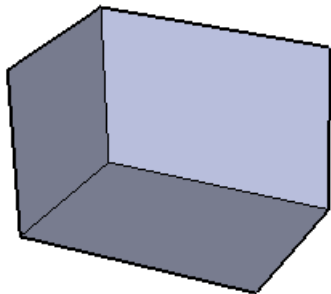
22. Erase the dormer window face, and you can see into the house.



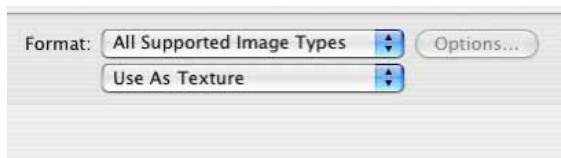
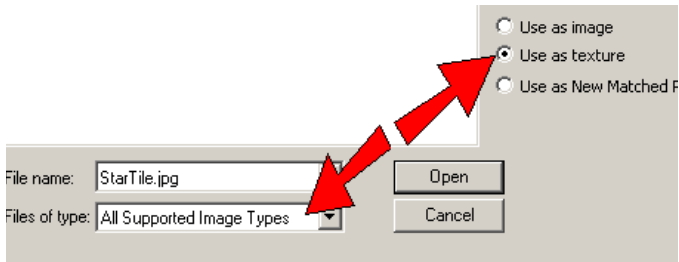
- Draw a room with two walls and a floor, and apply the material to the walls.



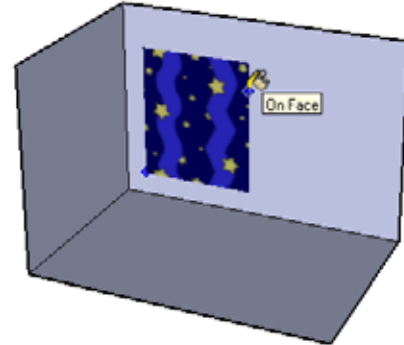
- The second method involves importing the texture directly onto a face. Start a new file and draw a new room.



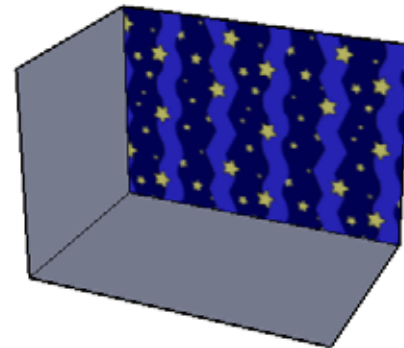
- Choose **File / Import** from the main menu. Make sure you are searching for files of all supported image types, and check **Use as texture**.



- The image is now attached to your cursor. Click the first corner within one of the walls, then move the cursor to define the second corner. The **Dimensions** field lists either the image's width or height, depending on where the cursor is along the image.

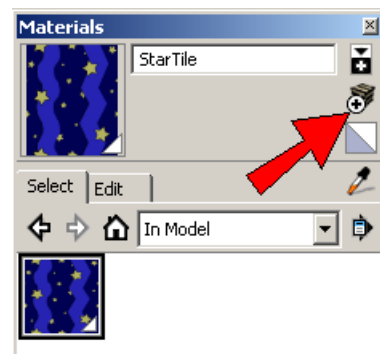


- Click the define the second corner, and the image tiles to fill the face.

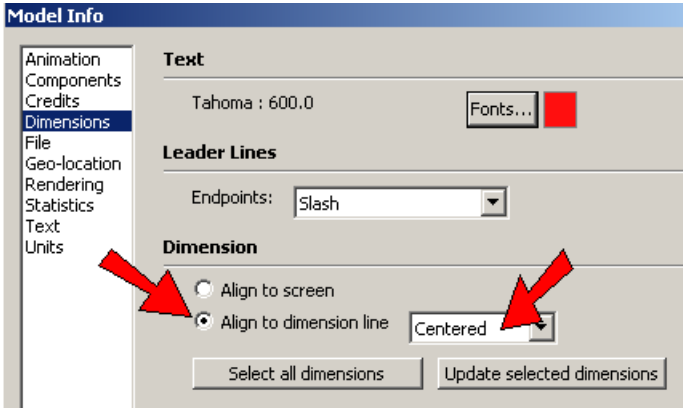


The image now appears in **In Model**. Now we'll copy it to make a similar material.

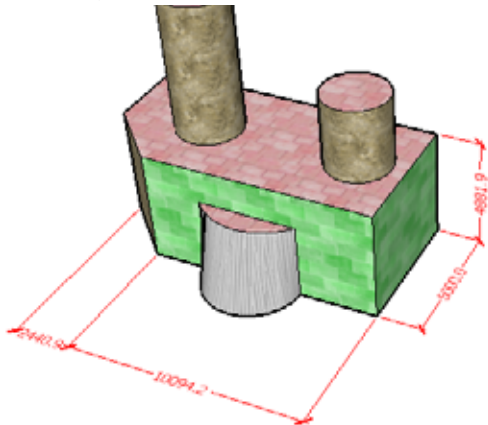
- Windows: Make sure the new material is active, and click **Create Material**.



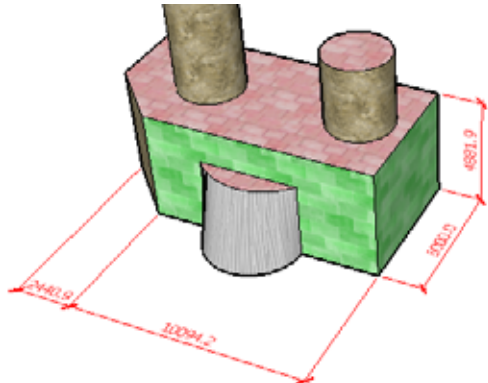
- By default, so far the dimensions have been aligned so that they always face you, no matter the orientation of the model. To change this, go back to the **Dimensions** page and check **Align to dimension line**, and set alignment to **Centered**.



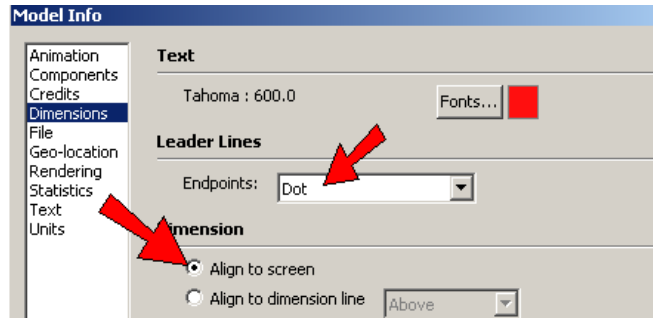
- Click **Select all dimensions**, then click **Updated selected dimensions**. Each dimension is now aligned to its plane. (This type of dimension can be a bit hard to read unless you are directly facing the dimension.)



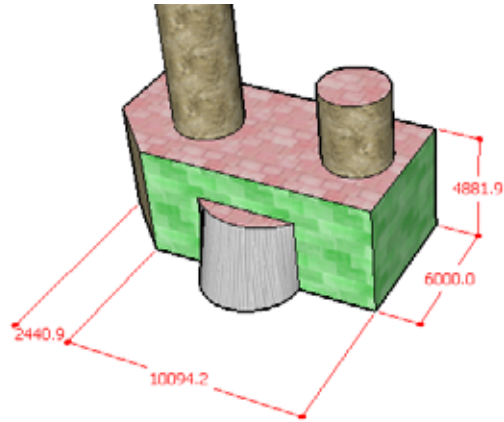
- Change the alignment from **Centered** to **Above**, and update all dimensions. The dimensions are now located above the dimension lines. (**Outside** would place the dimensions below the dimension lines.)



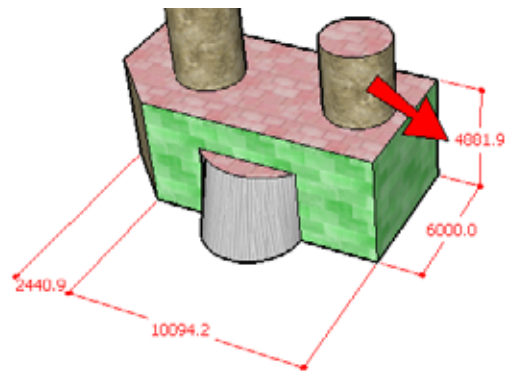
- Change back to **Align to Screen**, change the **Endpoints** to **Dot**, and update all dimensions.



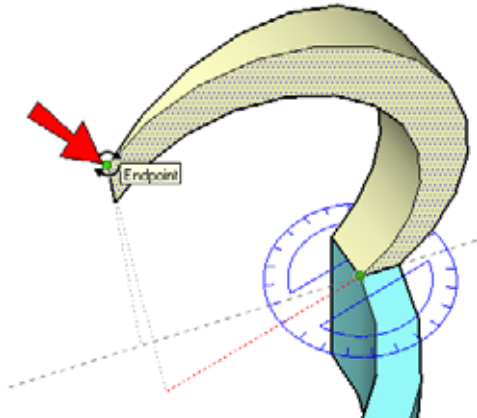
The dimensions are all aligned to the viewing plane, and end in dots at the witness lines.



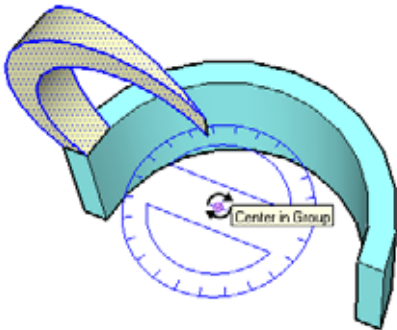
- We will now look into dimension overrides. With the **Dimension** tool active, double-click the dimension shown to edit it.



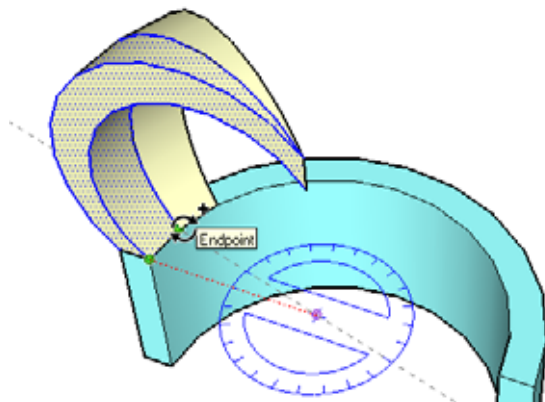
21. Then complete the wedge shape by clicking this point:



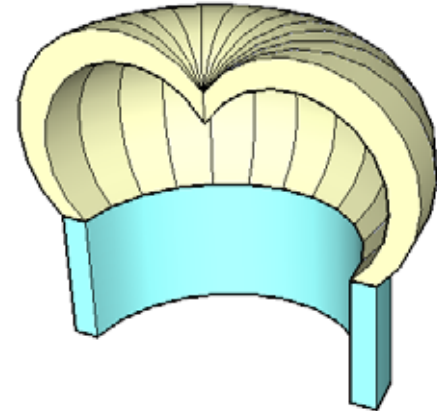
22. Now the wedge can be rotate-copied around the base. Select the entire wedge and activate **Rotate**. Place the protractor at the center of the base. (You could also Shift-lock the protractor to be flat, and place it at the tip of the wedge.)



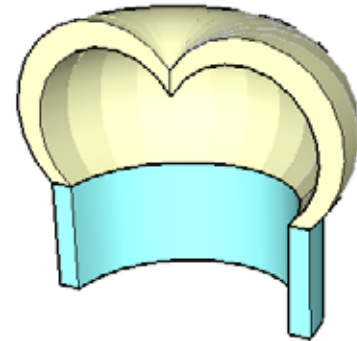
23. Press **Ctrl/Option** to make copies, and click any two adjacent segment points along the base.



24. Enter 11x (or whatever number works in your case), to finish the dome. Done!

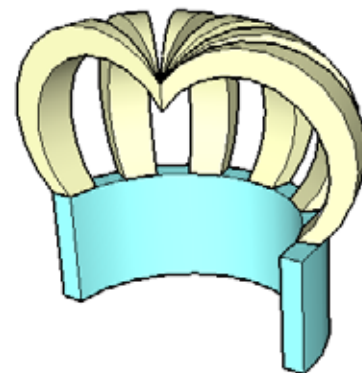


This is how the dome looks with softened edges (**Eraser** with the **Ctrl/Option** key).



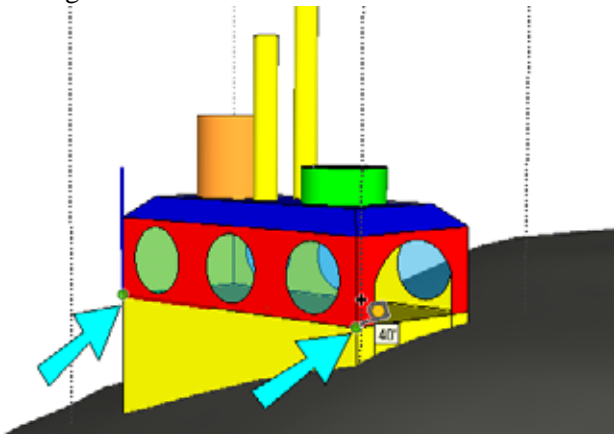
NOTE: Note that the dome above still has a faceted look. For the surface to truly appear smooth, you would have to create the copied slice without its side faces, or remove all interior faces. This will be shown in the next exercise.

You can create some neat variations on this. For instance, if you double the rotation angle, you can get this:

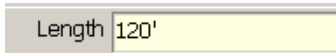


NOTE: General information on **Tape Measure** can be found in "Tape Measure" on page 45. Using the **Tape Measure** within groups is covered in "Resizing Components (and Groups)" on page 220.

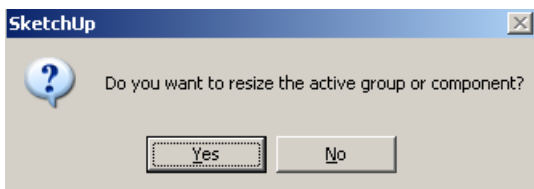
- Go back to SketchUp and open the model component for editing. Activate **Tape Measure** and click two points that define the length of the building. This length should be 40 feet.



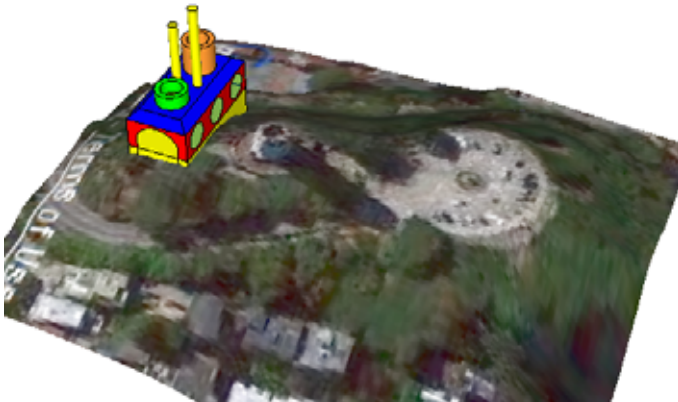
- To make the building three times larger, enter 120'. (You can enter this dimension even if you are working in different units.)



- When you are asked whether you want to resize the group, click **Yes**.



- Now the building is three times larger. Close the component, and adjust its location so that it still fits within the green space.

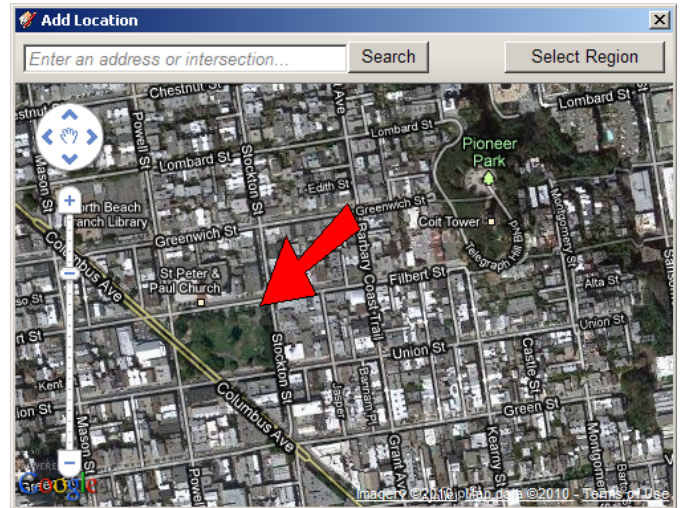


NOTE: You could also have used the **Scale** tool to resize the building.

- Use **Preview Model** again to update the building in Google Earth - it is much larger.

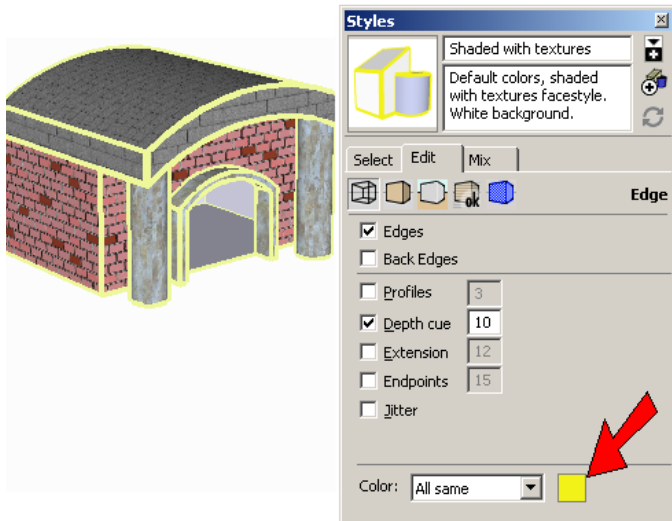


- This larger model doesn't fit well in its current space, so we'll find a new location for it. Click the **Add Location** icon again (which now is called **Add More Imagery**). Zoom out to see more of the city and drag the view to the right, until you see this patch of green space between Stockton and Powell Streets.



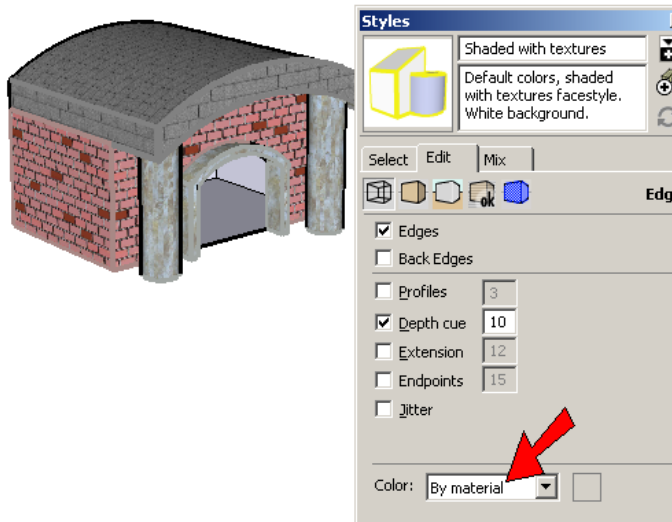
Edge color is set at the bottom of the **Edge** settings. Here are the options:

All Same: All edges have the color set in the color box. By default, edges are black.



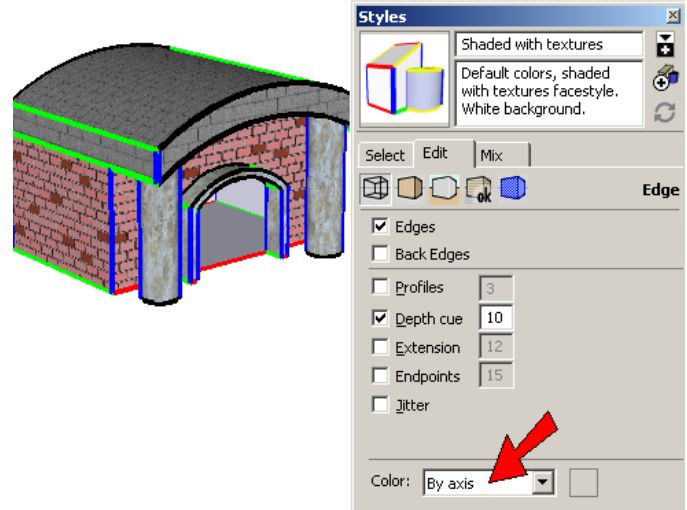
Mac: Clicking the color box opens the **Colors** window, in which you have picked a new color. Then either close the **Colors** window or re-click the color box on the **Styles** window. Otherwise, whenever you pick a new color, it will be applied to edges.

By Material: Edges are colored according to the applied material. For this to work, material has to be applied to *both faces and edges*. Applying material only to faces will not affect edges.

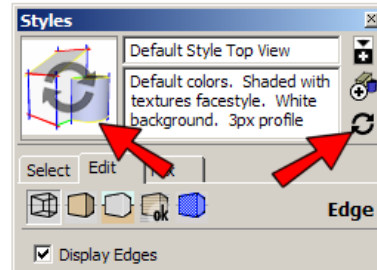


TIP: You can select both a face and its surrounding edges by activating **Select** and double-clicking on the face. This makes it easy to include edges when applying materials.

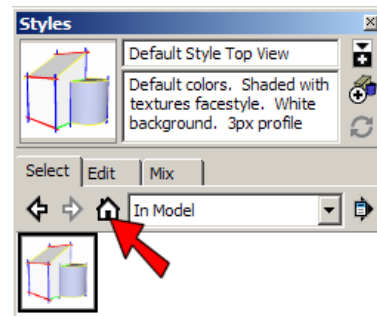
By Axis: Edges have the color of the axes to which they are parallel (red, green, or blue). Edges that are not parallel to any axis take on the assigned edge color set when the **All Same** option is selected.



A quick note about updating styles: When you have made the changes you want, click the **Update** icon on the large thumbnail, or the smaller **Update** icon.



This updating does not change the style definition in the folder where you got the style. Instead, it updates the style in **In Model**, which you can see by clicking the house icon under the **Select** tab.



NOTE: The *Advanced Exercises* book contains information on how to create and save your own styles, and use them for presentations.