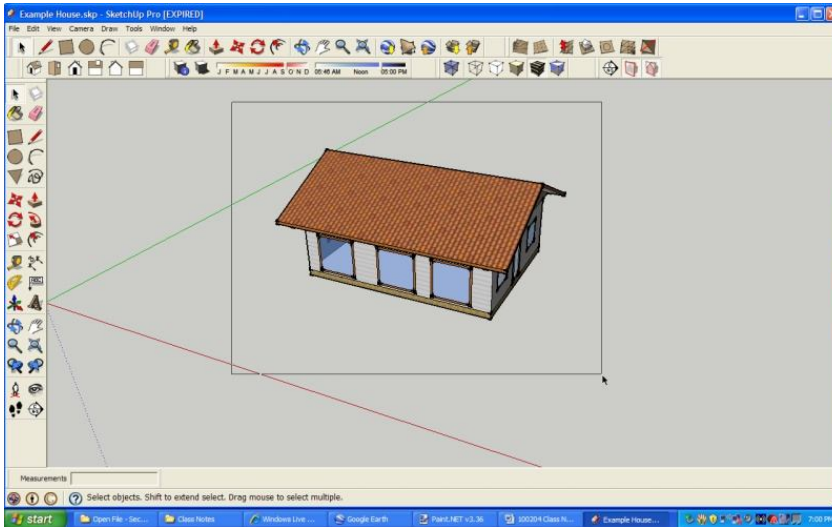


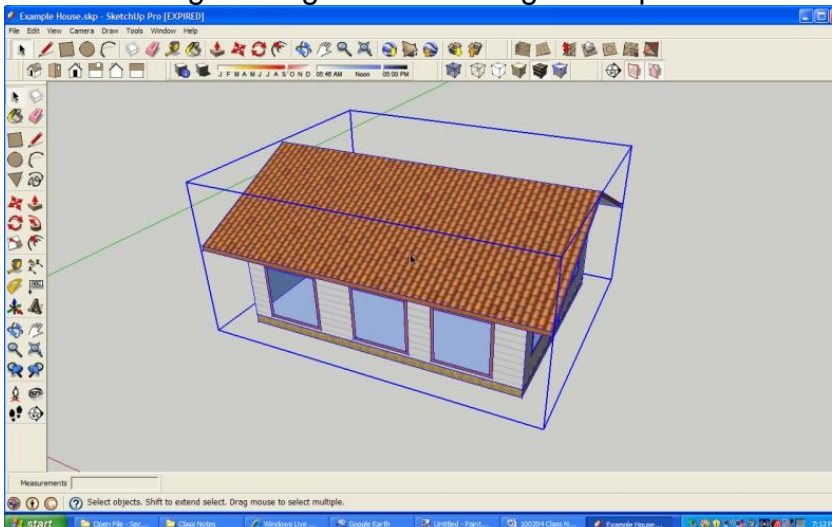
Week 2 – Choosing a site and performing a sun study

Now that you have your model pretty well finished I'm going to show you how to choose a site for it from Google Earth®, download the site to SketchUp®, and perform a detailed sun study on it.

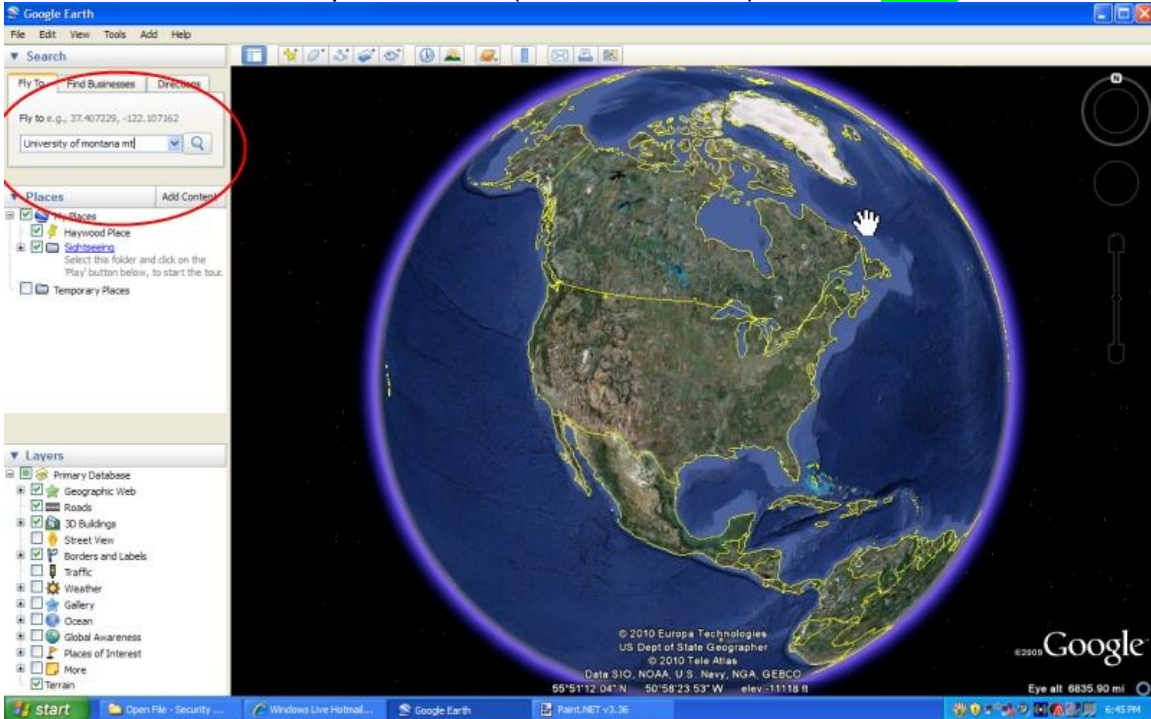
1. Before going any further it's a good idea to make the completed model into a single object called a "Group". To do this simply zoom away from your model until you can easily draw a "selection box" around it. Hit the **spacebar** to choose the "Select" tool, click in the top left corner, and drag a box around the entire model as shown below.



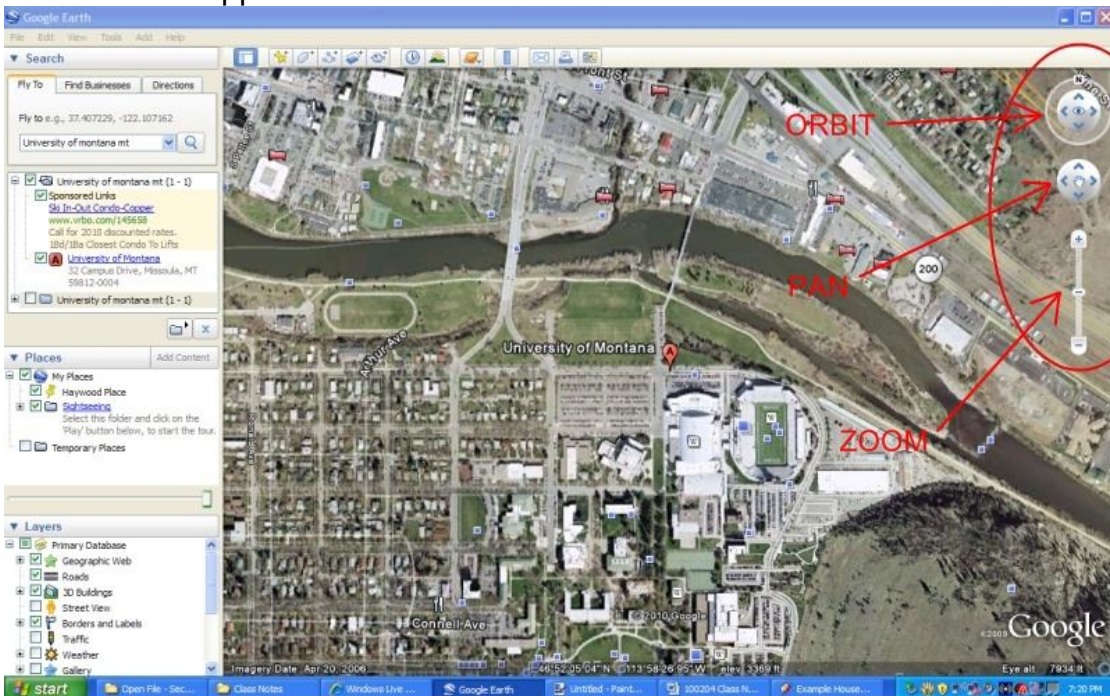
2. When you release the mouse button your whole model should turn blue. Now right-click on the model (I'm afraid I don't remember what Mac users do here, I think it might be to hold the option key and click), then click on "Make Group" from the drop-down menu. At this point the model should get a blue rectangular prism surrounding it as shown below, this signifies that it is now a single object. (Note: this can easily be undone by right-clicking on it again and clicking on "Explode" from the menu).



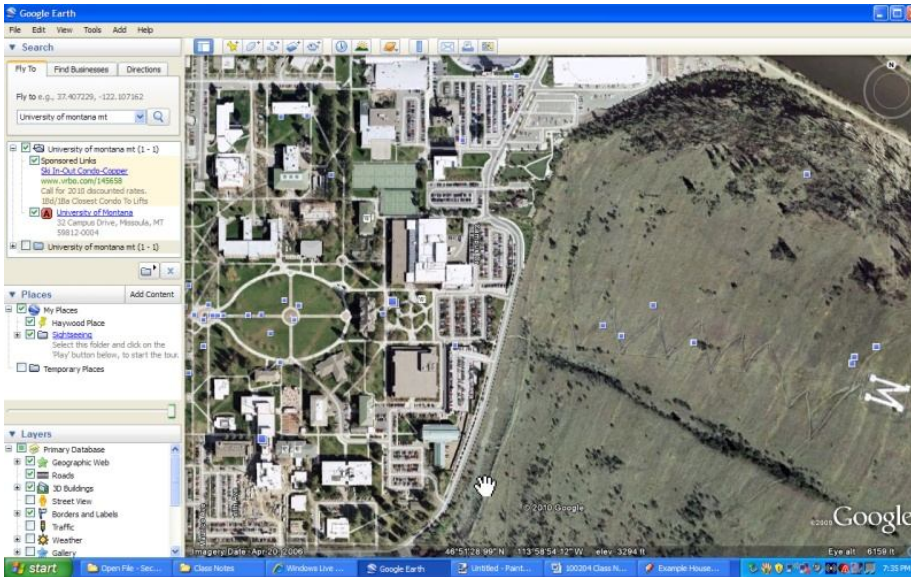
3. Making your whole model one group makes it much easier to move it precisely on the site that we will now upload from Google Earth®. So open Google Earth® and type **University of Montana Missoula MT** in the “Fly To” box in the top left corner (as shown below) then hit **Enter**.




4. You should watch in awe as the world spins and you fly all the way from outer space to a position about 8000’ directly over the Adams Center. Now if you hover over the top right corner of the image the navigation tools should appear as shown below.

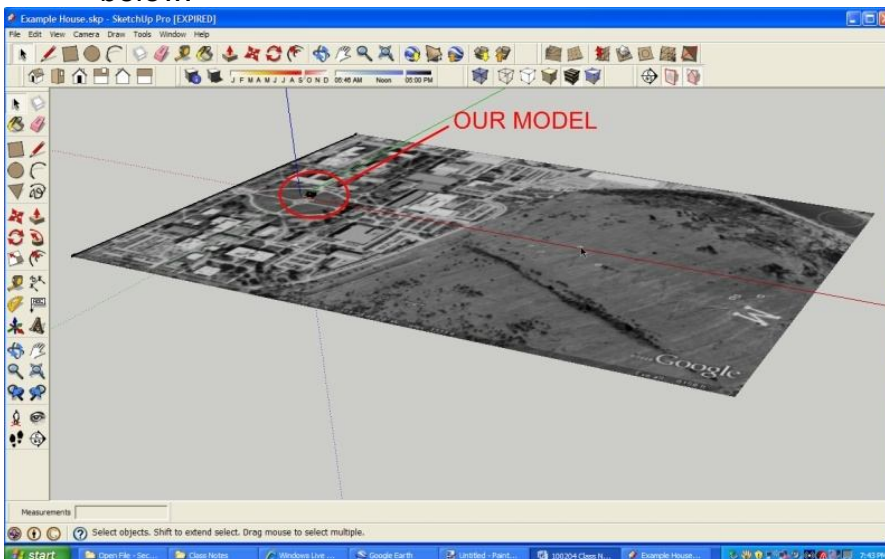


5. Try playing with these tools and see what happens. Alternatively, if you're lucky enough to have a three button mouse, try moving the wheel, or holding down on the wheel while you move the mouse around. Once you have the hang of getting around you can very easily return to a top-down, north-up view by typing **R**. This restores the default settings and it is important to do this before downloading your chosen site to SketchUp®.
6. Now using just the “Pan” and “Zoom” tools arrange your view so that you can see the oval and the “M” as shown below.

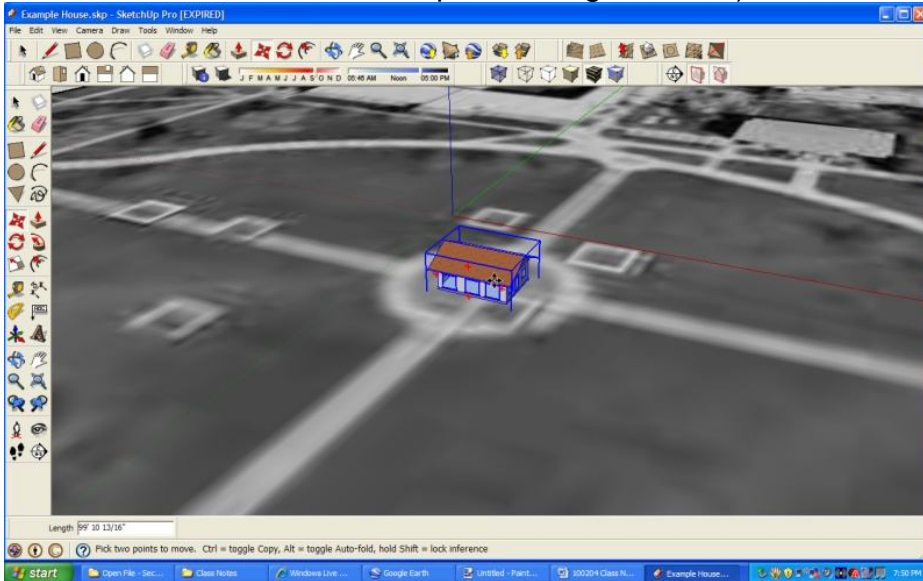



7. Type an **R** once again just to make sure that you are looking straight down and north is straight up then leave Google Earth® alone and return to SketchUp®.


8. Now you simply click on the “Get Current View” tool  and watch the magic happen. SketchUp® goes to Google Earth®, gets the site just as you have it framed in your view, and brings it into your model as shown below.

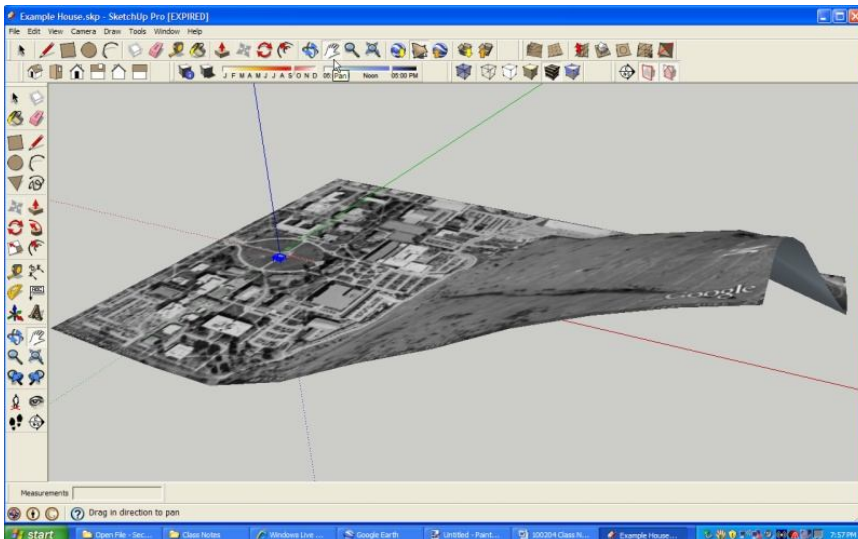


9. You don't always need to import such a large site but, if there is terrain (like Mt Sentinel) that could significantly impact the sun study of your building, you might want to consider including it as we have here. Now zoom in to your house model, select it and move it so that it is exactly in the center of the oval as shown below. (Note: it is better to move the model than to move the site because it will locate more accurately if you choose to load it back up into Google Earth®).

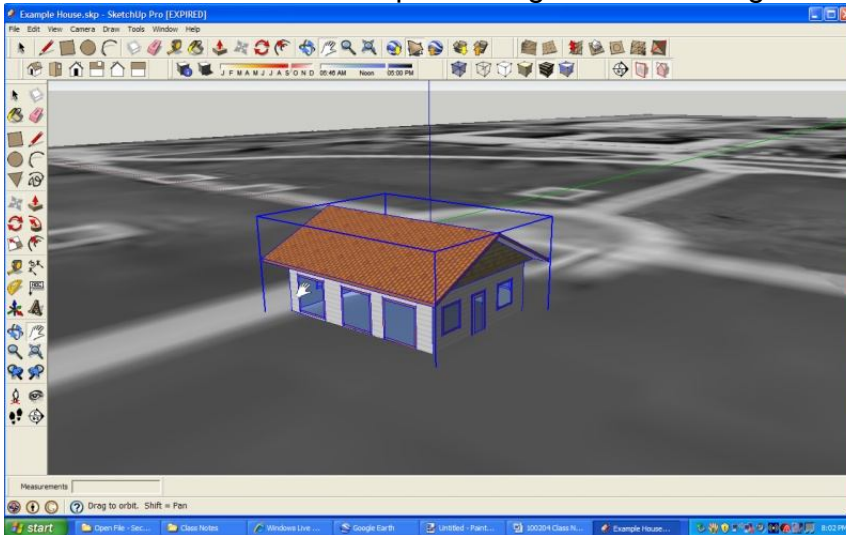


10. Now zoom back out so that you can see the whole site (use the “Zoom Extents” tool  to make it quick) and get ready to be amazed.



11. You will have noticed that your site is flat when it comes in from Google Earth®. You can leave it that way or, if you want to see an approximation of the terrain, you can simply click on the “Toggle Terrain Tool”  and watch what happens. Your site should now look something like the one below.

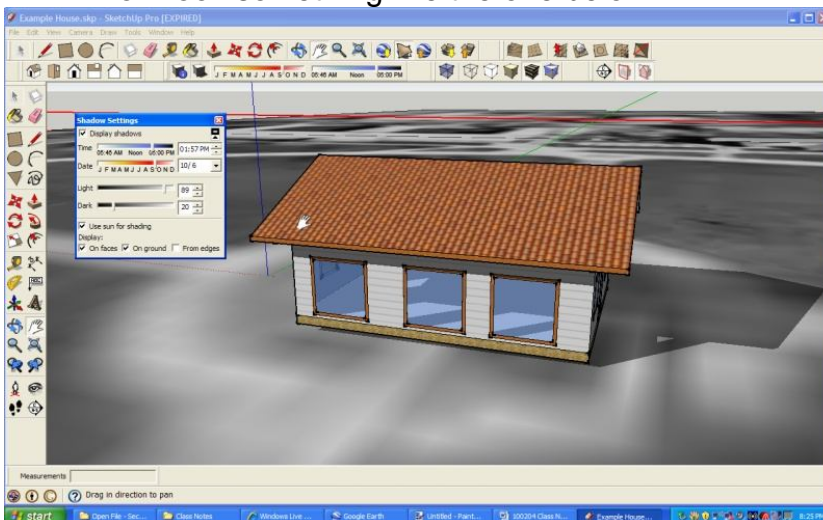


12. (I don't know about you but this makes me really happy). Try orbiting around and you will see that you have a pretty fair representation of Mt Sentinel with the University below. It's not super accurate and, when I zoom back to my model, I find that it is now slightly buried and is not quite in the middle of the oval any more (see below) so I can move it back to where I want it and up a bit to get it out of the ground.



13. Once you have it where you want it you're ready to try doing a sun study on your model. The beauty of selecting a site from Google Earth® is that it brings with it the exact latitude, longitude, and elevation. This allows SketchUp® to automatically calculate the precise sun angles and times of sunset and sunrise for the location for every minute of every day of every year. This is a simply fantastic tool for Passive Solar Design as it allows you, very easily, to see exactly how the sun is going to affect your building at any time and date of your choosing.

14. To activate this remarkable tool simply click on the “Display Shadows” tool  and then on the “Shadow Settings” tool . Your screen should now look something like the one below.



15. Notice that you can now see the sun shining in through the windows of the house, the shadow of the building on the ground, and the shadow of the roof overhang on the walls of the house. Let's take a closer look at the "Shadow Settings" box.



At the top is a check box that allows you to turn the shadows on and off. Below that is the time slider with the times of sunrise and sunset for the date chosen. Watch what happens when you move this slider left and right. Notice that the exact time shown in the box to the right of the slider changes. You can set a precise time of day by typing it into this box. Or, if you highlight the hour then click on the up and down arrows to the very right you can scroll through one hour at a time. Similarly if you highlight the minutes you can see how the

sun's position changes from one minute to the next.

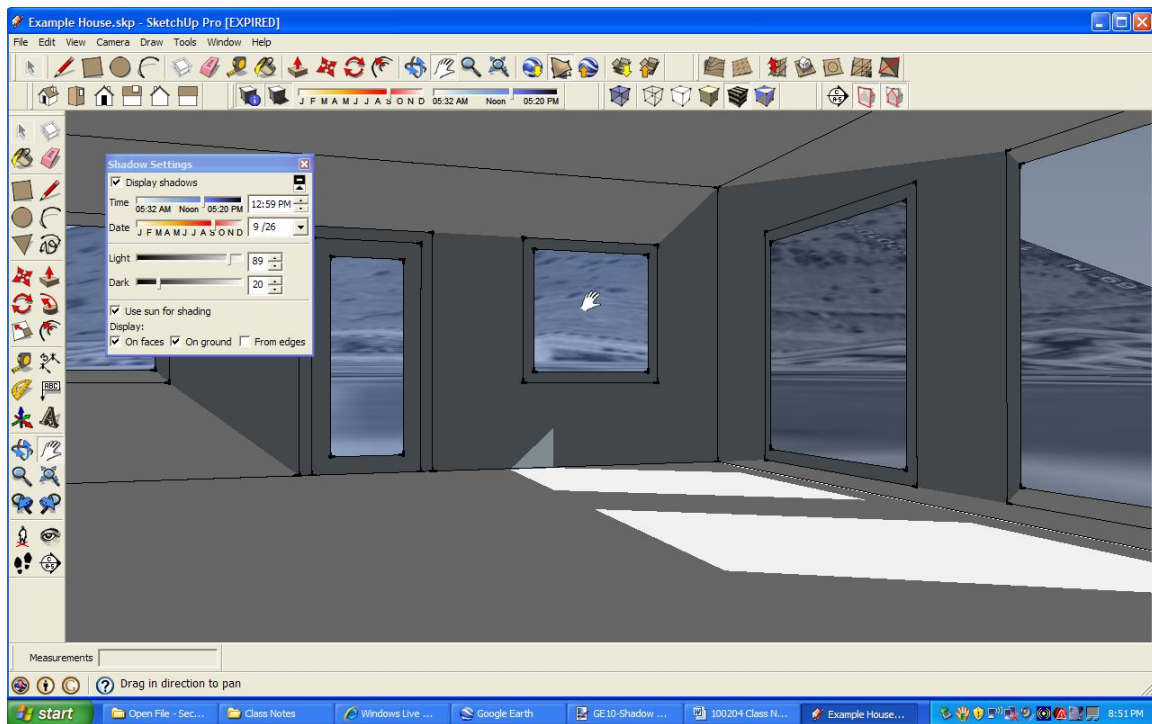
Beneath the time slider is the date slider. Watch what happens when you move it left and right. The date shown in the box to the right changes and the times of sunrise and sunset also change on the line above. As with the time slider you can type an exact date in this box or you can highlight either the month or the day and scroll through sun positions at the same time of day each month or each day.

The Light and Dark slider allow you to set the contrast so that the shadows are easier to see.

And the check boxes at the bottom allow you to control how the shadows are displayed.

Altogether these make for an incredibly powerful and easy-to-use tool for Passive Solar Design. By using this tool and adjusting eave overhang sizes, wall heights, window sizes and placements, and room layouts, the designer is able to determine exactly when the sun will enter the building and when it will be kept out. We will learn more about how to do this later in the lessons on Passive Solar Design. For now, have fun playing with the sun.

You can orbit and zoom your view so that you are inside the building and then adjust the sun settings to see how the sun enters the building as shown below.



16. One useful exercise is to set the time to noon and then set the date to December 21st, the Winter Solstice. Now highlight the month and scroll through each month of the year using the left and right arrows next to the month on the calendar. This shows you how much sun will enter the building at noon on the 21st of each month. This is handy because it includes the two equinoxes and both the solstices so you can see what happens when the sun is at its highest point in the summer and its lowest point in the winter. In the case of model we have drawn I notice that the sun is still coming in in the middle of summer which tells me that I either have to give the roof a bigger overhang or raise the bottom of the south facing windows a bit to keep the sun out in summer.

CONCLUSION

That completes this series of three lessons on drawing a simple house shape with Google SketchUp®; adding details like windows, doors, trim, colors, and materials; and downloading a site from Google Earth® and performing a sun study on the model.

I hope that you have found these lessons to be enjoyable, accurate, and informative. Please let me know if there are any mistakes that need to be corrected, things that are hard to understand, or steps that are missing.

Thank you.