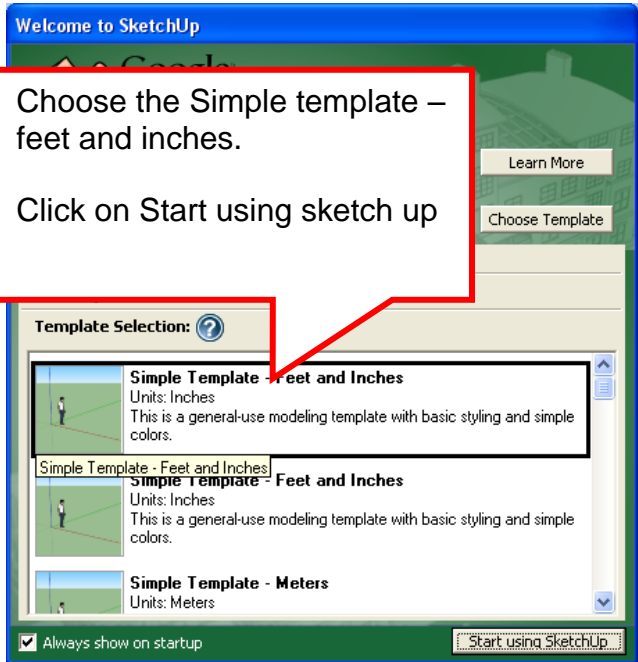
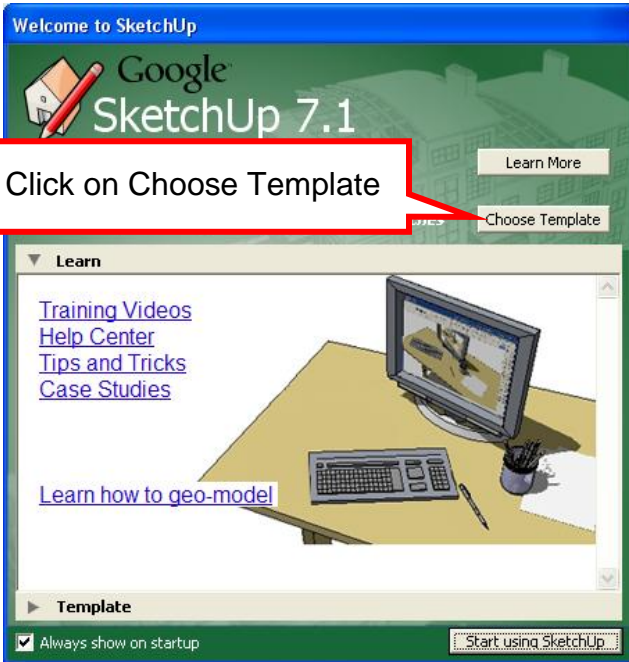


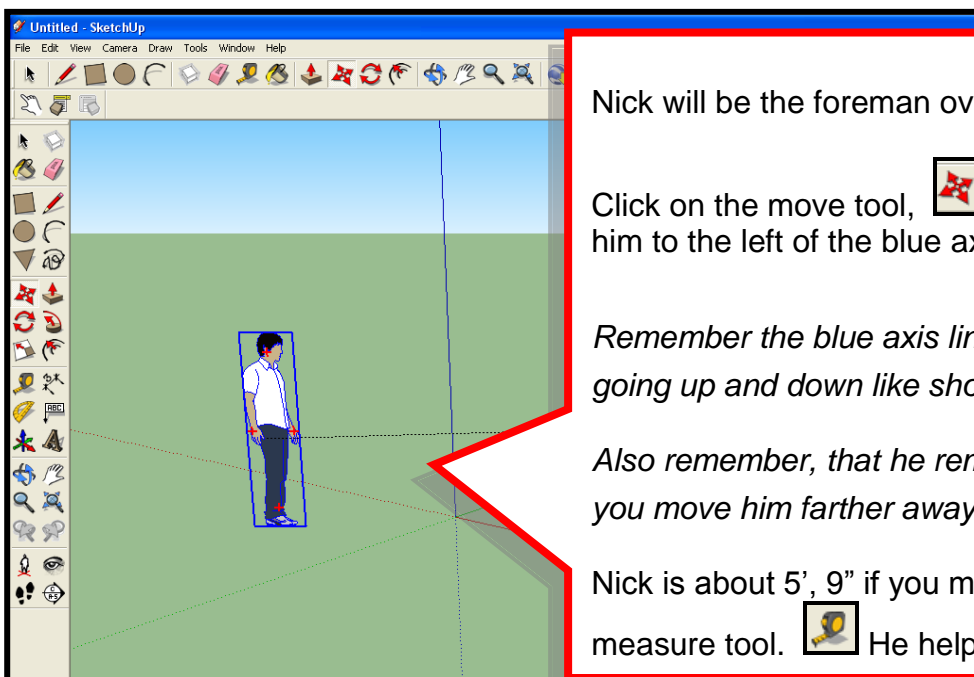
Playground Project in Google Sketch up

Objective: Apply and demonstrate the skills and geometry principles of sketch up to create a playground.

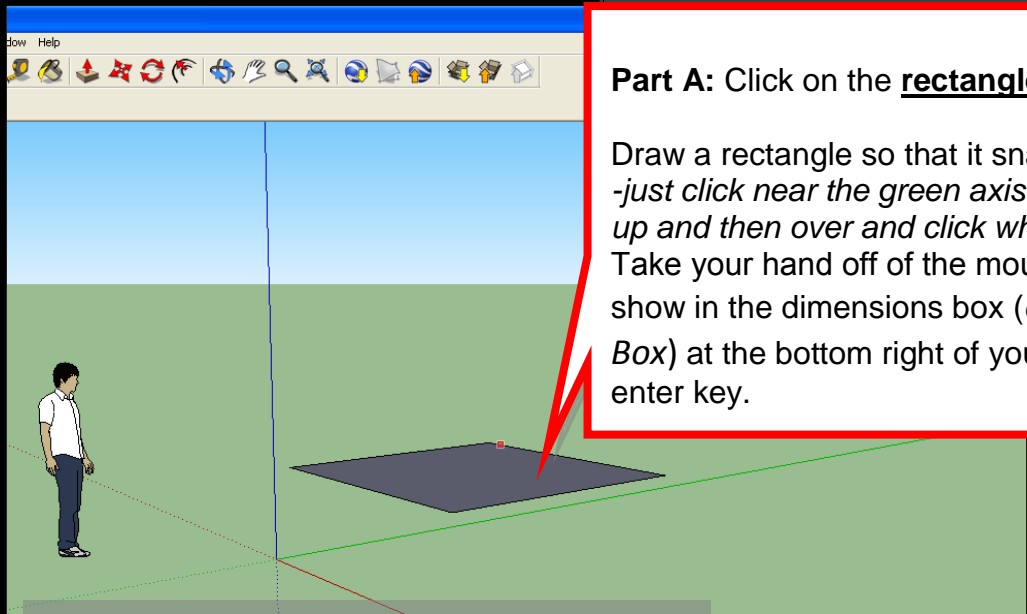
- Open Google Sketch up software.




- If you ever need to change views in sketch up once it's already open?
Click on Windows> Preferences>Template



Project 1: Make a sandbox with an area of 64 square feet.



Part A: Click on the rectangle tool. 

Draw a rectangle so that it snaps to the green axis line. *-just click near the green axis and then drag your mouse up and then over and click when it forms a rectangle.* Take your hand off of the mouse and type 8', 8'. It will show in the dimensions box (called the *Value Control Box*) at the bottom right of your screen. Now press the enter key.

Tip:
(Can't see this dimensions box? Make sure you maximize your sketch up window.)

Question: How do we know the area is 64 square feet?

Area = L x W

The length is 8' and the width is 8'.


8' x 8' = 64 square feet

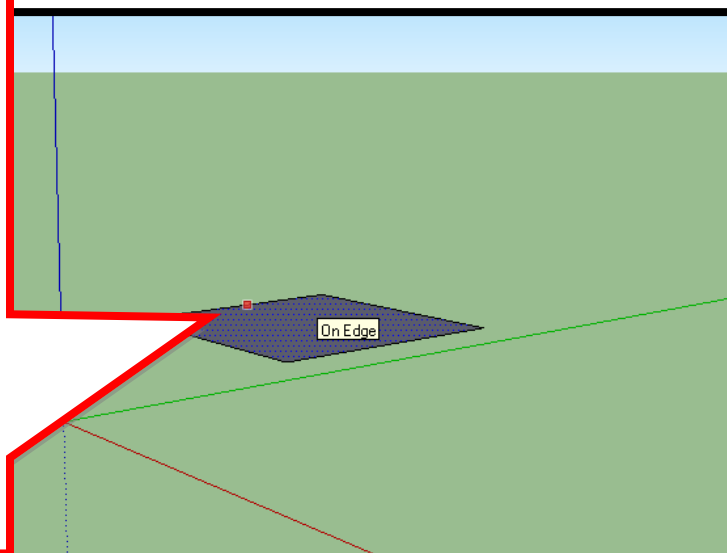
Dimensions 8', 8'

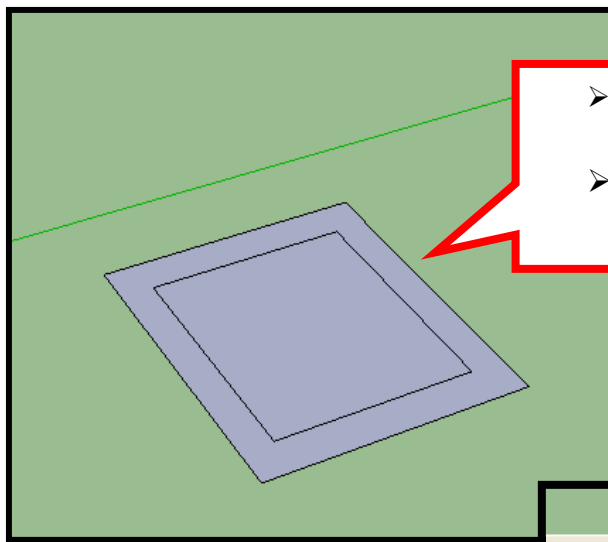
Dimensions 8', 8'

(Your rectangle will now be resized to be a **perfect 8 x 8 square**. So 64 is a square number.)

Part B: Now we will use the offset tool to create a 12 inch (1 foot) wall and seating edge around the sandbox. (Offset surfaces either inward or outward with the same shape.)

- 
- Click on the **offset tool**.
 - Your cursor will change to this tool.
 - Hover your mouse in the middle of the sand box and click.
 - Pull the mouse towards you just a little.
 - It will begin to draw a square inside of this square.
 - Let go of the mouse, but do not click yet.
 - Type **1' or 12"** in the value control box and press the Enter key.



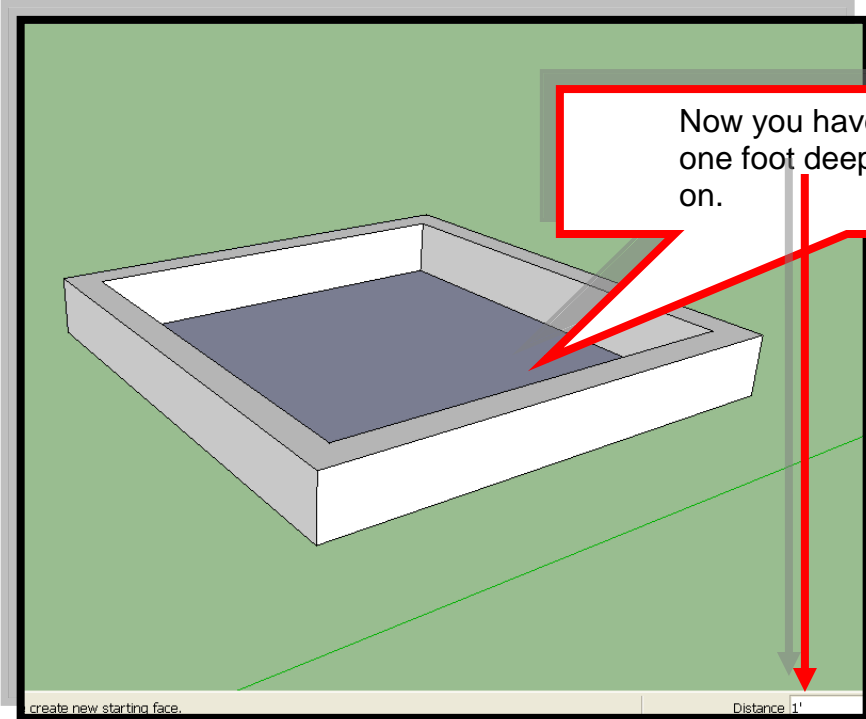


- Now you can see there is a small border around the sand box and the distance in is 1'.
- Look down in the Value control box that is now labeled distance and it should say 1'.



Part C: Now use the Push Pull Tool to pull out the wall and 1 foot seating area.

- First use the scroll on your mouse and scroll away from yourself to zoom in a little closer.
- Then click on the orbit tool and pull down so you can see the top of the sand box. *(Quick Tip: You can also hold down the scroll wheel on your mouse to rotate.)*



Now you have a nice sandbox that is one foot deep with a nice edge to sit on.

Wouldn't it be nice to glue down some nice padded wood strips to the seating area all around the top of the sandbox? **How much wood strips would we need if it came in 1 foot strips?**

➤ **Part D:** Measuring the perimeter: We can measure 2 different ways.

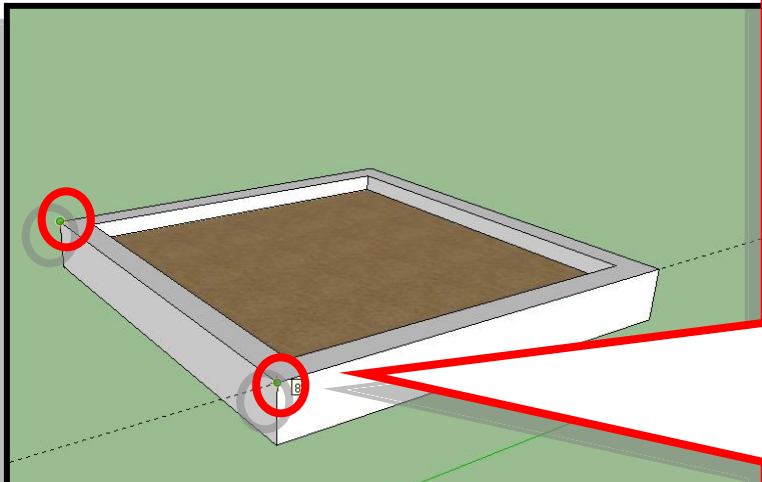
Measuring Perimeter- What do we measure to get the perimeter of the seating area around the sandbox so we can lay the padded wood strips?


Peri is a prefix that means “around” so we will measure the distance **around** the top edge.



1. Tape Measure tool

We know the seat width is 1 foot and the strips do come in one foot sheets. So we just need to know how many inches of strips.



Step 4: Click on the tape measure tool. 

- Click on one outside corner (vertices) of the sandbox. It will say **endpoint** **and have a green dot.**
- Drag your mouse and click on the corner right across to another endpoint.
- You will see the length in the length



You can use the ABC text tool to label the distance if you like.

The formula for perimeter is to add up all 4 sides (or the sum of all sides.)

Since we know that we made this sandbox 8' x 8", we already know that all four sides are 8 feet long.

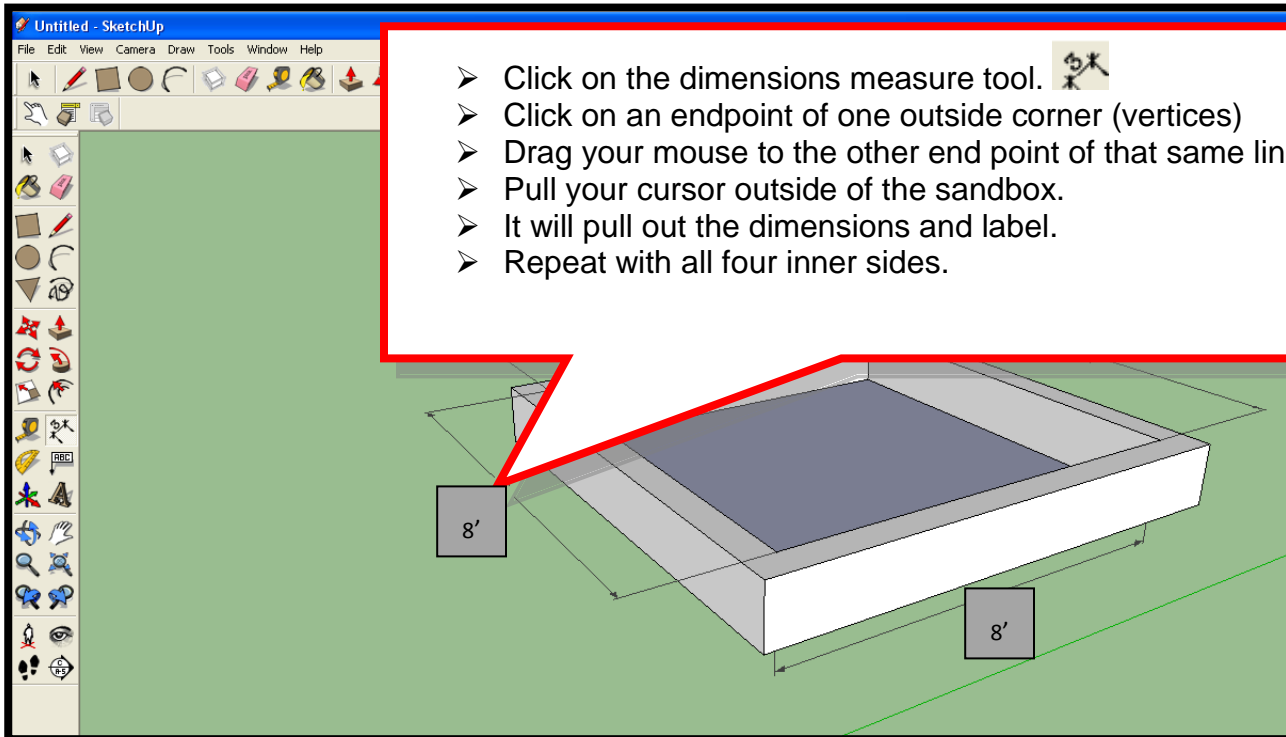
So Perimeter= 8 + 8+ 8+ 8= 32 square feet.

Older grade levels use this formula: $2(8) + 2(8) =$ also equals 32 square feet.

So we need **32 feet** of wood padding strips to go all the way around the sandbox.



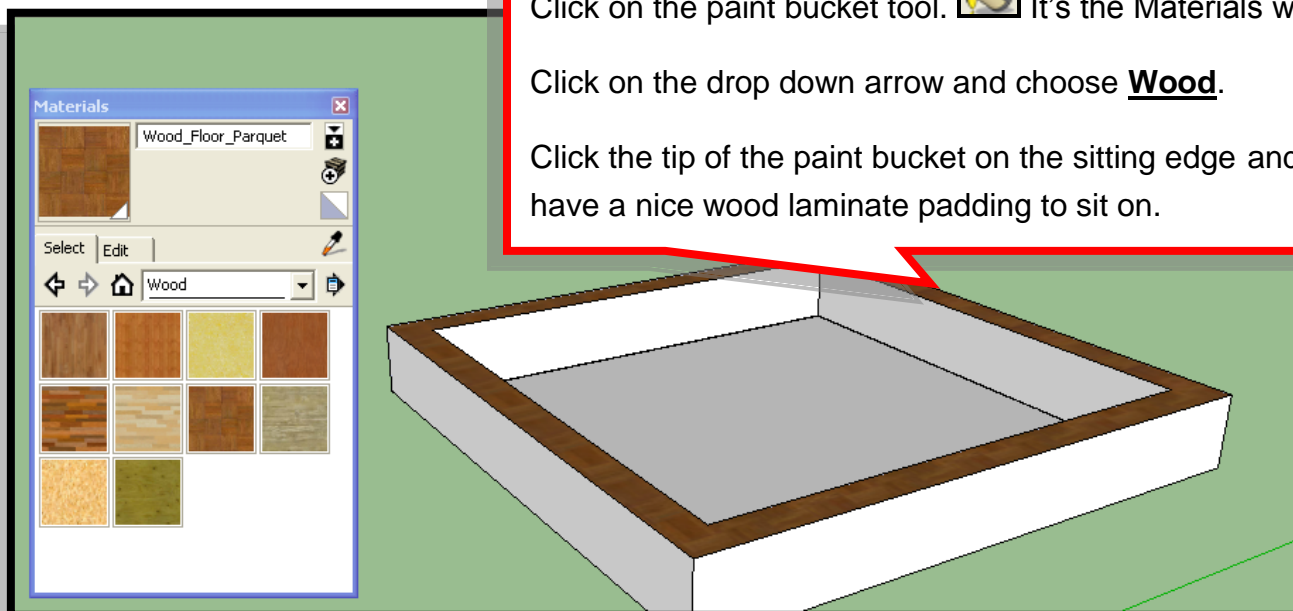
2. We can also use the **3D Dimensions measuring tool**



Now we can add all 4 sides together to get the perimeter.
 $8 + 8 + 8 + 8 = 32$ square feet (3rd grade)

Or use the formula: $2L + 2W = \text{perimeter}$
 So $8(2) + 8(2) = 32$ square feet.


Part E: Let's go ahead and add a padded wood laminate strip around the sitting edge.
 If we had to buy this 1" border, we would need to buy **32 feet**.



- **Bonus Question:** If the wood strips were \$3.00 per foot, how much money did it cost to put the padding around the sandbox?

Part F: Let's raise the floor surface add some sand to the sand box.

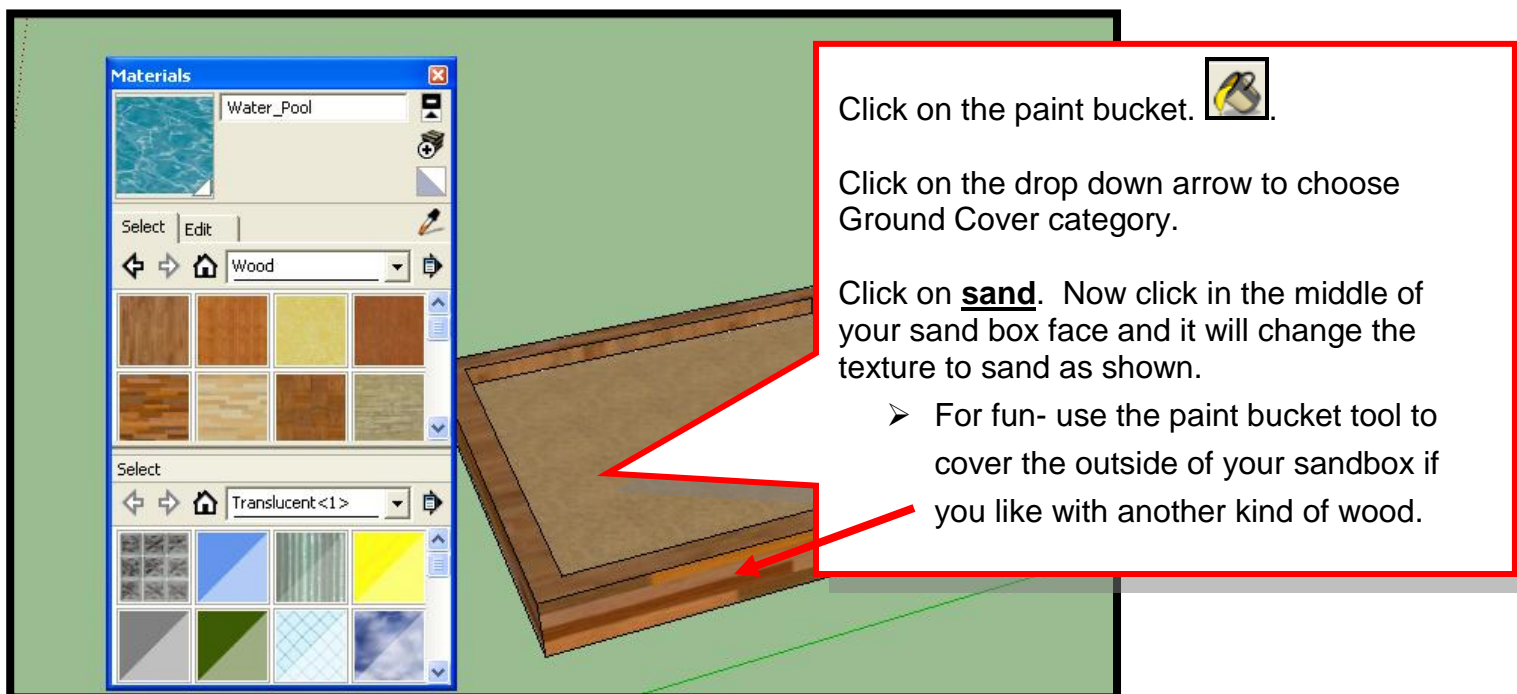
If we wanted to know how much sand to buy, we'd have to first calculate the volume of the sandbox- how much would it hold?

Click on the push/pull tool. 


- Click on the bottom surface face of the sandbox and pull up.
Notice how the bottom face raises towards the top.
- Let go of your mouse and type 6 (this will be 6 inches)
- Press the Enter Key.

Help Tip: Press the spacebar to exit any tool

Now you will have 6" of sand in your sandbox. Let's make it look like sand.



The image shows a software interface with a material palette on the left and a 3D view of a sandbox on the right. The material palette has two sections: 'Wood' and 'Translucent <1>'. The 3D view shows a sandbox with a brown interior and wooden sides. A red callout box points to the interior of the sandbox.

Click on the paint bucket. 

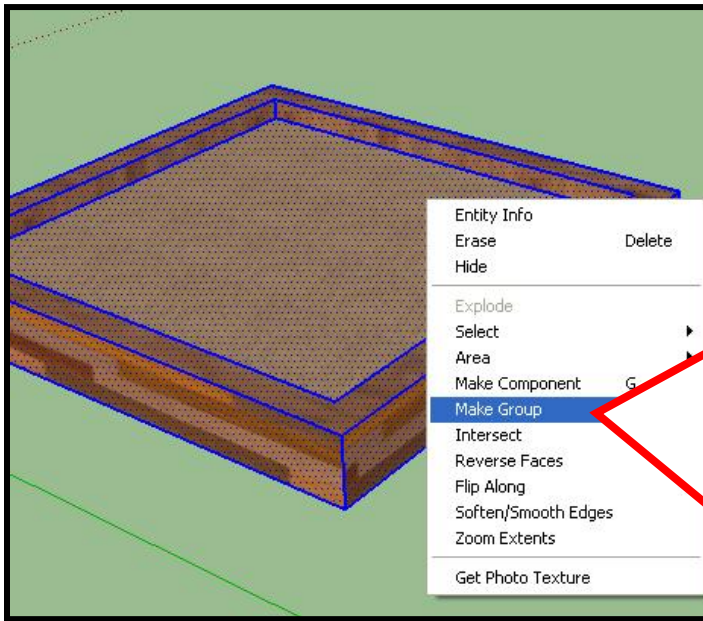
Click on the drop down arrow to choose Ground Cover category.


Click on **sand**. Now click in the middle of your sand box face and it will change the texture to sand as shown.

- For fun- use the paint bucket tool to cover the outside of your sandbox if you like with another kind of wood.

Right now your sandbox is nothing more than just edges and faces. If you click on the move tool and try to move it- it will move in pieces.

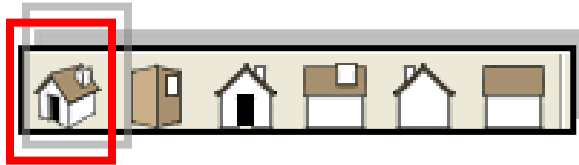
- Let's **make this sandbox a group** so we can move it around later if we need to.




- To turn an object into a group.
- Triple click on the object or select it by dragging your mouse over all of its parts. *Once selected-all parts will have blue lines or dots as shown.*
- Right click with your mouse.
- Choose **make group**.
- Now you will be able to move the entire sandbox around by clicking on the move tool  then select and drag.

Project 2: Make a kiddy wading pool with a radius of four (4) feet.

First click on the **isometric view** in the toolbar.

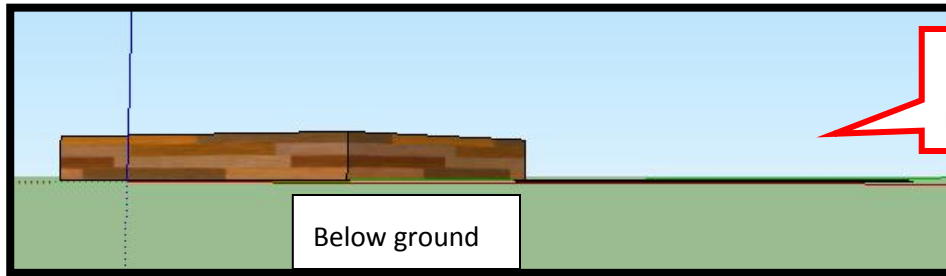


- If you don't have this tool bar, click on **View** > Toolbars > select **views**.

Part A: Click on the circle tool. 

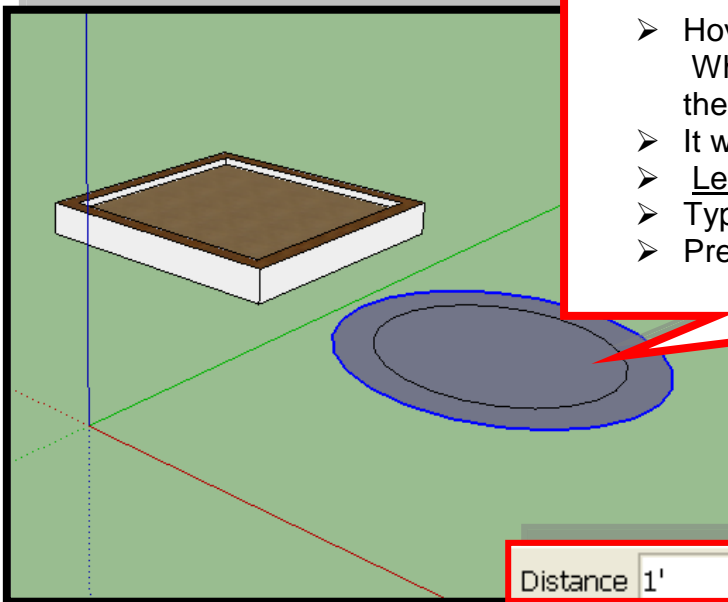
- Click where you want the center of your pool to be, then drag your mouse out to draw the circle.
- Don't click, but type 4' in the radius box.


Tip: Let's first make sure that we are drawing this pool above the ground- even with the horizon. Click on the orbit tool or hold down your middle scroll wheel on your mouse and move mouse around until you form a 90° angle. With the blue and red axis (*green will be hidden behind the red as shown below.*)

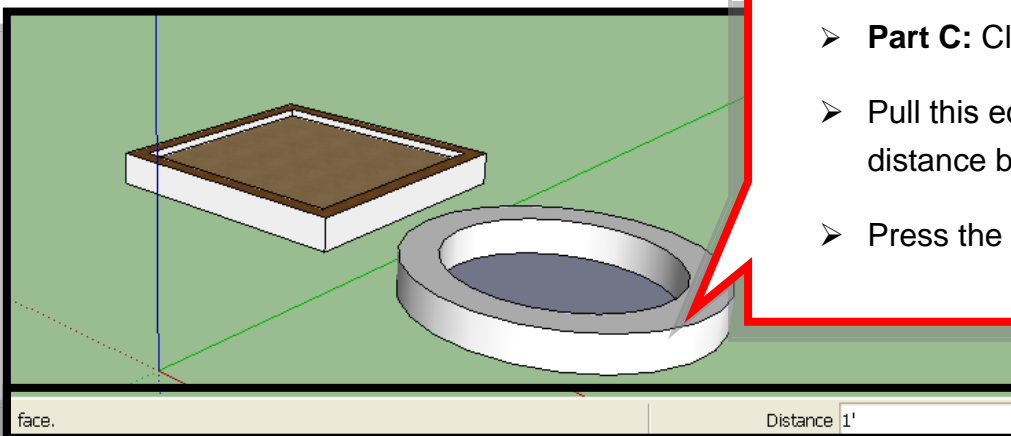



Looks like we are okay since they both look like they are above ground


Part B: Now we will use the **offset tool** again to make a 12 inch (1 foot) sitting edge around the wading pool. Offset creates surfaces either inward or outward with the same shape



- Click on the offset tool. 
- Hover your mouse in the middle of the pool. When you see a red point on an edge, click and pull the mouse towards you just a little.
- It will begin to draw a circle inside of this circle.
- Let go of the mouse, but do not click anywhere yet.
- Type 1' in the distance box.
- Press the enter key.

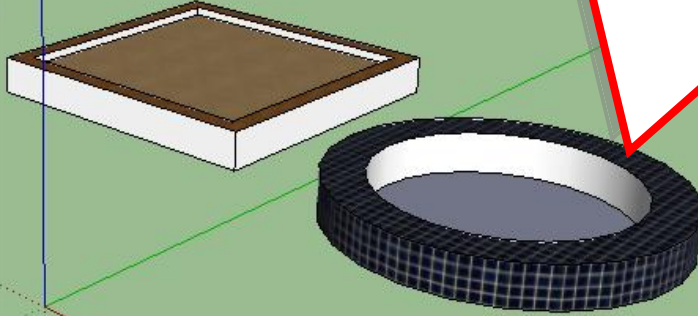


- **Part C:** Click on the push/pull tool. 
- Pull this edge up and type 1' in the distance box.
- Press the enter key.


Part D: Click on the paint bucket tool. 

Click on the drop down arrow and choose **Tile**.

Click the tip of the paint bucket on the sitting edge and you now have a nice tile padding to sit on.



➤ **Now let's add some water to the wading pool.**

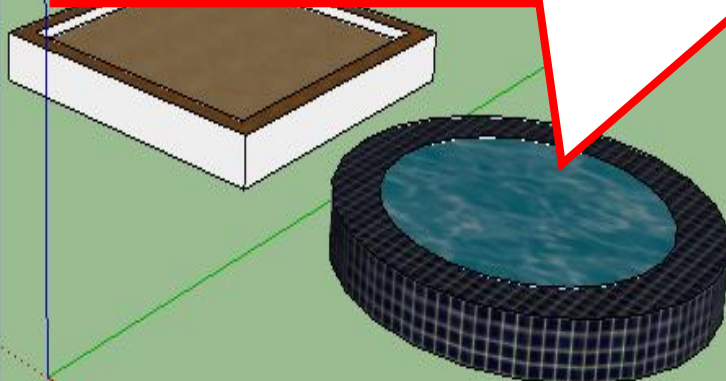
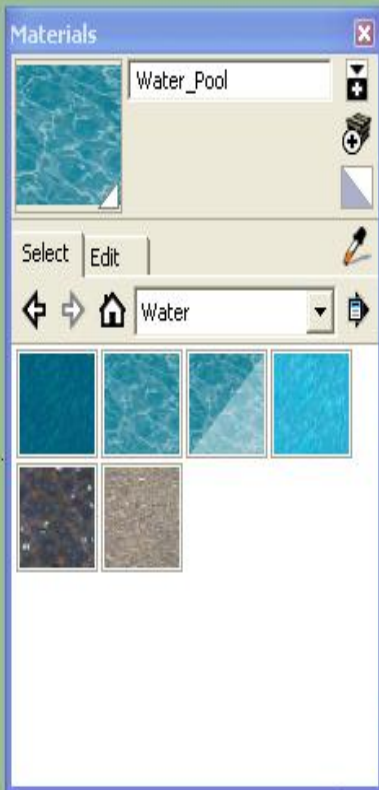
- Click on the push/pull tool. 
- Click on the bottom inside surface.
- Pull this surface up and type 1' in the distance box. (fill it to the top.)
- Press the enter key.

Change the surface to water.

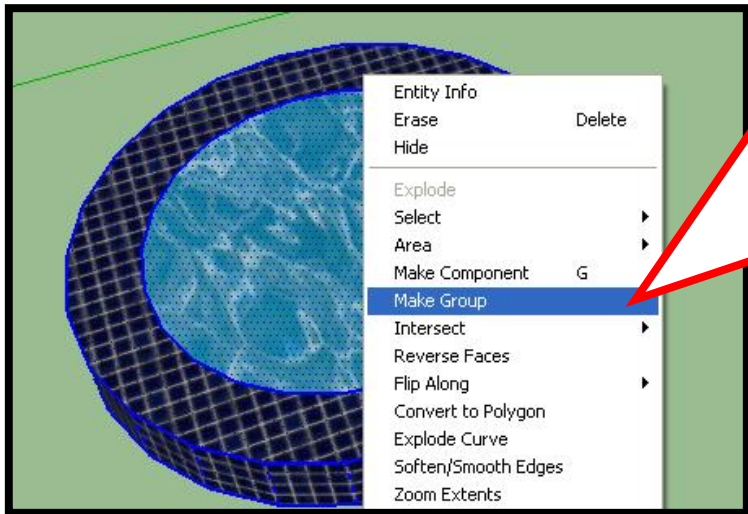
Click on the paint bucket tool. 

Click on the drop down arrow and choose **Water**.

Choose a water type and click on the surface.

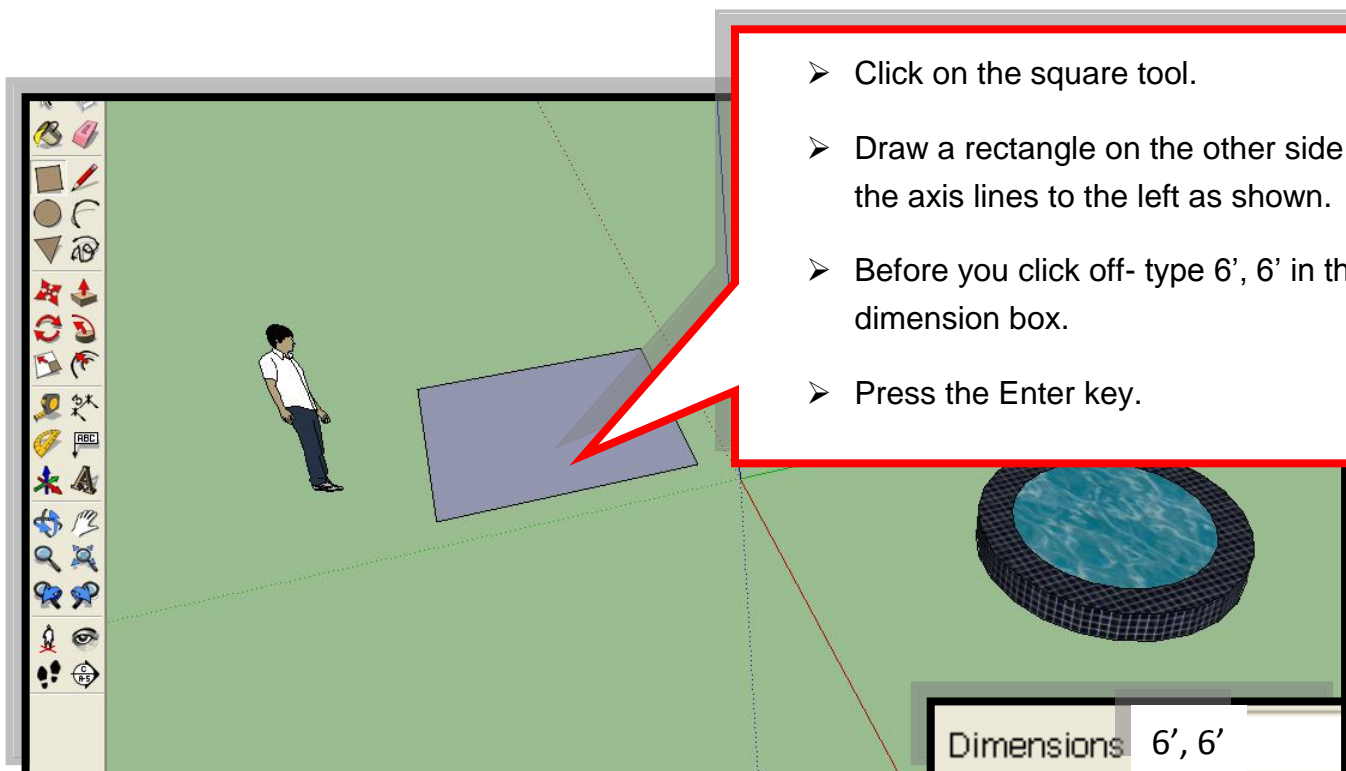


- Use the orbit tool (or hold down the scroll wheel on your mouse and turn) to adjust the angle of your view. Use the pan (hand) tool to adjust your view of your park.

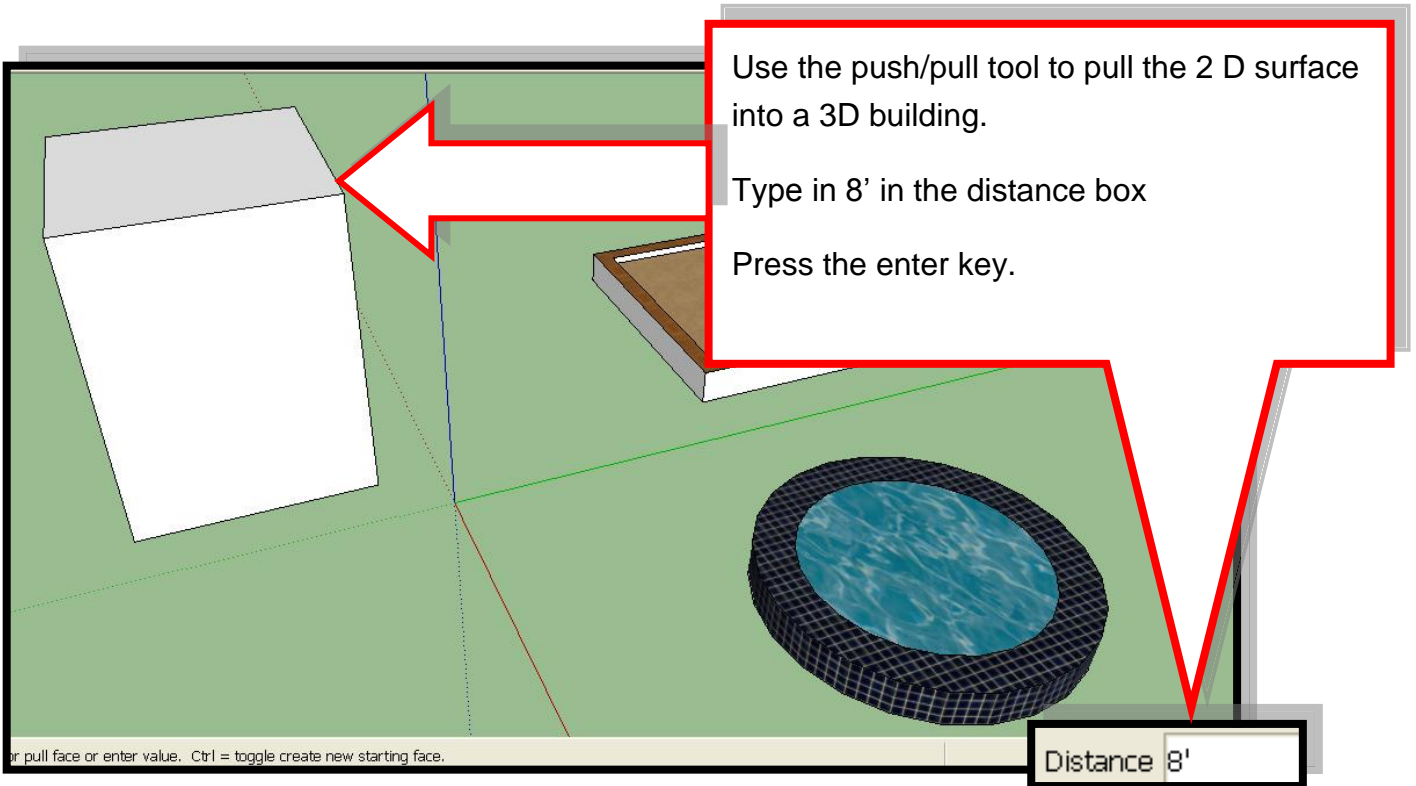



- **Part E:** Let's group the wading pool.
- Triple click on the object or select it by dragging your mouse over all of its parts. All parts will have blue lines.
- Right click with your mouse.
- Choose **make group**.
- Now you will be able to move th entire sandbox around.

Project 3: Make a snow cone stand





- Click on the square tool.
- Draw a rectangle on the other side of the axis lines to the left as shown.
- Before you click off- type 6', 6' in the dimension box.
- Press the Enter key.

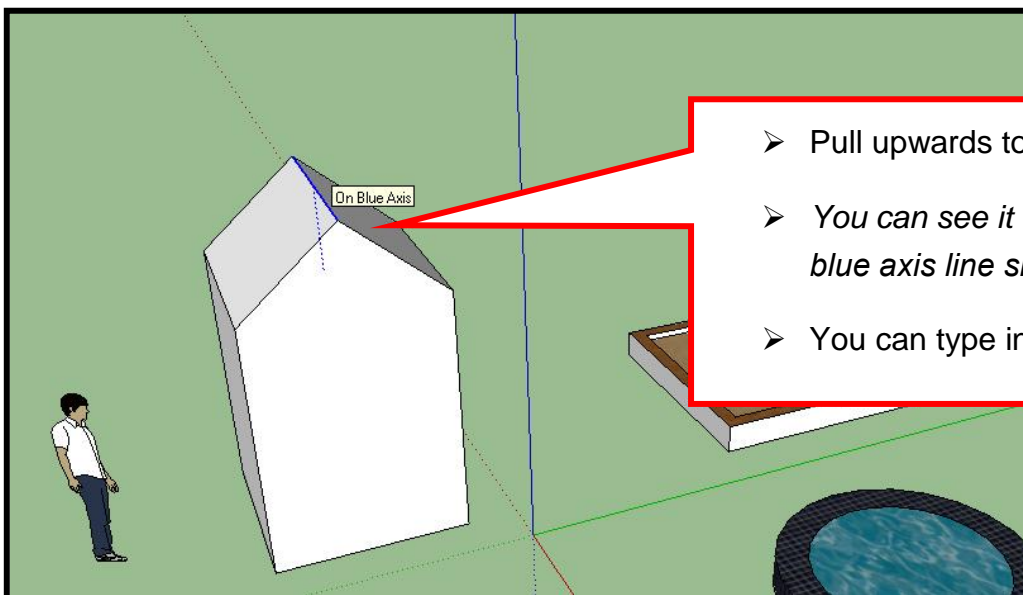
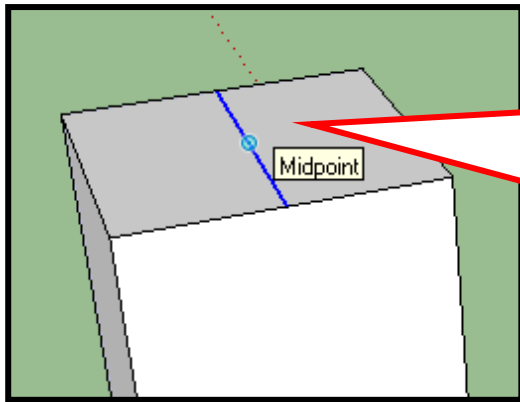
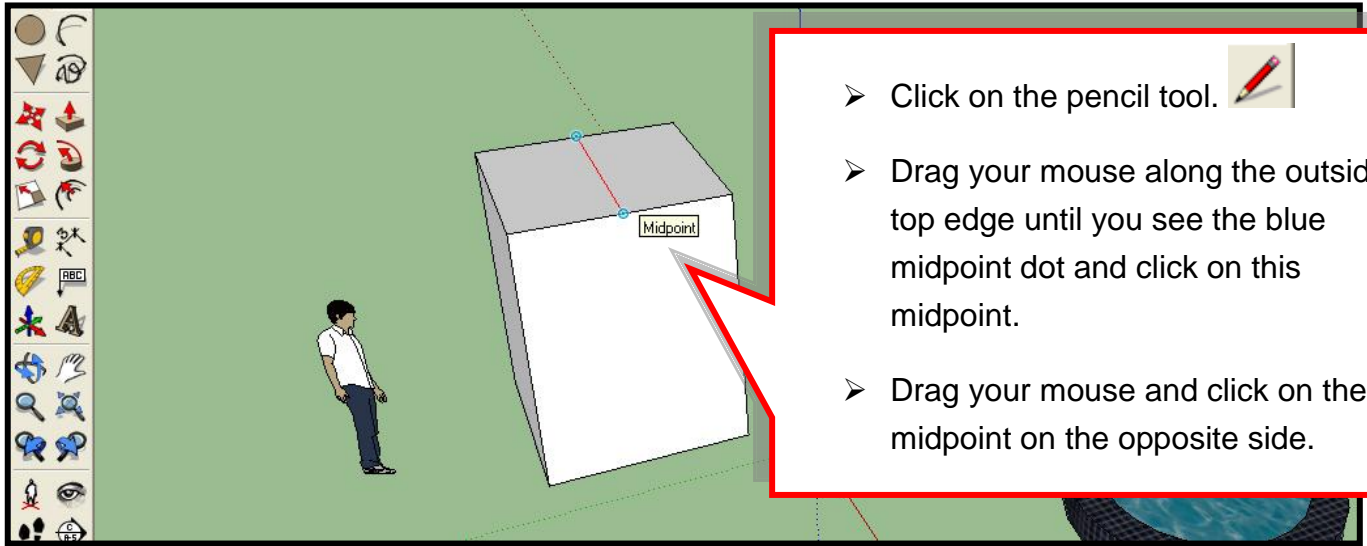


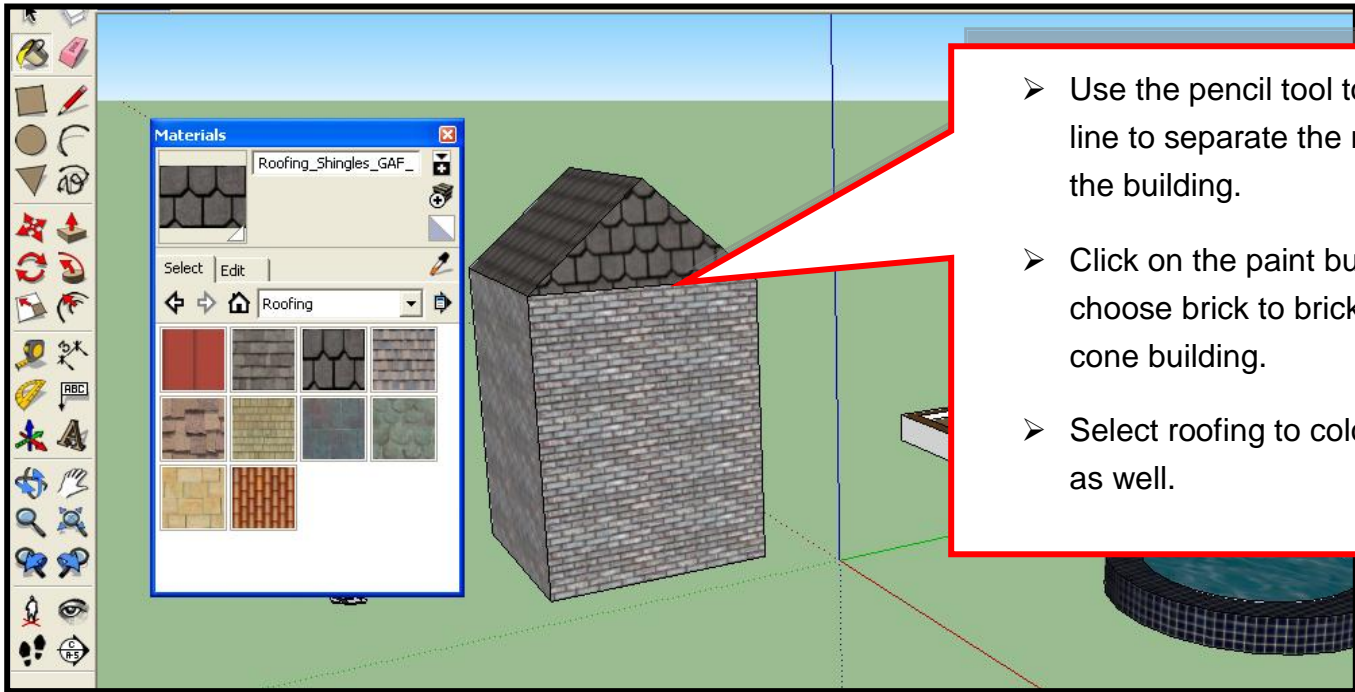
Note: You can click on the Zoom Extends tool  so you can see all of your objects in one screen as close up as possible.

- **For right now, Zoom out** (scroll towards yourself) so you can see your park at a little distance.

Use the orbit tool  (or hold down the scroll wheel on your mouse and drag,) to rotate and use hand tool  to pan so to position your objects.

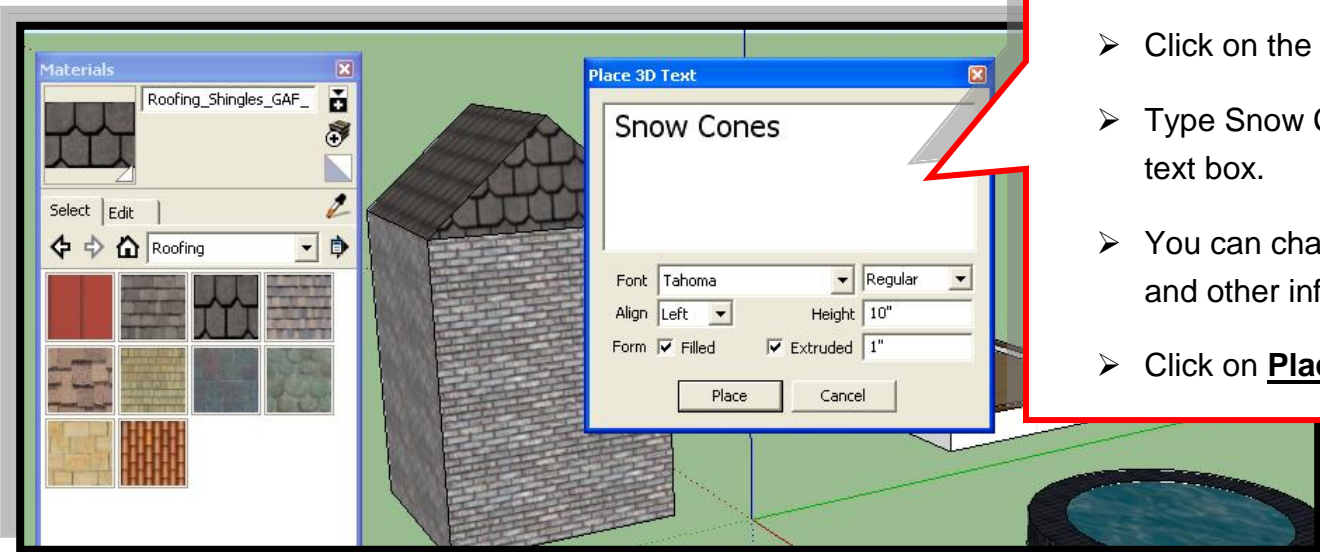
➤ Let's make a roof for our snow cone stand.




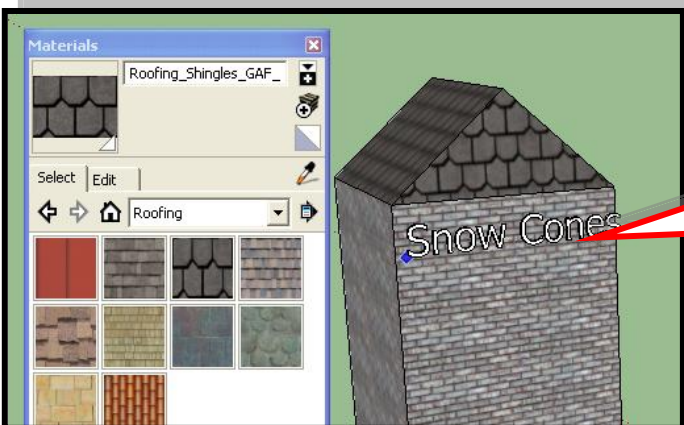


- Use the pencil tool to draw a line to separate the roof from the building.
- Click on the paint bucket and choose brick to brick the snow cone building.
- Select roofing to color in a roof as well.

➤ Add a 3D sign to your building

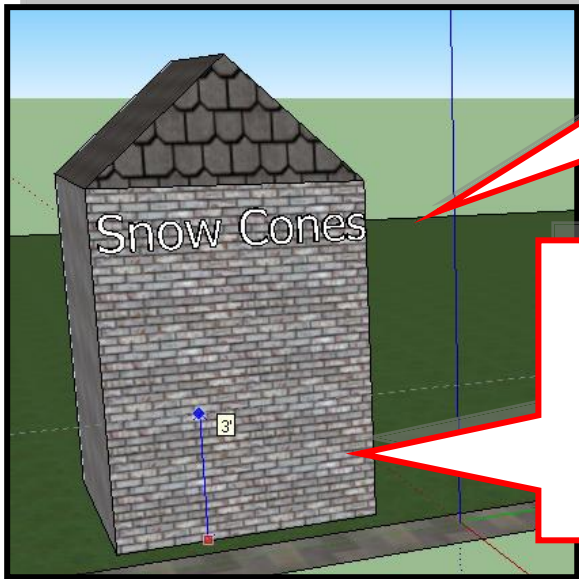


- Click on the 3D text tool 
- Type Snow Cones in the text box.
- You can change the font and other info.
- Click on **Place**.




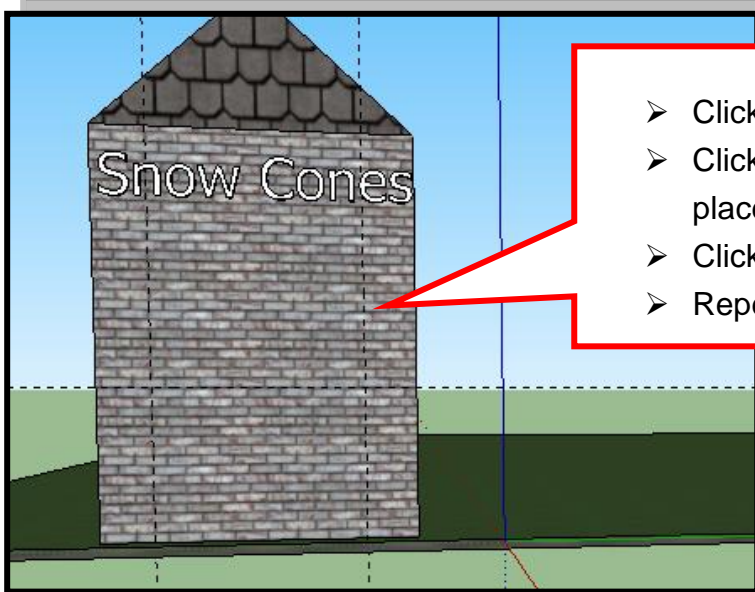
- You can click on the text to move up or down or use the + signs to rotate as well.


➤ Add a window to your snow cone building



- Zoom in and orbit so you see this close up view.

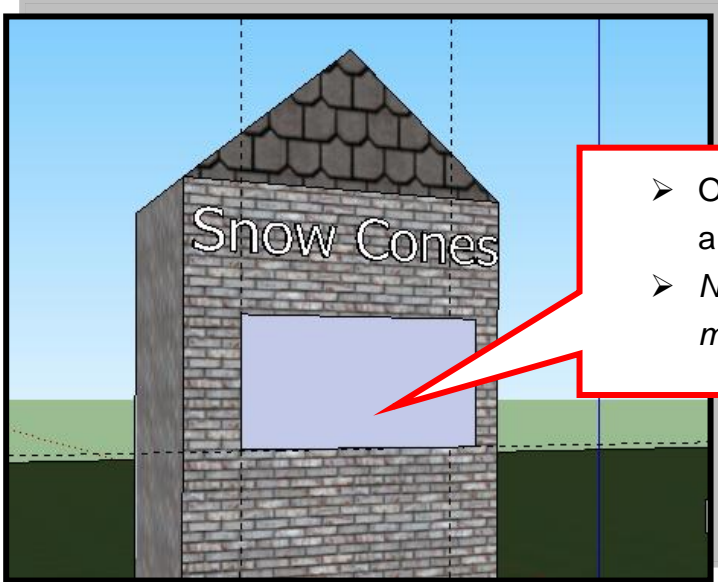
- Click on the measurement tool  Start at the bottom, click and move the mouse up to place guidelines.
- Click at 3' marker.



- Click on the measurement tool  again.
- Click on the left edge, then move the mouse over to place guidelines.
- Click at 2' marker.
- Repeat on the other side.





- Using these guidelines click on the pencil or rectangle tool and draw your window.
- *Note: It won't always look even if you have the object rotated like shown here.*

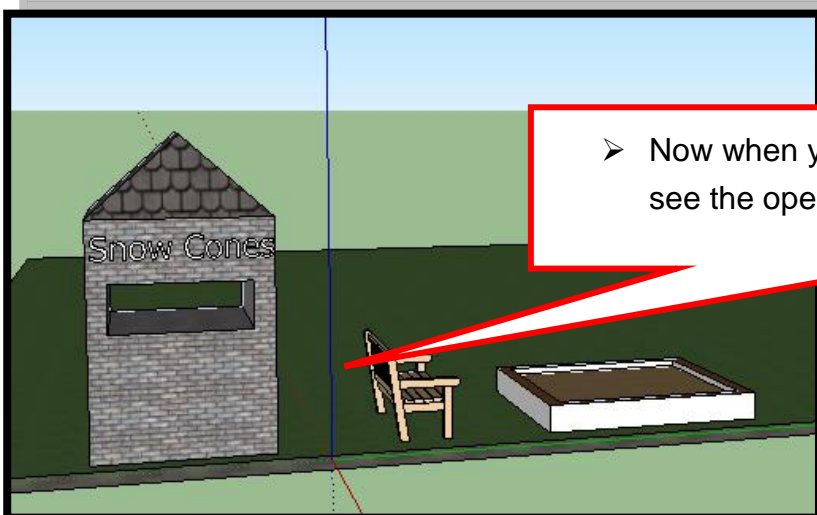


- Once you create the last side or click after drawing a rectangle, it may or may not be filled in as shown.
- Notice how it looks off center again since I rotated my view after creating.

Let's use the push/pull tool to pull back this rectangle all the way to the back so you can see through the stand.



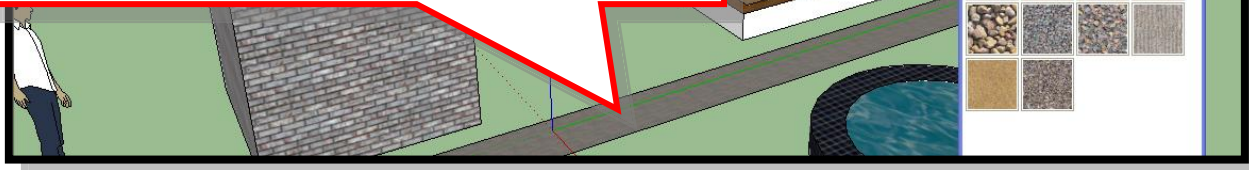
- Use the orbit tool  to position the stand so you can see the left back edge as shown.
- Click on the push/pull tool. 
- Push the rectangle back until you come to the back edge (it will say on edge with a tiny red square) then click.



- Now when you rotate your stand, you will be able to see the opening you just created as shown.

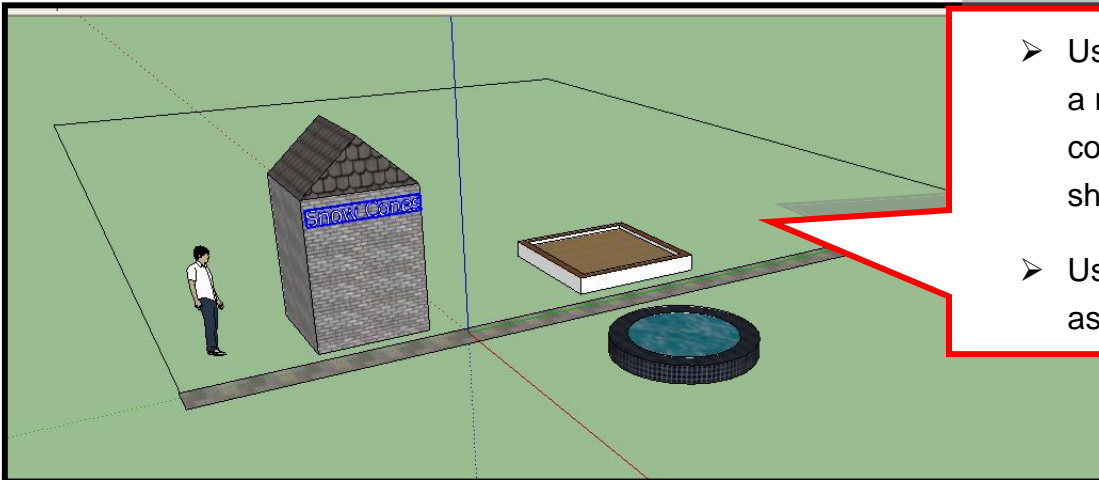
➤ Project 4 : Add a sidewalk

- Use the rectangle tool to draw a skinny rectangle parallel to the green axis line.
- *(if you hold down the shift key- it will lock it to the nearest axis line.)*
- Use the paint bucket to color in your sidewalk- choose ground covering

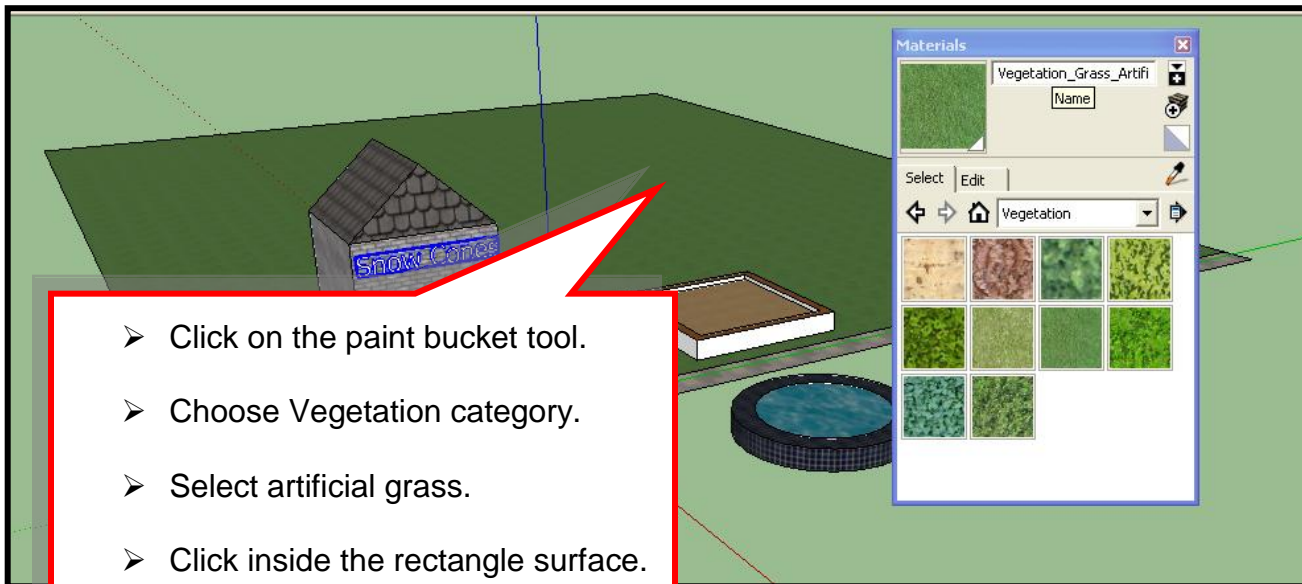


➤ Project 5: Add a section of artificial grass.


- Use the rectangle tool to draw a rectangle around the snow cone stand and sandbox as shown.
- Use the ends of the sidewalk as a stopping place.

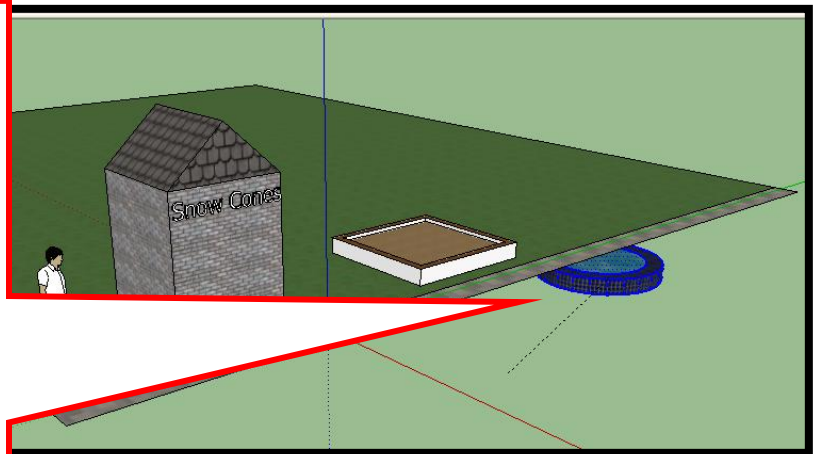


- Click on the paint bucket tool.
- Choose Vegetation category.
- Select artificial grass.
- Click inside the rectangle surface. Now you have grass!

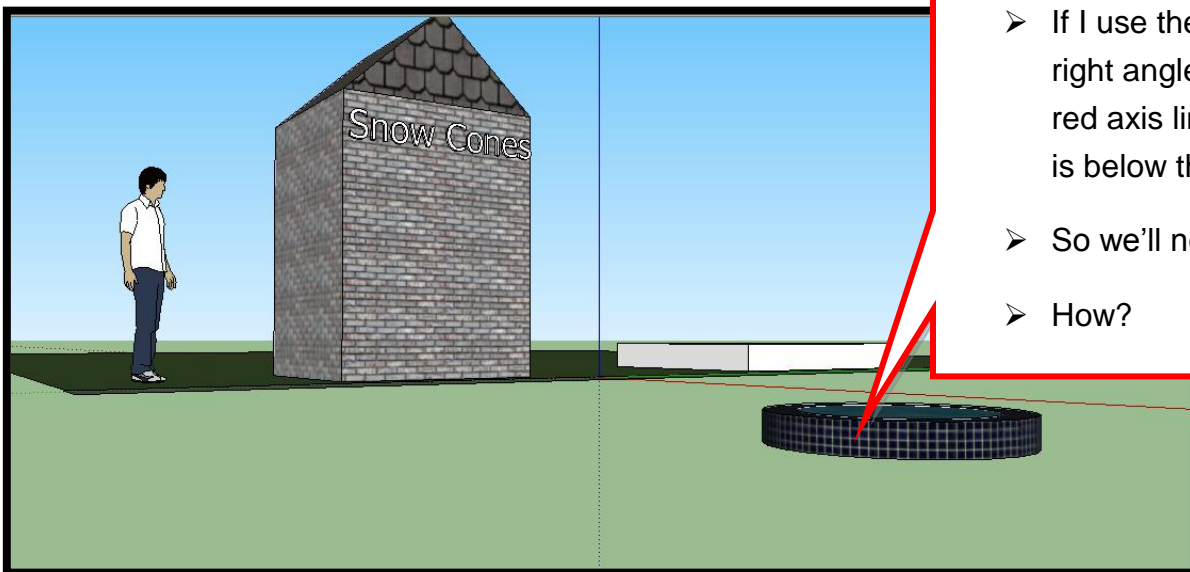


- Now let's try to move the wading pool over to the other side to the left of the green axis line- does it move over and set nicely on the new grass?

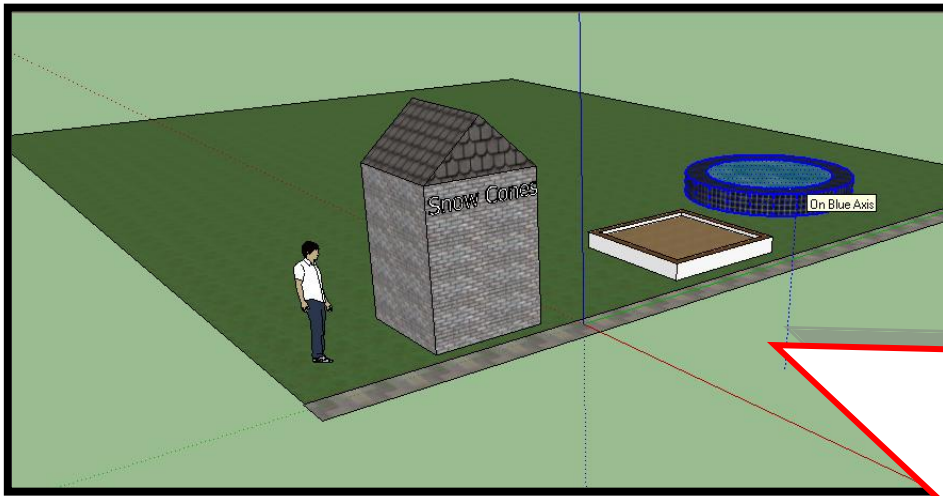
- Click once on the pool to select (*Remember- we made it a group.*)
- Click on the move tool. 
- Now try to drag the pool right next to the sandbox on the other side.
- What if it goes under the artificial grass? What's happening?



- Somehow on this screen it actually got below the horizon. Check it out below when I rotate the screen to be even with the horizon.

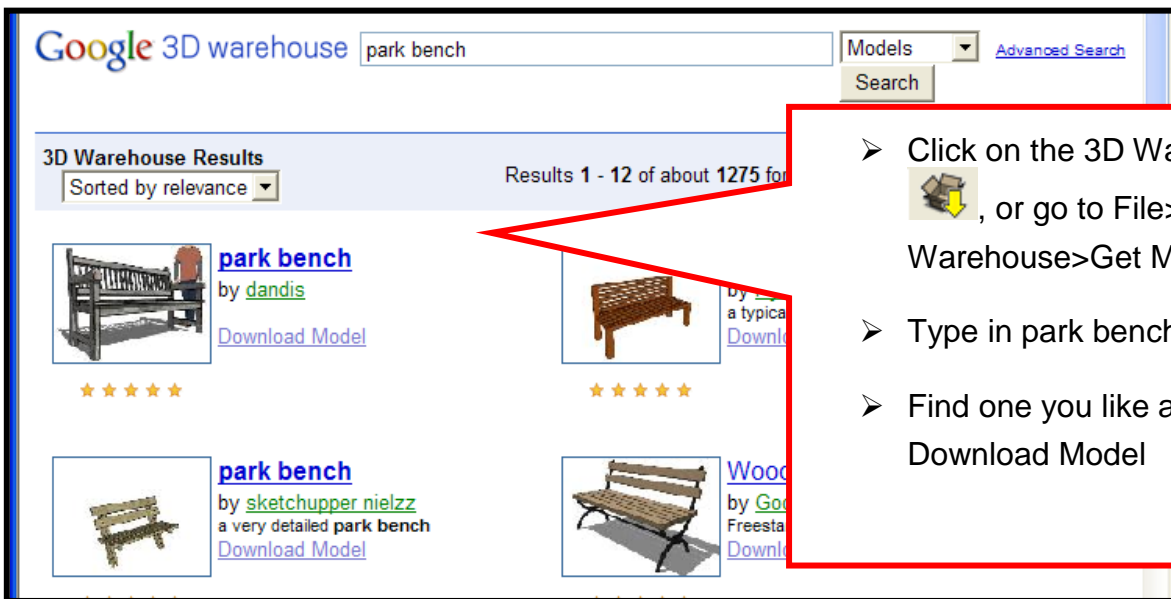



- If I use the orbit tool to create a right angle with the blue and red axis lines, you can see this is below the horizon.
- So we'll need to move it up?
- How?

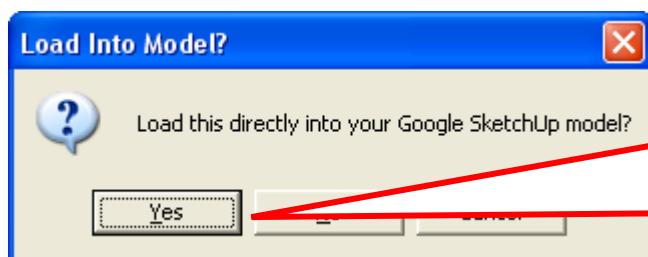


- Click on the wading pool to select since it's a group.
- Click on the move tool.
- Now try to drag the pool over until you see a **blue Axis reference line**- which means we are moving it up.
- Now you can place it on the other side as shown because you are moving it up above the horizon.

Project 6: Add a park bench using 3D Warehouse



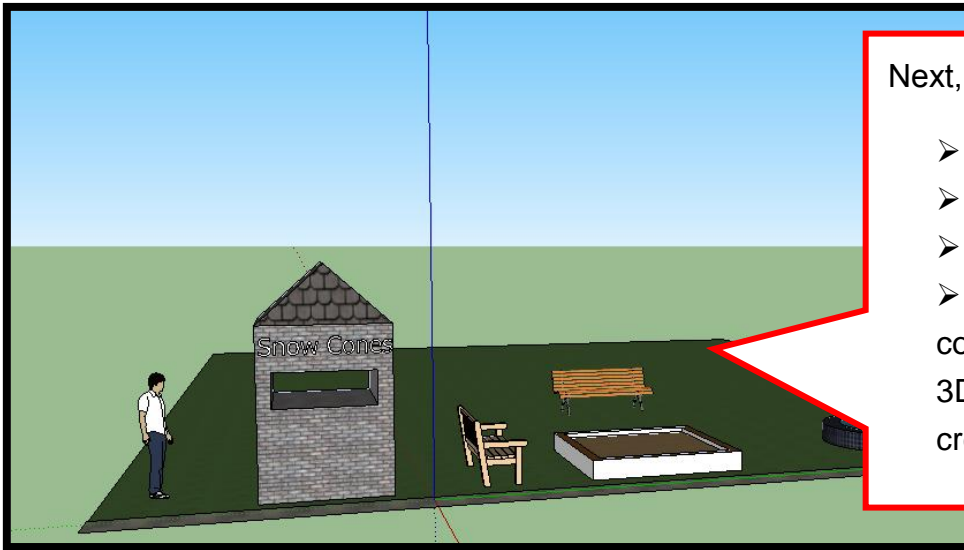
- Click on the 3D Warehouse icon , or go to File>3D Warehouse>Get Models.
- Type in park bench and press enter.
- Find one you like and click on Download Model



- Say yes to Load this directly into your Google Sketch up model.

Note: If you say no, it will prompt you to save this and import it later.

Here you can see I have downloaded two different park benches. One is facing the sandbox. We will cover how to rotate your bench like this in a few steps below.



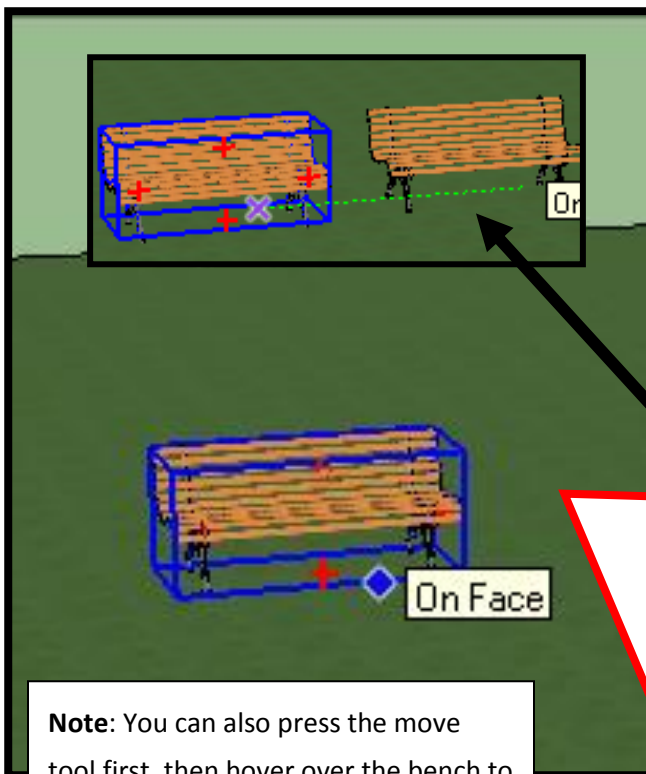
Next, let's talk about how to


- Copy,
- Move
- Rotate
- Resize

components that you bring in from the 3D warehouse, components library or create yourself.

Instead of downloading another bench, let's make a copy of the bench component we have already downloaded from the 3D warehouse.

➤ **Copying with the Move/Copy Tool:**  One tool that does the job of two.



- Press the spacebar to get back to the selection tool.
- Click one time to select the bench- because it is a component, all of the edges and faces are selected. (Unlike drawn objects that are only a series of edges and faces but are not grouped and are not components.)
- Click on the Move tool  or press the "M" on your keyboard. You can now drag to move the bench around. *Let's make a copy now.*
- Press the Control key on your keyboard and you will notice tiny + signs. If you drag the bench to move now- it will make a copy as you move.
- You can hover your mouse over any part of the bench on the infer points to drag in a certain direction. This will align or snap the bench to the face of the artificial grass.

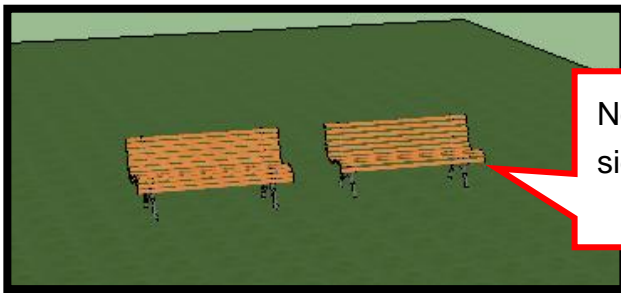
Note: You can also press the move tool first, then hover over the bench to get the + signs then press Control key and drag to make a copy.

You can lock an object as you drag so it so that it automatically moves along one of the axis lines by pressing on one of the arrow keys. You can also drag in a straight line by holding the shift key down.

Up and down arrows
lock to **blue vertical
axis.**

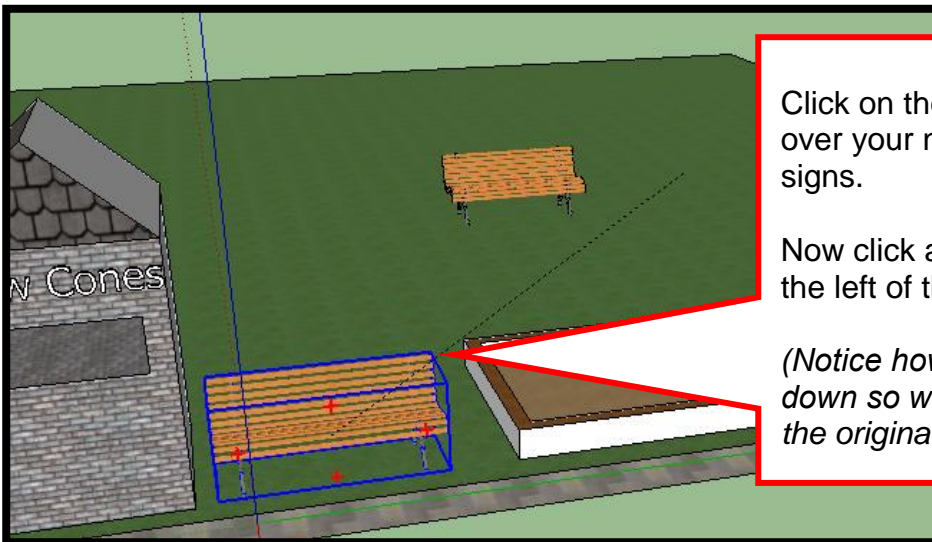
← Left
arrow Locks to
green axis line


→ Right arrow
Locks to **red axis line**



Now you will have 2 benches facing side by side.

➤ **Move your bench so it faces the sandbox.**

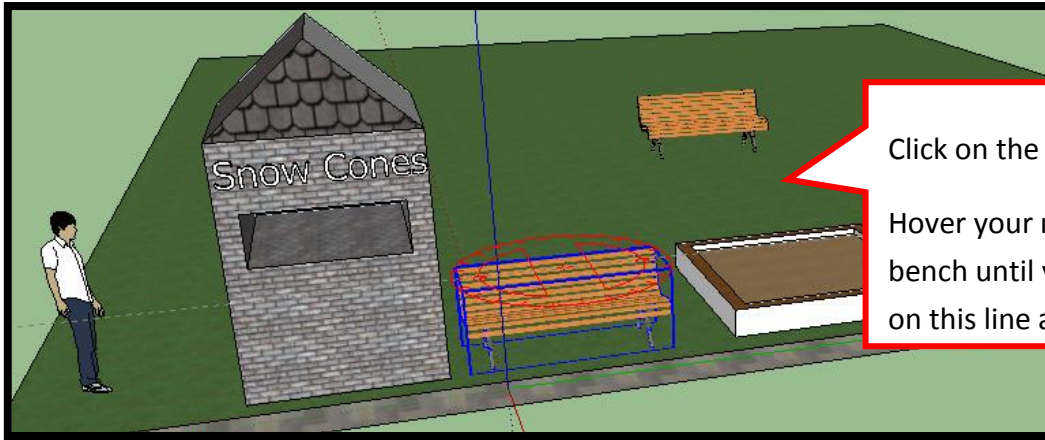


Click on the Move  tool, and then hover over your new bench until you see tiny + signs.

Now click and drag your bench diagonally to the left of the sandbox as shown.

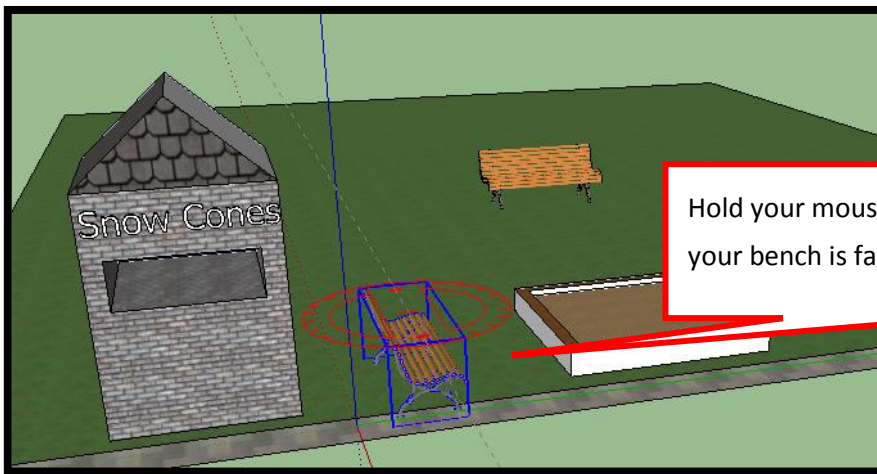
(Notice how we didn't hold the control key down so we didn't get a copy, we just moved the original.)

➤ **Rotate your bench so it faces the sandbox.**



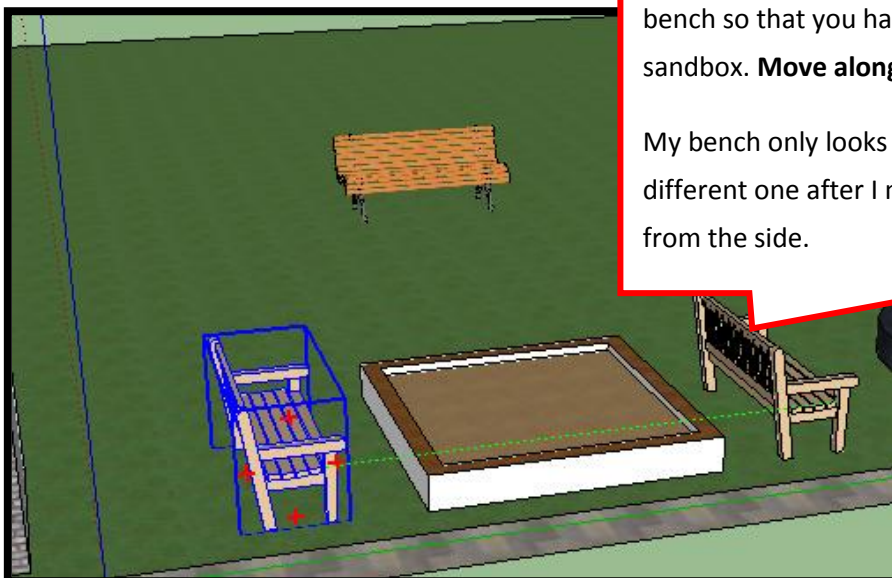
Click on the Move tool. 

Hover your mouse over the top corner of the bench until you see a small + sign or line and click on this line as shown.



Hold your mouse down and pull around to the left until your bench is facing the sandbox as shown.

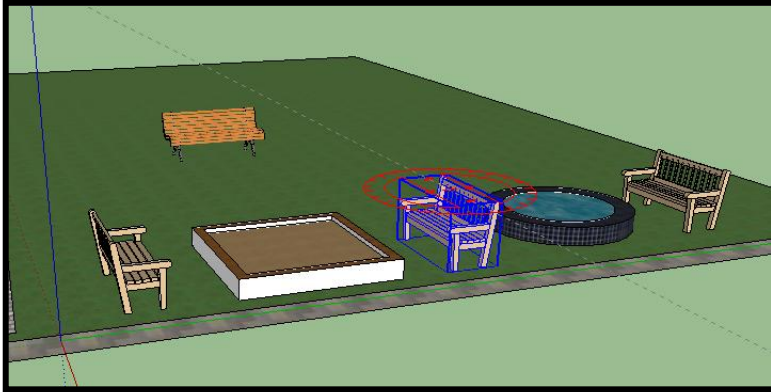
Follow the same steps above to make another copy of your bench.



Now follow the steps above to copy, move and rotate your bench so that you have one facing the other side of the sandbox. **Move along green axis line.**

My bench only looks different because I downloaded a different one after I noticed you couldn't see it very well from the side.

- After I rotate the bench my playground should look something like this.




- Add a component –

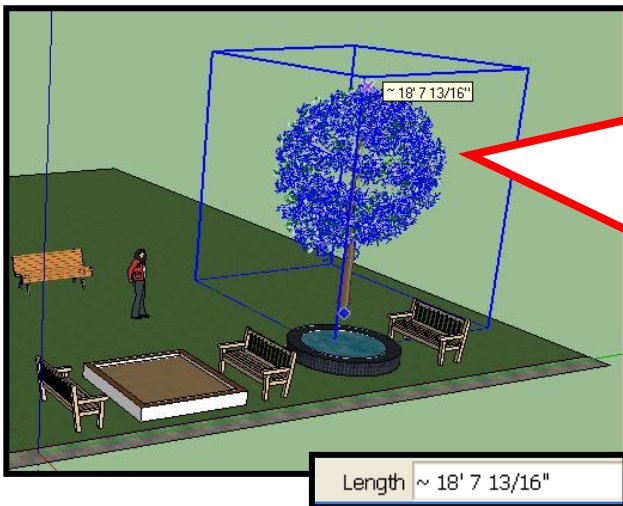
Click on **Windows** in the menu bar> Choose **Components**- Open Sampler.



Double click to bring in Nancy. If you create a component or download one, you can save it here and bring in later.

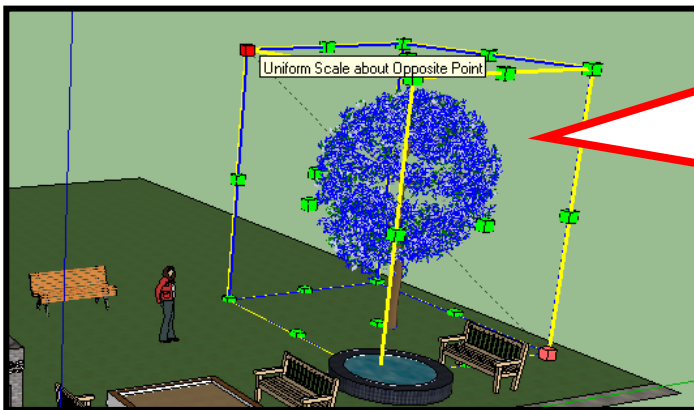
- Adding your own: Create an object or building. Triple click to select it. Right click and choose add a component.

Go back to the 3D warehouse  and download a tree for your park .
File>3D Warehouse>Get Model. Try to get a smaller sized tree.

Resizing components: Now move the tree along the right side of the play area. Since it's too large we will need to resize it.



- Click once on the tree component to select it. It will now be selected.
- Use the tape measure tool  to see how tall the tree is. This will also be displayed in the Length value control box. Mine is over 18 feet tall.
- Let's resize this tree component.
- Click on the scale tool  Tools>Scale
"S" key on keyboard.



- The tree will now have yellow outlines with green handles.
- Click on the top left Red handle that will turn red and say "Uniform scale about opposite point."
- Now drag down to reduce the size.
- Note: in the value control box it tells you the percentage of scale. You can also just type in a value.


Note: You can also type in the exact size tree that you want if you select the tree by clicking on it one time, then click on the **tape measure tool**. This time, instead of seeing Scale in the Value control box, you will see the length.

Now copy and move a new tree next to this one. Continue until you have trees all down the right side.



- Use Move/Copy tool to make a copy.
 - Continue until you have a whole row.
- You can also copy this group of trees and move them to back of the park.*
- Click on the first tree, hold the shift key down and click on all the rest of the trees.
 - Add as many trees as you like. Use the Move + Control key to copy and move your new set of trees.



- Use the Rotate tool  so the trees so they are facing the back,
- Or rotate like you did the park bench.

➤ You can simulate different times of the day by the shadows it casts.

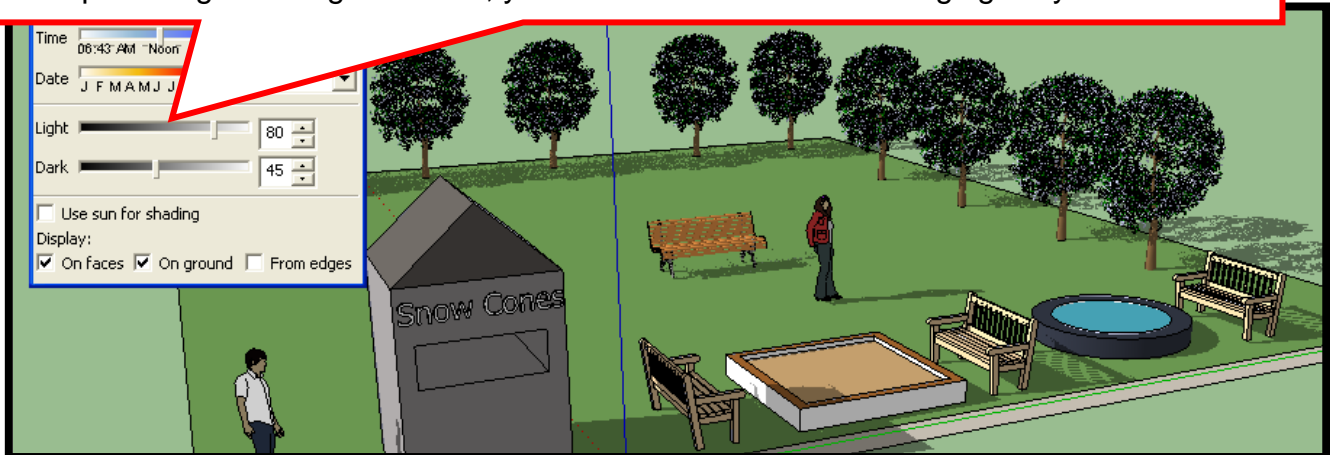
Click on **Windows** in the tool bar> **Shadows**

Check display shadows checkbox.

Adjust settings to see preferred shadows.

What time of the day you make it?

If keep clicking to change the time, you will see the shadows changing. Try it.



Time: 06:43 AM ~ Noon

Date: J F M A M J J

Light: 80

Dark: 45

Use sun for shading

Display:

On faces On ground From edges