GETTING STARTED WITH BLENDER

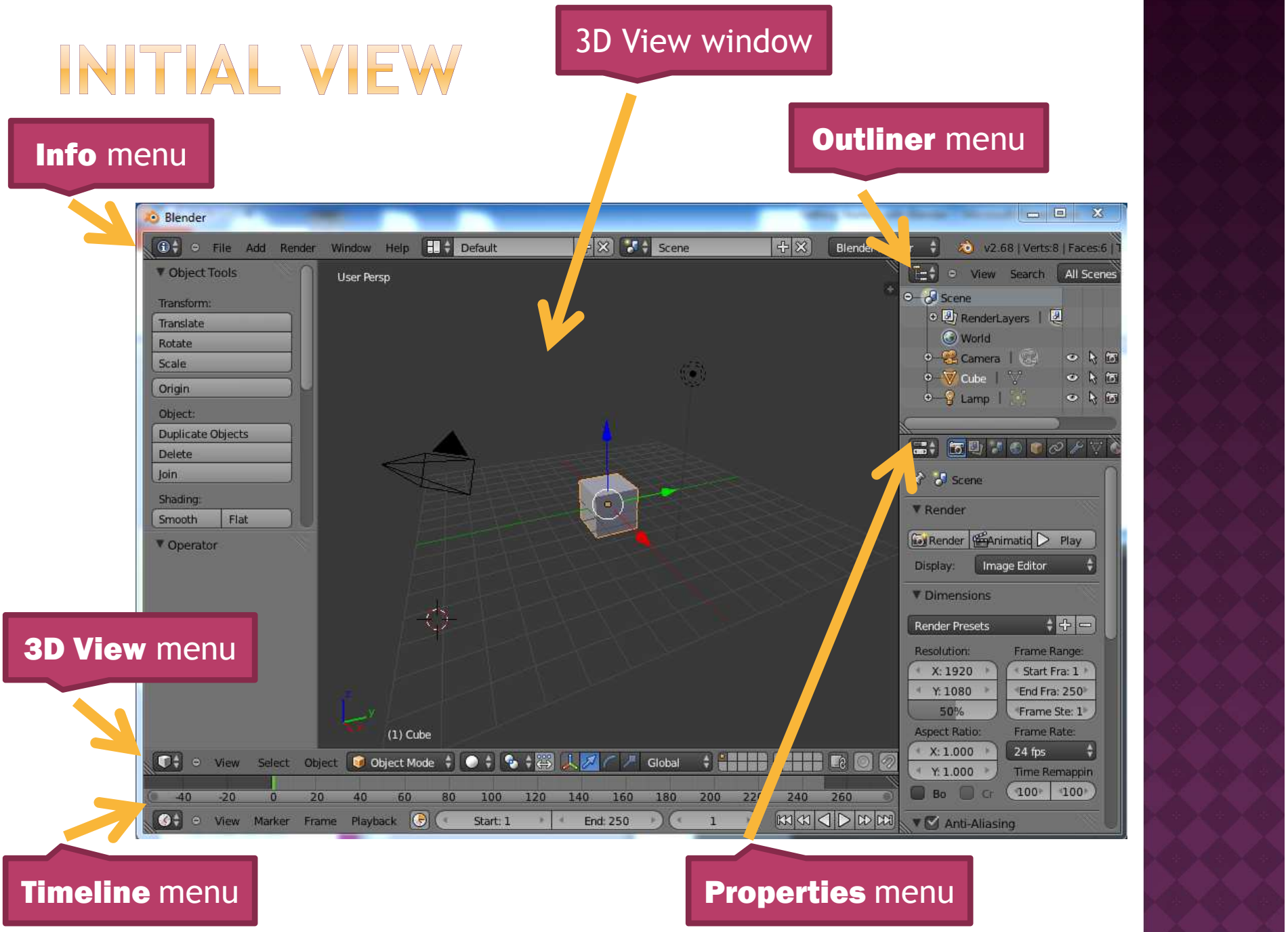
PART 1 – INTRO TO 3D MODELING

(FOR USE WITH UNITY)

CSCI 130 – Computer Game Design

Jason Fritts

INITIAL VIEW



FIRST THINGS FIRST - MOUSE SETUP

- 3-button mouse?
  - Blender's default is for a 3-button mouse with a scroll wheel, so if that's you, proceed on

- 2-button mouse?
  - Blender provides a 3-button emulation mode in which <ALT> + Left-mouse button emulates the Middle-mouse button
  - Change input preference:
    - File → User Preferences
    - Select Input tab
    - Check the **Emulate 3 Button Mouse** box

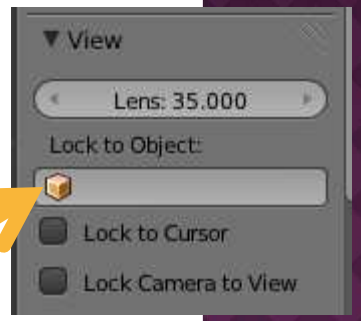
ADJUSTING VIEW POINT

- Rotating view
  - 3-button mouse:
    - click and hold Middle mouse button and move mouse
  - 3-button emulation mode:
    - hold down <ALT>, then click and hold Left mouse button and move mouse
- Zooming in and out
  - similar to rotating view, but also hold down <CTRL>
  - 3-button mouse:
    - hold down <CTRL>, then click and hold Middle mouse button and move mouse
  - 3-button emulation mode:
    - hold down <CTRL> + <ALT>, then click and hold Middle mouse button and move mouse

Give it a try!

ADJUSTING VIEW POINT

- View point
  - the view point is the point about which you rotate and zoom into or out of
  - by default, the view point is centered on the initial Cube in the Scene
- Change view point center
  - hit <N> key to open transform sidebar (can close it later by hitting <N> again)
  - can select **Lock to Cursor** and center view point anywhere in Scene with Left mouse click
  - alternately, can click **Lock to Object** object selection bar and choose a specific object as the center of view



Give it a try!

BLENDER MODES

- Blender has different operating modes
- You to choose the appropriate mode for the desired task
- The main modes we'll be using:
  - Object Mode
  - Edit Mode
  - Texture Paint

Select mode in **3D View** menu (near bottom in our view)

BLENDER MODES

- Object Mode
  - mode for creating or editing (moving, rotating, scaling) one or more objects in their entirety
- Edit Mode
  - mode for editing part(s) of a single object
    - vertices
    - edges
    - faces
- Texture Paint
  - mode for mapping textures onto faces or surfaces of an object

WORKING WITH OBJECTS - SELECTING OBJECTS

- Selecting Objects
  - one object:
    - click Right mouse button to select an object
  - multiple objects:
    - while holding down <SHIFT>, click Right mouse button on each of the objects to be selected

- Must first select an object before doing any
  - editing of objects position
    - location, scale, or rotation
  - editing of parts of object in Edit mode
    - vertices, edges, or faces

OBJECT TRANSLATION, ROTATION AND SCALING

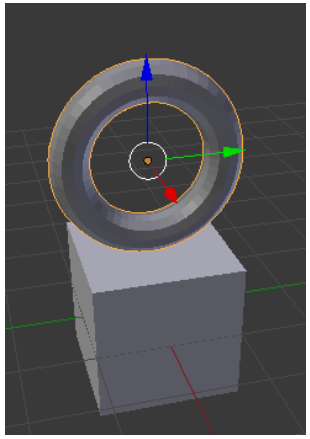
- In Object mode, can move, rotate, and/or scale objects
  - shortcut keys
    - translate ("grab") G
    - rotate R
    - scale S
- Frequently want editing to occur relative to just a single axis
  - for example, rotate about only one axis
  - after selecting type of editing (above), hit key for desired axis:
    - X, Y, or Z

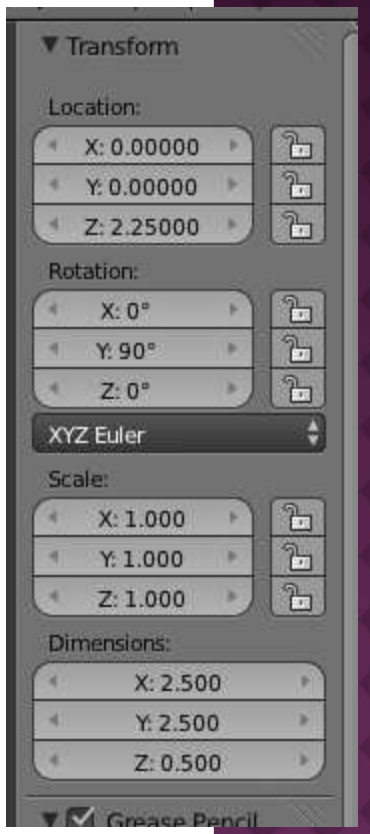
MAKE A SIMPLE STRUCTURE

- Starting from initial Scene (with just Cube)
- Select Object mode
- Add a Torus
  - create a new object with <SHIFT> + A
  - select **Torus** (doughnut)
  - select R to rotate
  - select Y to rotate only about Y axis
  - rotate about 90°, until it's standing on its side
  - select G to grab/translate
  - select X to move only along X axis
  - move Torus alongside cube

MAKE A SIMPLE STRUCTURE

- Add a Torus cont.
  - repeat grab (G) for Y and Z directions, and position Torus on top of Cube
  - Alternately, hit <N> key to open Transform sidebar and adjust position, as shown to the right: (can hit <N> again later to close sidebar)



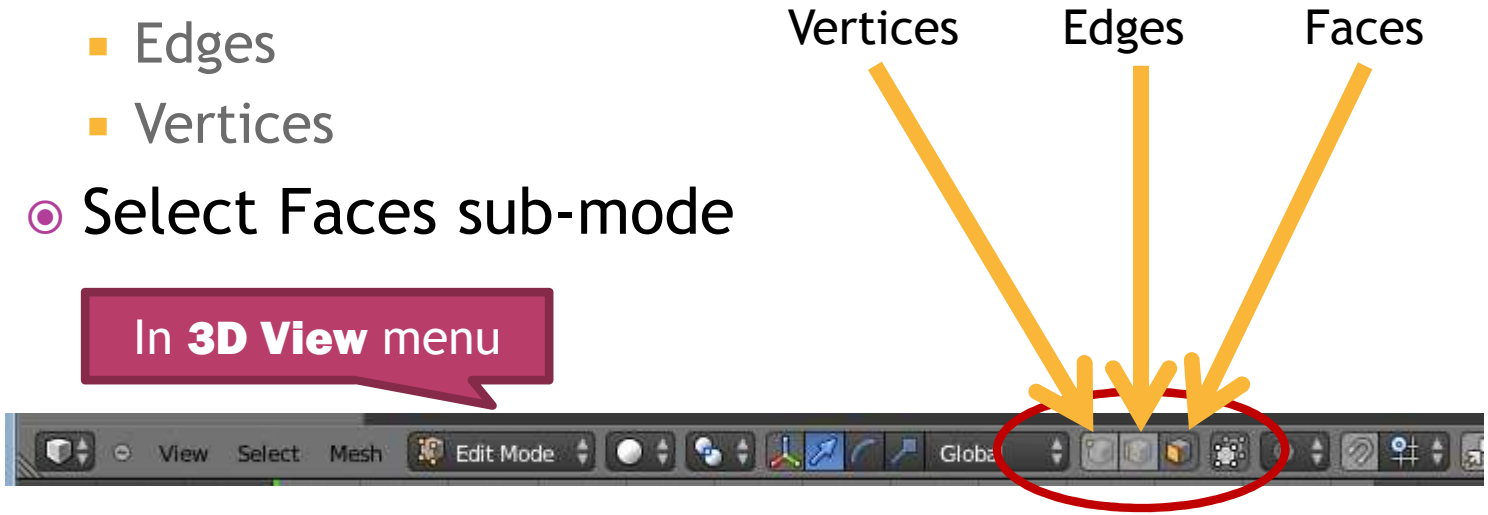


And now you have an icon to the donut gods!

USING EDIT MODE TO MAKE IRREGULAR SHAPES

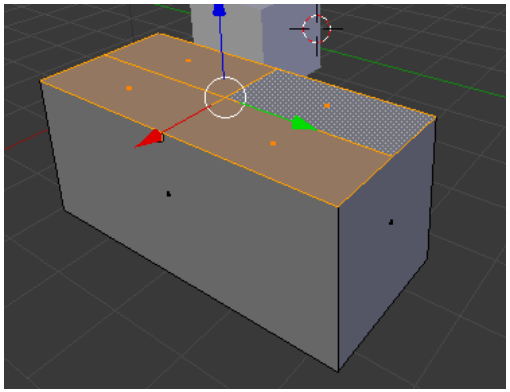
- Create a new Cube in Object mode via <SHIFT>+A
- Position new Cube (*Cube.001*) as desired
- Switch to Edit mode

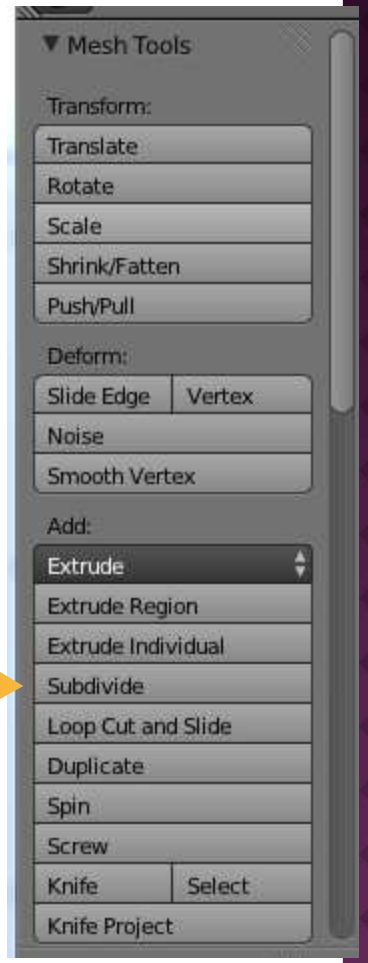
  (see 5 slides above to recall directions)
- There are three sub-modes in Edit mode:
  - Faces
  - Edges
  - Vertices
- Select Faces sub-mode



USING EDIT MODE TO MAKE IRREGULAR SHAPES

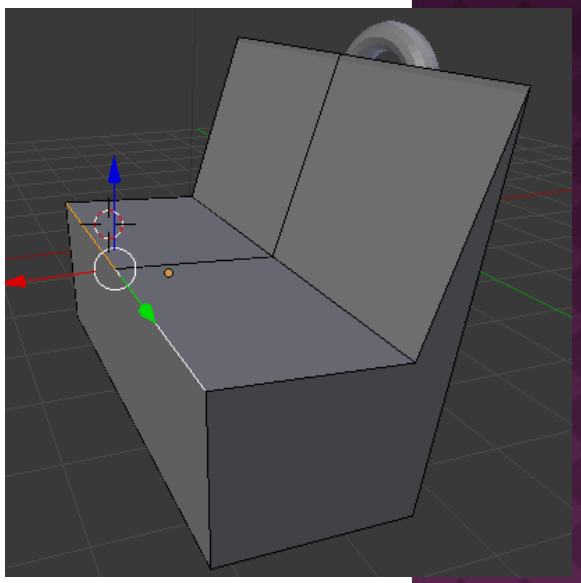
- Make cube wider
  - click Right mouse button on one of the side faces
  - translate one of the side faces (along a single axis) out to make cube wider
- Split top faces
  - Select a top face of shape
  - in Transform sidebar on left (hit T to open if closed), select **Subdivide**





USING EDIT MODE TO MAKE IRREGULAR SHAPES

- Angle and pull up top back edge of cube
  - now select Edges mode
  - holding down <SHIFT>, select the two long-wise edges along the back top edge of the cube
  - translate the two edges up and slightly back, like the back of a church pew



- Similarly, pull top middle edges of cube back and slightly down
- Likewise, pull top front edges slightly out

Good work. Have a seat!

MAKE A SIMPLE BUILDING

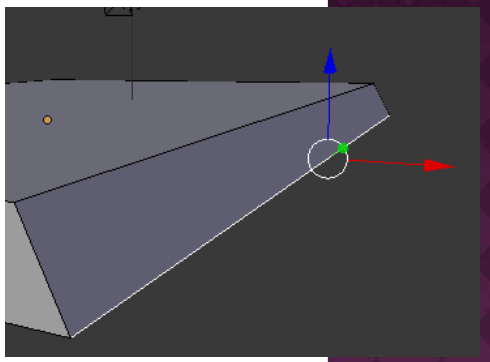
- Starting from initial Scene (with just Cube)
- First, create foundation
  - Hit <N> to open Transform sidebar
  - select Cube and increase Scale of X and Y to something like 12 and 20 to make foundation
  - let's make a beveled foundation, so switch to Edit mode
    - *Note: <TAB> will toggle you between Edit mode and Object mode for the selected object*
  - to facilitate controlled adjustment, let's turn on snapping -- click the Magnet button, below
    - After turning on Snapping, ensure button to its right is set to Increment (as shown)

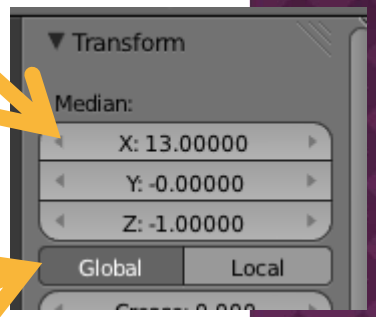
In **3D View** menu

Snap during transform

MAKE A SIMPLE BUILDING

- Select Vertices setting
- Then, for each of the 4 sides of the foundation, pull out the bottom edge by 1 unit
  - with snap on, should immediately snap to next unit when you begin pulling edge out
  - validate position in Transform sidebar
    - select ‘Global’ positioning
    - for this edge, X changed from 12.0 to 13.0
  - repeat for all 4 sides
- Foundation is done
  - will texture later





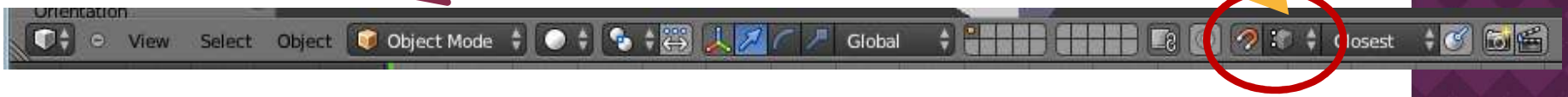
Show position in Global coordinates

MAKE A SIMPLE BUILDING

- Create a wall
  - <TAB> to switch back to Object mode
  - <SHIFT>+A and select **Mesh** -> **Cube** to add Cube
  - Move cube near edge of foundation
  - Change Snap mode to Edge (see below)
  - Hit <G> and move mouse near corner of foundation
    - cube should snap to the corner

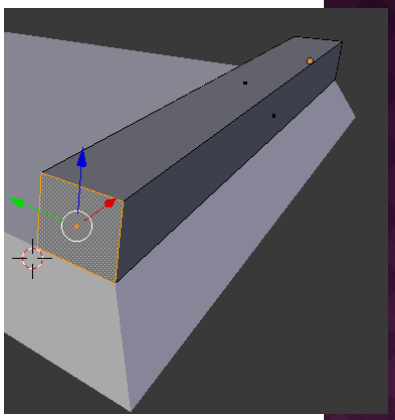
In **3D View** menu

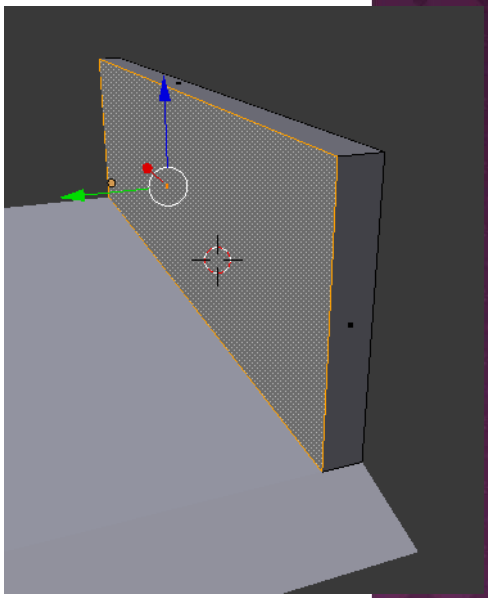
Snap to Edges mode



MAKE A SIMPLE BUILDING

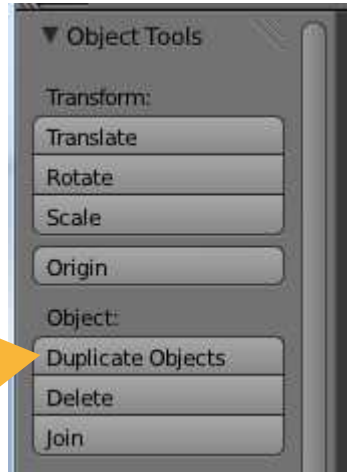
- <TAB> to switch to Edit mode
- Select Faces option
- Select opposite face from foundation corner
- Hit <G> and pull face to next corner
  - snaps into place when mouse over foundation corner
- Switch Snap mode back to increment
- Select top face and pull to about Z = 8
- Wall too thick though, so select inner face and reduce wall thickness

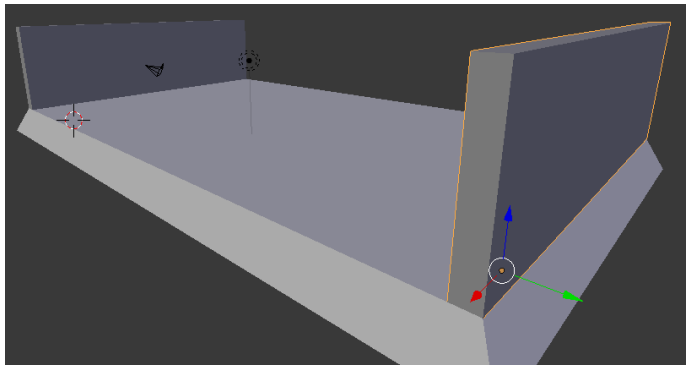




MAKE A SIMPLE BUILDING

- Duplicate wall for opposite edge
  - <TAB> to switch back to Object mode
  - If not already selected, select Wall
  - In Tools sidebar (on left), select **Duplicate Objects**
  - Change Snap mode to Vertices
  - Hit <G> and move new copy of Wall to opposite edge
    - snaps into place when mouse over foundation corner



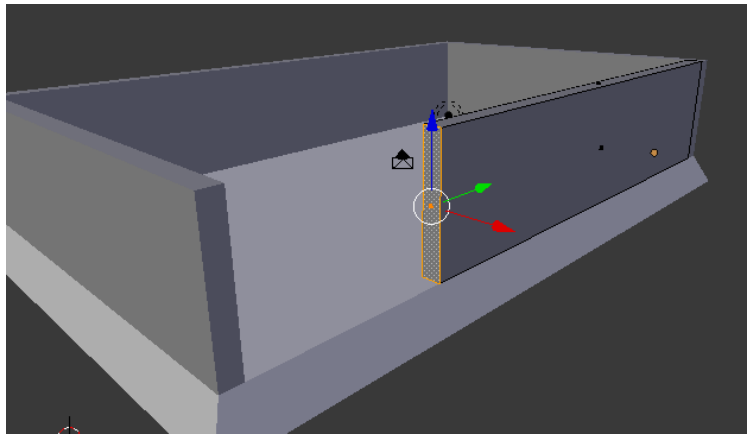


MAKE A SIMPLE BUILDING

- Create back wall
  - Repeat duplication of side wall
  - Rotate new copy of wall 90 degrees about Z axis
  - <TAB> to switch to edit mode
  - Select end face of wall, hit <G> and snap it to side wall
    - snaps into place when mouse over bottom inside corner of side wall

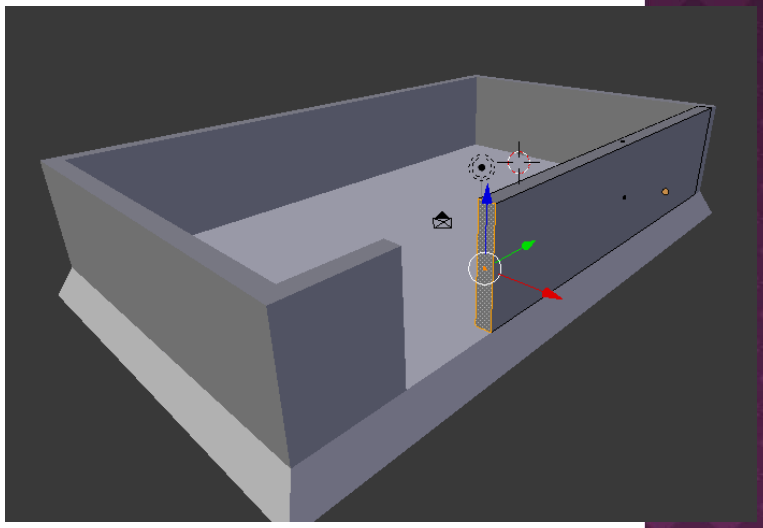
MAKE A SIMPLE BUILDING

- Create front walls and doorway
  - To make a front wall with doorway, we'll create two front walls on either side of doorway
  - Duplicate back wall
  - Hit <G> and snap it into position as front wall
  - <TAB> to enter Edit mode
  - Select Faces option
  - Switch Snap mode to Increment
  - Select side face of front wall and move it towards center of foundation



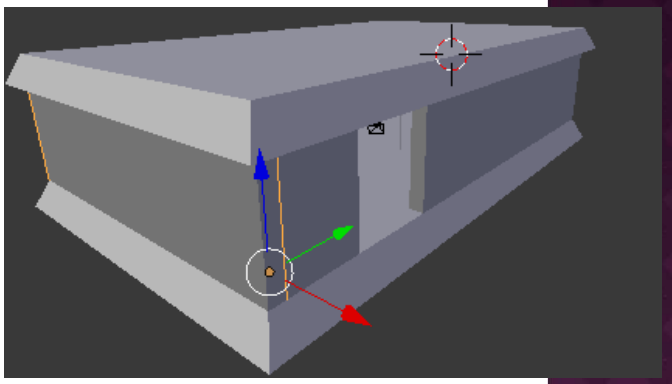
MAKE A SIMPLE BUILDING

- <TAB> to enter Object mode
- Duplicate the front wall
- Switch Snap mode to Vertices
- Hit <G> and snap copy of front wall to opposite side wall
- <TAB> to enter Edit mode
- Select Faces option
- Switch Snap mode to Increment
- Adjust position of side edges of two front walls to size and position doorway as desired



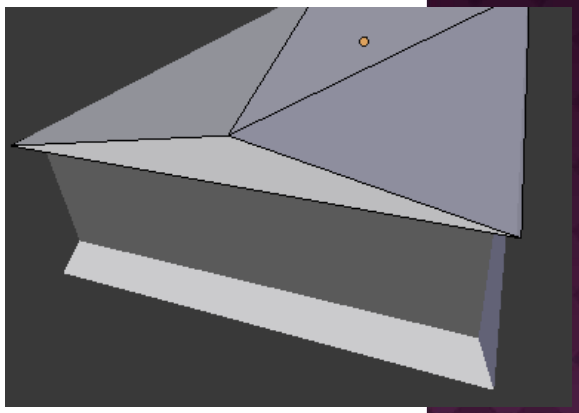
MAKE A SIMPLE BUILDING

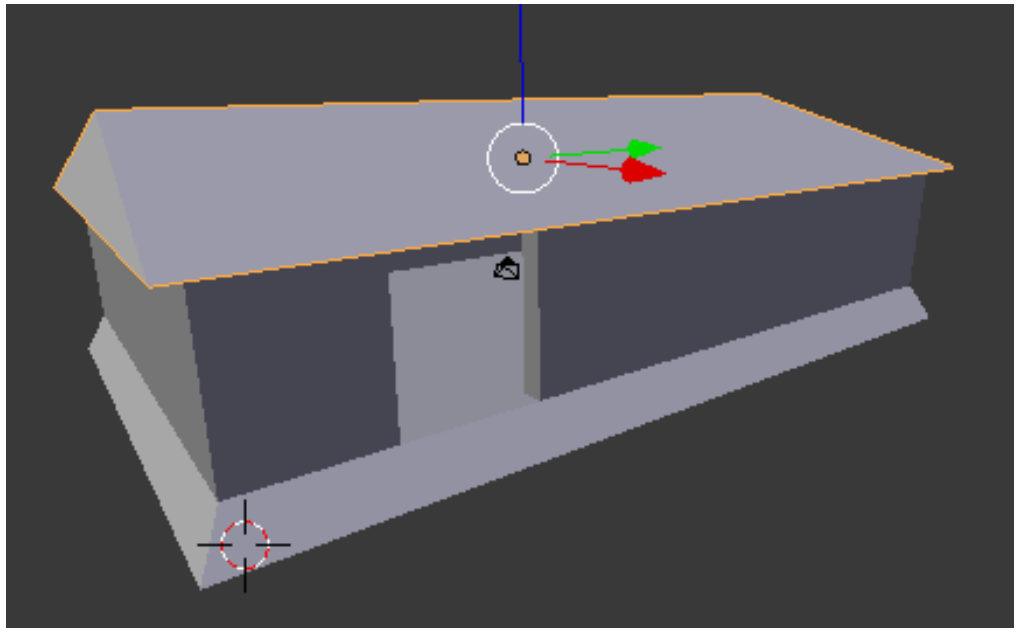
- Make the roof
  - In Object mode, duplicate the foundation to make the roof
  - Make sure Snap is in Increment mode, then move copy of foundation to top of walls
  - <TAB> to switch to Edit mode
  - Select Edges option
  - Select top left edge of roof
  - In Tools menu (left sidebar), select **Merge** -> **Collapse**



MAKE A SIMPLE BUILDING

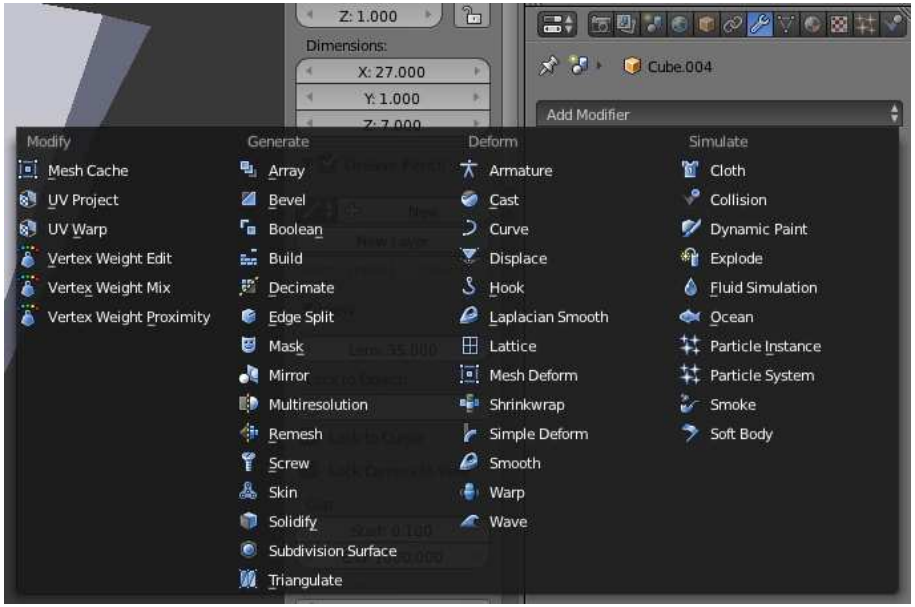
- After Collapse, roof should look like:
- Repeat for top right edge of roof
- Then pull up top edge of roof a little, and final building should look like this:





ADD WINDOWS USING BOOLEAN MODIFIERS

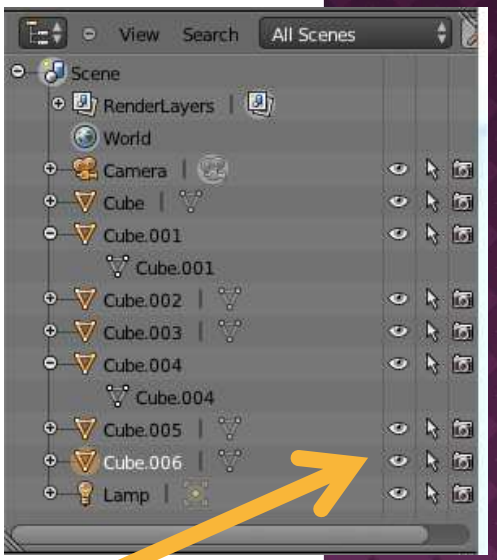
- Modifiers provide power effects to objects
  - http://wiki.blender.org/index.php/Doc:2.6/Manual/Modifiers
  - Among the modifier options is a Boolean difference operation
    - we can use it to subtract one object from another



ADD WINDOWS USING BOOLEAN MODIFIERS

- NOTE: Before adding windows, suggest texturing wall first (see next presentation)
  - objects that contain holes are tougher to texture (unless you only use one texture for entire object)

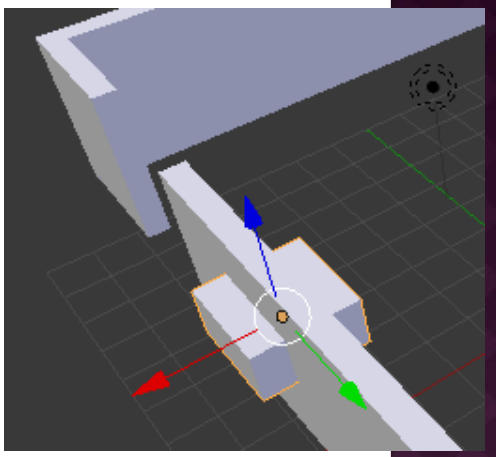
- Before we start, increase visibility
  - To make it easier to see what you're doing, let's "hide" roof
  - select roof object, and in Outliner view, click on the 'eye' icon next to white highlighted object to deselect roof
    - still exists, but no longer in way of editing
  - Can similarly make floor invisible



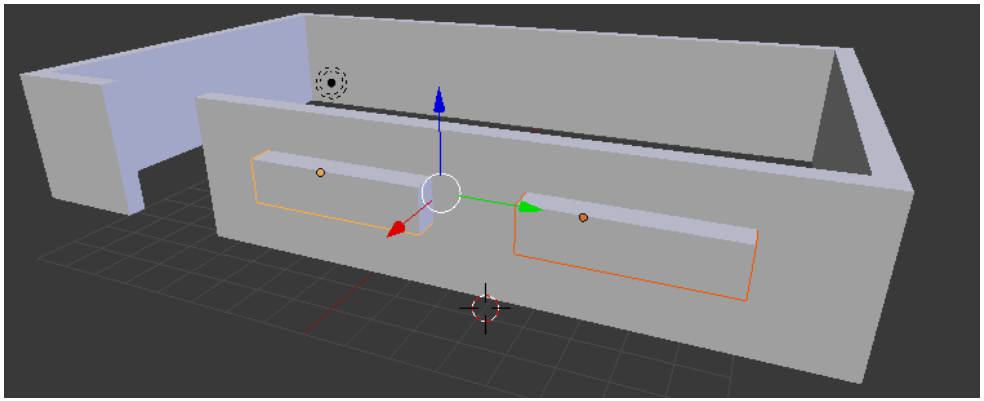
Roof is Cube.006 here

(hold down <CTRL> and left click to rename, as desired)

ADD WINDOWS USING BOOLEAN MODIFIERS

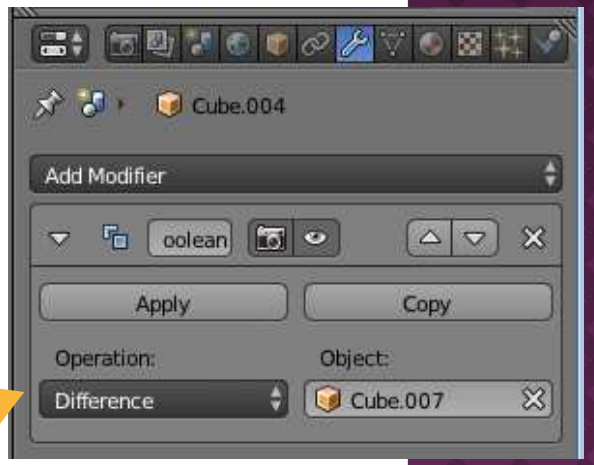


- Add windows to (larger) front wall
  - <SHIFT>+A to create a new Cube
  - Resize it to about (x, y, z) = (4, 4, 2)
  - Select larger of the two front walls
  - Position new Cube where you want a window
  - Resize and/or duplicate window, as desired
    - here, two wider windows are made

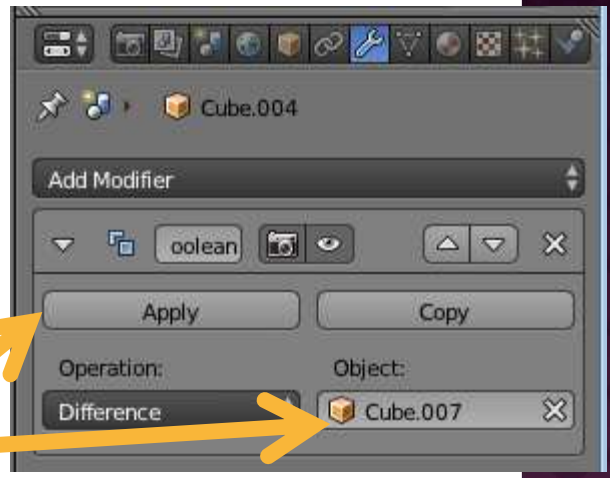


ADD WINDOWS USING BOOLEAN MODIFIERS

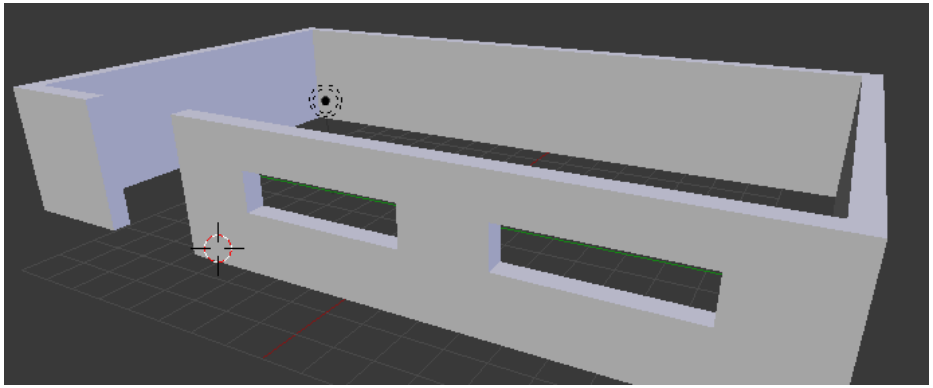
- In the Outliner view, note the names of the two window objects
  - Cube.007 and Cube.008 here
- In Object mode, select the large front wall
- In Properties window, select the Modifier menu
  - ID of front wall listed (Cube.004)
- In ‘Add Modifier’ drop-down menu, select **Boolean** from 2nd column
- The following view should appear:
- Under ‘Operation’, select **Difference**



ADD WINDOWS USING BOOLEAN MODIFIERS

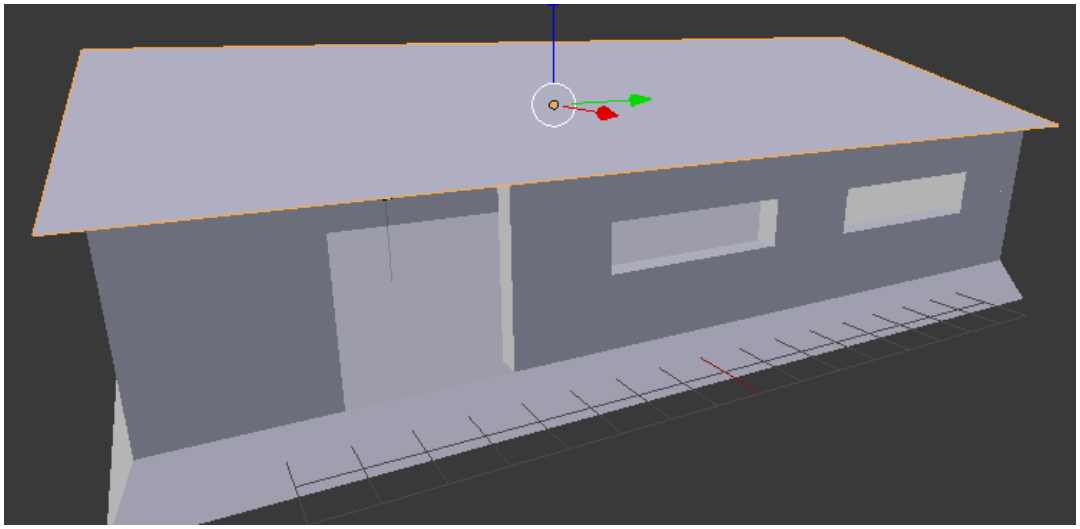


- Then, click on box below Object and select one of the two window cubes
  - Cube.007 or Cube.008, here
- Then hit **Apply** button
- Afterwards, delete Cube.007
- Repeat for other windows, then delete those cubes
- Should see windows now:



ADD WINDOWS USING BOOLEAN MODIFIERS

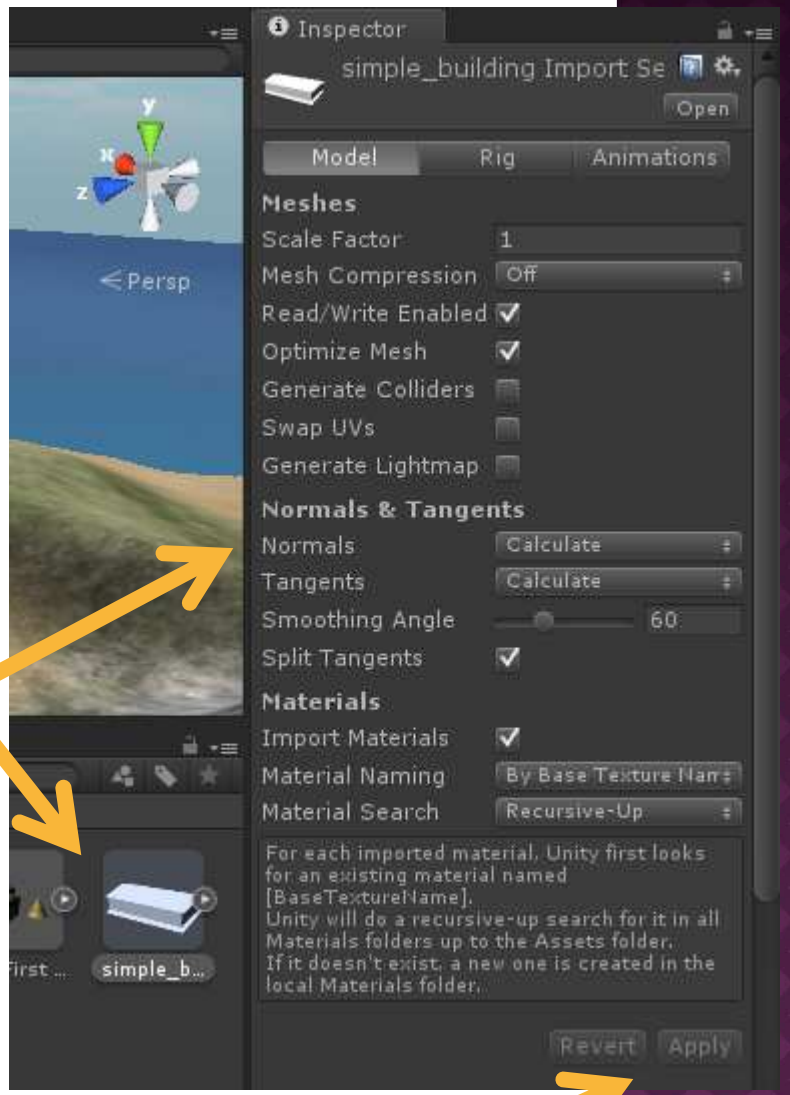
- Restore the visibility of the roof and floor
  - simply click ‘eye’ icon again and they’ll reappear
- Your house should now have windows:



- You can similarly cut holes in floors for stairwell entrances, or holes in walls for doorways

SAVE BLENDER PROJECTS DIRECTLY INTO UNITY

- Save Blender projects directly into Unity
  - Save/copy your .blend files directly into the desired sub-folder of the Assets/ folder in your Unity project
  - After saving/copying a .blend file into Unity, select that asset in Unity, change **Normals** to ‘Calculate’, and hit **Apply**



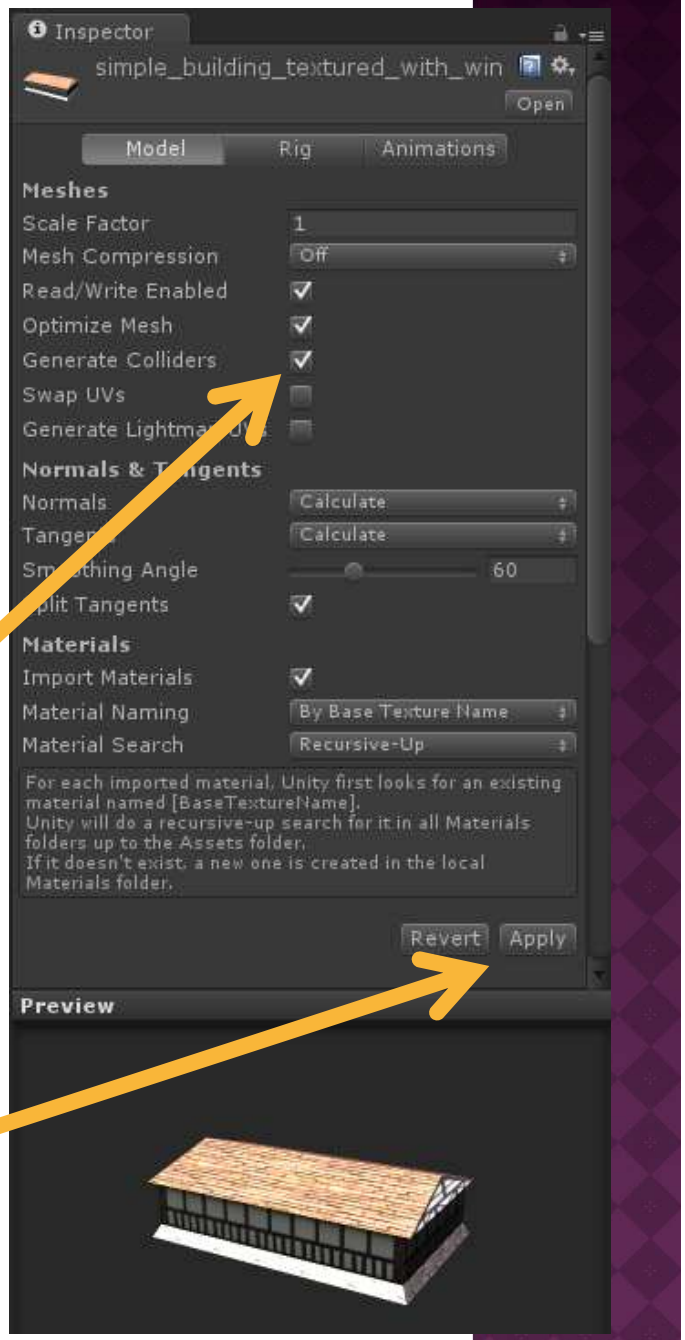
Hit ‘Apply’ (after changes)

MAKING BLENDER OBJECTS SOLID IN UNITY

- For many 3D objects, we want them to be solid so that player
  - will collide with them, or
  - can walk through/over them

- To make Blender objects solid in Unity
  - Again, select object in Project window
  - Check the **Generate Colliders** checkbox
  - Select **Apply** to save changes

- Next time, texturing…



Hit ‘Apply’ (after changes)