

ACTIVITY: Majestic and Marvellous Modeling

BY: Keenan

GRADE and CAMP: 7-9 Comp. Sci.

TOPIC(s): 3D Computer Modeling

TIME: 180 mins

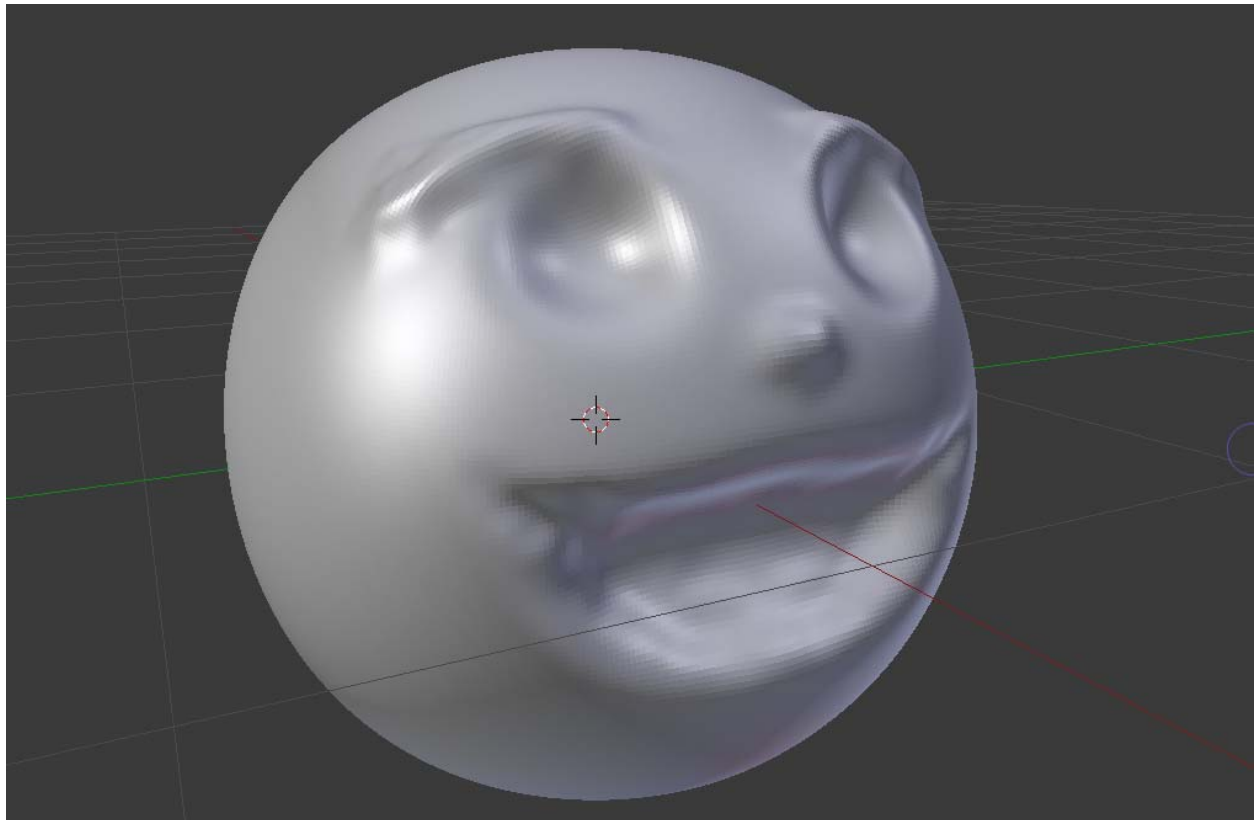
Intro = 10 mins

Demonstration = 45 mins

Building = 115 mins

Conclusion = 5 mins

OBJECTIVE: The kids are to learn about 3D modelling programs and their operation



MATERIALS (what you'll need for one week of camp):

- Computers
- Blender Software
- Creativity

SAFETY CONCIDERATIONS (what to watch out for):

Rolling Chairs in the labs are notorious for destroying cables and toes.

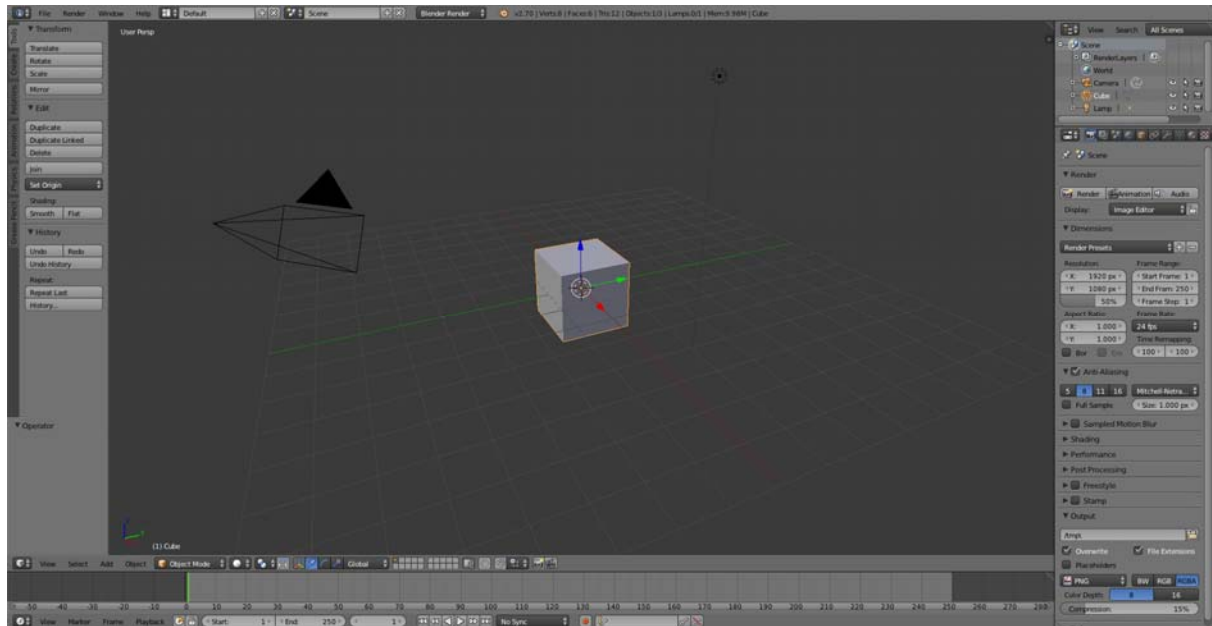
SCIENTIFIC BASIS:

3D modelling is a more common occurrence than you might think. Although what we will be doing today will be considered to be moderately simple, given enough time anyone can make some really neat models in this program.

Blender is a free program that allows for the simple creation of 3D models on a computer. In today's world there are large teams (such as the movie studios Pixar and Disney) who spend hours modelling and animating bizarre creatures and people to make entertaining movies and video games.

PROCEDURE:

1. Start by opening the Blender Application, which can be found in the campers SCI-FI Folder
2. Upon opening (this can take a while) they should be presented with a screen that looks like this:



3. We are now ready to begin with Object mode, the most basic of the three modes that we will be covering today. The program by default is in object mode.
4. We can rotate the camera by clicking down the mouse wheel and panning the mouse.
5. First of all we want to select the cube. By default, simply right click on the cube.
6. On the left side bar there will be a bunch of various options as follows:



7. There are a lot of buttons here, but most of them do exactly as they say. We won't cover all of them, but don't be afraid to experiment.

Translate: (Shortcut – G) Move the selected object around the field

Rotate: (Shortcut – R) Spin the object around it's center

Scale: (Shortcut – S) Make the object larger or smaller

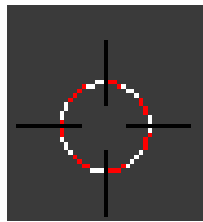
Undo: (Shortcut – Ctrl Z): Undo the last action

Redo: (Shortcut – Ctrl Shift Z): Redo the undone action

Delete: (Shortcut – Delete): Delete the selected object

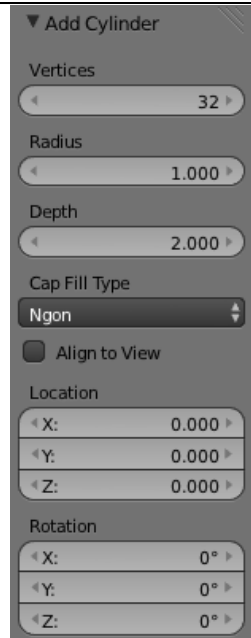
With all of these actions right-clicking confirms it and left-clicking cancels it.

8. If you ever want to lock an action to a specific axis, while using a tool such as translate, rotate or scale, simply press the x, y or z key to lock movement to that corresponding axis while modifying the cube. Try this now by moving your cube around and pressing one of the axis keys. The best way to learn blender is by experimenting!
9. So we are going to delete the cube and add a cylinder, but first we need to center the cursor.
10. When you left click on the 3D view the cursor moves to where you left click. The cursor:



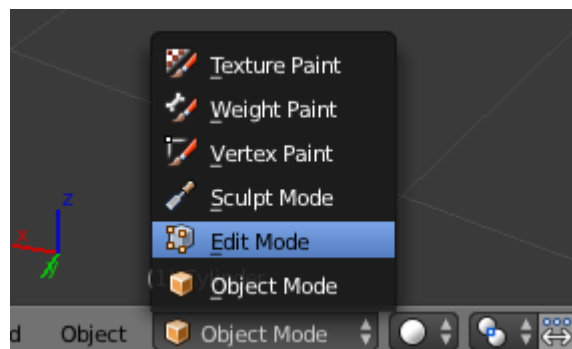
11. This is where new objects will be created, so to center the cursor simply press Shift-C
12. There is a quick and easy way to add objects to blender, using the shortcut Shift-A while your mouse is over the 3D view a menu will pop-up.
13. Underneath the Mesh tab there will be a bunch of different 3D shapes to choose from, for now pick the cylinder. Make sure your cursor is centered!
14. A new cylinder will have appeared in the center of the 3D view.

If the student can't see their newly created object in the 3D view get them to press the HOME key, this focuses the view on all objects currently in your scene.



15. The above area (found in the bottom left hand corner) is where you can change all of the properties of your last preformed action. So here we can edit the size and shape of the cylinder. Change the Number of Vertices to 12.

16. Now we want to change to EDIT MODE. To do this, look in the bottom left hand corner is a drop down box currently in “Object Mode” Select it and change to edit mode.



17. Edit mode is where the fun begins. The same tools from object mode are still there, but now there are dozens more. The ones we will look at are as follows:

Extrude Region/Individual

Loop cut and Slide

Bevel

Insert faces

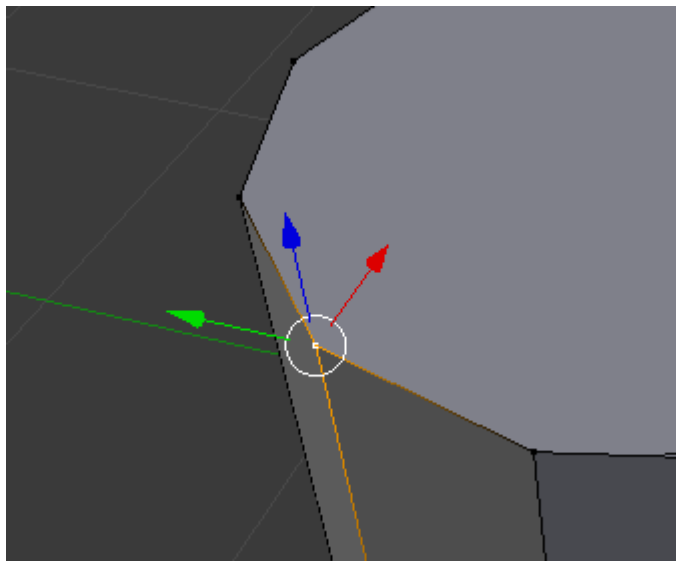
18. Before we do that however we must take a look at selecting Vertices, edges and faces

19. Down on the bottom Tool bar are three small buttons that look like:

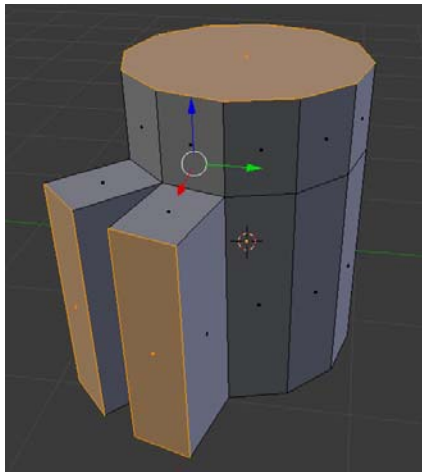


20. These buttons allow you to select a vertex, edge and face respectively.

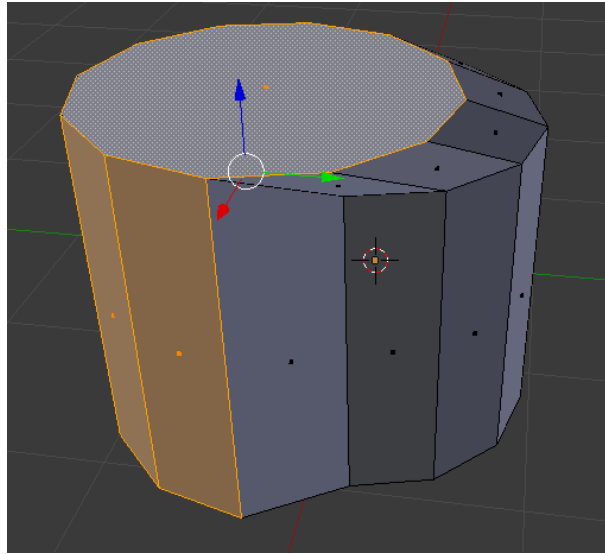
21. Choose the Vertex select mode and select a single vertex (or point) by right-clicking on your cylinder.



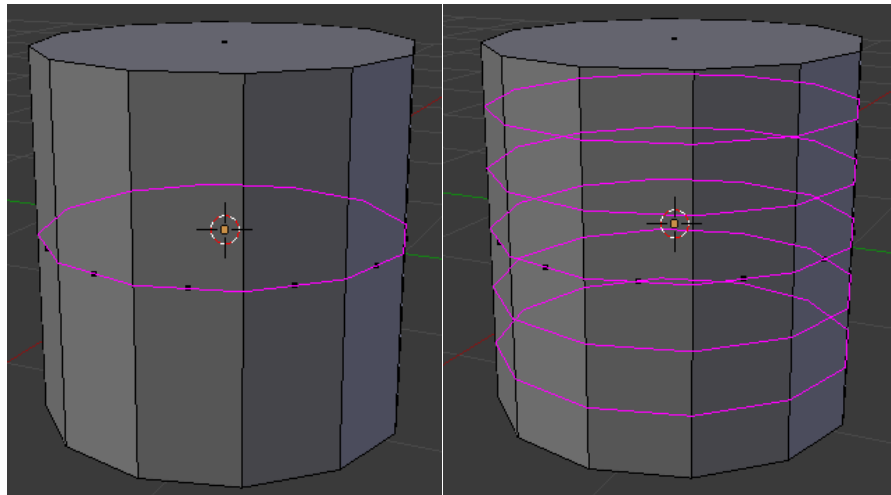
22. It should look similar to this, notice how it is orange? This means it is selected and is now moveable by the user. So let's try it out by using the translate tool (Shortcut G) and moving it around, you can also move it along the x, y or z axis by click and dragging one of the three arrows. Try this now.
23. You can select multiple Vertices at a time by shift right-clicking on different vertices.
24. The same rules apply for both edges and faces, so give this a shot now by changing to edge select mode, then selecting and moving one or more edges and/or faces. Remember Ctrl-Z is your friend.
25. You can get some neat shapes with these tools, but let's have a look at some of the more fun tools.
26. First select one or more faces on your cylinder.
27. Next click the "Extrude Individual" button and slide the mouse around. You should see some powerful wizard magic occur. Right-click to confirm the changes and left-click to cancel.



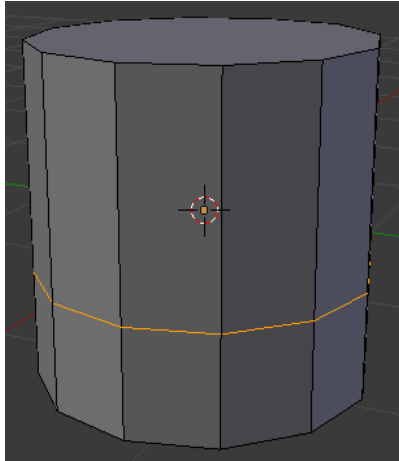
28. What extrude does is takes your selected face and pushes it straight outwards.
29. The "Extrude Region" moves all the faces along the same line



30. The “Loop Cut and Slide” tool allows us to cut a single face into smaller faces. Simply select the tool and hover over a face, which will cause a purple line to appear. Before clicking, try scrolling up or down on the mouse wheel to decide how many pieces to divide the face into.



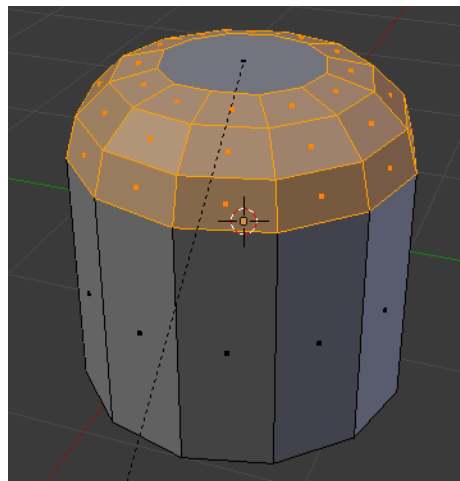
31. Left Click to confirm the location and number of cuts. Now you may notice if you move your mouse around that the cuts “slide” around, you have to click once more to confirm the location and you will finalize the cut.



32. Your cylinder will now have a “cut” in it, creating more faces to work with.

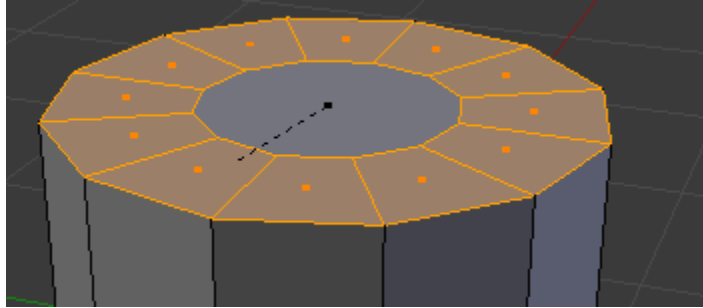
33. Next is the Bevel tool, which takes an edge or face and rounds the edges off. To use this tool first select a face or edge then press Ctrl-B OR under the menu listed as Mesh>Faces>Bevel

34. Like last time move the mouse around to see the different effects AND scroll up or down to change the number of new faces that will be created upon beveling.



35. Lastly we have the “Insert Faces” action, which takes a selected face and allows you to divide it into smaller faces

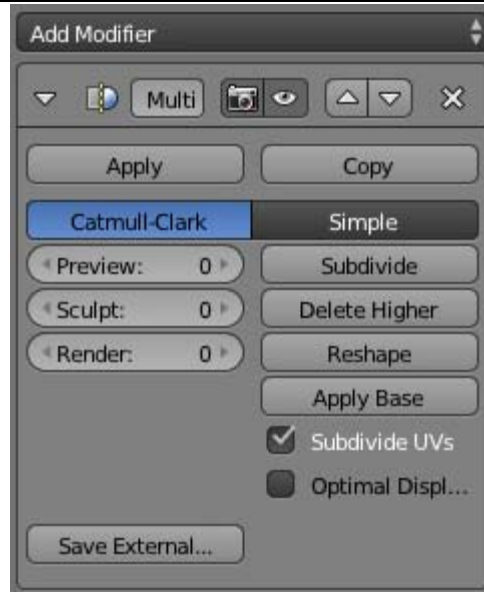
36. Select a face and press the “i key” and once again slide the mouse around until you get a desired shape, right-clicking to confirm and left-clicking to cancel.



37. There are a ton of tools that are pretty easy to figure out if the kids want to try them out, otherwise let them mess around for a bit and be sure to explain the best way to learn is for them to try. It's better to discover than to be told, also Ctrl-Z (Undo) and Ctrl-Shift-Z (Redo) are your friend!
38. **There is still another section on Sculpting**, but for now let them get familiar with the program. They will have to start over once it's time to sculpt, but they can of course save their current model.
39. Sculpt mode is a great mode in that you can make much smoother surfaces and objects like the smiley face on the cover.
40. To start create a new file or a new cube mesh, whichever works best as both results in a new cube which is what we need.
41. Next we have to subdivide the entire cube, to do this we will click on the modifier tab. This can be found on the right toolbar and is the button shaped like a wrench.



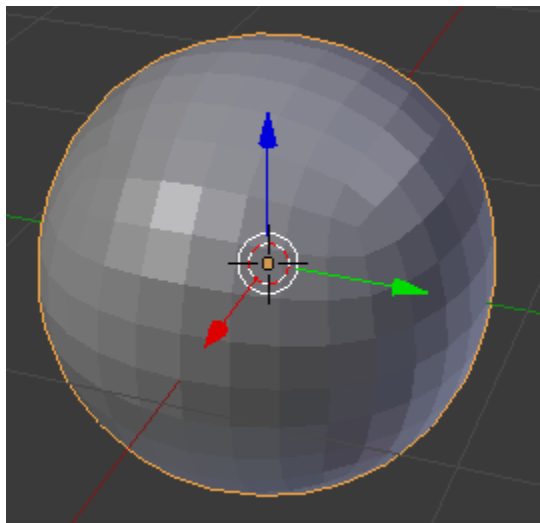
42. From here click the "Add Modifier" Drop down box and select underneath "Generate" "MultiResolution". This will create a box underneath the drop down menu that looks like this:



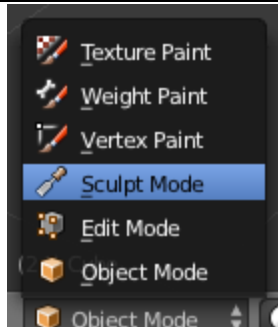
43. Click the subdivide button three or four times, noticing each time the cube becomes more rounded, with smaller and smaller squares.

44. **Do NOT go past 6 or 7** as the more detailed you go the slower your computer will respond. NOTE: **The “UNDO” command WILL NOT undo subdividing.** To fix it lower the “Sculpt” number to a reasonable value such as 3 or 4 and click the “Delete Higher” button.

45. You should now have a ball that looks like this:



46. We are now ready to sculpt! Go to “Sculpt Mode”



47. From here on out it is like “3D Paint”. Select the type of brush you wish to use from the top right corner by clicking on the current brush:



48. That's it, it's time to experiment around in sculpt and edit mode. Don't be afraid to experiment

49. Saving works like any other program simply look under the “File” Tab and select “Save As...”

REFERENCES & ADDITIONAL RESOURCES:

The Download location: <http://www.blender.org/download/>

Alternatively google search: “Blender Download”