Project 1 – Make a Hat

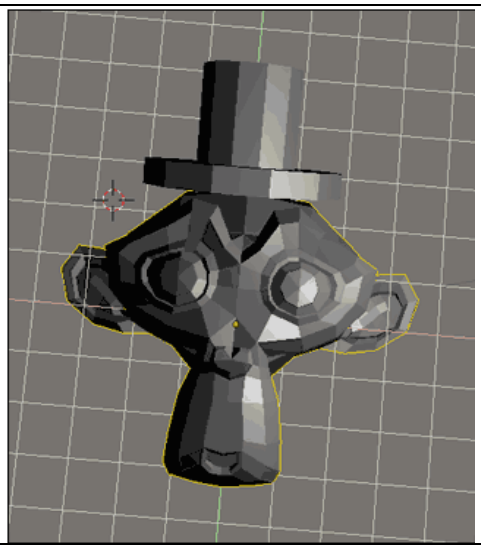
Introduction

In this project, you will:

- Learn about the Blender interface.
- Move around in 3D space.
- Create a hat for a monkey.
- Make your first 3D image

Project Preview

In this project, you'll make a hat for Suzanne the monkey. Here's an example of what you'll make.

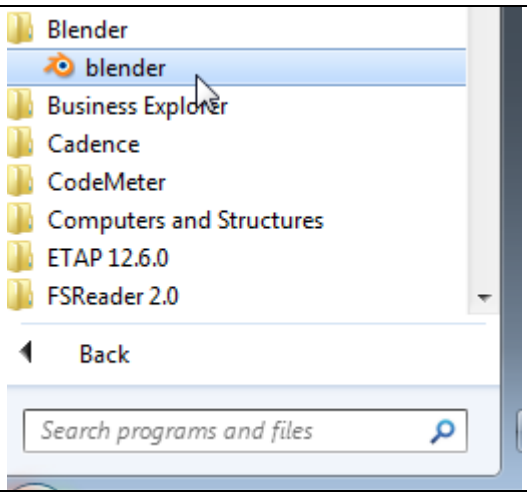
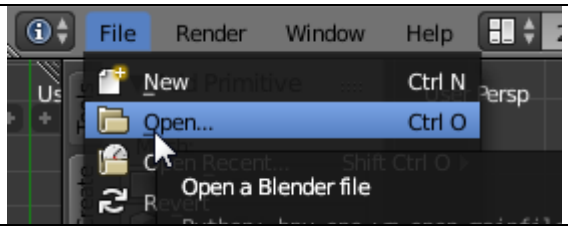
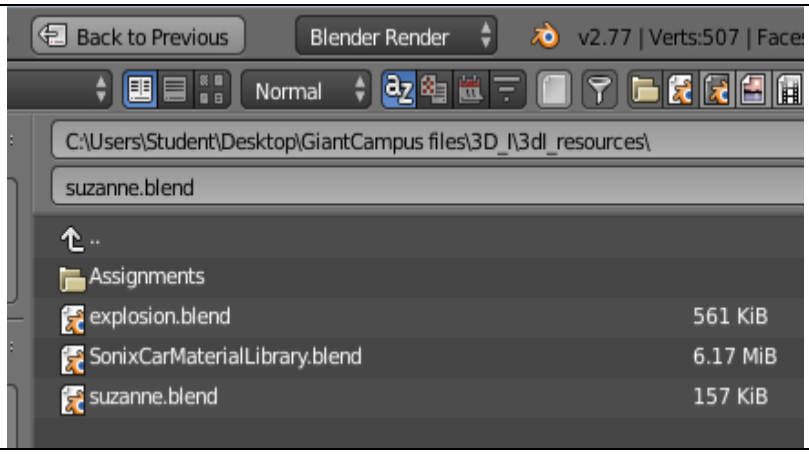
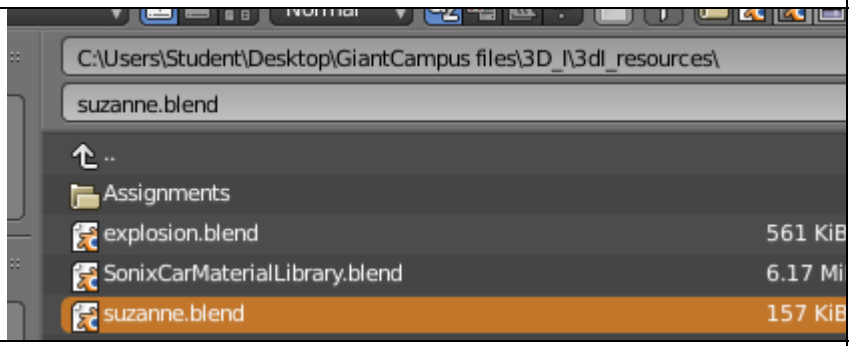


LAB 1 - Introduction

In this lab, you'll open Suzanne the monkey and use Blender's tools to move around in 3D space.

Open Suzanne.blend

You'll start by looking at an example of a 3D object. Complete the steps below to open a Blender file. If Blender is already open, skip the first step.

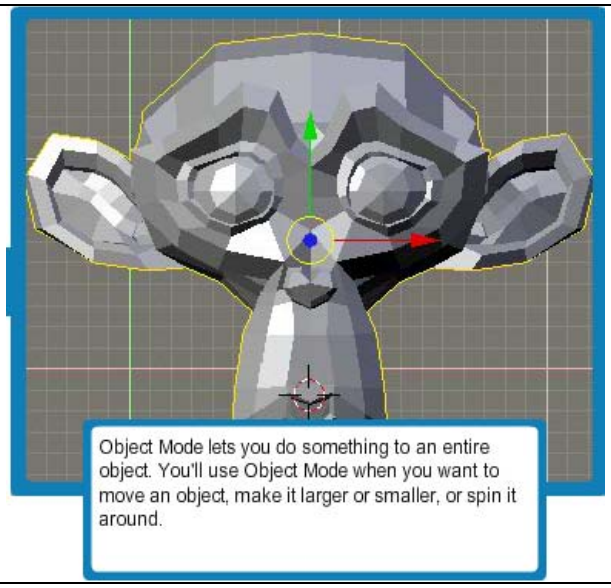
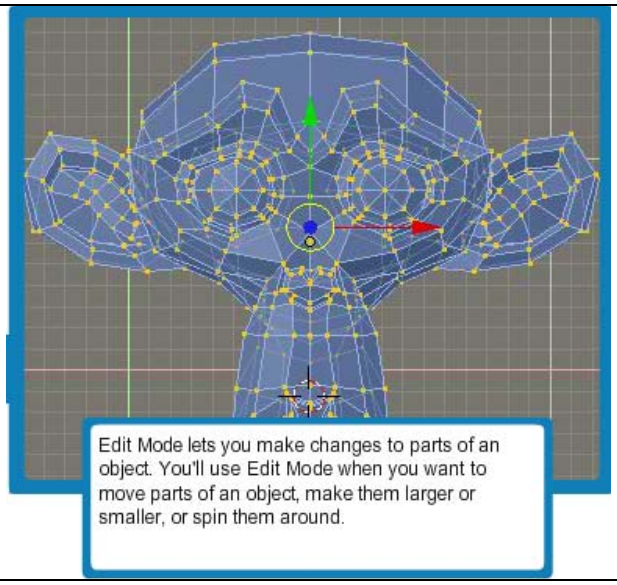
1. On the Start menu, left-click All Programs, left-click Blender Foundation, left-click Blender, and then left-click Blender again.	
2. On the File menu, left-click Open.	
3. In the Directory field, type this file path: C:\Users\Student\Desktop\UHD \3D Animation\. TIP: If your files are in a different place, type the file path for their location.	
4. Left-click Suzanne.blend.	

5.Left-click Open.		
Suzanne appears in 3D view.		

Modes

Blender has several different modes for interacting with objects.

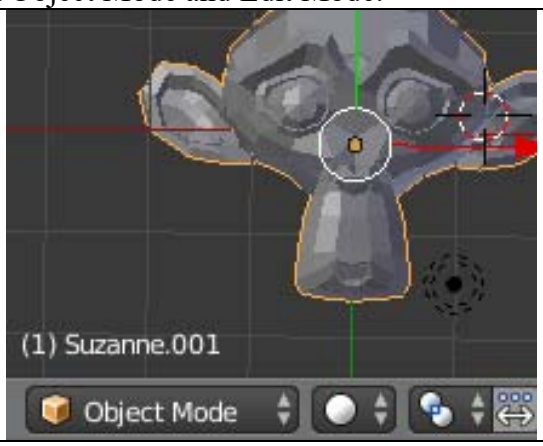
See the difference between Object and Edit mode.

Object Mode	
Edit Mode	

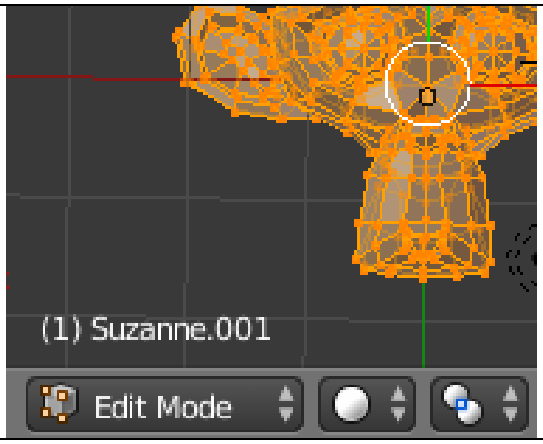
Switch to Object Mode

Complete the steps below to switch between Object Mode and Edit Mode.

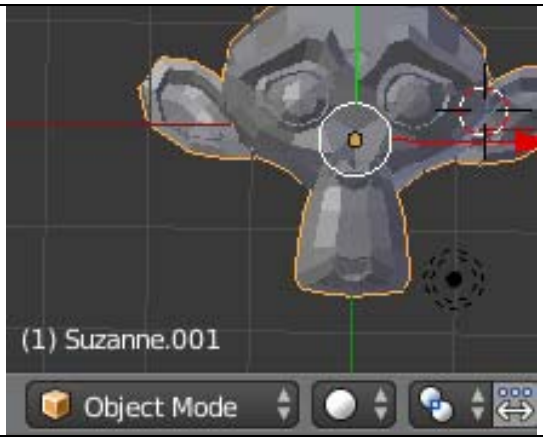
1. At the bottom of the 3D View window, left-click the Mode list and select Object Mode.



2. You can also press TAB to switch back and forth between Object Mode and Edit Mode.



3. After you've switched between the two, be sure to end in Object Mode.

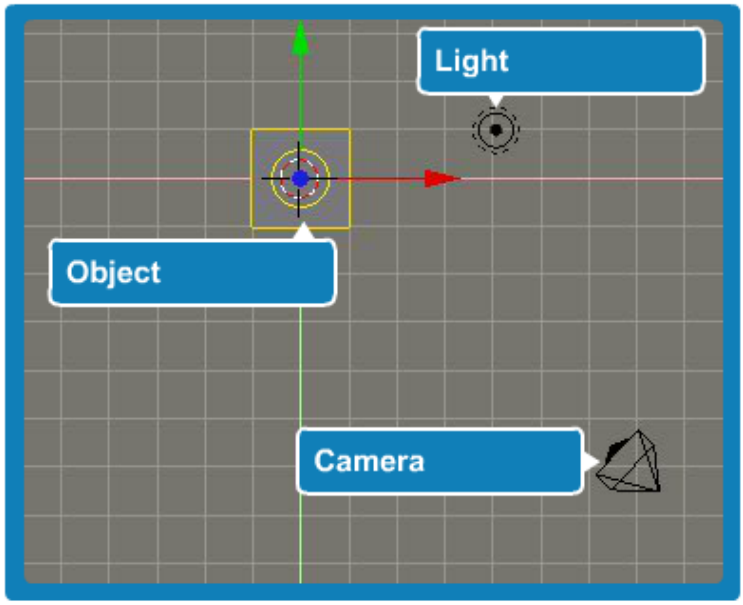


3D View Window

The biggest window in Blender is the 3D View window. This is where you can see your 3D objects and interact with them.

Your mouse pointer must be within the 3D View window to move around or make changes to 3D objects.

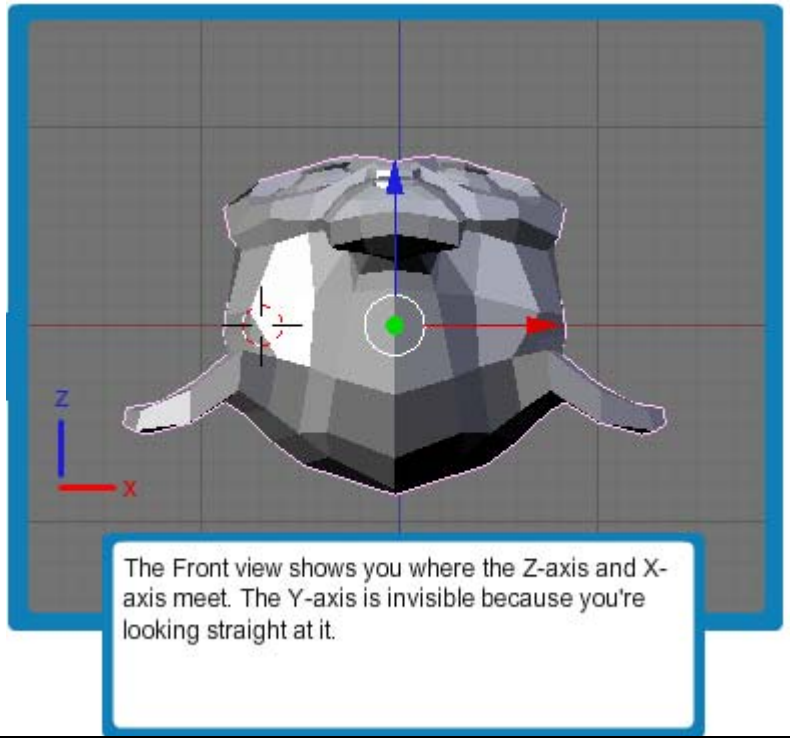
Click and drag the elements of the 3D View window to the correct location.

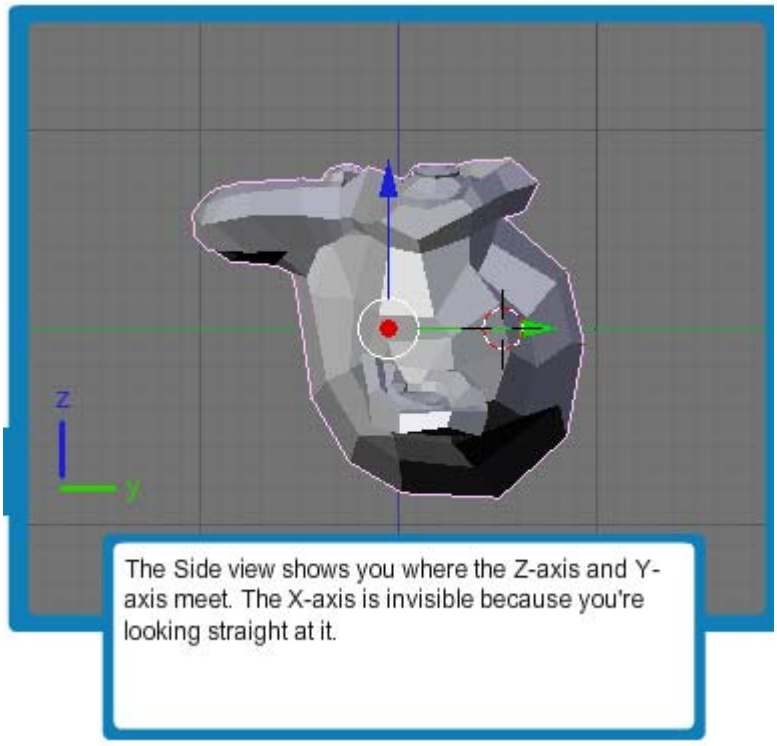
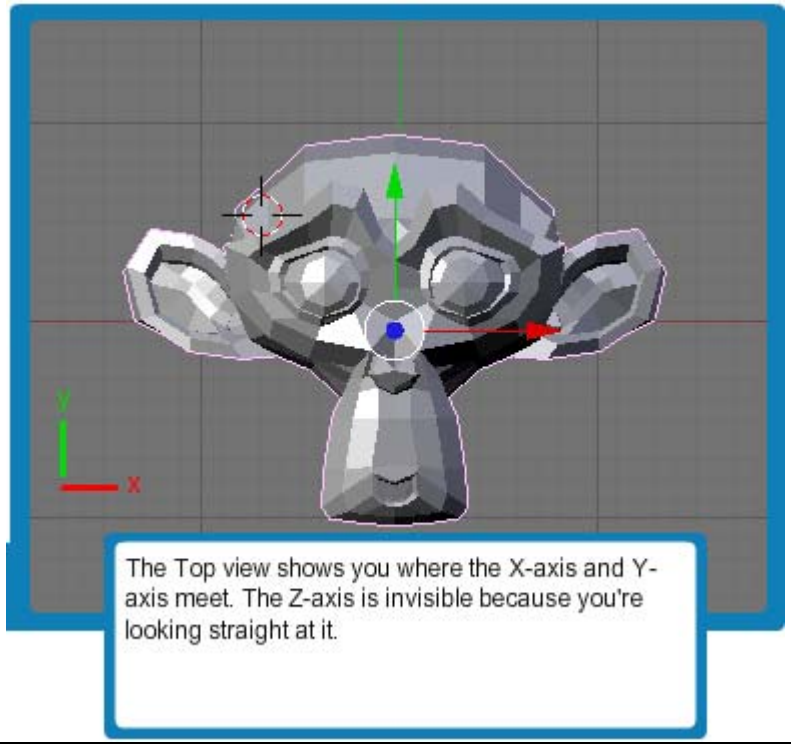


Preset 3D Views

Blender has four preset 3D views. These views are an easy way to move around in the 3D View window.

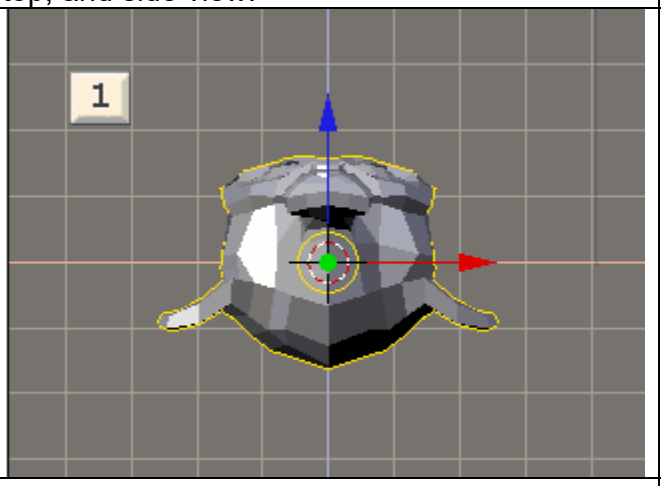
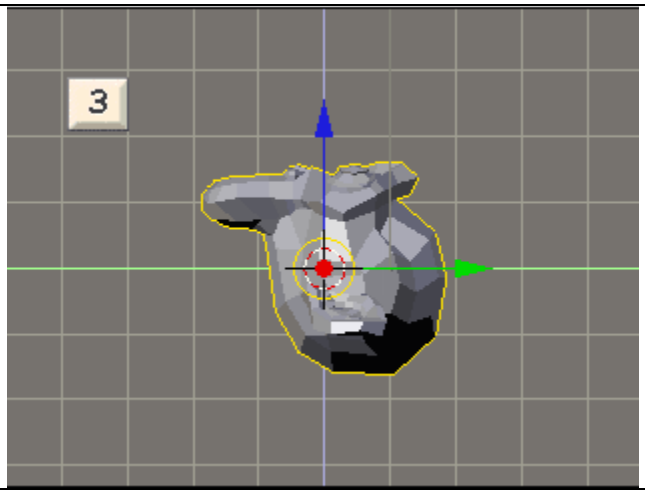
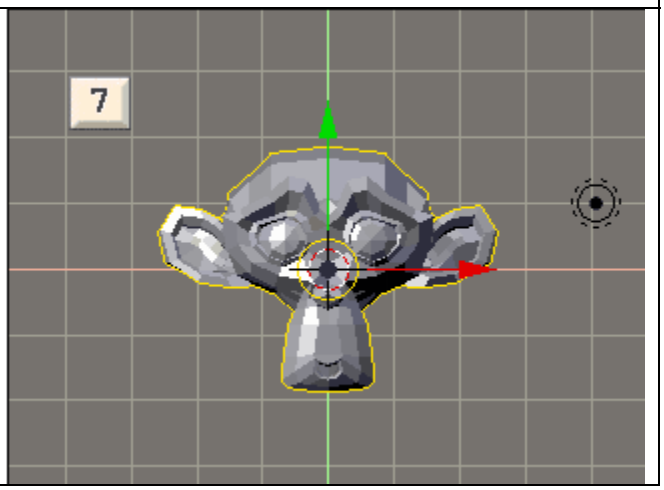
Front



Side	 z y The Side view shows you where the Z-axis and Y-axis meet. The X-axis is invisible because you're looking straight at it.
Top	 y x The Top view shows you where the X-axis and Y-axis meet. The Z-axis is invisible because you're looking straight at it.

Use Preset Views with the Keyboard

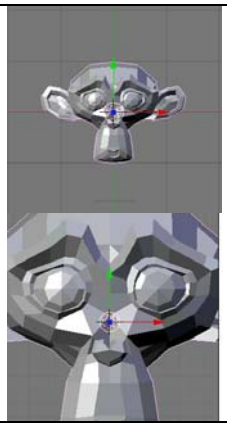
Complete the steps below to show the front, top, and side view.

1. Press NUM1 to see the Front view. TIP: Be sure to use the numeric keypad numbers and not the number keys at the top of the keyboard	
2. Press NUM3 to see the Side view.	
3. Press NUM7 to see the Top view	

Zooming

Zooming moves your point of view closer or farther away. Zooming does not change the actual size of the object at all.

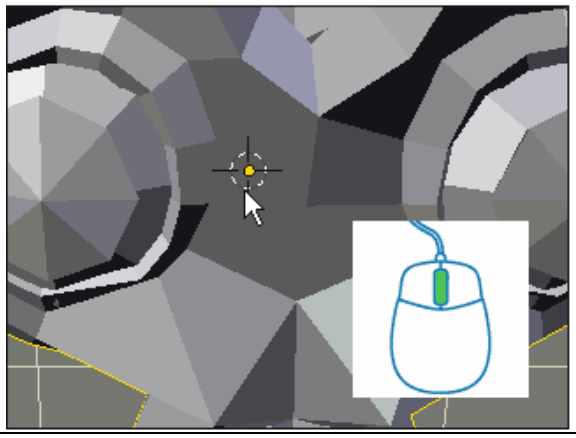
You'll zoom in when you want to make more detailed changes to your 3D object. You'll zoom out when you want to see the entire 3D object you're working on.



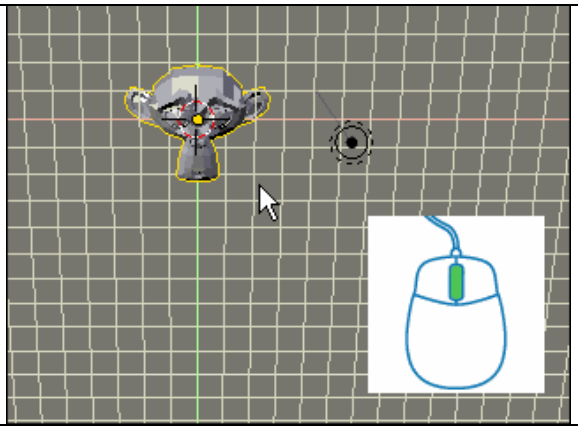
Zoom with the Mouse

Complete the steps below to zoom with the mouse.

1. Rotate the mouse wheel upward to zoom in.



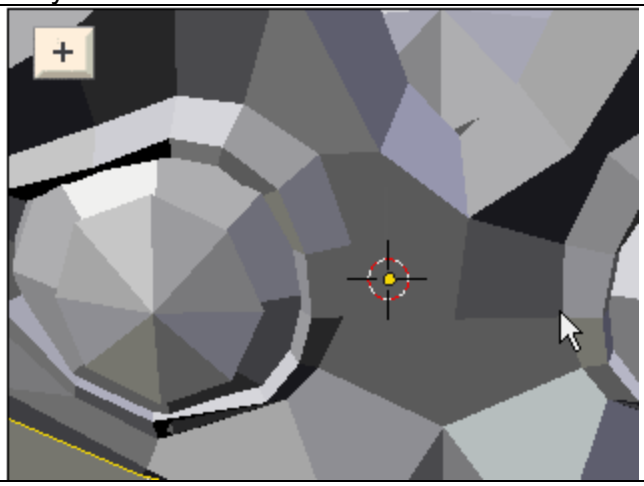
2. Rotate the mouse wheel downward to zoom out.



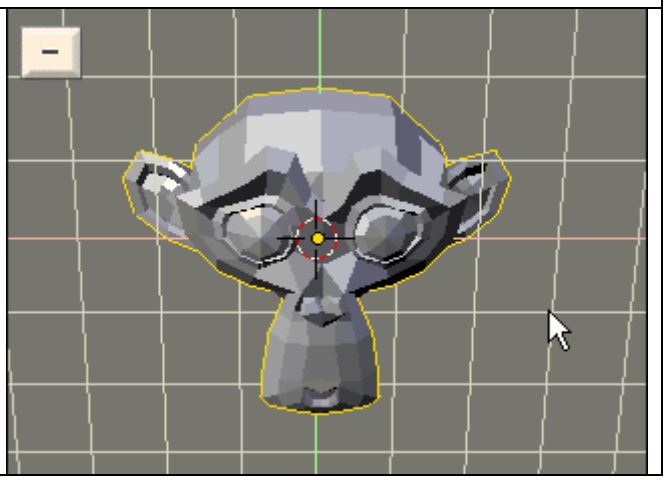
Zoom with the Keyboard

Complete the steps below to zoom with the keyboard.

1. With your mouse pointer in the 3D View window, press the + key to zoom in.



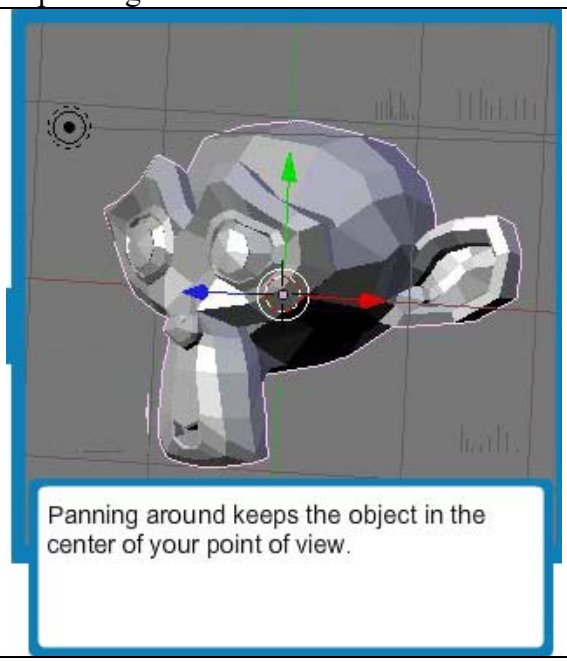
2. With your mouse pointer in the 3D View window, press the - key to zoom out.



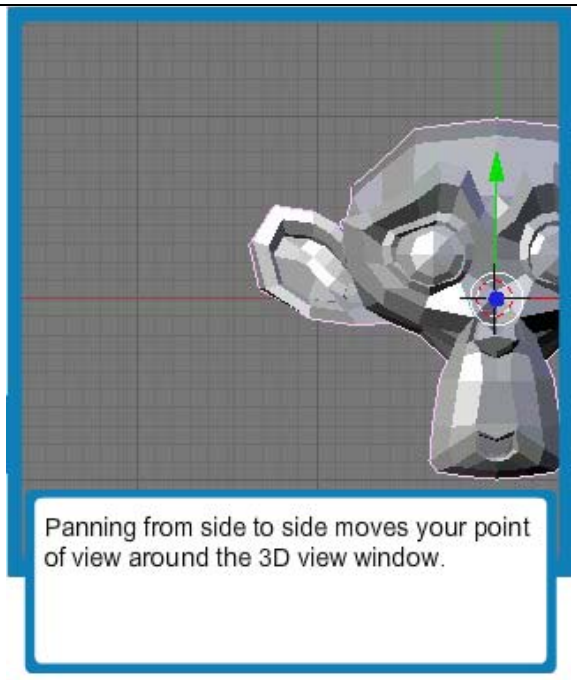
Panning

Panning moves your point of view around or alongside your 3D object. You can pan with the mouse or the keyboard.
In Blender, there are two types of panning. Click the buttons below to see the difference.

Panning Around



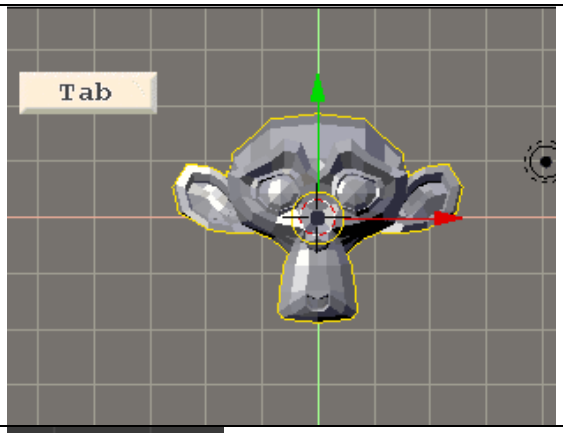
Panning Side to Side



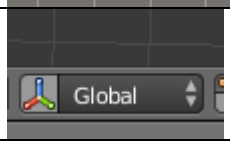
Pan with the Mouse

Before you pan with the mouse, you need to turn off the 3D Transform Manipulator. If it's turned on, you can accidentally make changes to your 3D objects.

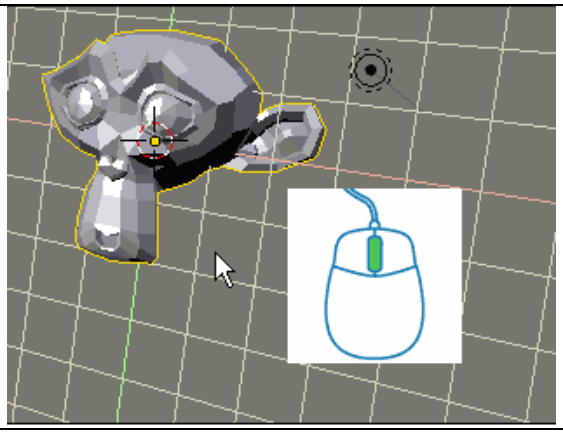
1. Make sure you are in Object Mode. If not, press the TAB key to switch to Object Mode.



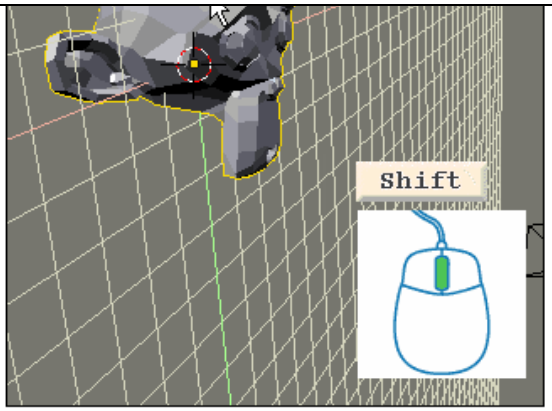
2. Left-click the Use 3D Transform Manipulator button to turn it off. TIP: Make sure your screen matches the example.

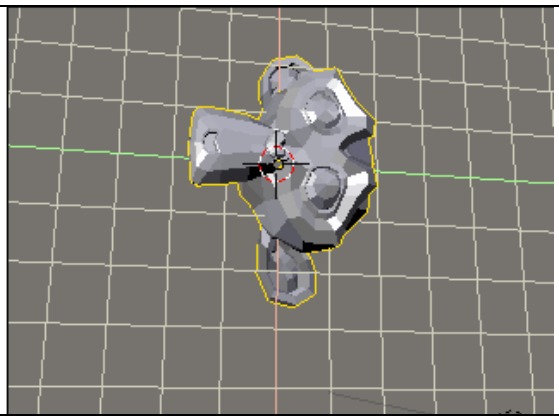


3. Press and hold the mouse wheel (or center mouse button) and move the mouse to pan around Suzanne. TIP: Make sure you're pressing down on the mouse wheel and not rotating it.



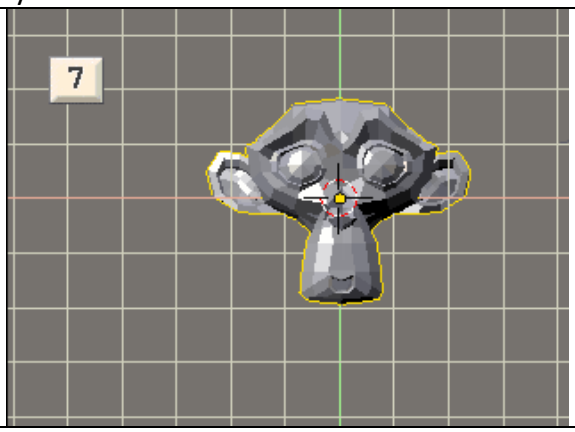
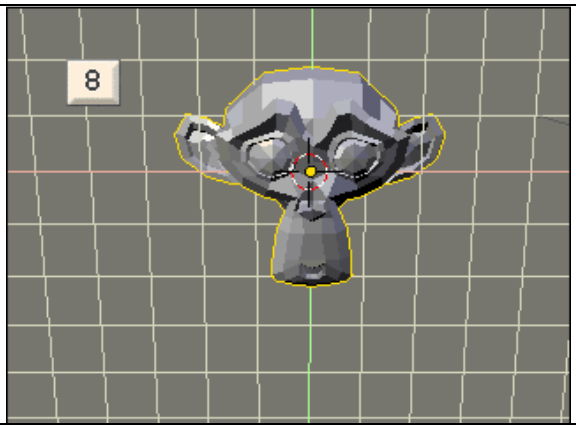
4. Hold down SHIFT while pressing the mouse wheel (or center mouse button) and move the mouse to pan along the object in a straight line.

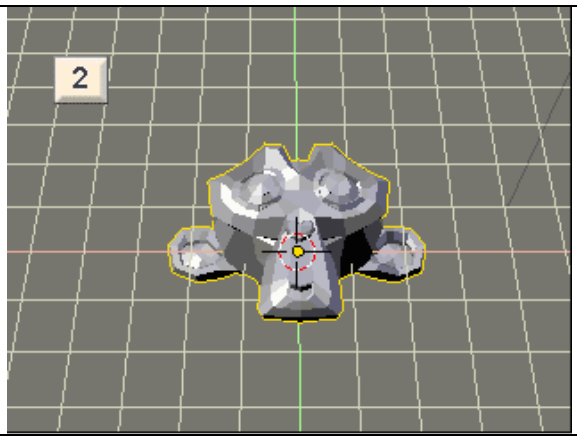
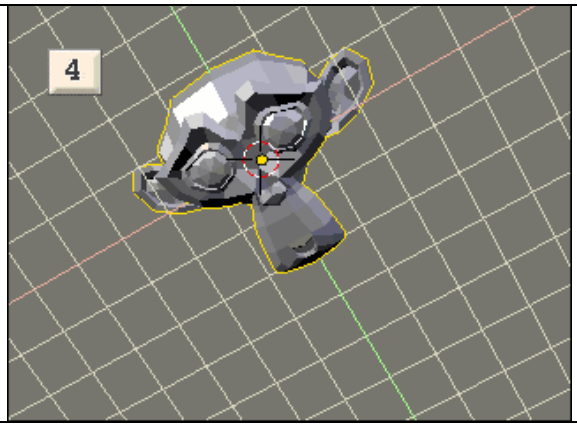
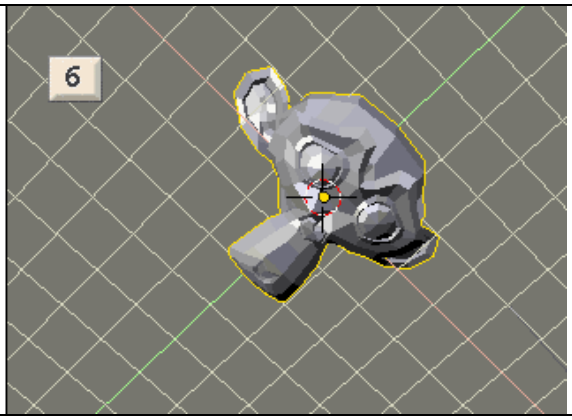


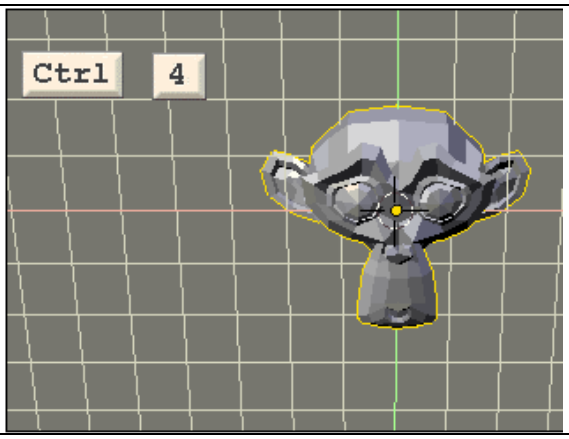
5. Pan around Suzanne until it matches the image as closely as you can get it.	

Pan with the Keyboard

Complete the steps below to pan using the keyboard.

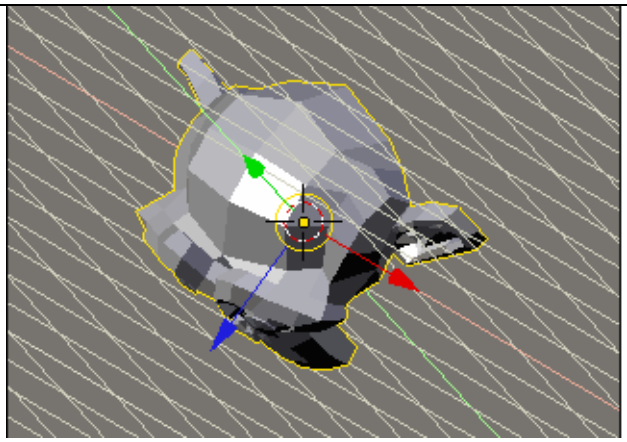
1. Place the mouse pointer over the 3D View window and press numeric keypad 7 (NUM7) to return to the Top view.	
2. Press NUM8 to pan around the object upward.	

3. Press NUM2 to pan around the object downward.	
4. Press NUM4 to pan around the object to the left.	
5. Press NUM6 to pan around the object to the right.	

6. Hold down the CTRL key while pressing NUM8, NUM2, NUM4, or NUM6 to pan in place (not around Suzanne) up, down, left, or right.	

Navigate in 3D

Complete the steps below to practice your skills with zooming and panning.

1. Practice moving around in 3D space by getting your image of Suzanne to look like the example. Do your best, but don't worry if you can't get it to match exactly. 2. Experiment with the mouse and keyboard commands to see which you like best. 3. If you're done for the day, you can close Blender without saving. If not, move on to the next lab	

SUMMARY	In this lab, you learned how to: • Switch between Object Mode and Edit Mode. • Use Preset Views in the 3D View window. • Pan and zoom in 3D space using the mouse and keyboard.

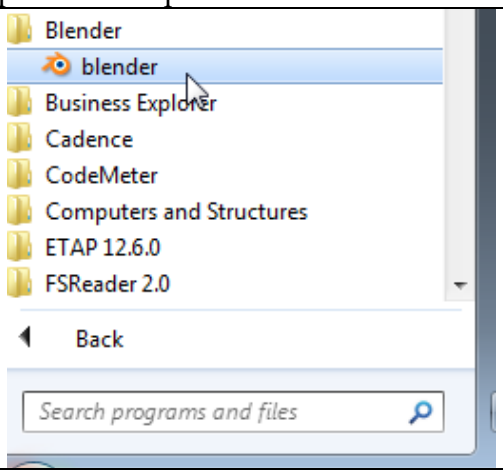
Lab 2 Introduction

In this lab, you'll move, spin, and resize Suzanne.

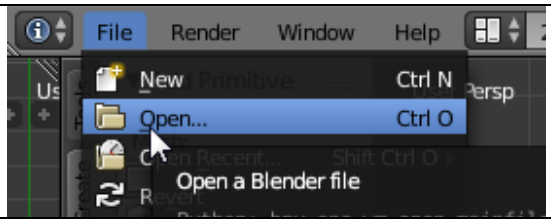
Open Suzanne.blend

You'll start by looking at an example of a 3D object. Complete the steps below to open a Blender file. If Blender is already open, skip the first step.

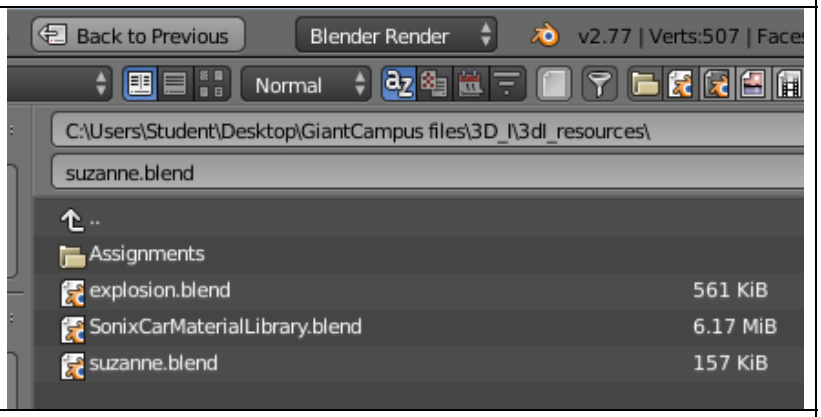
1. On the Start menu, left-click All Programs, left-click Blender Foundation, left-click Blender, and then left-click Blender again.

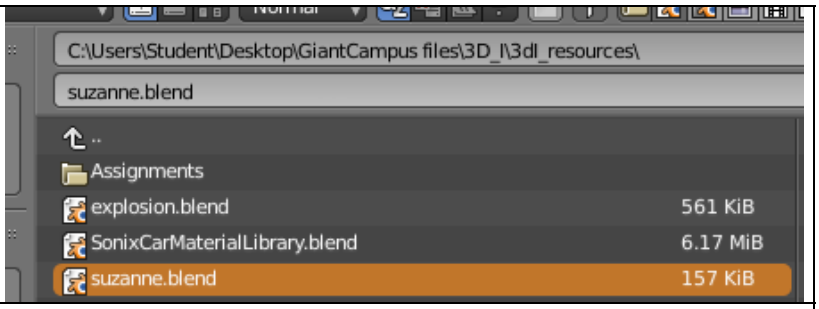


2. On the File menu, left-click Open.



3. In the Directory field, type this file path: C:\Users\Student\Desktop\UHD\3D Animation\. TIP: If your files are in a different place, type the file path for their location.

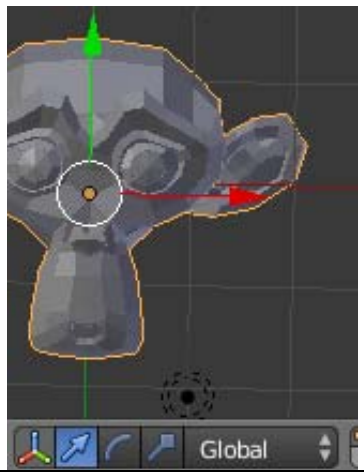


4. Left-click Suzanne.blend.	
5.Left-click Open.	
Suzanne appears in 3D view.	

The 3D Transform Manipulator

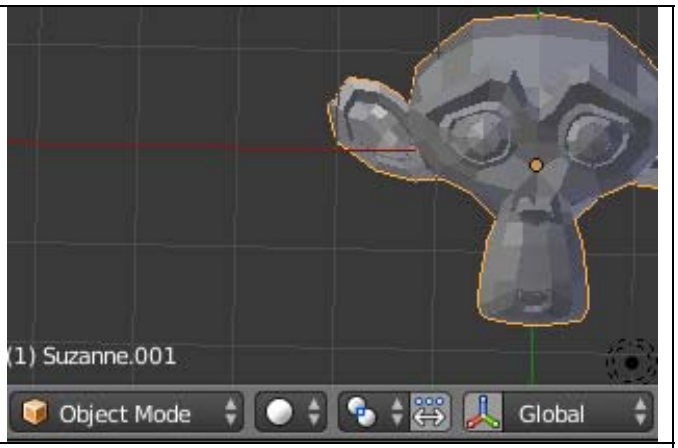
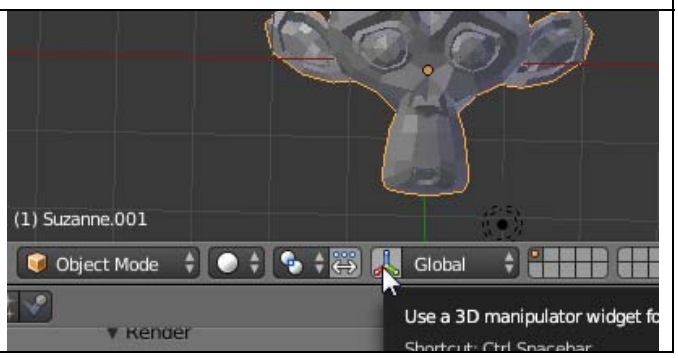
To make it easy to edit 3D objects, Blender uses the **3D Transform Manipulator**. Unless it's turned off, it will appear at the center of any object that you select.

The 3D Transform Manipulator lets you move, spin, and resize objects.



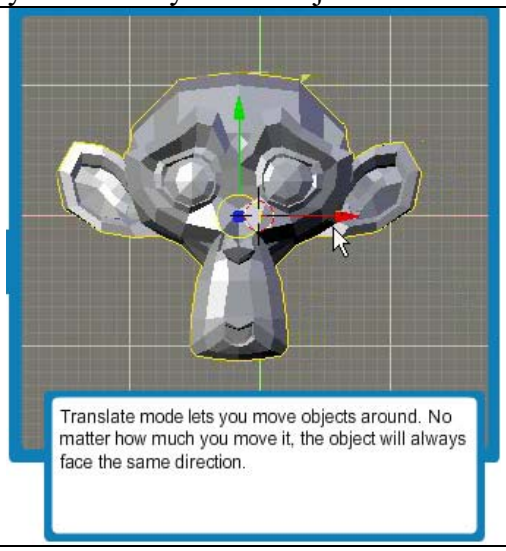
Turn On 3D Transform Manipulator Button

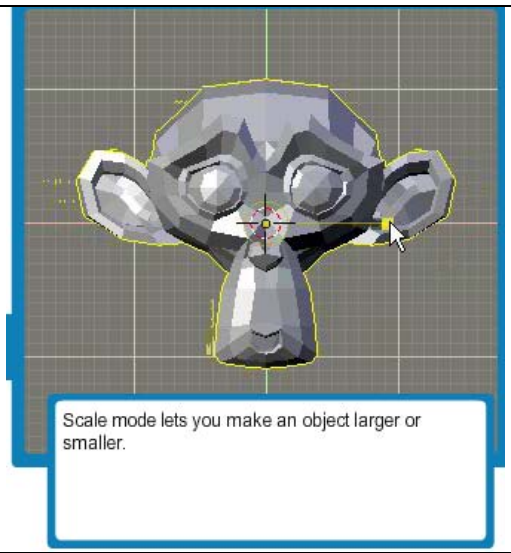
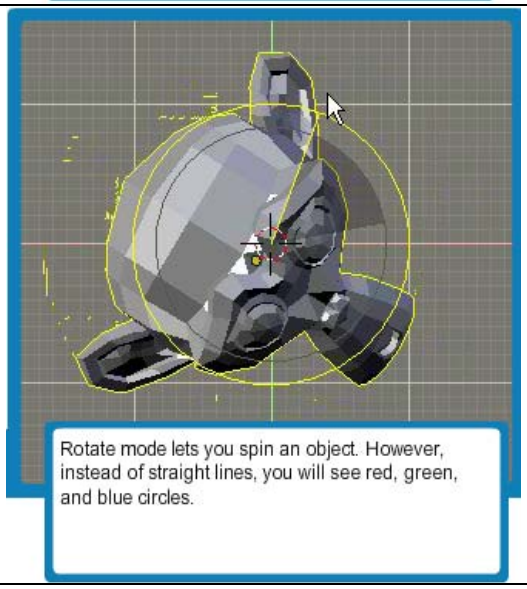
You turned off the 3D Transform Manipulator earlier so that you wouldn't accidentally change anything. Complete the steps below to turn it back on.

1. Make sure you are in Object Mode. If not, press the TAB key.	
2. Left-click the Use 3D Transform Manipulator button to turn it on. TIP: Make sure your screen matches the example.	

The 3D Transform Manipulator Modes

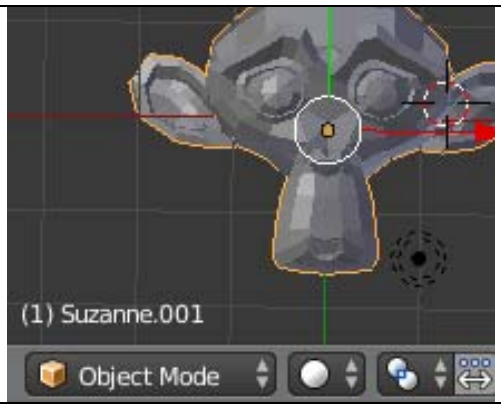
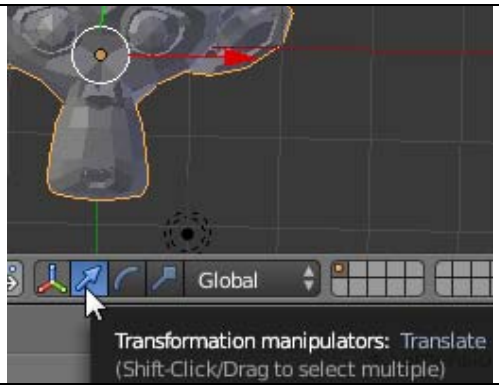
The 3D Transfrom Manipulator has three different modes: translate, scale, and rotate. Click the buttons below to see what each mode allows you to do to your 3D object.

Translate	

Scale	
Rotate	

Move Suzanne

Complete the steps below to move Suzanne using the Translate mode of the 3D Transform Manipulator. You'll know you've selected the 3D Transform Manipulator when the red, green, and blue arrows change to white.

1. Make sure you are in Object Mode. If not, press the TAB key to switch to Object Mode.	
2. Make sure Suzanne is still outlined or hilighted. If not, right-click to select her.	
3. Left-click the Translate manipulator mode button. The translate button looks like a blue arrow. The ends of the red, green, and blue lines will change to arrows.	
4. Left-click inside the 3D Transform Manipulator and move the mouse to move Suzanne.	
5. Left-click to stop moving Suzanne.	

The Undo Command

Blender is a complicated program, and it's easy to make mistakes. If you make a change that you don't like, you can undo the last thing you did by pressing CTRL + Z.

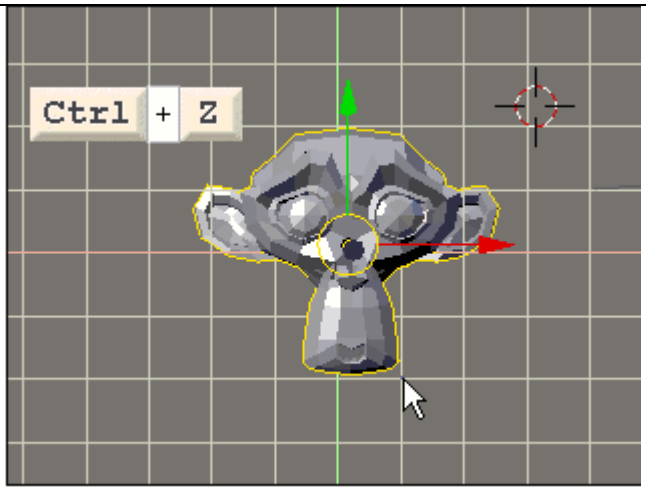
This is much easier than deleting everything and starting over.

CAUTION: Blender will only let you undo your last 32 changes. So you can't use Undo to fix everything you did in a project!

Undo a Change

Complete the steps below to undo a change.

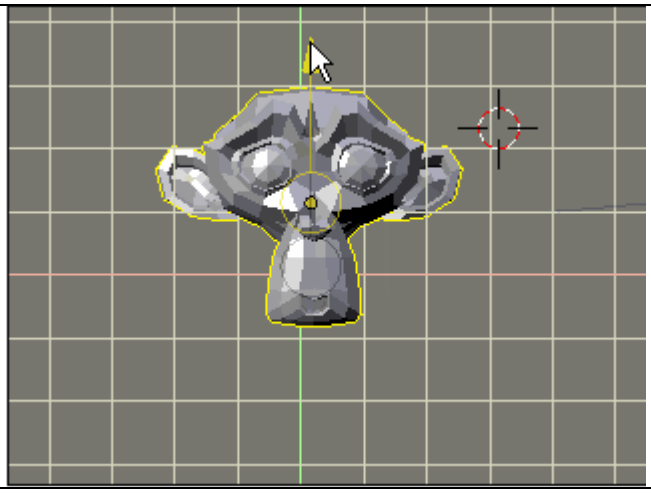
1. Press CTRL + Z to undo any mistakes. You may need to press it more than once to get it back to what you want.

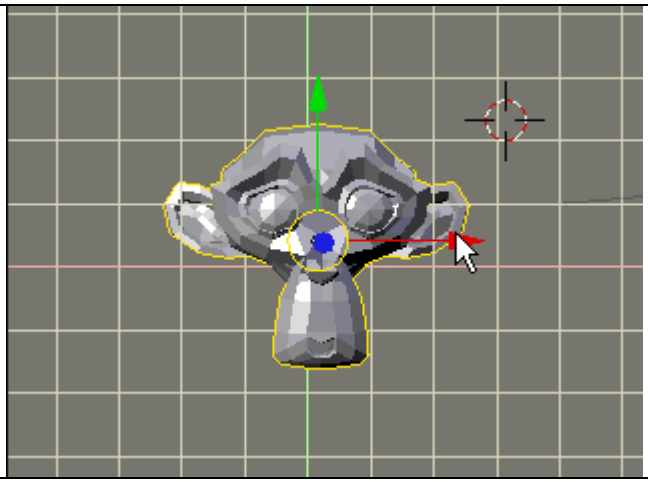
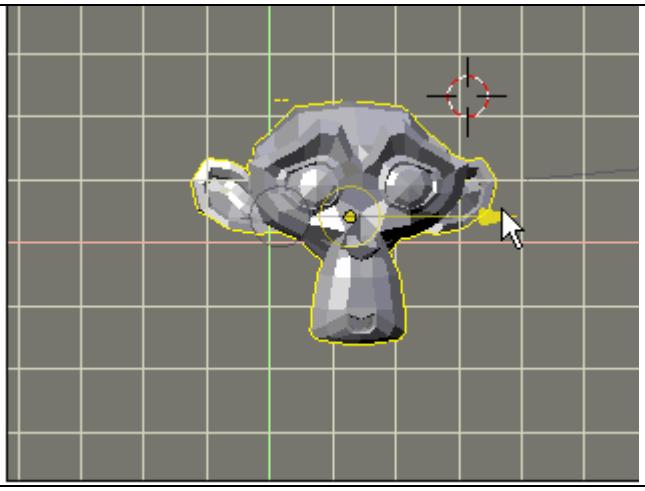


Move Along One Axis

Complete the steps below to move along the Y-axis.

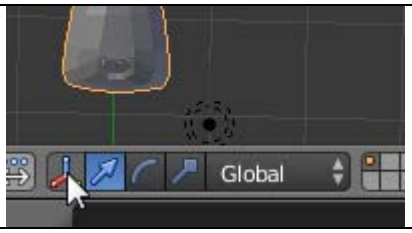
1.Left-click the 3D Transform Manipulator's green arrow and move the mouse. This moves Suzanne along the Y-axis.

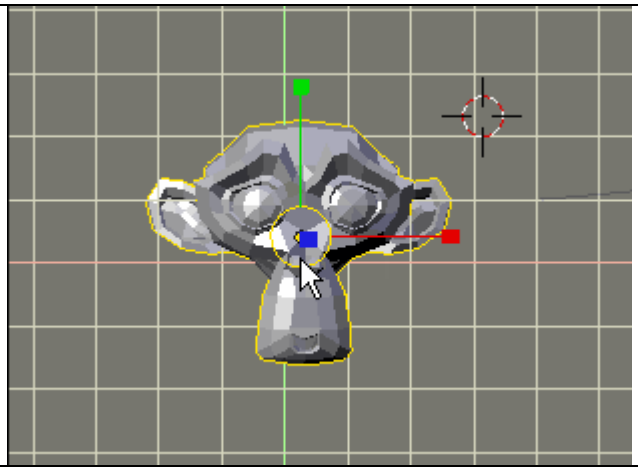
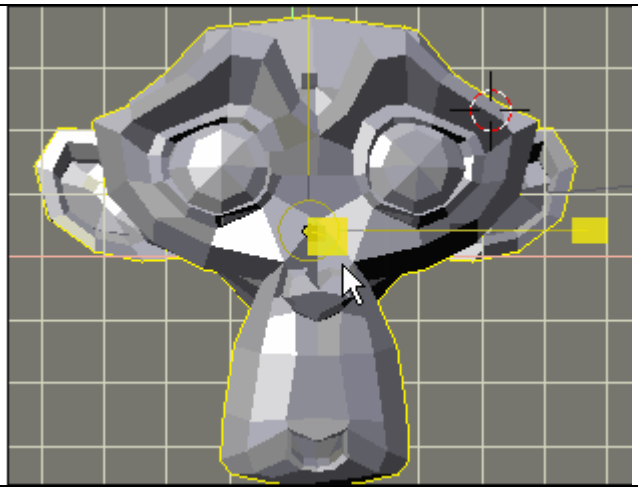


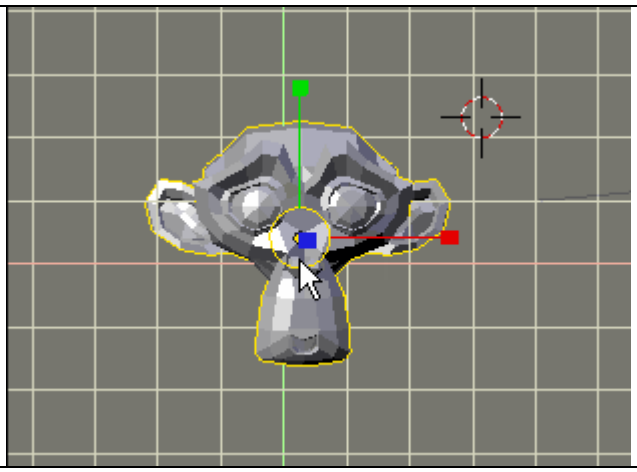
2.Left-click to stop moving Suzanne.	
3.You can move Suzanne along any axis by clicking just that arrow instead of inside the circle.	

Make Suzanne Larger

Complete the steps below to scale Suzanne.

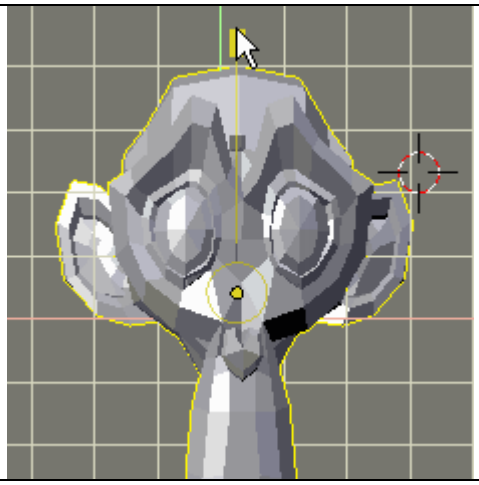
1.Right-click Suzanne to select her if she's not already. TIP: Selected objects will be surrounded by a highlight line.	
2.Check that the Use 3d transform manipulator button is turned on.	

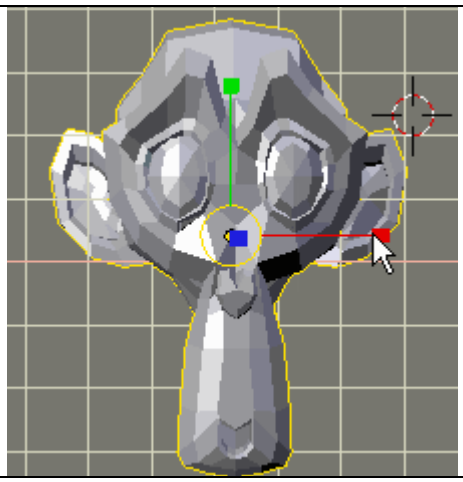
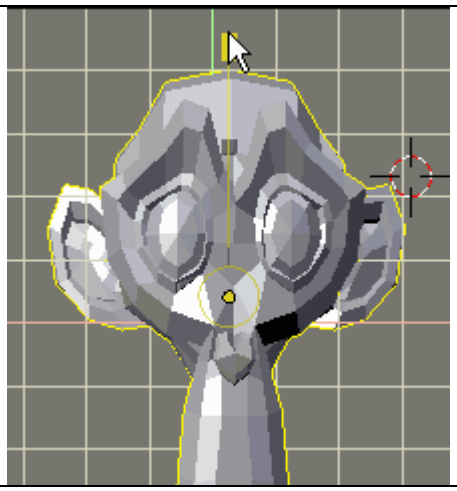
3.Left-click the Scale manipulator mode button.	
4.Left-click inside the 3D Transform Manipulator. Be careful not to click the square in the center or the red, blue, or green lines.	
5.Move the mouse pointer very slowly toward the edge of the yellow circle. As you move outward Suzanne will get larger. CAUTION: Do not move your mouse over the yellow dot in the center of Suzanne or she will flip over.	

6.Left-click to stop scaling. You can press CTRL + Z to undo your last move.	

Stretch in One Direction

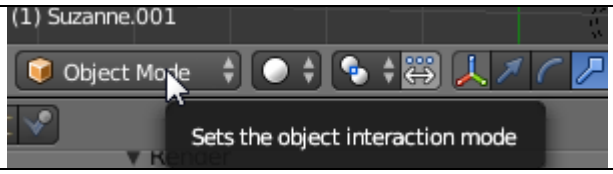
Just like moving, you can scale in just one direction. Complete the steps below to stretch Suzanne along the Y-axis.

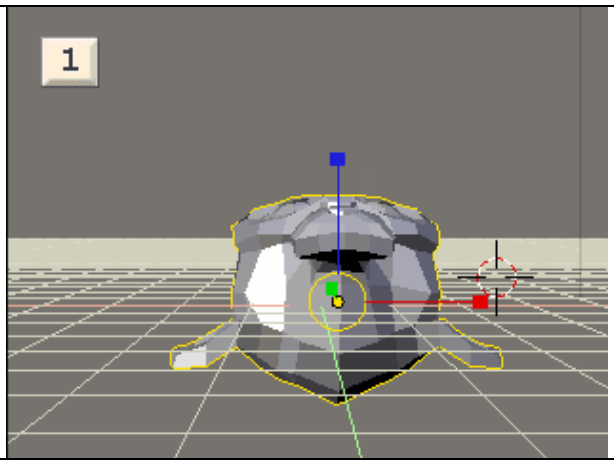
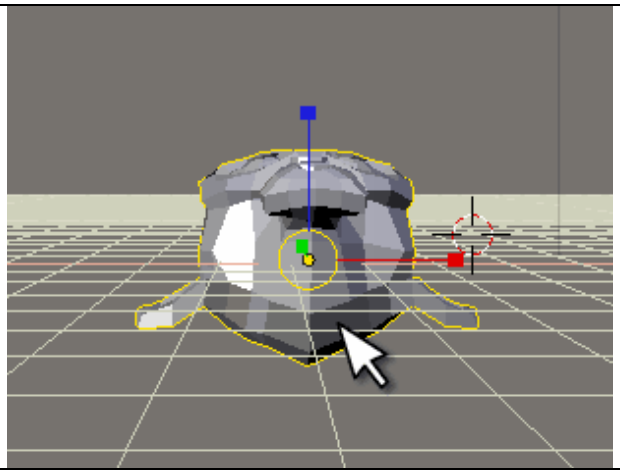
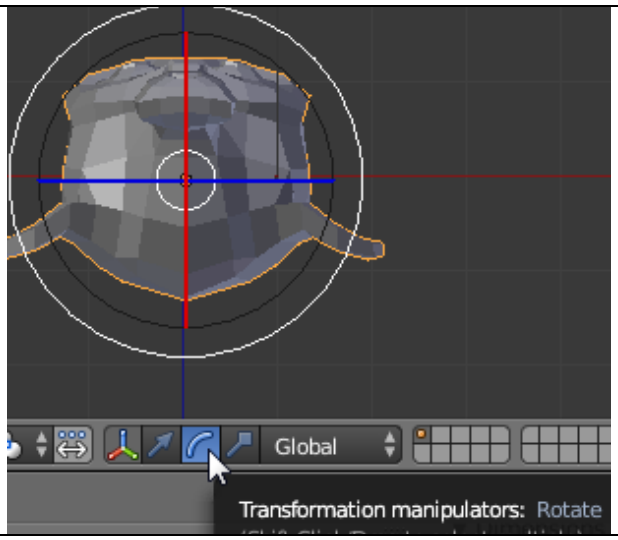
1.To scale Suzanne along the Y-axis, left-click the green box and move the mouse. Left-click again to stop scaling.	

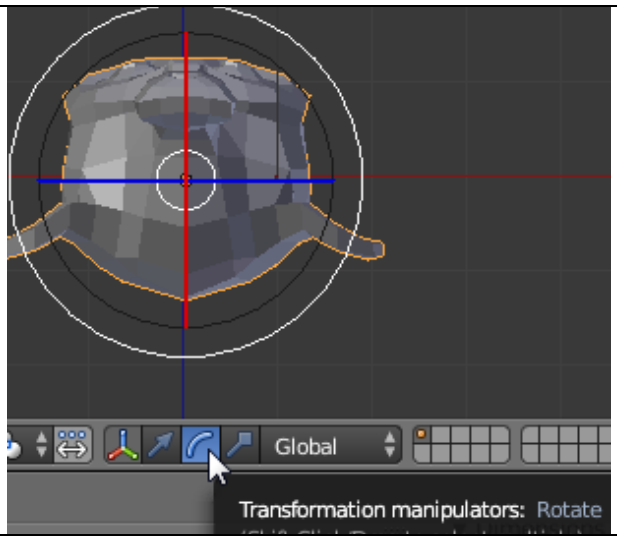
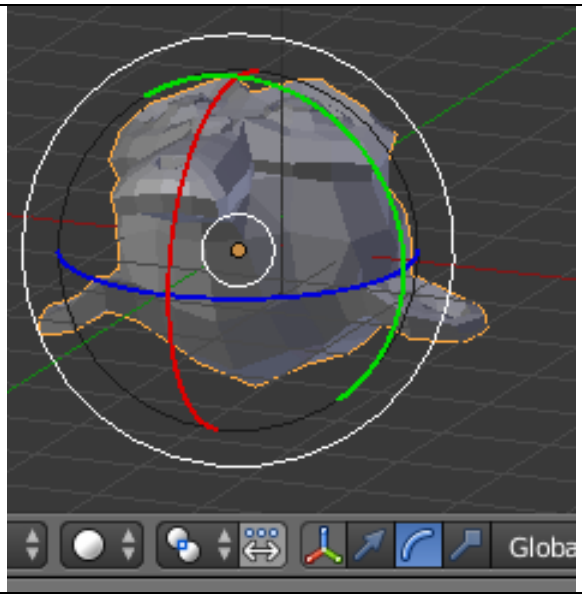
2.You can scale Suzanne along any axis by clicking the green, blue, or red square.	
3.Press CTRL + Z to undo any mistakes. You may need to press it more than once to get the object back to how you want it.	

Rotate an Object

Complete the steps below to rotate Suzanne.

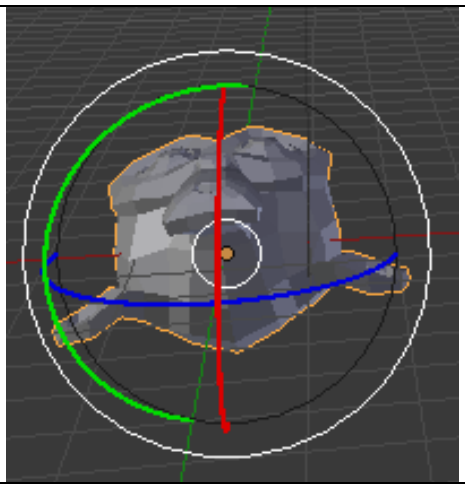
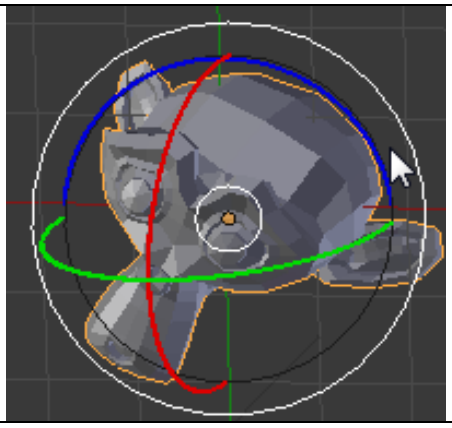
1.Check that you are in Object Mode. If not, press the TAB key to switch to Object Mode.	

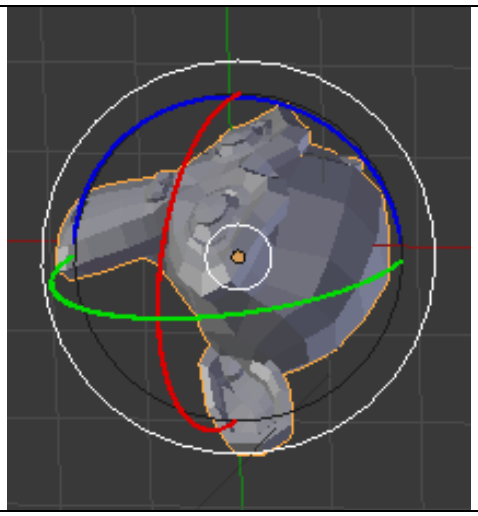
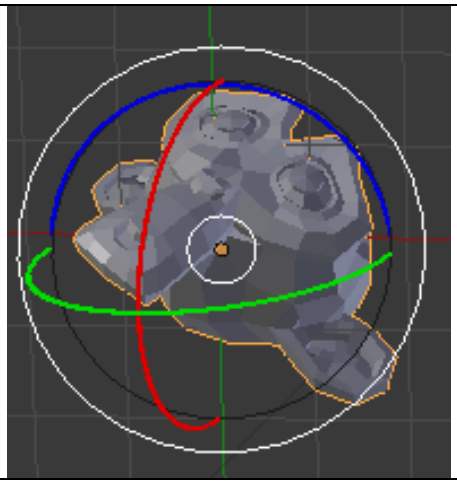
2.Press NUM1 to return to the Front View.	
3.Make sure Suzanne is still outlined in yellow. If not, right-click to select her.	
4.Left-click the Rotate manipulator mode button. The translate button looks like a blue arc.	

5.Left-click the outer white line of the 3D Transform Manipulator. Move your mouse to rotate. Left-click when you're done.	
6.Press and hold the middle mouse button to pan around Suzanne.	

Rotate Around One Axis

Complete the steps below to rotate around one axis.

1.Left-click the outer white line again and move the mouse. The object will spin around your new point of view. Left-click when you're done.	
2.If you can't see the blue line, use the scroll wheel or middle mouse button to rotate your view until you can see all three lines.	
3.Inside the 3D Transform Manipulator left-click the blue line and move the mouse right and left to rotate Suzanne along the Z-axis. Left-click to stop rotating.	

4.Inside the 3D Transform Manipulator, left-click the red line and move the mouse to rotate Suzanne along the X-axis.	
5.To rotate Suzanne along the Y-axis, left-click the green line and move the mouse. Left-click again to stop rotating.	
6.Press CTRL + Z to undo any mistakes. You may need to press it more than once to get the object back to how you want it.	

Check Your Work

1. Make sure you are comfortable rotating, moving, and scaling.

2. If you're done for the day, you can close Blender without saving. If not, move on to the next lab.

SUMMARY	In this lab, you: • Used Translate mode to move an object. • Used Scale mode to resize and stretch an object. • Used Rotate mode to spin an object. • Translated, scaled, and rotated on different axes.

Lab 3 Introduction

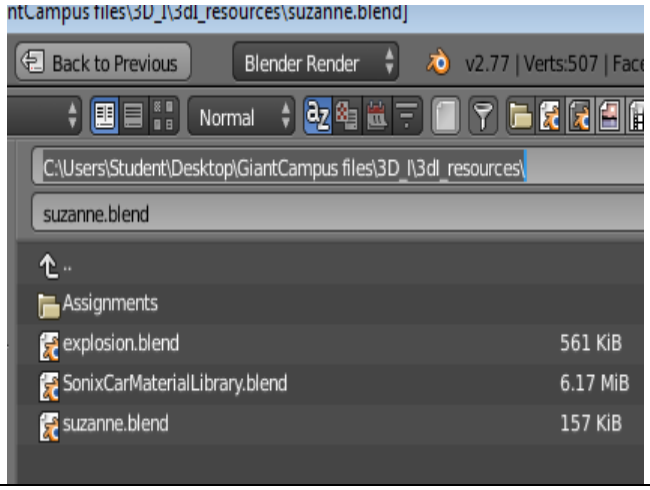
In this lab, you'll open and save your 3D modeling work.

The File Navigation Screen

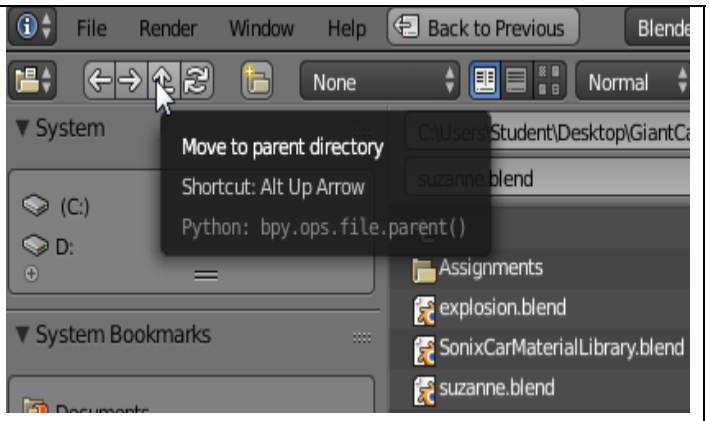
The Open command in Blender takes you to the file navigation screen. Here you can see the files and folders on your computer.

At the top of the file navigation screen, you'll see the current folder in the **Directory** field. The **current folder** is the folder you are in right now.

The white items in the list are folders that are inside the current folder. Clicking one will take you to that folder.

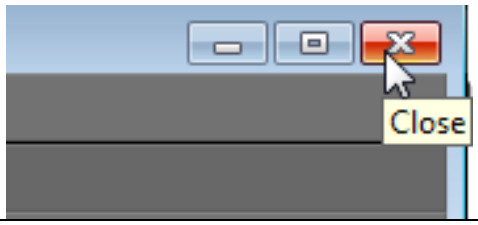
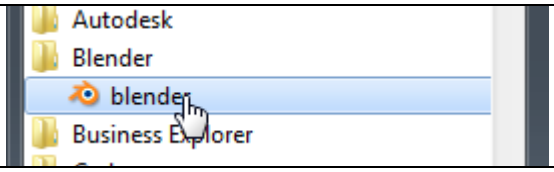
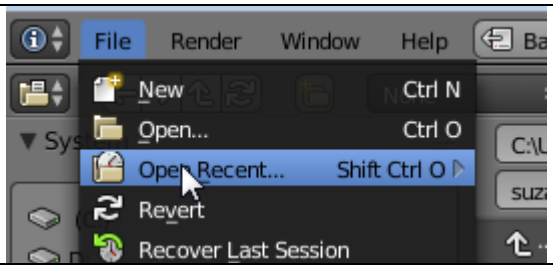


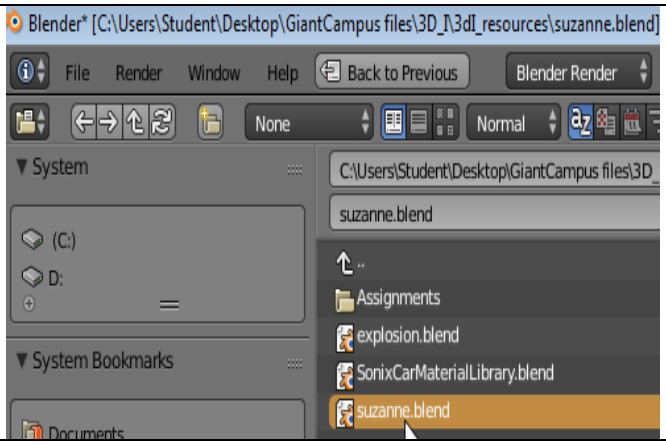
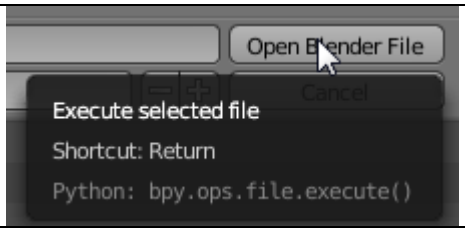
The Parent Directory

Clicking the **Move to the parent directory** button will take you to the folder that has the current folder inside it.	

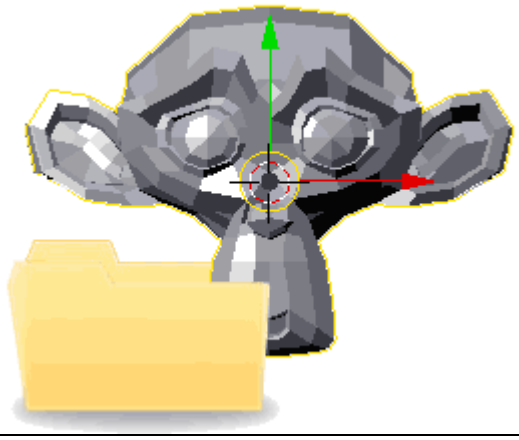
Open a File

Complete the steps below to open a saved file. You'll do this any time you want to open a file that has already been created.

1.Close Blender by clicking the X in the top right corner.	
2.On the Start menu, left-click All Programs, left-click Blender Foundation, left-click Blender, and then left-click Blender again.	
3.On the File menu, left-click Open.	

4.Left-click suzanne.blend. Notice that there's a yellow box next to that file name. That means it's a Blender file.	
5.Left-click Open.	

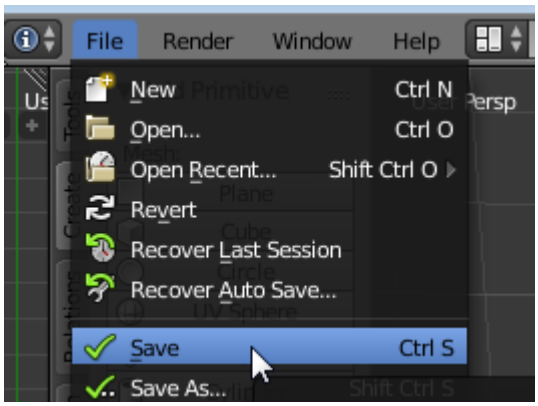
Saving Files

It's important to save your Blender file as you make changes. Saving your file keeps you from losing your work if your computer crashes or you make a major mistake. When you close Blender, it won't ask you if you want to save. Always save your work before closing Blender.	

The Save Command

One way to save a Blender file is the Save command. The **Save** command overwrites the older version of the file with any new changes that you've made.

You'll use Save after you've made a minor change that you're happy with.

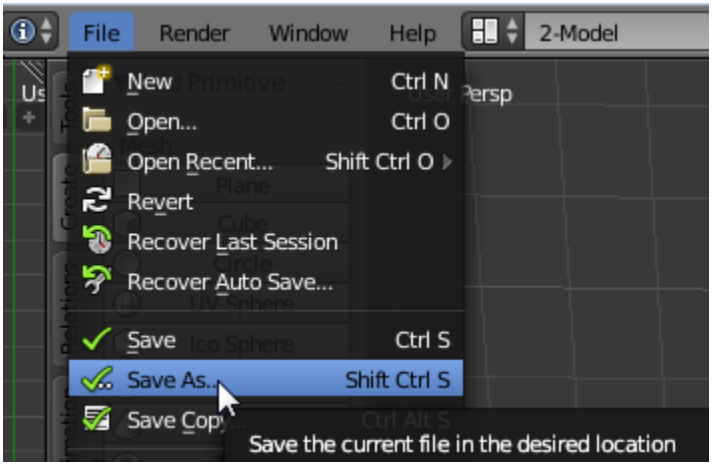


The Save As Command

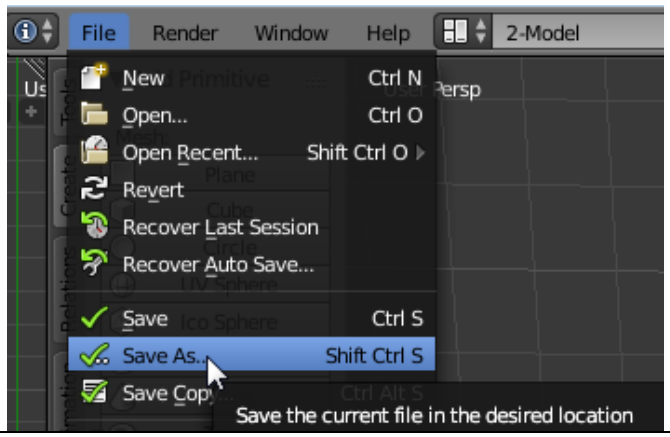
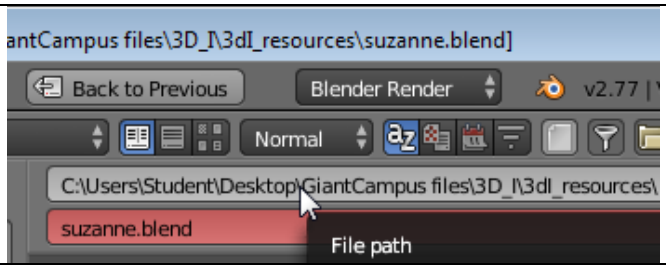
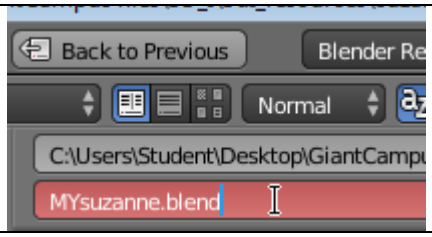
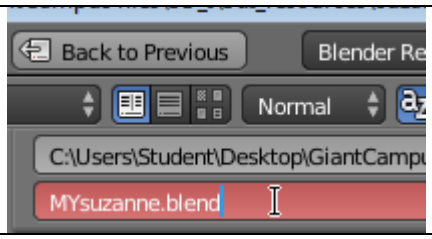
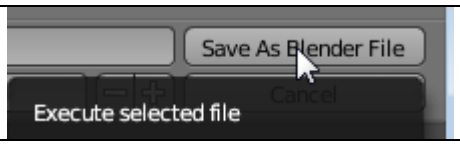
The second way to save a Blender file is the Save As command. The **Save As** command saves your current project as a new file with a new name.

That means the older version of your file will still be around in case you need it later.

You'll use Save As whenever you think you might want to keep a copy of your old file while continuing to work on the new version of your file.



Save Your Own Copy

1.On the File menu, click Save As.	
2.Make sure you're saving in the right folder. The file path should be: C:\Users\Student\Desktop\UHD\3D Animation\	
3.Left-click the name in the File field to highlight it.	
4.Type your new name for the file. We chose suzanne_2. You do not have to type .blend. Blender will add that file extension for you.	
5.Left-click Save As.	

Summary	In this lab, you: • Used the Open command to open a file. • Used the Save As command to save a file.

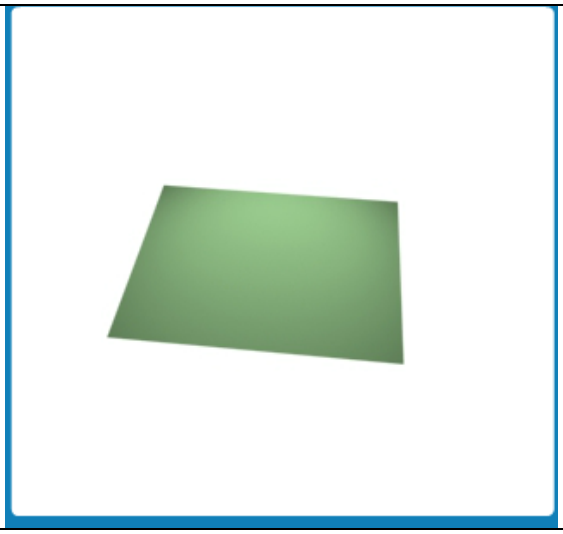
Lab 4 Introduction

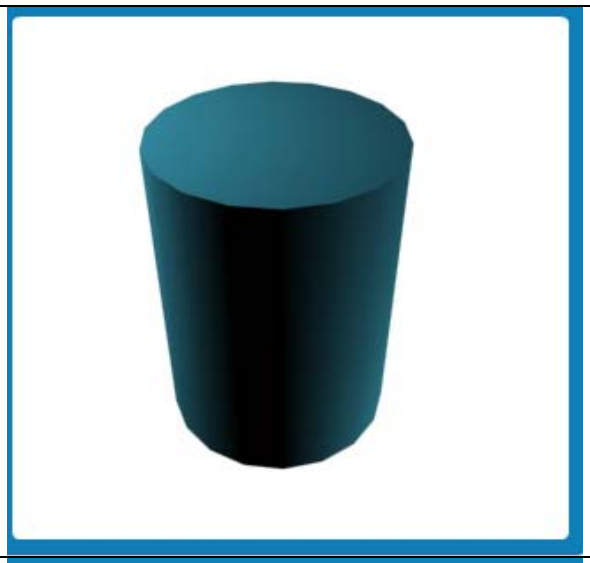
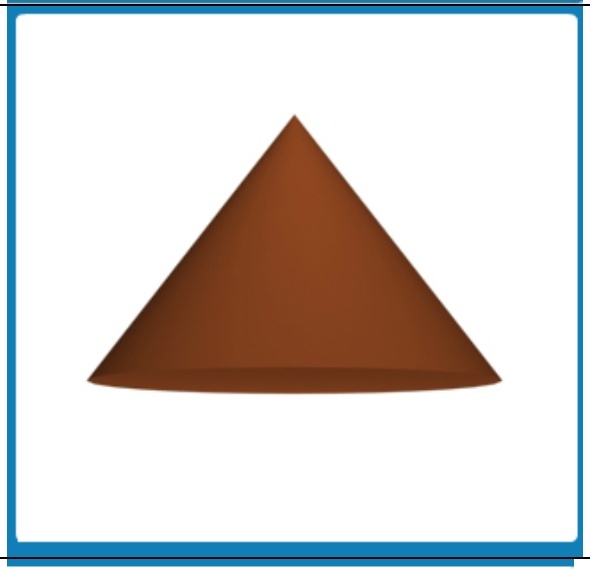
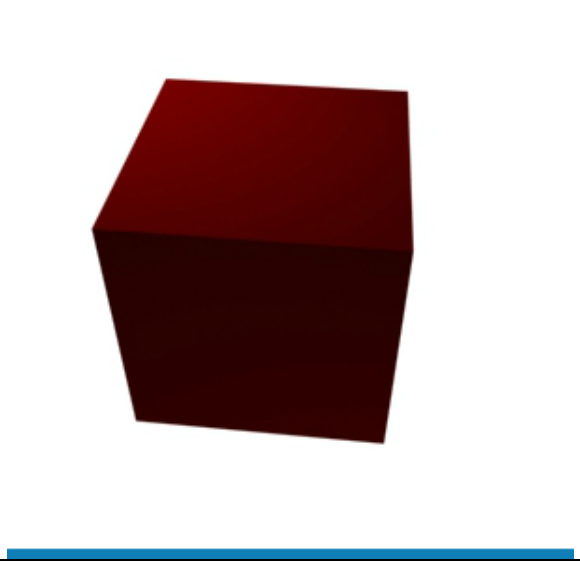
In this lab, you'll use simple shapes to make a hat.

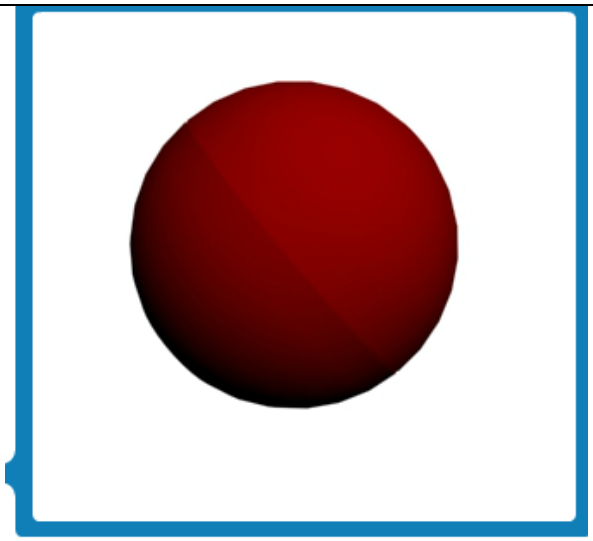
Meshes

Meshes are the basic shapes that are included in Blender. Most of them are 2D and 3D objects that you will join together to make more complicated 3D objects in Blender.

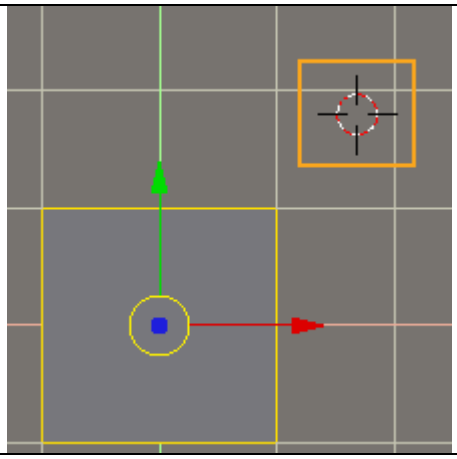
Click the buttons below to see the different types of meshes. Suzanne is also a mesh that was made just for Blender.

Plane	

Cylinder	
Cone	
Cube	

Sphere	

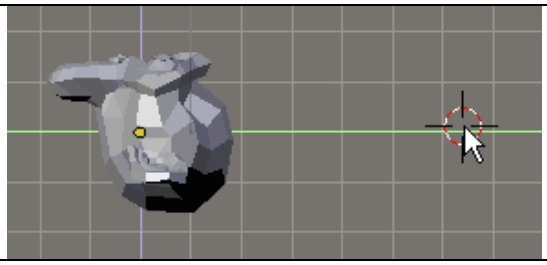
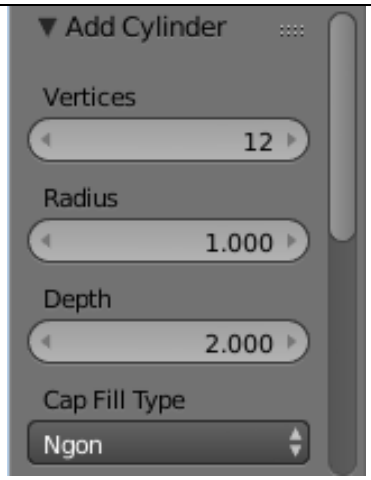
3D Cursor

The **3D cursor** controls where new objects appear in the 3D View window. You'll use the 3D cursor to add meshes to a certain location in the 3D View window.	

Add a Cylinder

You'll add a cylinder that will be the base of Suzanne's hat.

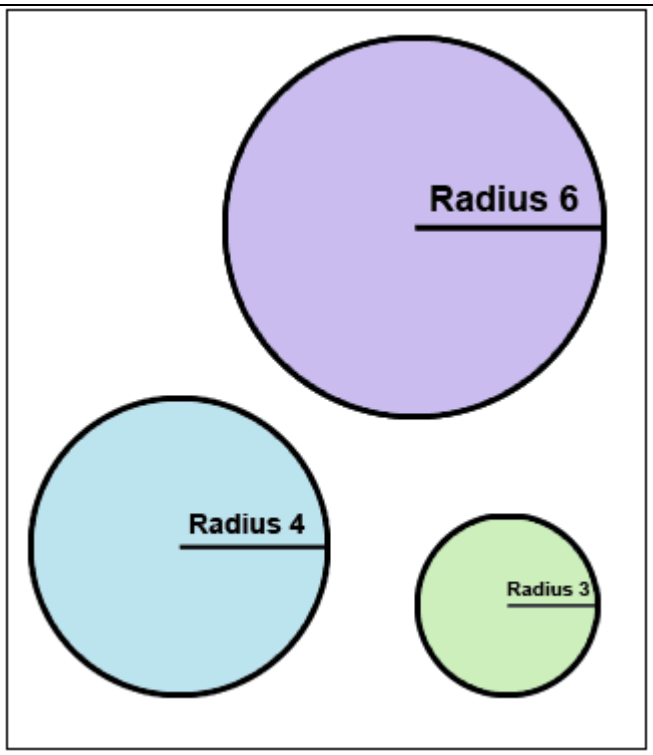
1.Make sure that everything is unselected. If you see any yellow lines, press the A key to deselect everything. TIP: The example is in Side View. It's ok if your screen doesn't match, as long as you know where the top of Suzanne's head is.	
2.Make sure you are in Object Mode. If not, press the TAB key to switch to Object Mode.	

3.Left-click above Suzanne's head. This will move the 3D cursor to where you want to place the hat.	
4.On the Add Primitive select the Create Tab then left-click Cylinder.	
5.In the Add Cylinder dialog box, left-click Vertices. Type 12 in the Vertices field. TIP: This number controls how smooth the cylinder is. 6.Left-click Radius. Type 1 in the Radius field. TIP: This number controls how wide the cylinder is. 7.Left-click Depth. Type 2 in the Depth field. TIP: This number controls how long the cylinder is. 8.Make sure Cap Ends is selected. TIP: This determines whether the flat ends of the cylinder are open or not. Cap Ends will close (or cap) the ends of the cylinder.	
9.Left-click OK.	

Radius

Radius controls how wide a circular object is. This affects the size of cylinders, cones, and spheres.

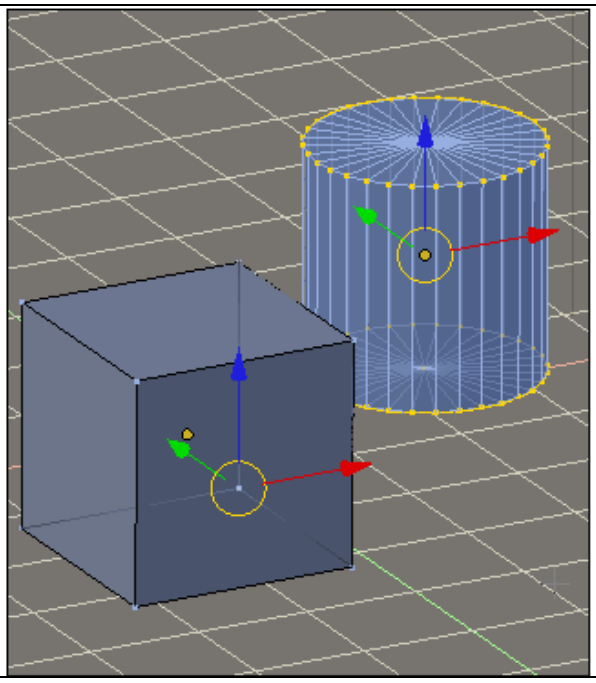
You'll edit the size of the radius whenever you create a circular object.



Vertex/Vertices

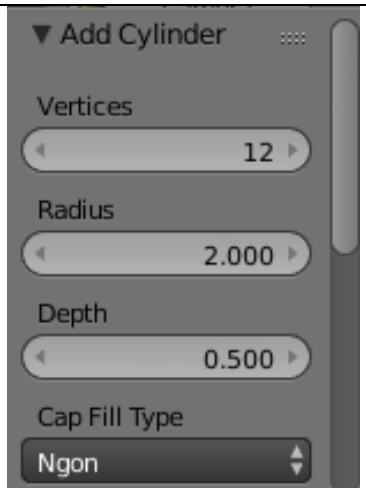
A **vertex** is the point at which two lines meet. A square has four vertices, and a cube has eight.

A cylinder can have as many vertices as you want. By adding more vertices, you can make the cylinder smoother.

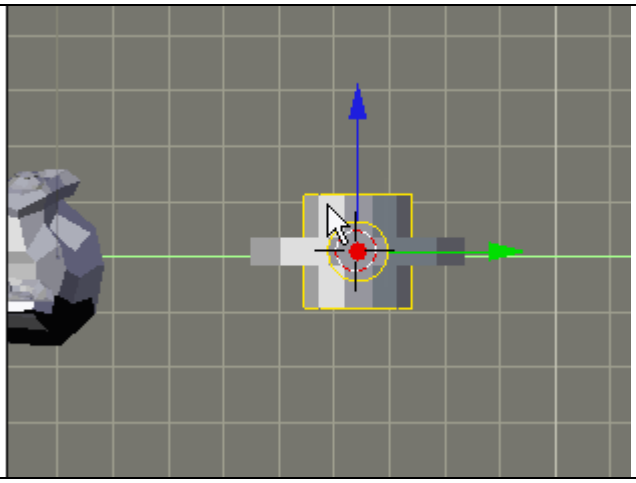
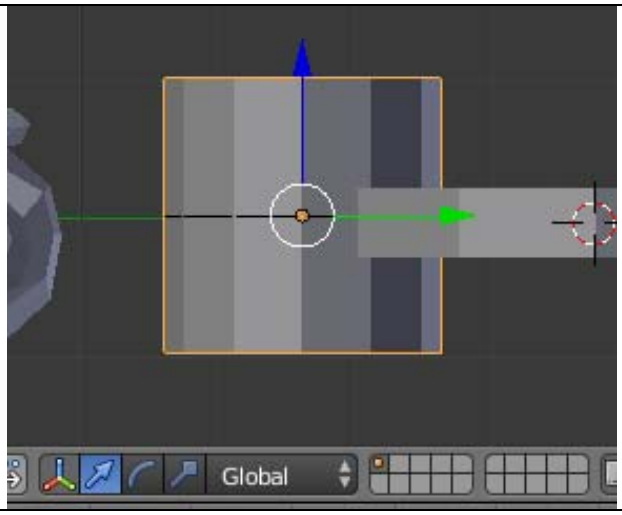
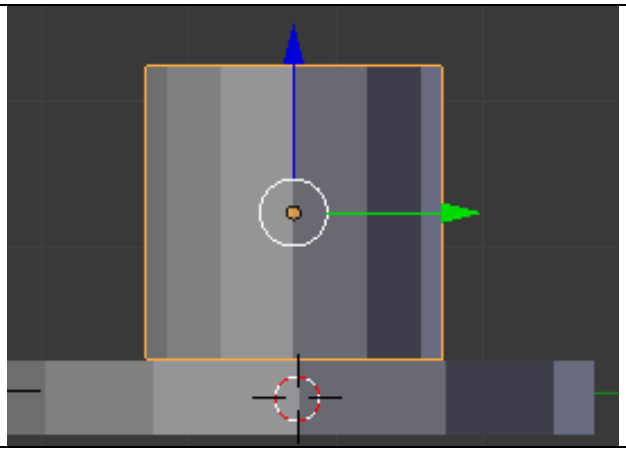


Add the Second Cylinder

You'll make a shallower cylinder for the brim of the hat.

1. Select the Create Tab to Add Primitive Cylinder, then left-click Cylinder.	
2.In the Add Cylinder dialog box, left-click Vertices. Type 12 in the Vertices field. TIP: This number controls how smooth the cylinder is. 3.Left-click Radius. Type 2 in the Radius field. TIP: This number controls how wide the cylinder is. 4.Left-click Depth. Type .5 in the Depth field. TIP: This number controls how long the cylinder is. 5.Make sure Cap Ends is selected. TIP: This determines whether the flat ends of the cylinder are open or not. Cap Ends will close (or cap) the ends of the cylinder.	
6.Left-click OK.	

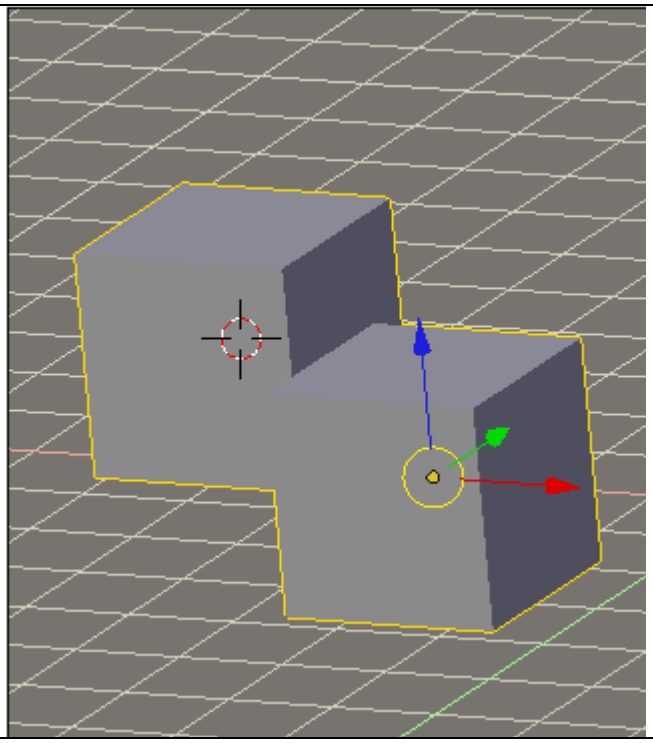
Move the Cylinders

1.Right-click the first cylinder to select it. Its edges will turn yellow when it's selected.	
2.Left-click the Translate manipulator mode button.	
3.Find the arrow pointing out from the flat surface of the first cylinder. Left-click that arrow and drag it until the first cylinder is on top of the second cylinder.	

The Join Objects Command

The **Join Objects** command takes two separate objects and turns them into one.

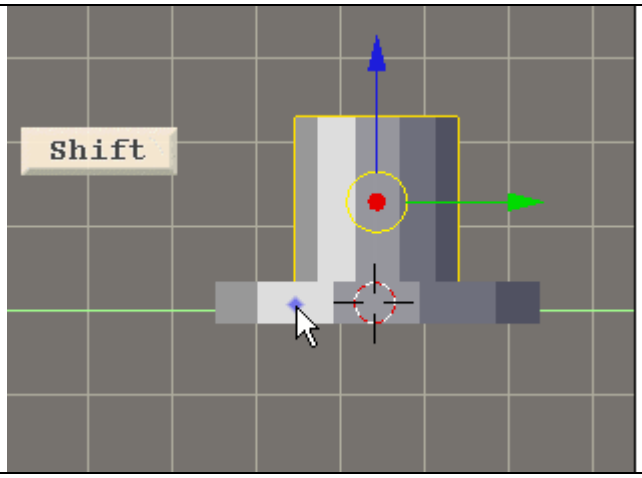
You'll join objects when you want to translate, rotate, and scale them together. It even works if they're not touching each other.

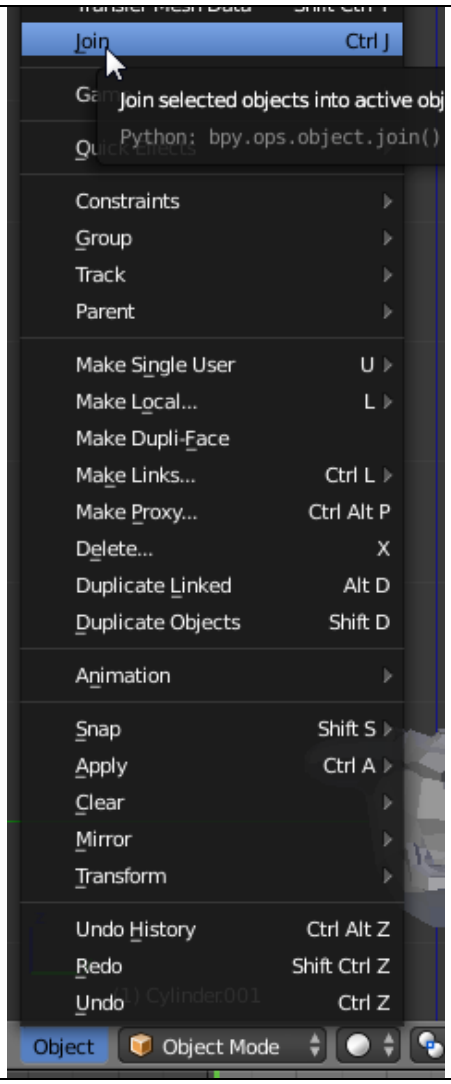
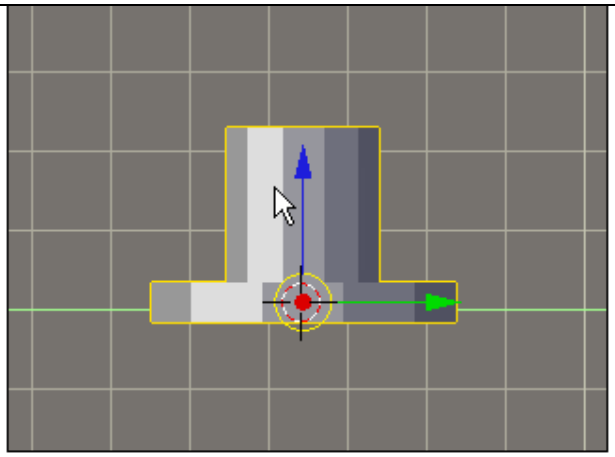


Join the Cylinders

Complete the steps below to make two objects into a single object. You'll do this whenever you want to join objects together.

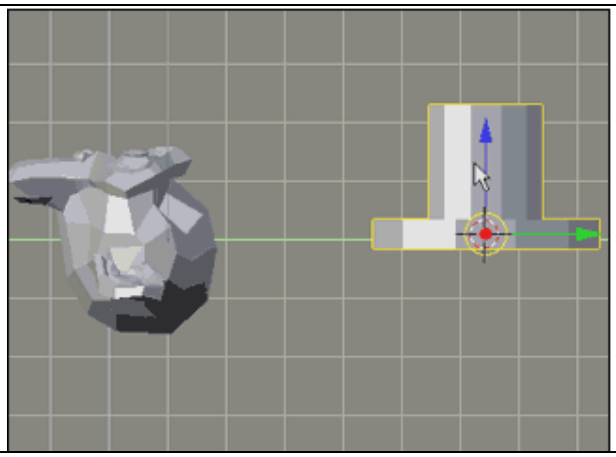
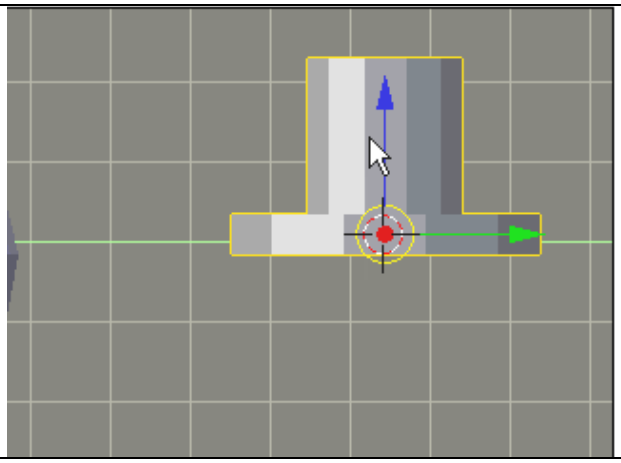
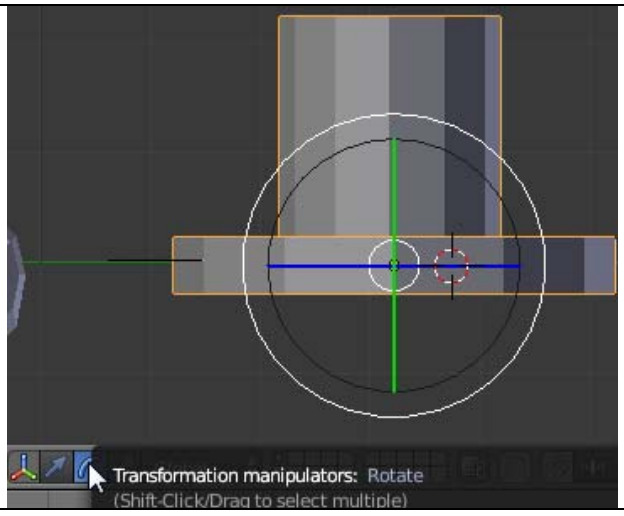
1.Press and hold SHIFT and right-click the second cylinder. Both cylinders will be outlined in yellow.

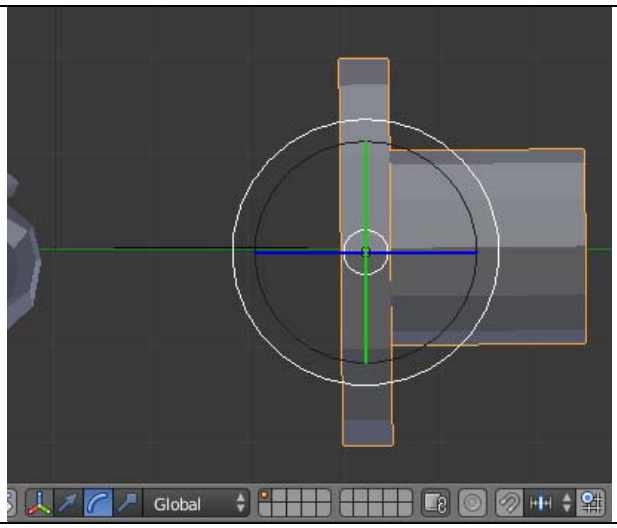
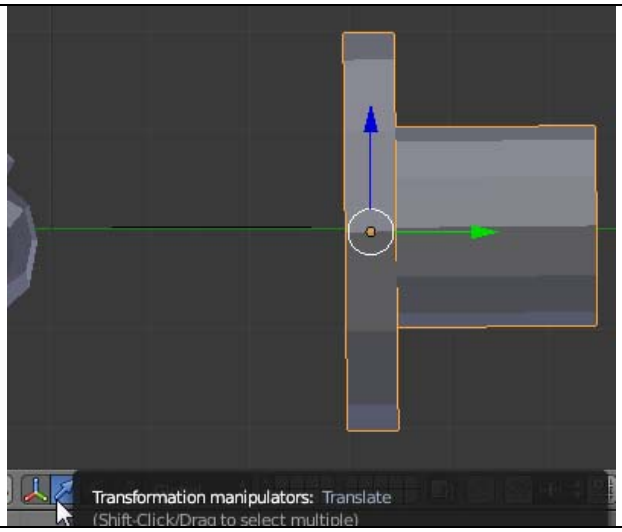
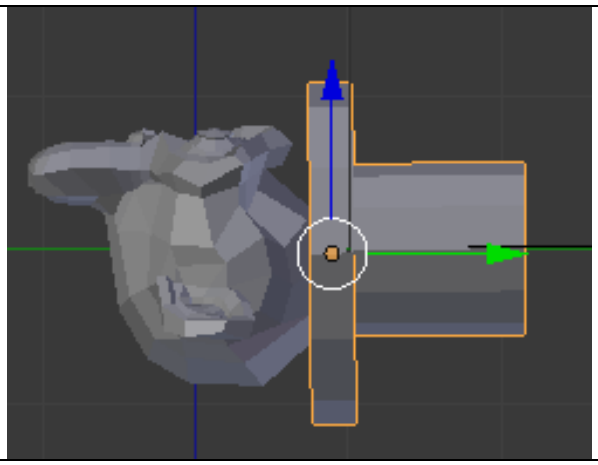


2.At the bottom of the 3D View window, left-click the Object menu, and left-click Join Objects. In the OK? box, left-click Join Selected Meshes.	
3.Press the A key to deselect everything.	
4.Left-click the hat to make sure that both pieces are highlighted in yellow. If they're not, repeat this process.	

Position the Hat

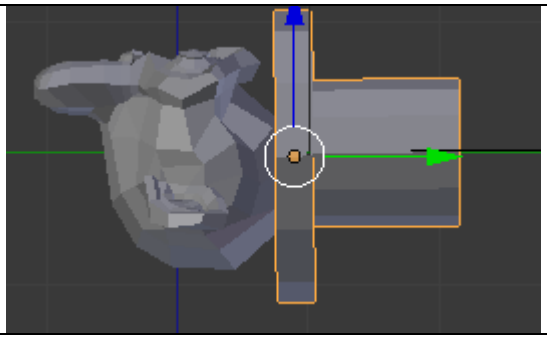
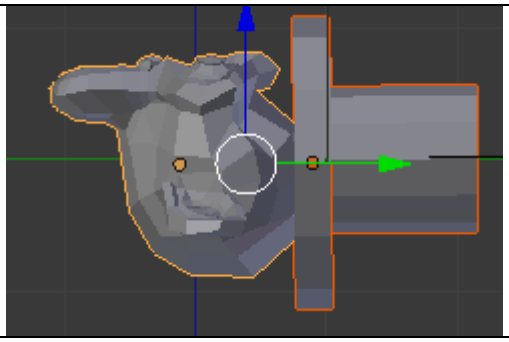
Complete the steps below to place the hat on top of Suzanne's head. You'll do this anytime you want to move 3D objects closer to or further from one another

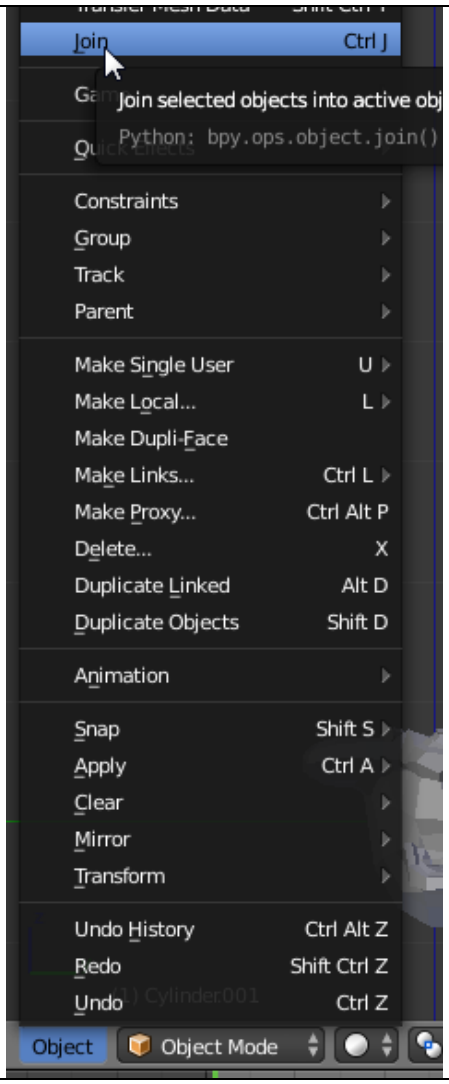
1.Position Suzanne and the hat so you can see both of them.	
2.Right-click the hat.	
3.Left-click the Rotate manipulator mode button.	

4.Rotate the hat until the top of the hat is pointing the same way as the top of Suzanne's head.	
5.Left-click the Translate manipulator mode button.	
6.Left-click and drag the arrows to move the hat to the top of Suzanne's head.	
7.Press the A key to deselect everything.	

Join the Hat and Suzanne

You did this process before when you joined the two cylinders together to make a hat. Remember to pan around Suzanne and the Hat to make sure they're positioned the way you want.

1.Right-click the hat to select it. It will be outlined.	
2.Press and hold the SHIFT key and right-click Suzanne to select her. The hat and Suzanne are now outlined or highlighted.	

3.At the bottom of the 3D View window, left-click the Object menu, and left-click Join Objects. In the OK? box, left-click Join Selected Meshes.	

Check Your Work

Complete the steps below to make sure your project is on track.

1. Press the A key to deselect everything.
2. Right-click Suzanne. Make sure the hat and Suzanne are outlined in yellow.
3. If they're not, you need to repeat the process for joining the objects.
4. If they are joined, save your work before moving on.

Summary

In this lab, you:

- Added differently sized cylinders.
- Used the Join command to make two objects into a single object.
- Used the 3D Transform Manipulator to move objects closer together.
- Positioned an object near another object.

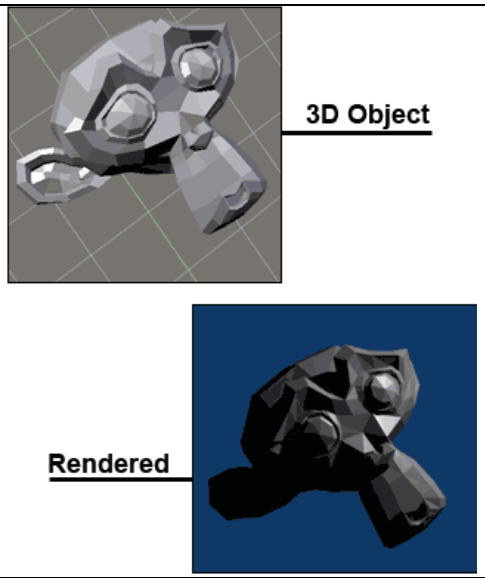
Lab 5 Introduction

In this lab, you'll create images based on your 3D objects.

Rendering

Rendering is the process of turning a 3D object into a 2D object, like an image file.

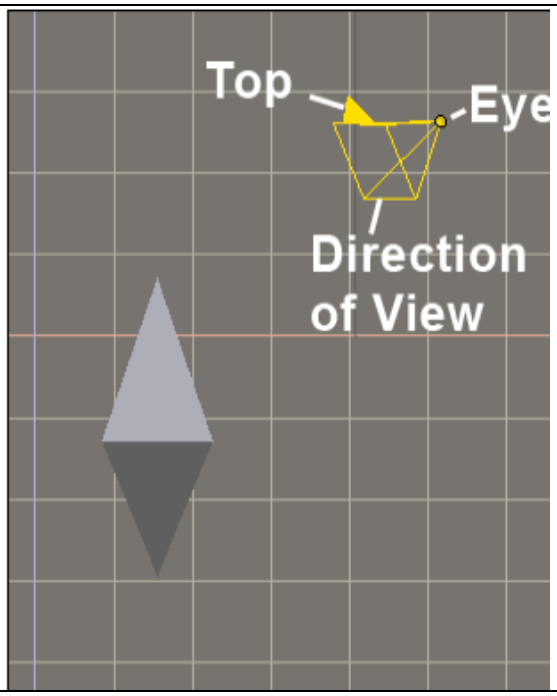
This process is like taking a photo of yourself. The photo is a 2D version of yourself



Using the Camera to Render

The 3D View window contains a camera. When you open a new Blender file, the camera points at the origin (where X, Y, and Z meet) by default.

When Blender renders an image, it renders everything that the camera can see.

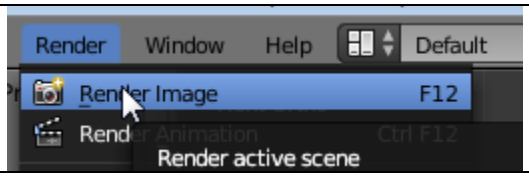


Render the Current Frame

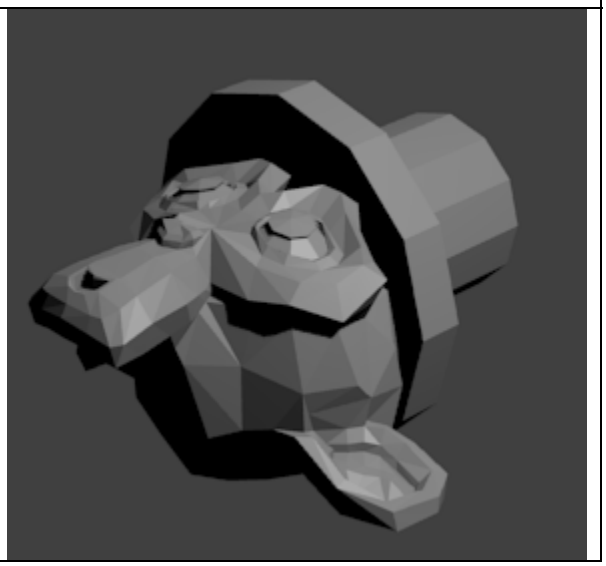
Complete the steps below to render your 3D object. You'll do this whenever you want to make a two-dimensional image out of your 3D object.

1.Make sure that you are in Object Mode.

2.On the Render menu at the top of the screen, left-click Render Image.



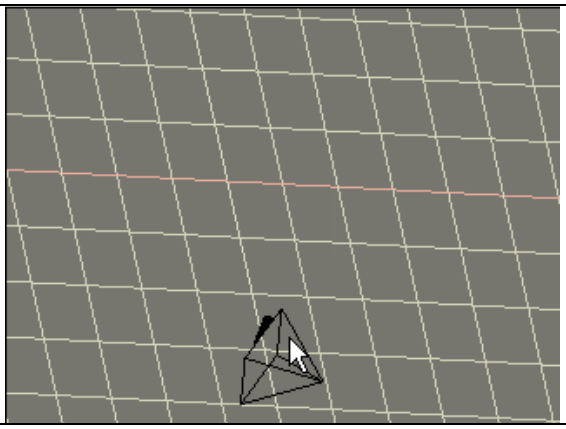
3.Look at the image and see how it's framed. Close the window when you're done.

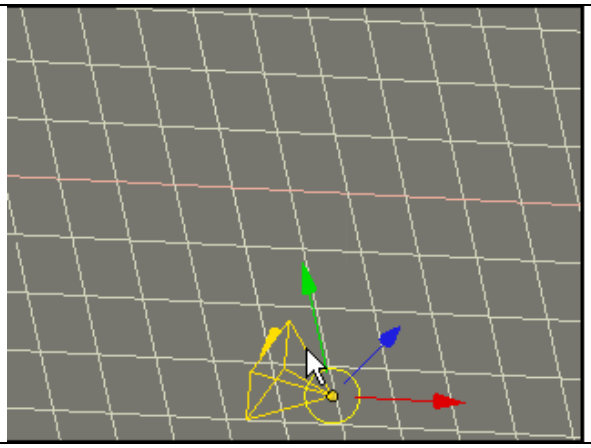
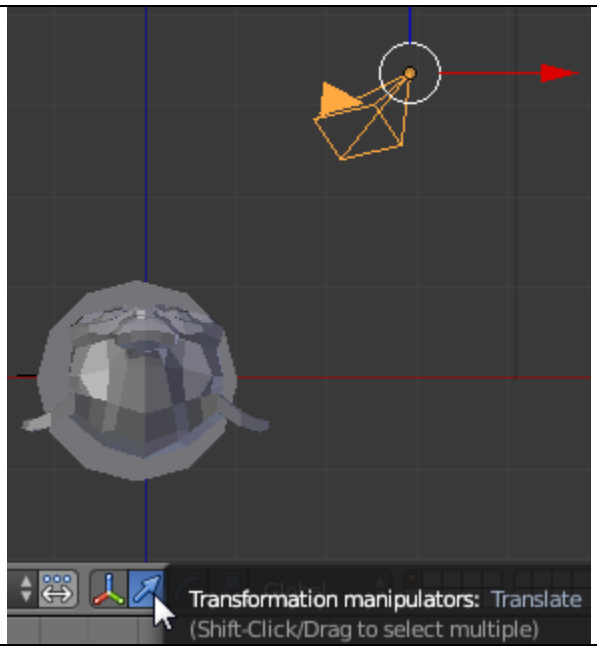
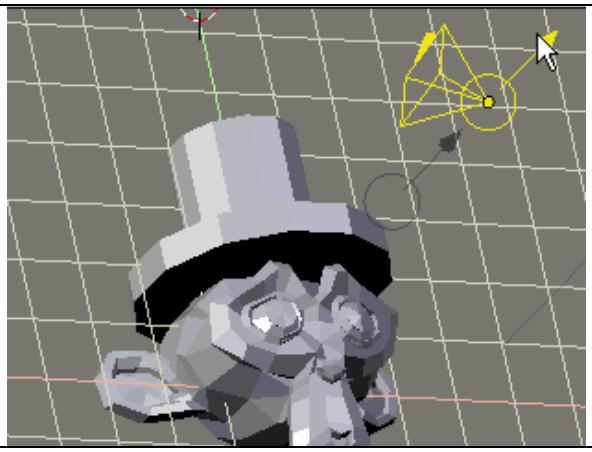


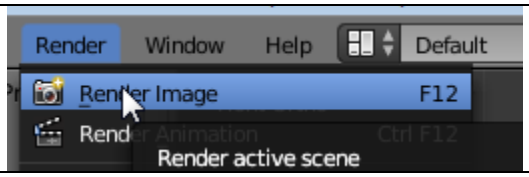
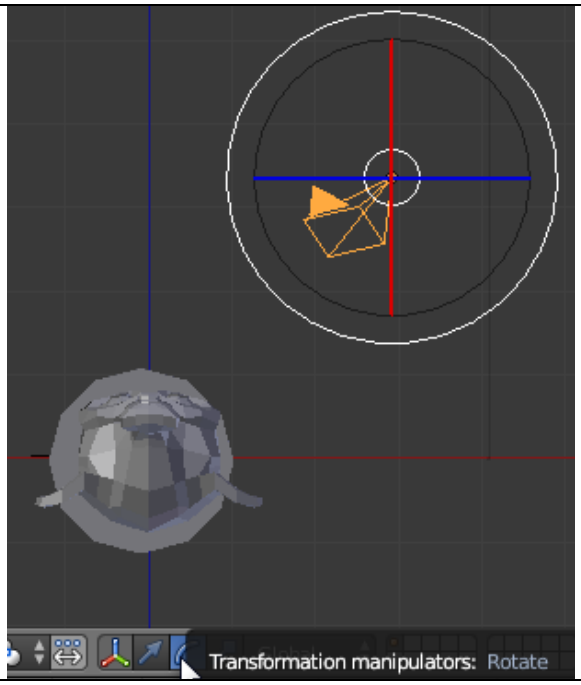
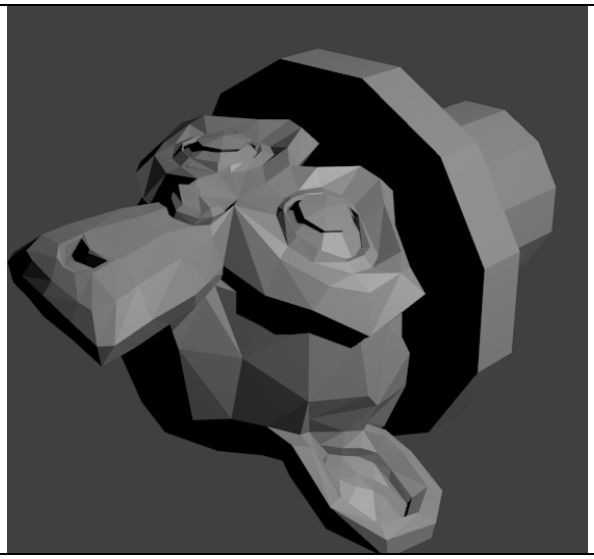
Render Your Image Again

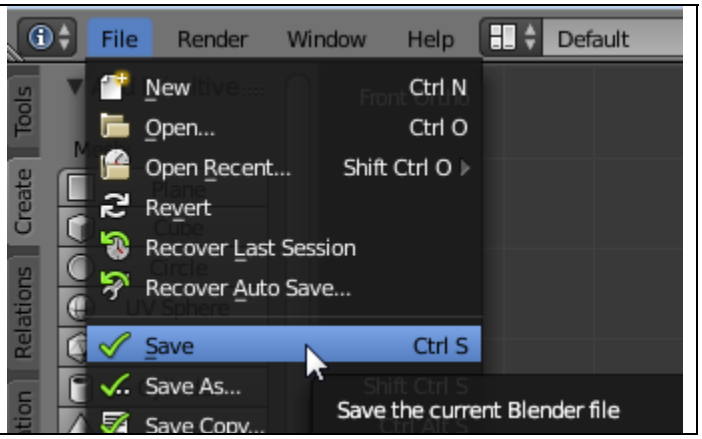
Complete the steps below to move Blender's camera. You'll do this whenever you want to change the way the rendered image looks.

1.If you want to change the angle, rotate your view until you can see the camera. It looks like a pyramid with a black triangle.



2.Right-click the camera.	
3.Left-click the Translate manipulator mode button to move the camera.	
4.Left-click and drag the arrows to move the camera until the big end of the pyramid is pointing at Suzanne.	

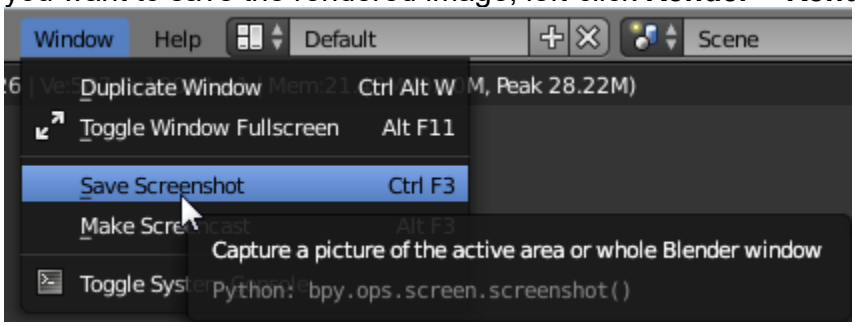
5.On the Render menu, left-click Render Image.	
6.If you want to rotate the camera, left-click on the Rotate manipulator mode button.	
7. On the Render menu, left-click Render Image again.	

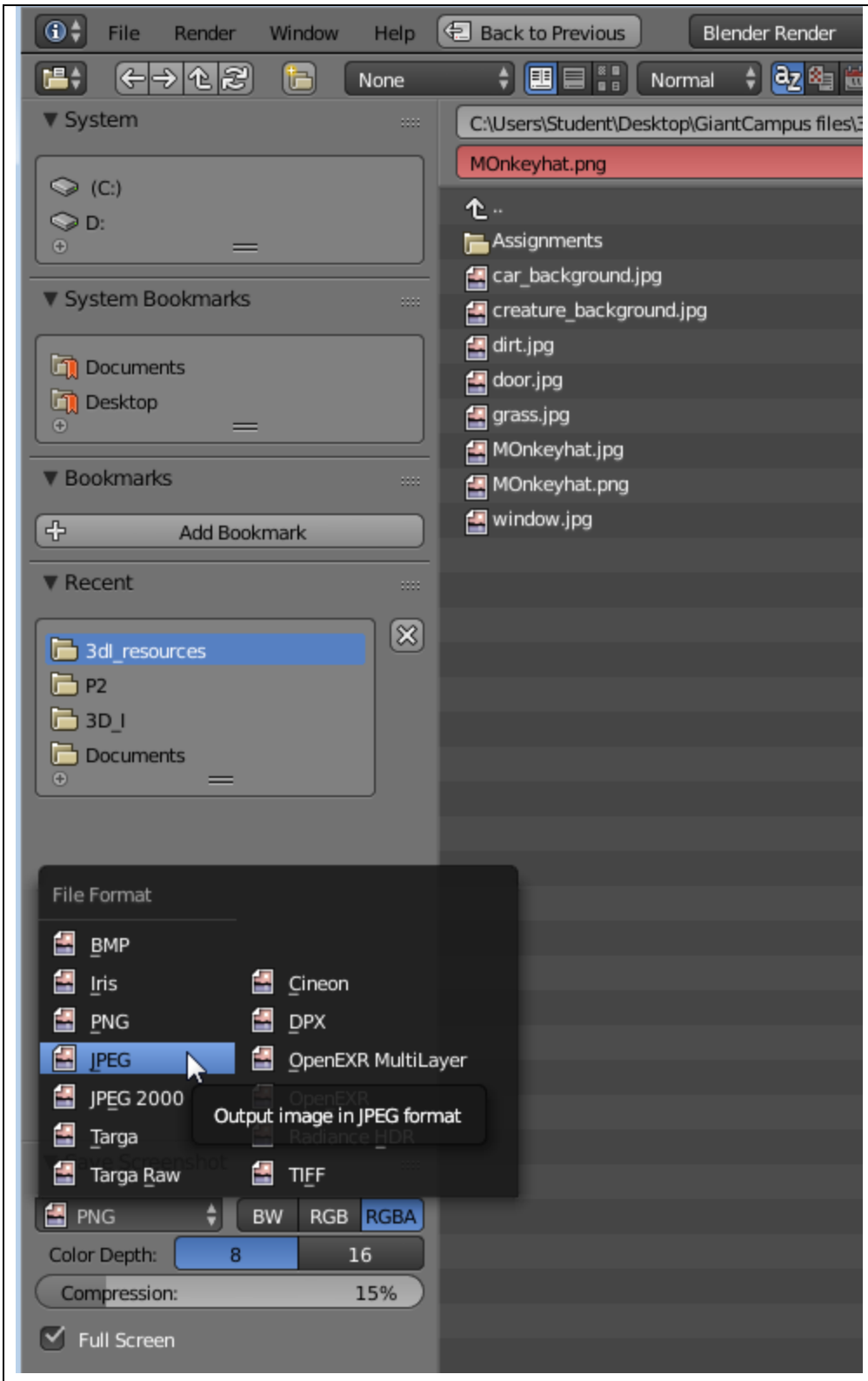
8.On the File menu at the top of the screen, left-click Save.	

Check Your Work

Complete the steps below to make sure your project is on track.

1. Make sure the monkey or its hat aren't cut off at the edge of the rendered image. If not, move the camera and render the image again.

2. If you want to save the rendered image, left-click **Render > Render Image** and left-click  Choose a name for your image and type that in the file name field. Left-click


File
Render
Window
Help
Back to Previous
Blender Render
None
Normal
System
(C:)
D:
System Bookmarks
Documents
Desktop
Bookmarks
Add Bookmark
Recent
3dl_resources
P2
3D_I
Documents
C:\Users\Student\Desktop\GiantCampus files\
MOnkeyhat.png
..
Assignments
car_background.jpg
creature_background.jpg
dirt.jpg
door.jpg
grass.jpg
MOnkeyhat.jpg
MOnkeyhat.png
window.jpg
File Format
BMP
Iris
PNG
JPEG
JPEG 2000
Targa
Targa Raw
Cineon
DPX
OpenEXR MultiLayer
OpenEXR
Radiance HDR
TIFF
Output image in JPEG format
PNG
BW
RGB
RGBA
Color Depth:
8
16
Compression:
15%
Full Screen

Save JPEG.

Summary

In this lab, you:

- Used the Render menu to create an image of a 3D object.
- Moved the camera to create different rendered images

Review

Congratulations! You made a hat and put it on Suzanne's head.

In this project, you:

- Explored Blender.
- Moved, stretched, and spun objects in three dimensions.
- Used basic shapes to build a hat.