

# GAME BUILDERS ACADEMY™

Learn ★ Grow ★ Have Fun ★ Succeed!

## 3D Computer Modeling and Animation Level 1

**John J. DeRosa**  
**Paul Lipsky**



TEAM GBA CORP. 35 Lace Lane, Westbury, New York 11590

# GAME BUILDERS ACADEMY™

*Learn ★ Grow ★ Have Fun ★ Succeed!*

## 3D Computer Modeling and Animation, Level 1 written by John J. DeRosa and Paul Lipsky

### Curriculum Development

Paul Lipsky  
John J. DeRosa

### Box/Binder Design

Michael Pugliese

### Production Editor

Sally Brecher Rosenberg

### Marketing and Sales

Walter Ebe  
John Taylor

### Special Thanks

Justin Berry  
Vincent Garcia

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For more information,  
contact Game Builders  
Academy, 35 Lace Lane,  
Westbury, New York, 11590.

Or find us on the World  
Wide Web at  
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TEAM GBA CORP. 35 Lace Lane, Westbury, New York 11590



## ***Welcome to this Exciting Teaching Tool***

Enjoy this wonderful journey with your students - and let us know about your successes!

### ***Course Overview***

This course is designed to guide you and your students through a series of modules that will introduce the 4 phases of 3D, Modeling, Animating, Texturing and Rendering. Along the way, there are many opportunities for students to apply, practice, and reinforce various academic subjects they've learned or are learning in school.

In this course, your students will use and strengthen their math skills, logic skills, communication skills, concentration and critical thinking skills, problem solving and creative thinking – all in the context of learning how to model and animate their own designs. Your students will be introduced to the technical and artistic concepts and techniques for 3D modeling and animating a “Bionic Object Boy” character, a “Potato Head” and an “Evil Monster” as well as many other small modeling exercises.

Students will use the 3D software package, Maxon Cinema 4D, to create their 3D models. Cinema 4D is an industry-standard 3D software package that enables the user to model, animate, texture, and render 3D models in a simple drag and drop environment.

**END ■**



## ***How to Use this Manual***

This manual is designed to guide you and your students through a series of modules that will walk you through the process of modeling and animating in 3D. Along the way there will be many opportunities for discussion about various academic subjects, creative and artistic ideas, and much more.

The various projects are divided into 10 classes. Each class consists of a number of different modules. The modules are designed to be, as the name implies, modular. Many of them can be done in different sequence or on their own for variations on the given project. But we highly recommend that you follow the sequence of lessons and modules as laid out in this manual. The order of modules has been carefully designed to build sequentially to the finished projects, and to build students' knowledge, skills, and confidence with each successive module.

Each module includes the detailed procedure(s), in a clearly, numbered, step-by-step organization. Offset in gray within each module are questions to ask students (along with answers), discussion points on the given steps, or comments relating to the accompanying screenshot. Offset in blue and boxed within each module are additional notes for teachers explaining or clarifying given steps, ideas for having students reinforce material or experiment with skills newly gained in the given module (or step), and more. We highly recommend that you incorporate as much of this material as possible.

Throughout the manual, there are many screenshot images to help visually guide the teacher through each lesson. Due to the length of many of the modules, the word "END" appears at the end of each Module, and each module page includes the name of that particular module as well.

During the beginning of each day of class, instructors can show images of the different projects that students will be completing so they can see the end goal, and will have a clear picture and overview of each project.

Along with the finished sample image or rendered movie of each lesson, there is a Cinema 4D file that accompanies each module that shows how the model or animation should look after completion of the module. These are called "postmods" for post module, or "after" module. It's usually helpful to show the postmod for a given module before teaching that module, but this is up to you. You may choose to have your students fully discover the result of their work on their own, without first seeing what the result will be.

*continued on next page*

## **II - 3D Computer Modeling and Animation**



**How to Use this Manual** *continued from previous page*

If a student misses one or more classes, and needs a prior c4d file to accomplish the given task, the students may use the postmod file from the previous section. Although this is, of course, not as good as having the student's original file to work on that day, it at least allows the student to follow, complete, and learn the day's material, with a file that includes all the material that was covered on the day(s) missed.

The postmods also serve as reference for you and for your students as to exactly how the file is set up. So, as a teacher, you have each module on paper, with the steps - and you also have the specific postmod file that goes with that module to show exactly how the file looks with all the steps in the module completed.

Take the opportunities for academic discussions as far and as deep as you like, or not at all, as you see best for your class and the given day, students' responses, classroom situation, etc. Enjoy this wonderful journey with your students - and let us know about your teaching successes and students' accomplishments!

**END** ■



## ***What's on the Included Disk***

The disk is set up with 10 folders labeled Class 1 – Class 10. Included inside each folder is an Instructor Files Folder which contains Cinema 4D files used as reference for the lessons, postmod files (the completed file(s) created after each module), rendered movies of the lessons from that class, as well as files for Brainteasers and extra modeling assignments to challenge students who may be a bit speedier than the rest of the class. Some Class folders contain a Student Files Folder containing Cinema 4D files and or images needed to complete a lesson.

### **INSTRUCTOR FILES DISK**

- **Link to Game Builders Academy Web site:** <http://www.gbalearning.com>
- **Link to Maxon Cinema 4D site:** <http://www.maxon.net>
- PDF of **Academic Discount Form** for students wishing to purchase the Cinema 4D software
- **Post Modules Files:** There is a file that accompanies each Module and shows how the file should look after the completion of each module
- **Student Starter Files:** Cinema 4D files and/or images needed to complete a lesson
- **Student Tutorials:** PDF's of each Class

**END** ■

## **IV - 3D Computer Modeling and Animation**



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**END** ■



## Starting Cinema 4D

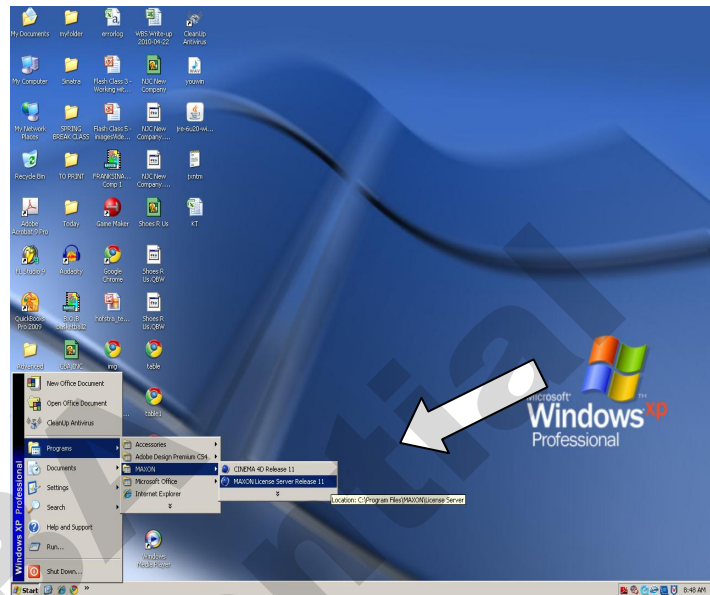
This Module will explain opening and preparing Cinema 4D for the first time. There are a few preparations that should be considered before starting to make Cinema 4D and your class run more efficiently.

1. When working in a lab setting, be sure to open the **Cinema 4D License Server** first.

Follow this path:

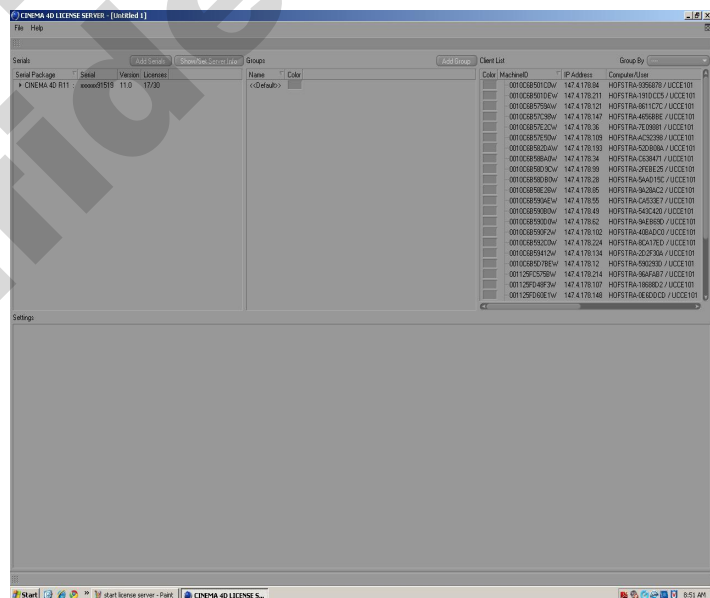
Start>Programs>MAXON>

MAXON License Server Release 11.



2. After the **Cinema 4D License Server** opens, students and instructor can open their copies of Cinema 4D.

The License Server screen looks like the picture provided.

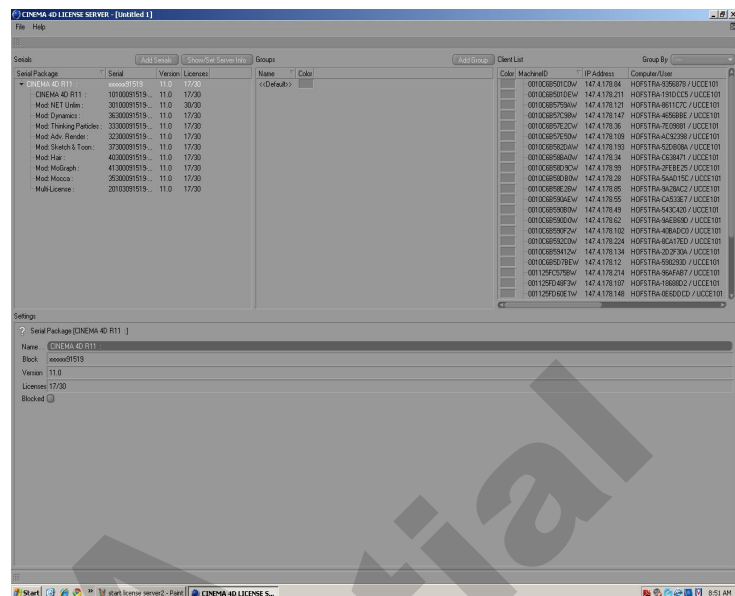


## VIII - 3D Computer Modeling and Animation

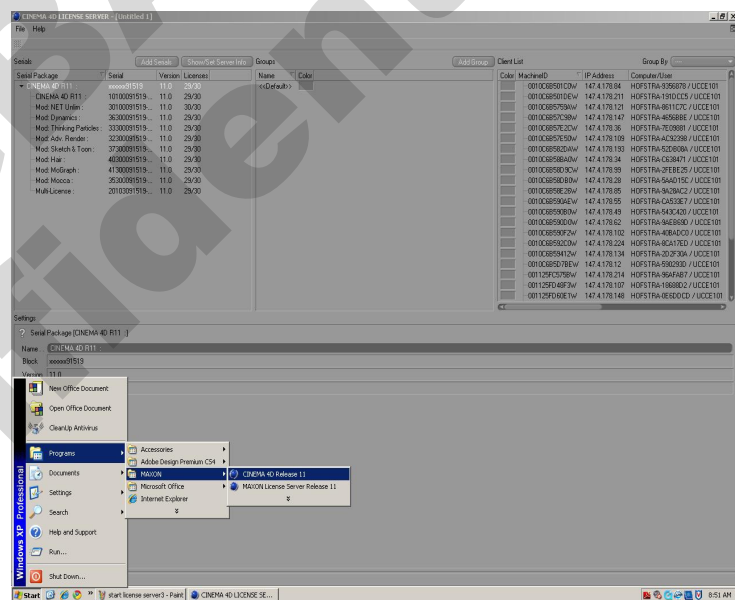


## Starting Cinema 4D continued from previous page

Expanded view of License Server:



3. Use the Start menu to **open the Cinema 4D application** (not the License Server).





**Starting Cinema 4D** *continued from previous page*

When Opening Cinema 4D for the first time we want to set the program to **Software Mode**.

**Software Mode** is a setting that uses the computers graphics card for shading instead of clogging the computers processor, resulting in less program crashes and faster workflow.

**4. If Cinema 4D is open, close the application.**

**5. Double click the Cinema 4D icon on the desktop to open the program.**

**6. While you see the opening rectangular Icon of Cinema 4D, hold down the Shift key until the application opens.**

**\*Note to Teacher:** *If you were too slow holding shift, just close Cinema 4D and repeat this step again.*

**X - 3D Computer Modeling and Animation**

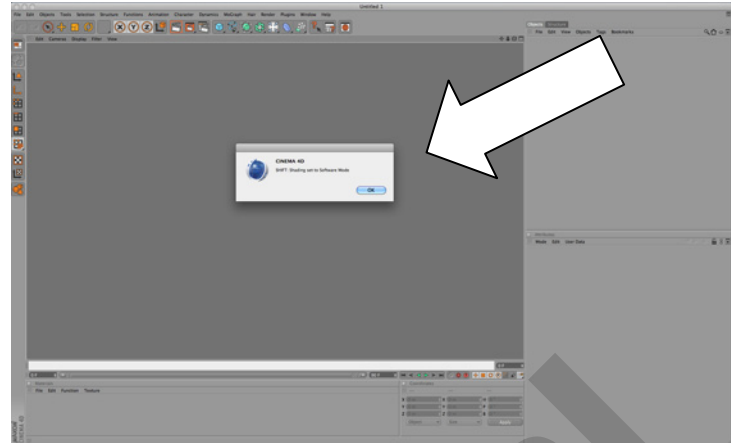


## Starting Cinema 4D continued from previous page

After **Cinema 4D** opens, there will be a window that reads:

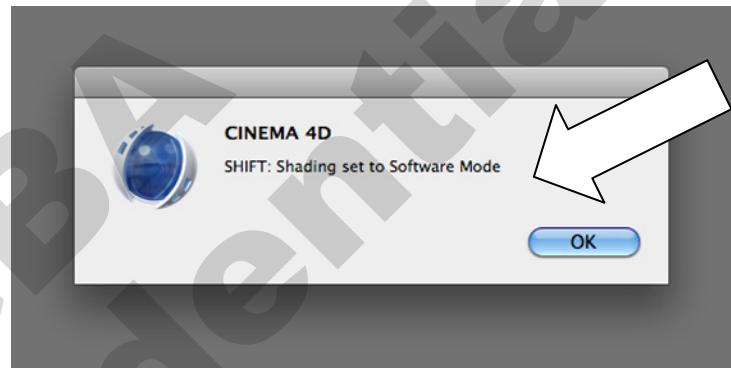
**Shift: shading set to Software Mode.**

**Software Mode** is now turned on.



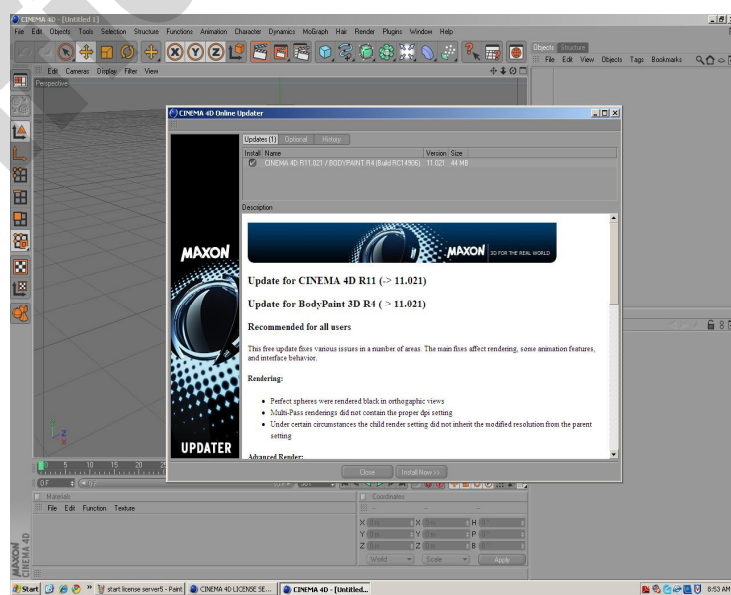
This will only have to be performed once.

**Software Mode** will stay present through multiple restarts.



7. You may find that an online update screen appears as shown here. Feel free to **Close the window** without updating.

END ■



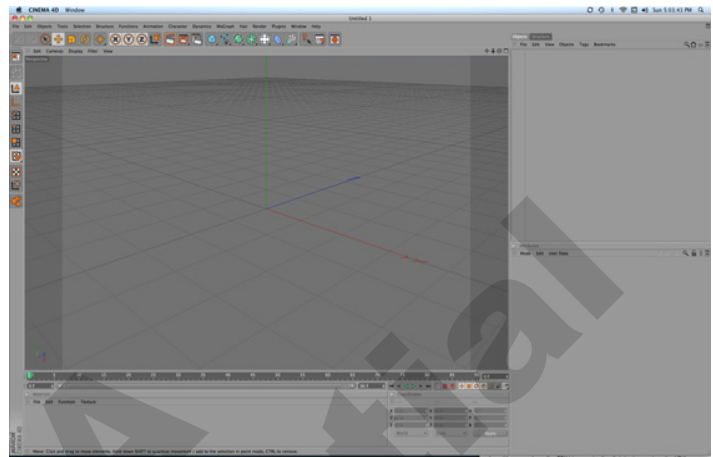
## 3D Computer Modeling and Animation - XI



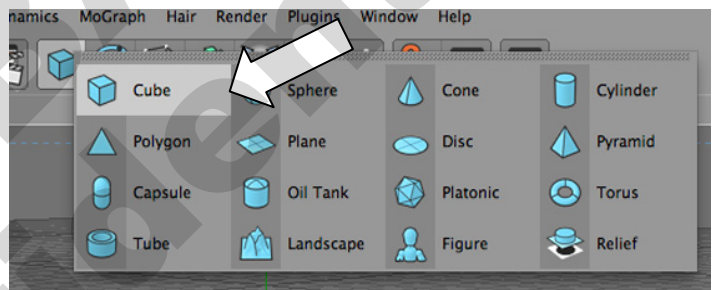
## Changing/Increasing the Gizmo Size

When opening Cinema 4D for the first time, the default Gizmo size can be a bit small and awkward for younger Students to use. In this Module we will increase the size of the Gizmo to optimize your Students experience using Cinema 4D.

### 1. Open Cinema 4D.



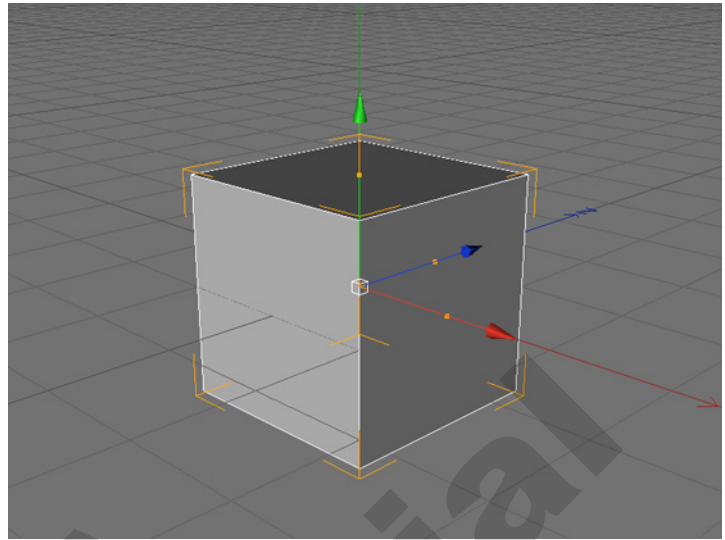
### 2. Create a Cube.



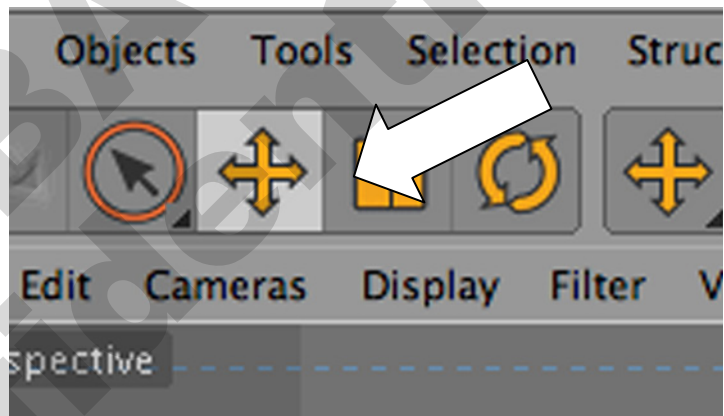
## XII - 3D Computer Modeling and Animation

**Changing/Increasing the Gizmo Size** *continued from previous page*

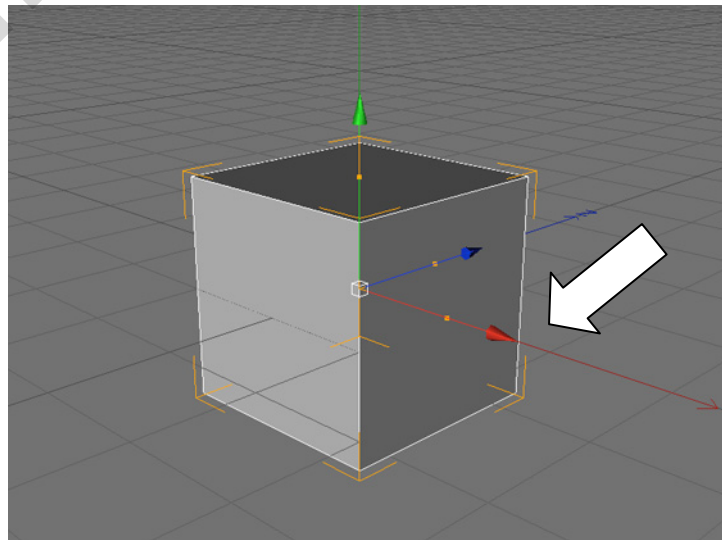
A **Cube** appears inside the scene.



**3. Select the Move Tool**



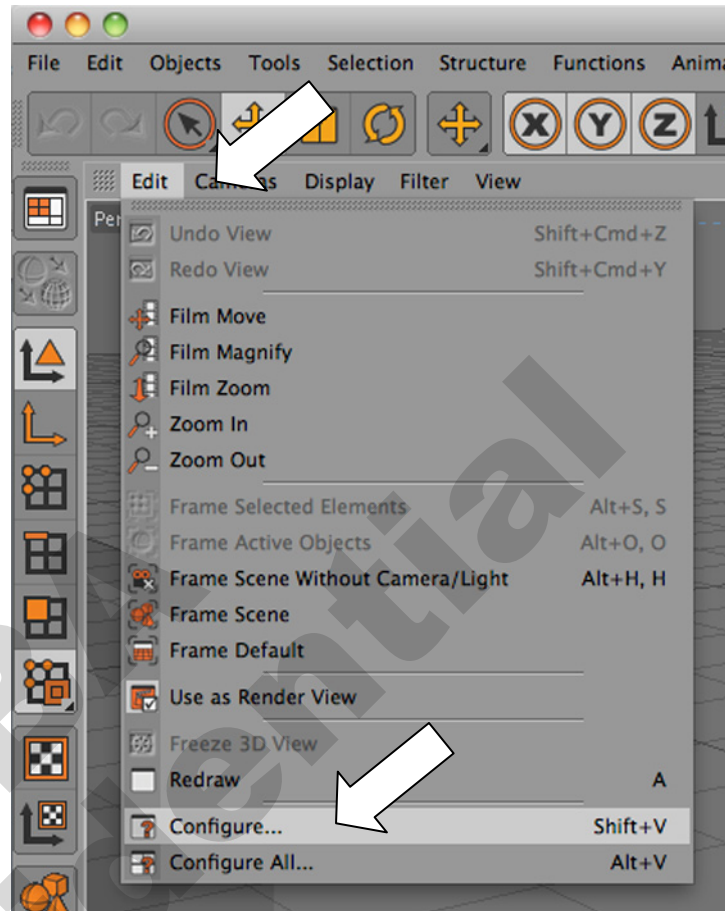
**4. Select the Cube.** Notice the size of the Gizmo.



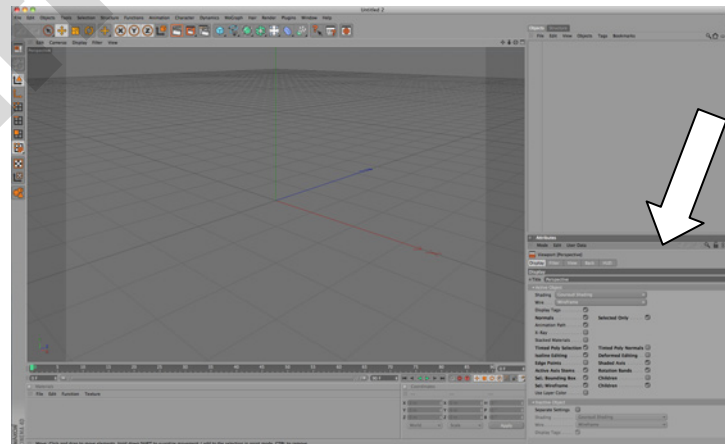
**Changing/Increasing the Gizmo Size** *continued from previous page*

5. Just above the Viewports, **left-click on the Edit Menu** and **select Configure** from the drop-down menu.

**\*Note to Teacher:** Do not use the Edit Menu at the top of Cinema 4D.

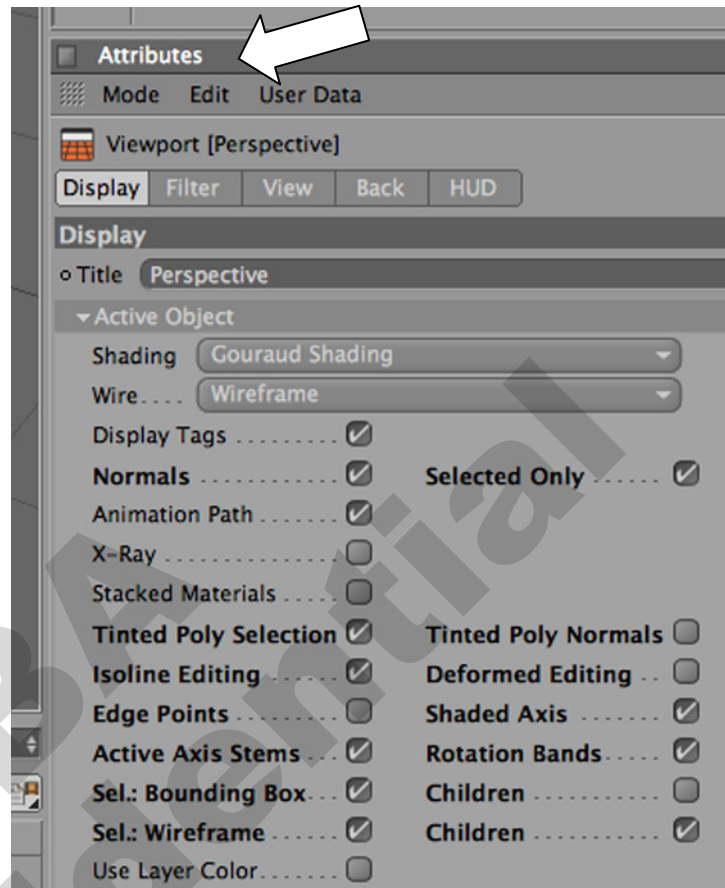


6. Look at the **Attributes Manager** located at the bottom right side of Cinema 4D.

**XIV - 3D Computer Modeling and Animation**

**Changing/Increasing the Gizmo Size** *continued from previous page*

The picture, at right, shows a close-up view of the **Attributes Manager** window.

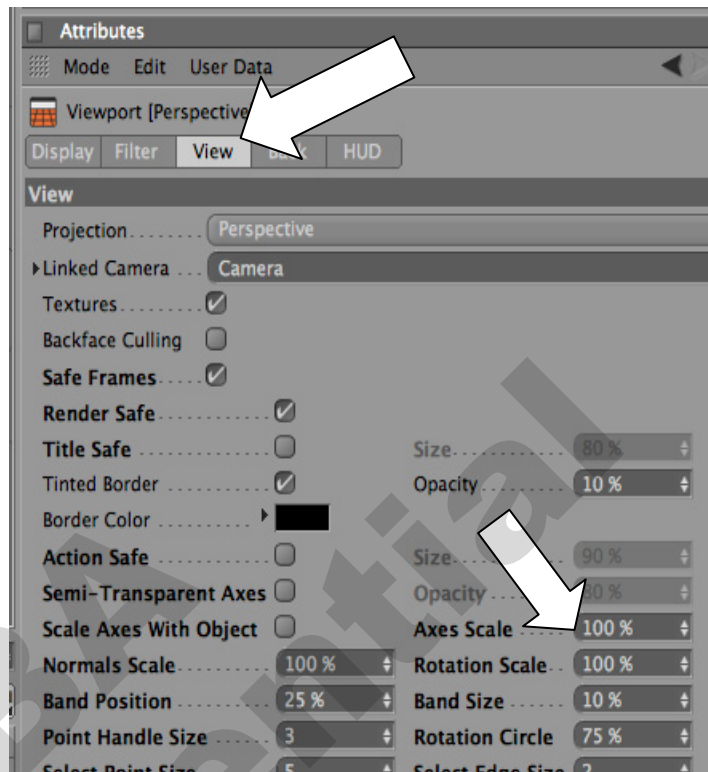




**Changing/Increasing the Gizmo Size** *continued from previous page*

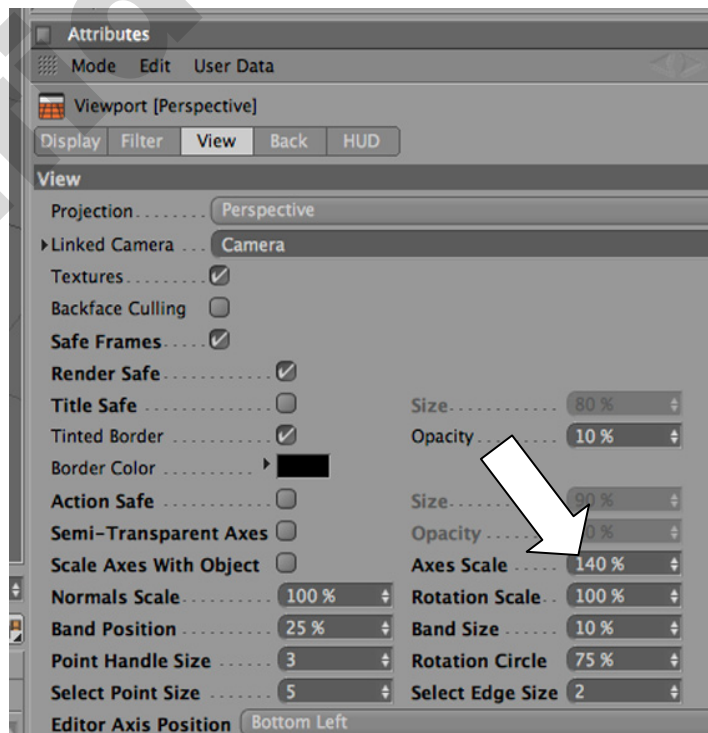
7. In the **Attributes Manager**, left-click on the **View** tab.

Look at the **Axes Scale** and notice the default value is **100%**.



8a. Change the **Axes Scale** to **140%** by either typing in the new value or using the up arrow within the **Axes Scale** field.

8b. Press Enter to set the value.

**XVI - 3D Computer Modeling and Animation**

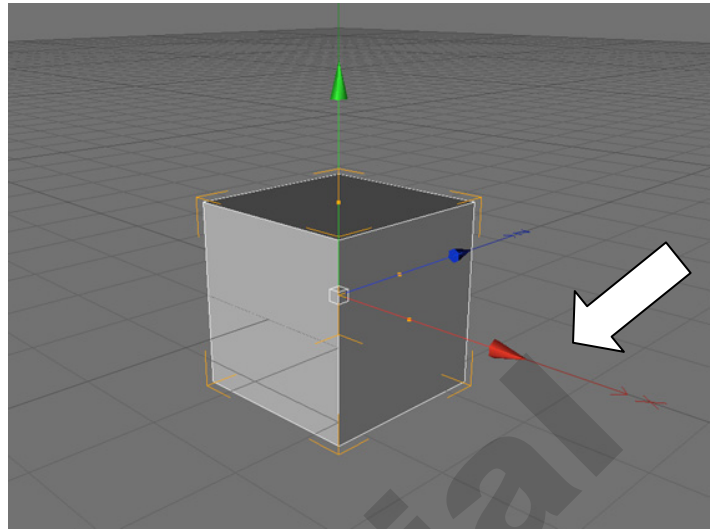


**Changing/Increasing the Gizmo Size** *continued from previous page*

9. The **Gizmo Size** is now larger in size for students to use.

**\*Note to Teacher:** Configuration value changes that are made within the application will be saved and not have to be changed again before each day.

END ■

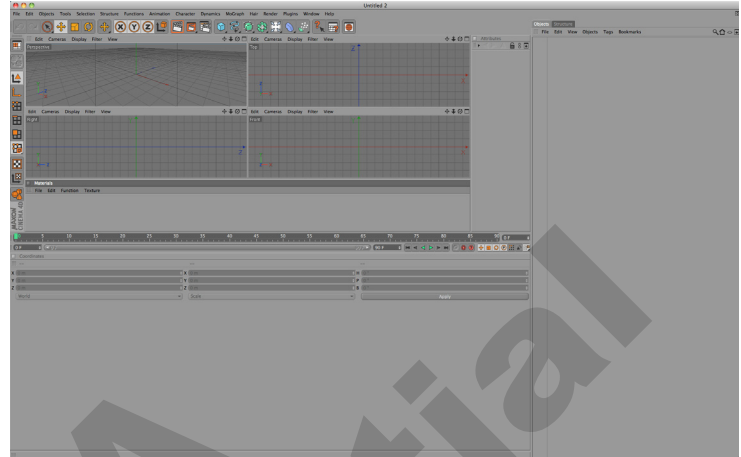




## Default Layout Settings

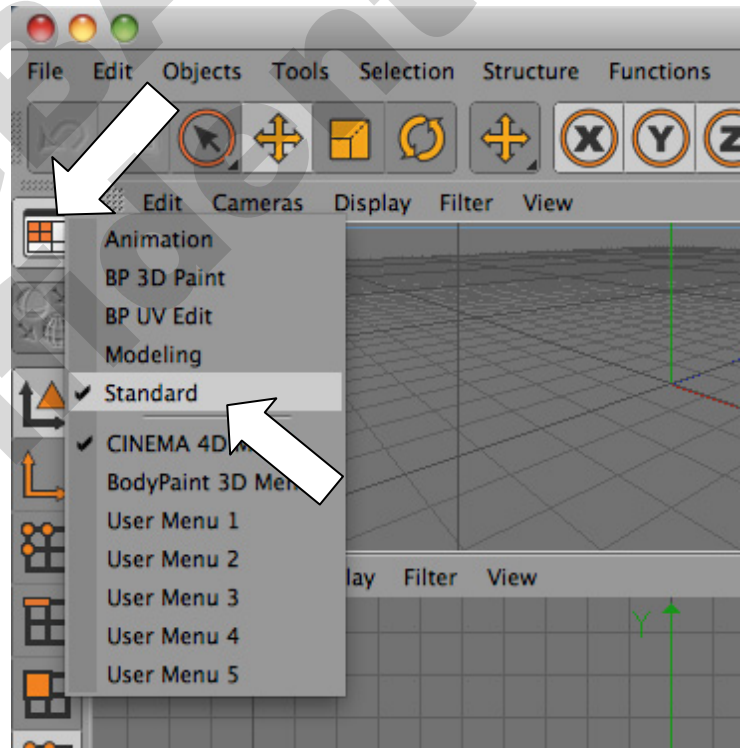
Sometimes students have the habit of pressing buttons and change the appearance and layout of Cinema 4d. There is no need to worry. The Default Layout Button can return your altered layout to default factory settings.

Here is an example of a Cinema 4d layout that has been altered.



Not to worry!

1. Left-click on the **Cinema 4d Default Layout Button** and choose **Standard** from the drop-down menu, as seen in the picture provided.

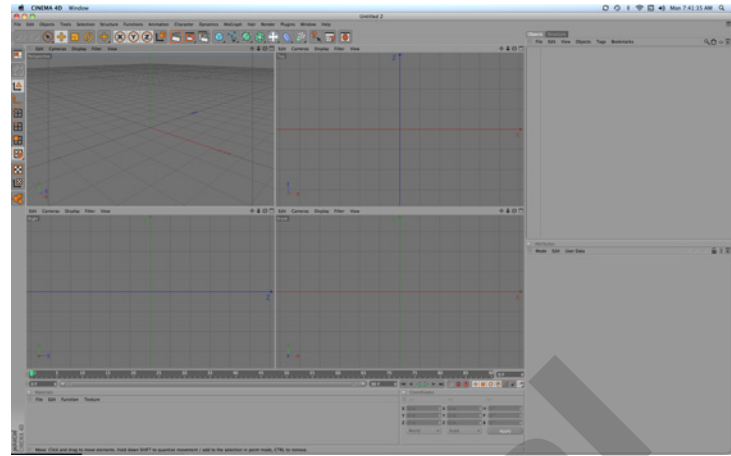


## XVIII - 3D Computer Modeling and Animation

**Default Layout Settings** *continued from previous page*

This will return your layout to factory default settings.

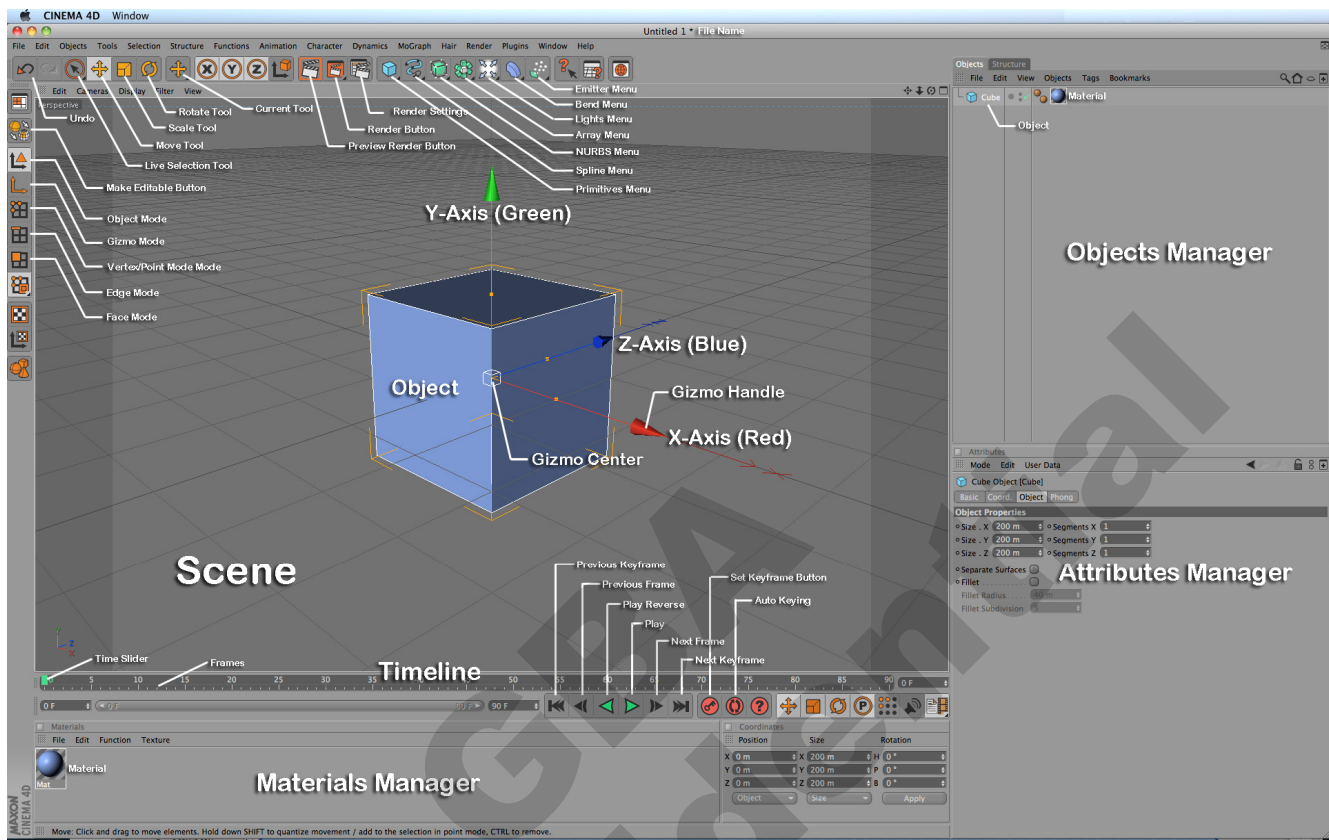
END ■





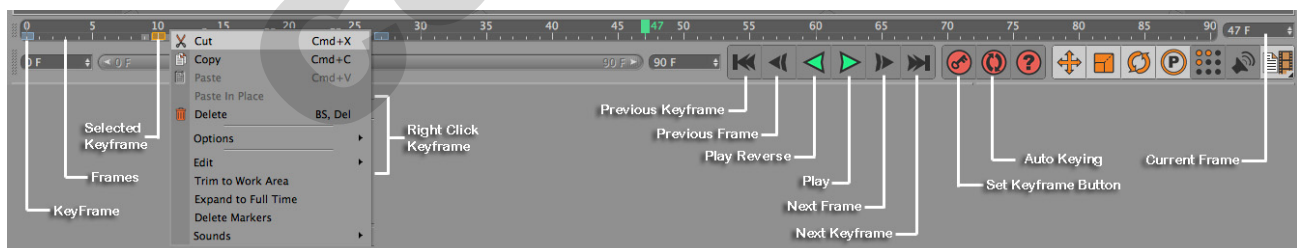
## Cinema 4D Reference Map

Please turn to the Reference Section at the back of the Manual for a larger version of the Cinema 4D Interface:



## Cinema 4D Timeline Reference Map

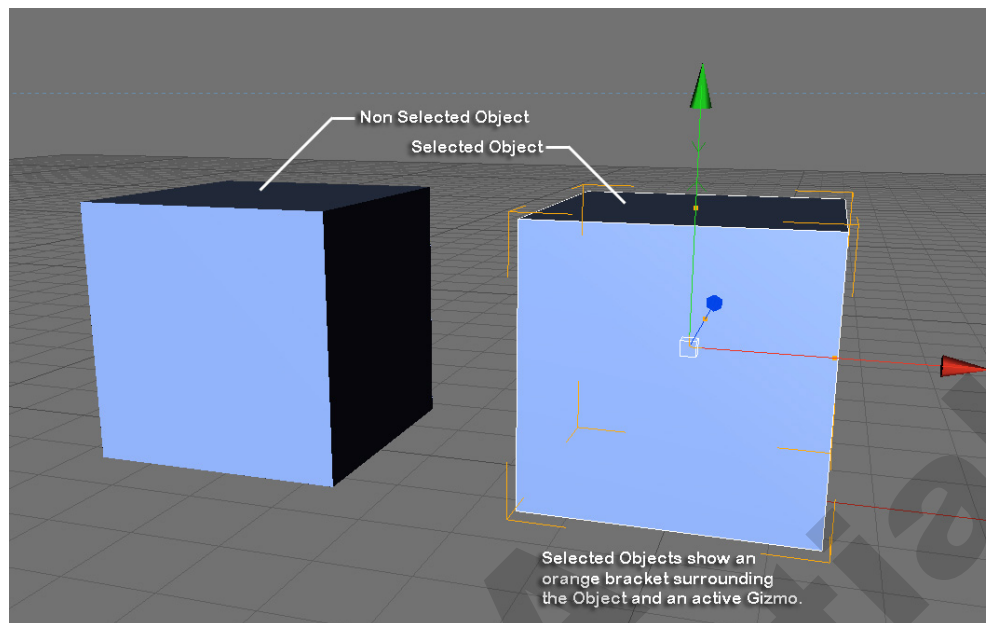
Please turn to the Reference Section at the back of the Manual for a larger version of the Cinema 4D Timeline:



## XX - 3D Computer Modeling and Animation



## Cinema 4D: How to Tell if an Object is Selected



## Cinema 4D Object Manager Reference Map





## Questions of the Day!

Here is a list of questions and possible answers to start off each class and get your students talking, participating, and thinking. One Question of the Day appears on the overview page for each new class.

---

**1. What is your favorite 3D movie?**

*Toy Story, Transformers, Avatar, Wall-e, How to Train Your Dragon, etc.*

---

**2. Who is your favorite 3D character?**

*Anakin Skywalker from Clone Wars, Bumble Bee from Transformers, Wall-e, etc.*

---

**3. If you could be any 3D character, who would it be?**

*Anakin Skywalker from Clone Wars, Bumble Bee from Transformers, Wall-e, etc.*

---

**4. If you could have one 3D character "Super Power", which would you pick?**

*Anakin Skywalker's Jedi Mind Tricks, Astro Boy's Flying abilities.*

---

**5. What is the name of the first 3D movie ever made?**

*Toy Story, 1994.*

---

**6. Name as many one-eyed 3D characters as you can.**

*Mike from Monsters Inc., Bob, and the Giant Robot from Monsters vs. Aliens, Ravage from Transformers.*

---

**7. Name as many furry 3D characters as you can.**

*Insectosaurus from Monsters vs. Aliens, Sully from Monsters Inc.*

---

**8. Name as many robotic 3D characters as you can.**

*Wall-e and Eve from Wall-e, Bumble Bee & Optimus Prime from Transformers, Battle Droids from the Clone Wars.*

---

**9. Who is the slimiest 3D character?**

*Bob from Monsters vs. Aliens.*

---

**10. What was your favorite project during this class?**

END ■

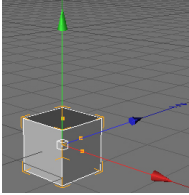









## XXII - 3D Computer Modeling and Animation





## Tools, Terms, and Definitions












Terms and Definitions to use as reference when working with Cinema 4D.

	<p><b>Gizmo-</b> The blue, green and red selection tool that appears in the middle of a selected object.</p> <p><b>RED</b> handles (arrowheads or cubes) = X-axis</p> <p><b>GREEN</b> handles (arrowheads or cubes) = Y-axis</p> <p><b>BLUE</b> handles (arrowheads or cubes) = Z-axis</p>
	<p><b>Move Tool-</b> Moves an object along the X, Y, or Z-axis.</p>
	<p><b>Scale Tool-</b> Scales or resizes an object. Scale from the middle of the gizmo to keep your object in proportion.</p>
	<p><b>Rotate Tool-</b> Rotates an object along the X, Y, or Z-axis.</p>
	<p><b>Current Tool-</b> Displays the currently selected tool in Cinema 4D. Hold down to see the list of most recently used tools.</p>
	<p><b>Render Preview Button-</b> Renders a preview of the current scene. This preview cannot be saved.</p>
	<p><b>Render Button-</b> Renders your scene. This Render can be saved to your computer.</p>
	<p><b>Render Settings-</b> Contains options for saving renders to different formats, resolutions, and locations. Choose the Render Setting Button before rendering your final image or movie.</p>
	<p><b>Primitives Menu-</b> Contains a list of simple primitive shapes for modeling. Cube, Sphere, Cylinder, etc.</p>
	<p><b>Spline Menu-</b> Contains different types of splines. A spline is a line made up of many points that can be curved or straight in shape. Splines are used to create 2D outlines that can be modified in Cinema 4D to become 3D objects.</p>
	<p><b>NURBS Menu-</b> Contains a list of NURBS modifiers that manipulate objects and splines. Hold down the NURBS menu to access the HyperNURBS, Lathe NURBS, Sweep NURBS, Extrude NURBS, Loft NURBS, and Bezier NURBS.</p>





## Tools, Terms, and Definitions *continued from previous page*

	<b>Array Menu-</b> Contains a list of 3D Functions that manipulate objects. Hold down the Array Menu to access the Array, Metaball, Atom Array, Boole, Symmetry, Connect Object, Instance, Construction Plane and Null Object Functions.
	<b>Lights Menu-</b> Contains a list of different lights and cameras that can be used in Cinema 4D.
	<b>Bend Menu-</b> Contains a list of manipulators that can be applied to 3D objects. The Bend menu contains manipulators for bending, twisting, melting, exploding, etc.
	<b>Emitter Menu-</b> Contains a list of emitters to be used with particles.
	<b>Undo Button-</b> Click the undo button to undo the last step performed in Cinema 4D. Quick Key Function (control-z).
	<b>Make Editable Button-</b> Converts a simple primitive shape into a polygon, allowing it to be edited with Cinema 4D manipulators.
	<b>Object Mode-</b> Object mode allows the user to select the full object.
	<b>Gizmo Mode-</b> Gizmo Mode allows the user to select and modify the gizmo only and not the object. Used for moving the gizmo into a different location to allow an object to be rotated from a different location.
	<b>Vertex/Point Mode-</b> Allows the user to select and modify only the points of an object. Shape must be Editable to access Point Mode.
	<b>Edge Mode-</b> Allows the user to select and modify only the edges of an object. Shape must be Editable to access Edge Mode.
	<b>Face Mode-</b> Allows the user to select and modify only the Faces of an object. Shape must be Editable to access Face Mode.
See Cinema 4D Map, Reference 1	<b>Materials Manager-</b> An area located at the bottom of Cinema 4D for creating custom materials to be placed on your objects.
See Cinema 4D Map, Reference 1	<b>Material-</b> A custom made color or texture to be placed on an object.

## XXIV - 3D Computer Modeling and Animation



## Tools, Terms, and Definitions *continued from previous page*

See Time Line Map, Reference 2	<b>Timeline-</b> Located below the Scene in Cinema 4D, the timeline is made up of many frames that can be used to create animations. See the Timeline Document for more details.
See Time Line Map, Reference 2	<b>Time Slider-</b> The small green rectangle on the timeline that represents your location on the timeline.
See Time Line Map, Reference 2	<b>Previous Keyframe-</b> Jumps the time slider to the previous keyframe on the timeline.
See Time Line Map, Reference 2	<b>Previous Frame-</b> Jumps the time slider to the previous frame on the timeline depending on where the time slider is located.
See Time Line Map, Reference 2	<b>Play Reverse-</b> Plays your animation in reverse. Press again to stop playback.
See Time Line Map, Reference 2	<b>Play-</b> Plays your animation. Press again to stop playback.
See Time Line Map, Reference 2	<b>Next Frame-</b> Jumps your time slider to the next frame.
See Time Line Map, Reference 2	<b>Next Keyframe-</b> Jumps the time slider to the next Keyframe on the timeline.
See Time Line Map, Reference 2	<b>Set Keyframe Button-</b> Creates a keyframe on the timeline where the time slider is currently located.
See Time Line Map, Reference 2	<b>Auto Keying-</b> An automatic keying option that sets Keyframes along the timeline when objects have been modified on the scene.
See Time Line Map, Reference 2	<b>Objects Manager-</b> An organized menu that lists all of the objects on your scene. The objects manager can be used to select your objects, add manipulators and materials, etc.
	<b>Attributes Manager-</b> When an object is selected, the Attributed Manager lists a number of options to change and manipulate the selected object.
	<b>Scene-</b> The area located in the middle of Cinema 4D that contains our objects. The scene can be Orbited, Panned and Zoomed for optimal use. Press the middle mouse button inside the scene to activate the 4 orthogonal views that show the Perspective, Top, Right and Front Views.
	<b>Orthogonal Views-</b> Allows the user to view objects on the scene from the Top, Right, Front and Perspective View. Press the middle mouse button inside the scene to activate the 4 orthogonal views. Press middle mouse button again inside any of the orthogonal views to activate a full screen view.

END ■



## Extra Potato Head Objects for Tracing

Use any of these images to create your own unique Potato Head creation!



PH\_ARM\_2.jpg



PH\_ARM\_MUSCLE\_1.jpg



PH\_ARM\_MUSCLE\_2.jpg



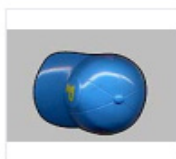
PH\_BAG.jpg



PH\_BOWTIE.jpg



PH\_CAP\_SIDE.jpg



PH\_CAP\_TOP.jpg



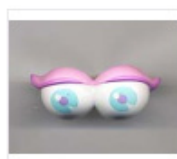
PH\_CAT\_EARS.jpg



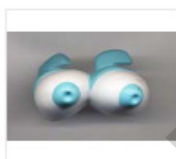
PH\_EAR\_2.jpg



PH\_EARING.jpg



PH\_EYES\_FEMALE.jpg



PH\_EYES\_with\_EYEB...



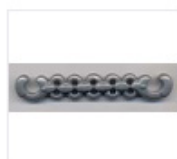
PH\_FEET.jpg



PH\_FIRE\_EXTIGUISHE...



PH\_HAND\_1.jpg



PH\_HANDCUFFS.jpg



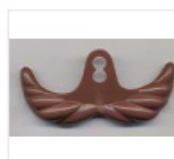
PH\_LIPS\_2.jpg



PH\_LIPS\_with\_TEETH...



PH\_MUSTACHE\_1.jpg



PH\_MUSTACHE\_2.jpg



PH\_MUSTACHE\_3.jpg



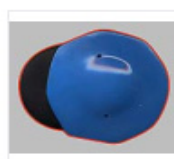
PH\_NOSE.jpg



PH\_POLICE\_HAT\_FRO...



PH\_POLICE\_HAT\_SID...



PH\_POLICE\_HAT\_TOP...



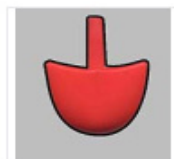
PH\_POLICE\_LIGHTS.jpg



PH\_POLICE\_SHIELD.jpg



PH\_TEETH.jpg



PH\_TONGUE.jpg



PH\_UTILITY\_BELT.jpg

## XXVI - 3D Computer Modeling and Animation

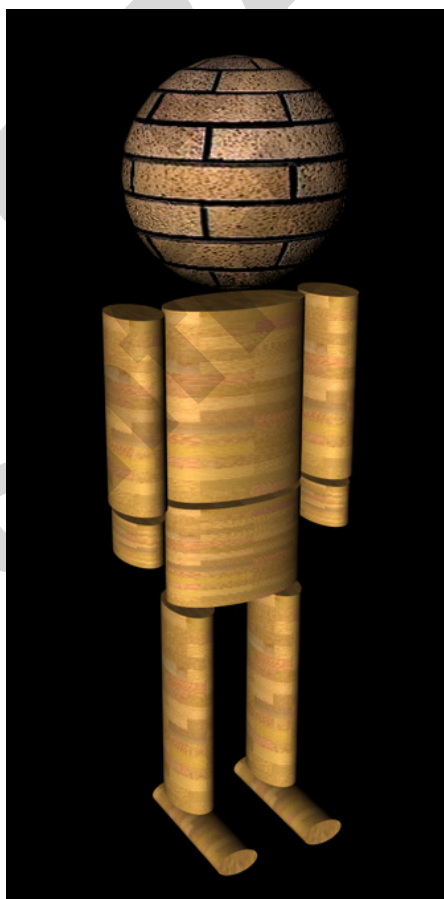


## Class 2: Meet B.O.B. (Bionic Object Boy)

### Question of the Day: Who is your favorite 3D character?

**Possible Answers:** Anakin Skywalker from Clone Wars, Bumble Bee from Transformers, Wall-E

<b>Brainteaser: “Stacked Shapes”</b> .....	<b>46</b>
<b>Class 2a: Creating B.O.B. (Bionic Object Boy)</b> .....	<b>47</b>
<b>Class 2b: Texturing B.O.B.</b> .....	<b>62</b>
<b>Class 2c: Label and Hierarchy B.O.B.</b> .....	<b>71</b>



### Meet B.O.B - 45

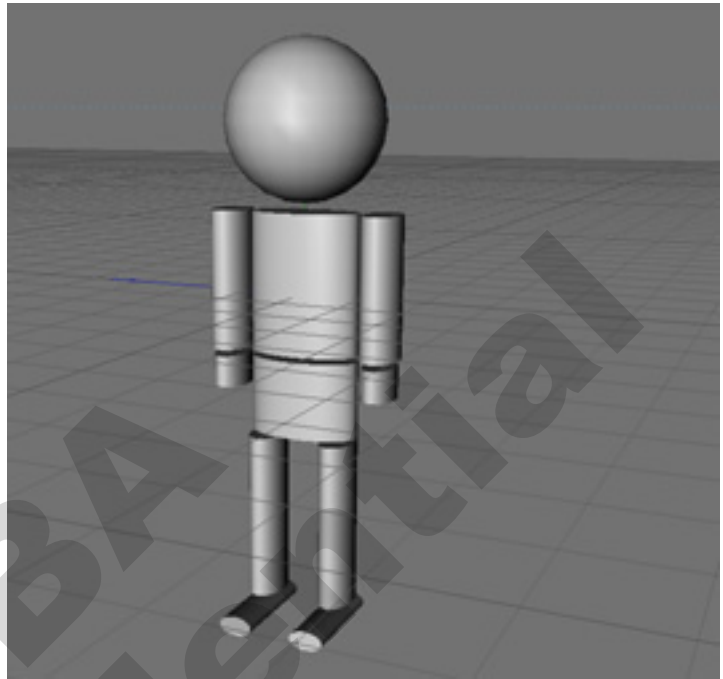


## Class 2c: Label and Hierarchy B.O.B.

We have just finished building and texturing B.O.B. In this Module we will be using the Object Manager to Label and Hierarchy B.O.B.'s body parts. Cinema 4D offers a very simple and intuitive way to hierarchy Objects as you will see.

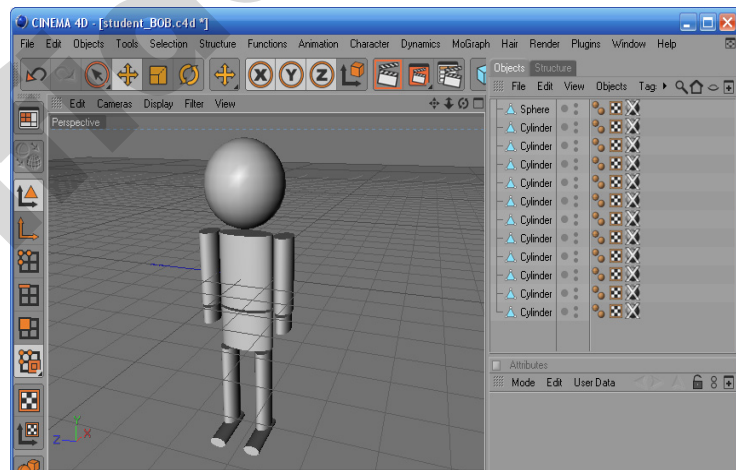
Now that B.O.B. is built, we will use the **Objects Manager** to label B.O.B.'s body parts.

**\*Note to Teacher:** The Objects Manager is an area on the right side of Cinema 4D's interface that allows us to rename our Objects and hierarchy them.



To the right of your interface is the **Objects Manager**. Its name describes exactly what it does; it is used to manage our Objects.

Our **Objects Manager** lists the 11 Objects that make up B.O.B. The Objects list includes 1 Sphere and 10 Cylinders.



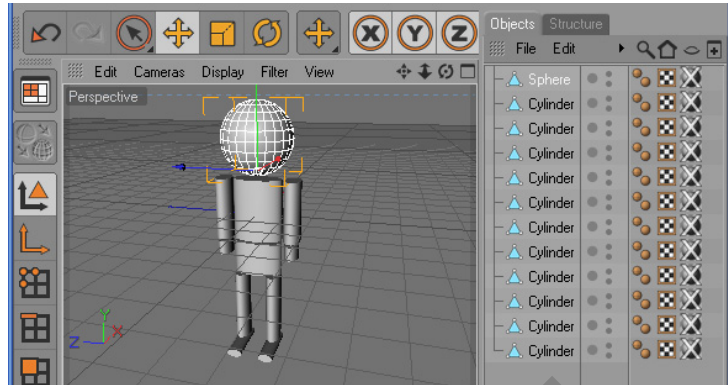




## Class 2c: Label and Hierarchy B.O.B. continued from previous page

When you left-click on one of the Objects listed in the **Object Manager**, that Object becomes highlighted in the viewport.

1. In this example, **left-click on Sphere**.
2. Left-click once on each of the Cylinders and see which Object gets selected in the Viewport.



We are going to rename each of the primitives in the Objects Manager with a name that identifies each of B.O.B.'s body parts.

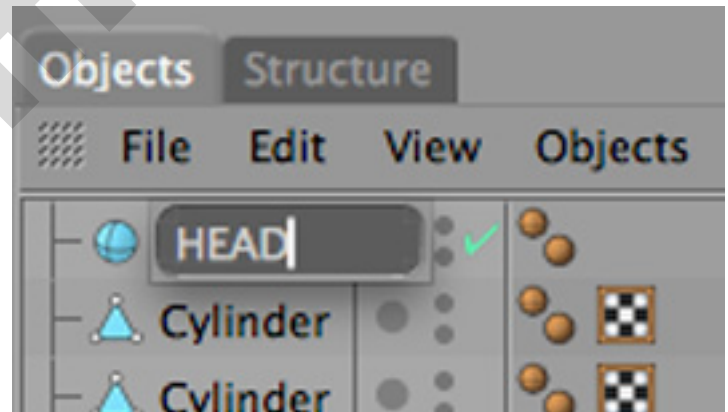
3. **Double-click** on an Object name to create an open text field. The Object will be highlighted. All you need to do is start typing the new name of the Object.



In the picture provided, you can see that this is a simple action that is no different than any word-editing software. Be sure the open text field is there before typing.

4. **Double-click on the Sphere** and type **HEAD**.

**\*Note to Teacher:** When editing the names of the objects, double click on the text to activate the text field for editing.



## 72 - Meet B.O.B.

**Class 2c: Label and Hierarchy B.O.B. continued from previous page**

5. Repeat step 3 and rename the Cylinders to identify the specific body part.

6. Use this list of names to **rename the Cylinders**:

**RIGHT HAND**

**LEFT HAND**

**RIGHT FOOT**

**LEFT FOOT**

**HIP**

**RIGHT LEG**

**LEFT LEG**

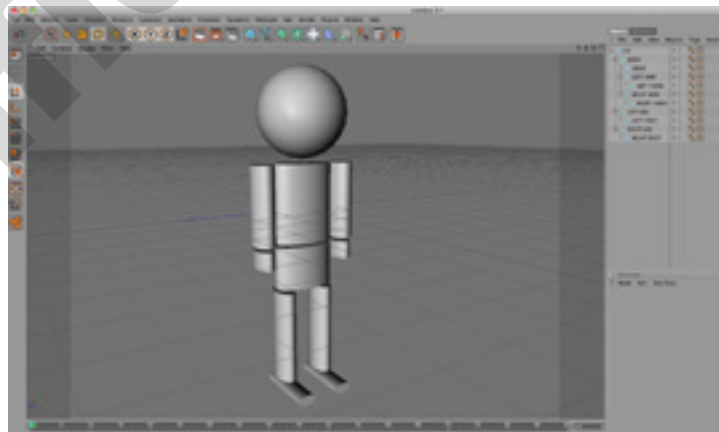
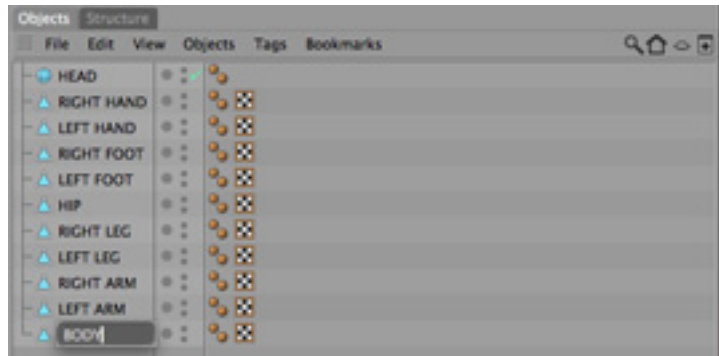
**RIGHT ARM**

**LEFT ARM**

**BODY**

**\*Note to Teacher:** Go through all of the labeling slowly with Students to be sure they are correctly renaming their parts.

Now that all the Objects are renamed, we will begin to hierarchy the Objects. Using a Drag and Drop technique, we will learn how to organize B.O.B's parts logically into a hierarchy that will allow us add keyframes and animate our character.





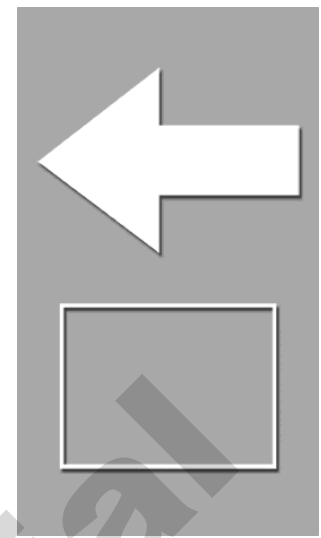
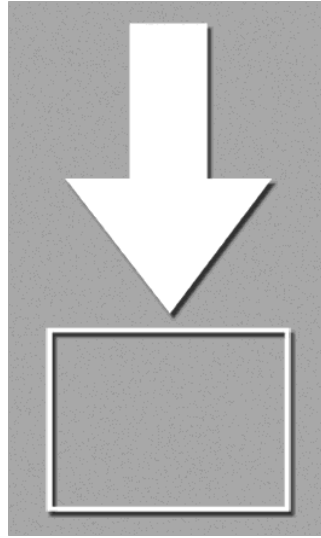


### ***Class 2c: Label and Hierarchy B.O.B. continued from previous page***

\*Important Note to Teacher: When dragging and dropping, the Downward Arrow indicates that the dragged Object tag is going into the Object.

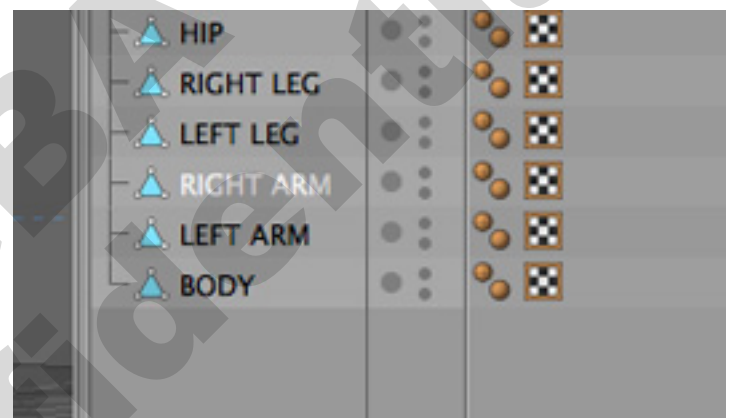
The **Left Arrow** indicates that the dragged Object is dropping above or below the Object.

***For all of our Objects we will be looking for the Down Arrow.***



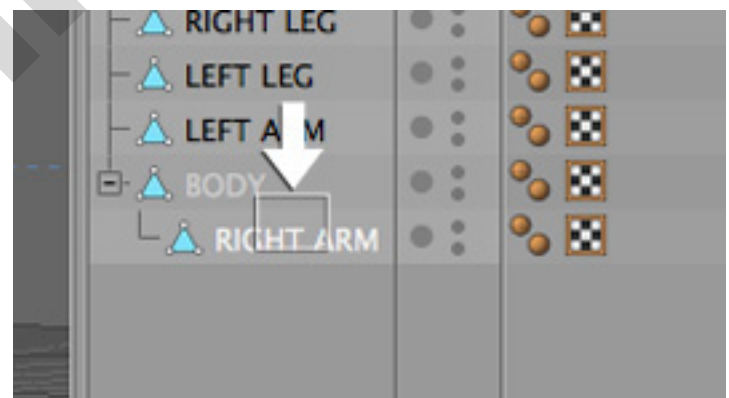
A great way of explaining this process would be to act out as if “you” were B.O.B.

**\*Example:** Start with the body and ask Students: “What limbs are attached to my body?” **Answer:** Arms and Head.



7. Left-click on RIGHT ARM and **Drag and Drop the RIGHT ARM** into **BODY**.

***\*Look for the Downward Arrow we talked about.***



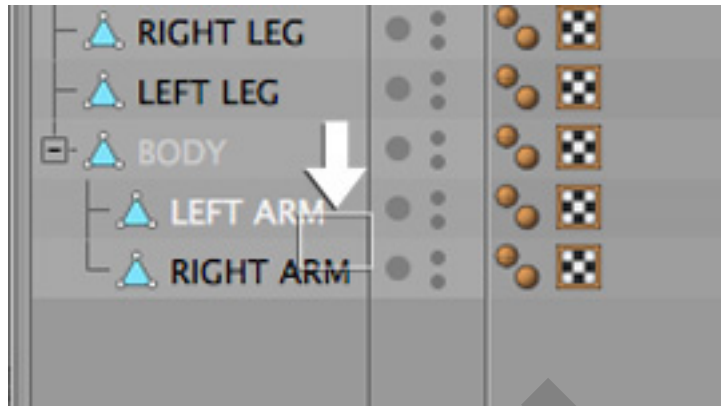
***\*Note to Teacher: If a student accidentally creates an incorrect hierarchy, no worries. Drag out the incorrect object and drop it into a blank area of the Objects Manager, and try it again.***

## **74 - Meet B.O.B.**

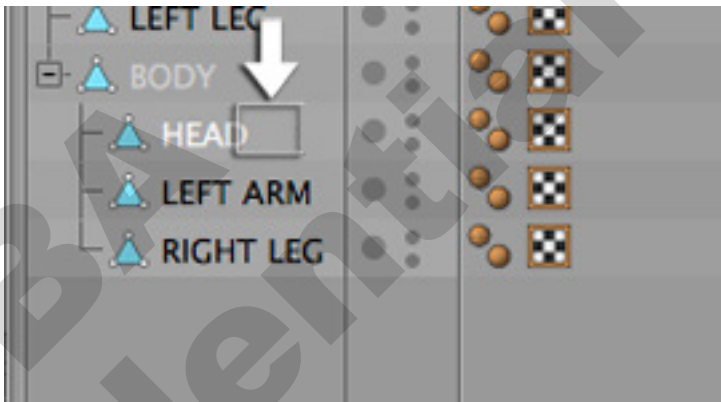
**Class 2c: Label and Hierarchy B.O.B. continued from previous page**

8. Now that we have dragged RIGHT ARM into BODY, left-click on LEFT ARM and **Drag and Drop LEFT ARM** into **BODY**.

Your **Objects Manager** should look like the picture provided.



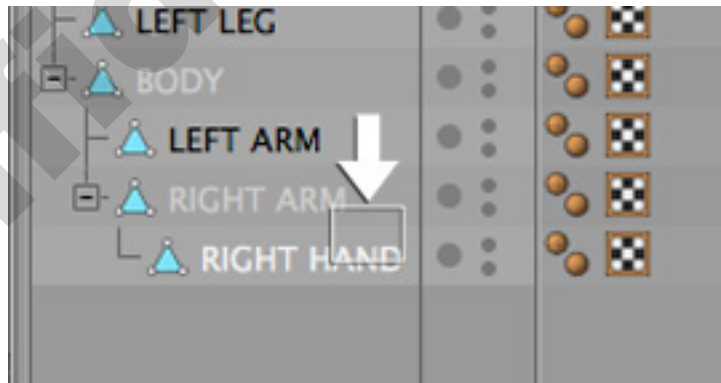
9. Left-click on HEAD and **Drag and Drop HEAD** into **BODY**.



Next, the Hands...

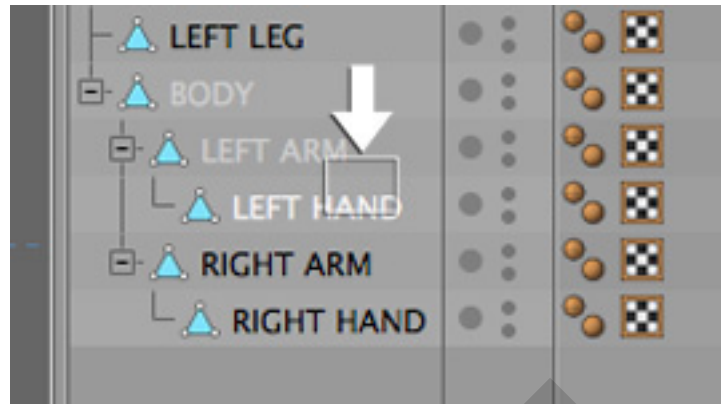
**Ask Students:** "What parts are attached to my arms?" **Answer:** Hands.

10. Left-click on RIGHT HAND and **Drag and Drop RIGHT HAND** into **RIGHT ARM**.



**Class 2c: Label and Hierarchy B.O.B. continued from previous page**

11. Left-click on **LEFT HAND** and Drag and Drop **LEFT HAND** into **LEFT ARM**.



We will now work on the HIP...

**Ask Students:** "What body parts are attached to my Hip?" **Answer:** Legs.

12. Left-click on **RIGHT LEG** and Drag and Drop **RIGHT LEG** into **HIP**.



13. Left-click on **LEFT LEG** and Drag and Drop **LEFT LEG** into **HIP**.



Next, the Feet...

**Ask Students:** "What parts are attached to my Legs?" **Answer:** Feet.

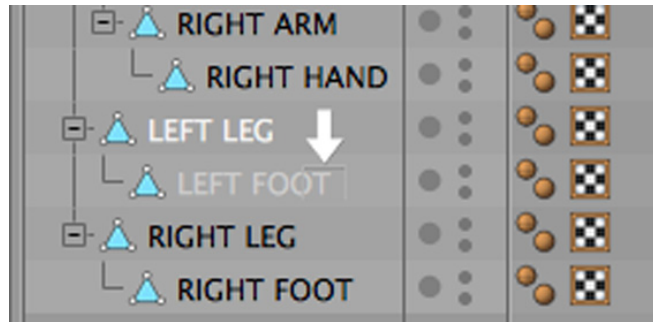
14. Left-click on **RIGHT FOOT** and Drag and Drop **RIGHT FOOT** into **RIGHT LEG**.

**76 - Meet B.O.B.**



### Class 2c: Label and Hierarchy B.O.B. continued from previous page

15. Left-click on **LEFT FOOT** and Drag and Drop **LEFT FOOT** into **LEFT LEG**.

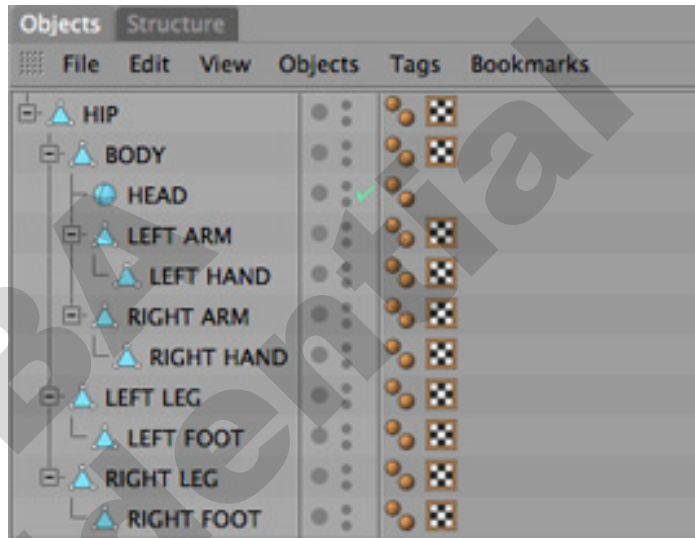


We will now finish B.O.B.'s Object hierarchy by attaching the BODY to the HIP.

**Ask Students:** "What major body part is attached to my Hip?" **Answer:** Body.

16. Left-click on **BODY** and Drag and Drop **BODY** into **HIP**.

Be certain to check that Student's hierarchy is identical to the hierarchy shown here.

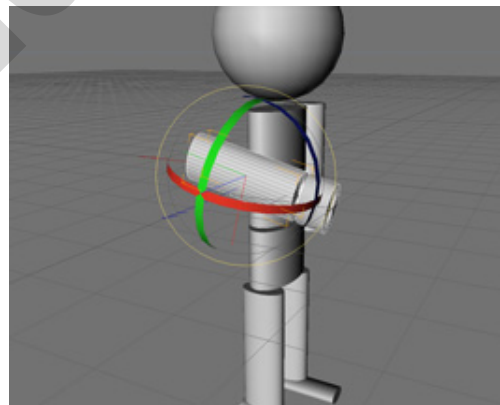


We are now finished with B.O.B.'s Object hierarchy.

Test out how B.O.B.'s parts work.

17. Select the **Left Arm** and choose the **Rotate Tool**.

Try rotating one of B.O.B.'s arms forward.



**\*Note to Teacher:** Notice that the arm rotates forward and the hand follows along with it.

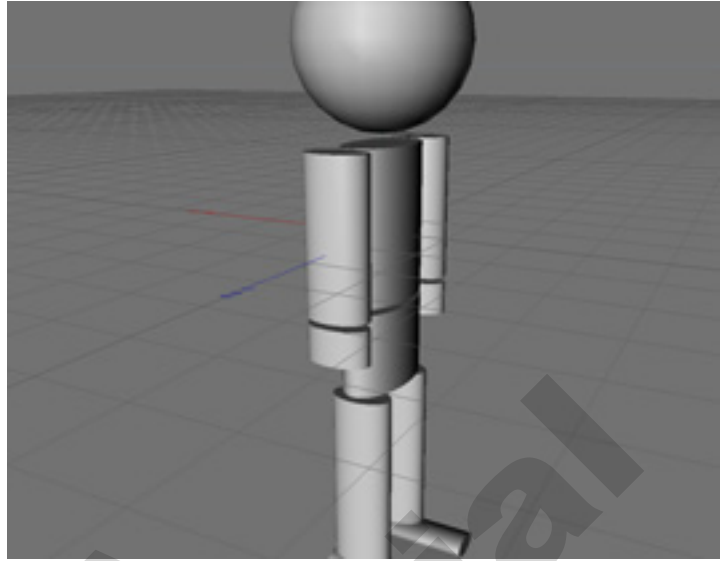
**Something is Wrong!** The arm rotates from the middle of the arm. The origin of our axis point is off.

Describe to Students how an arm rotates from up near the shoulder.

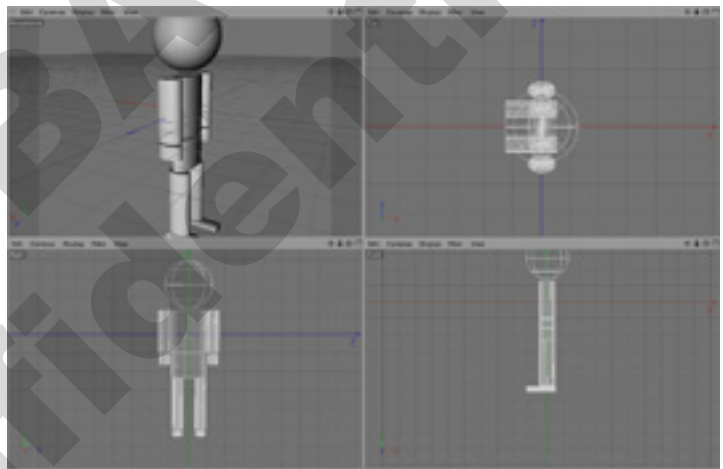
**Class 2c: Label and Hierarchy B.O.B. continued from previous page**

18. Be sure to **undo** the move of the arm by going up to the top **Edit** menu and selecting **Undo** from the drop-down menu,

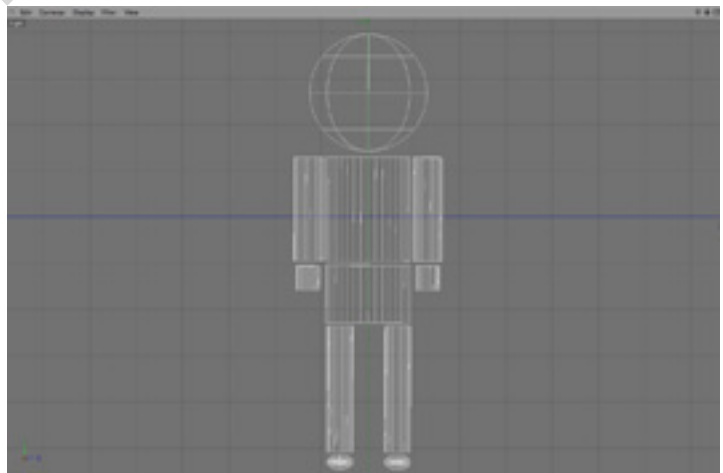
We will now begin to correct the origin of our axis points for each body part.



19. Press the Middle mouse button to activate the 4 orthogonal views.



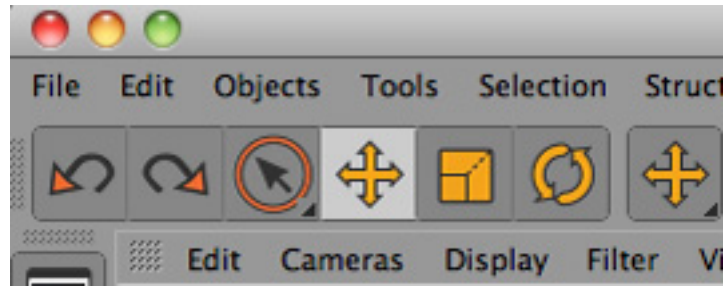
20. Left-click your mouse anywhere in the **Front Viewport** and press the **Middle mouse button** to make the Front Viewport the full screen view.

**78 - Meet B.O.B.**



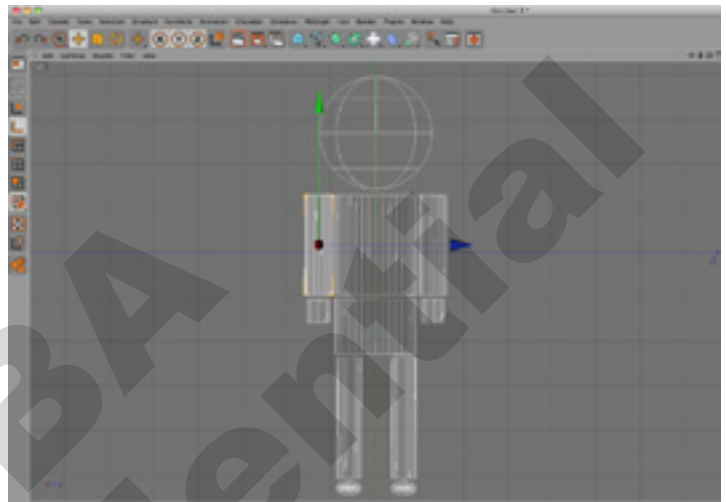
**Class 2c: Label and Hierarchy B.O.B. continued from previous page**

21. Select the **Move Tool**.



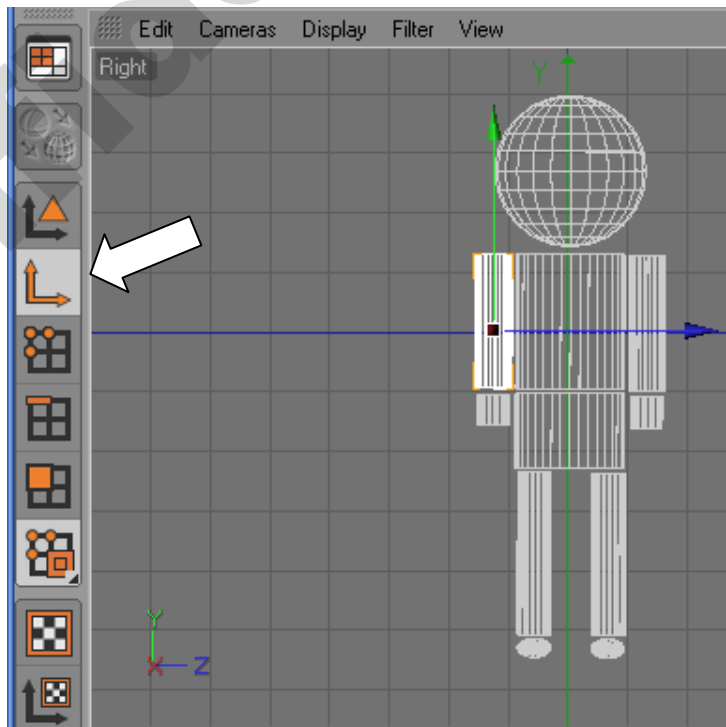
22. Select the **Left Arm**.

Notice the origin point (square) of the **Arrowhead Axis Gizmo** appears in the middle of the object.



23. In the tools area located on the left side of the Viewport area, left-click on the Object Axis tool (Axis tool). The Axis tool is now selected.

**\*Note to Teacher:** The Axis Tool allows us to change the origin of the axis for any editable shape.

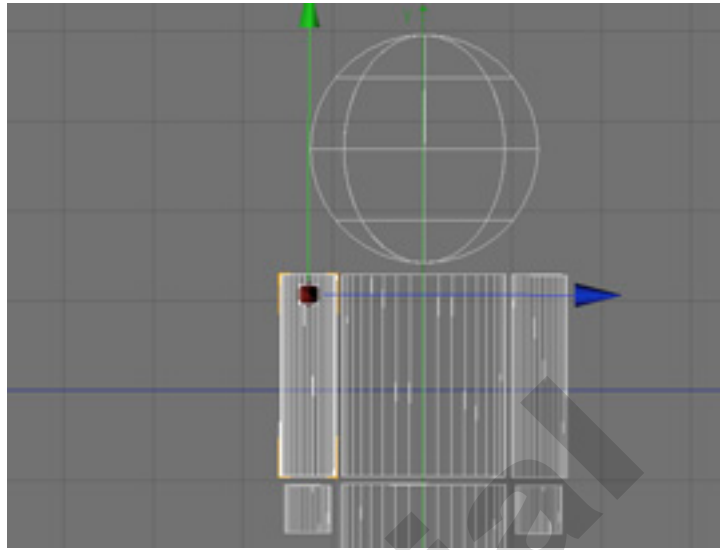


**Class 2c: Label and Hierarchy B.O.B. continued from previous page**

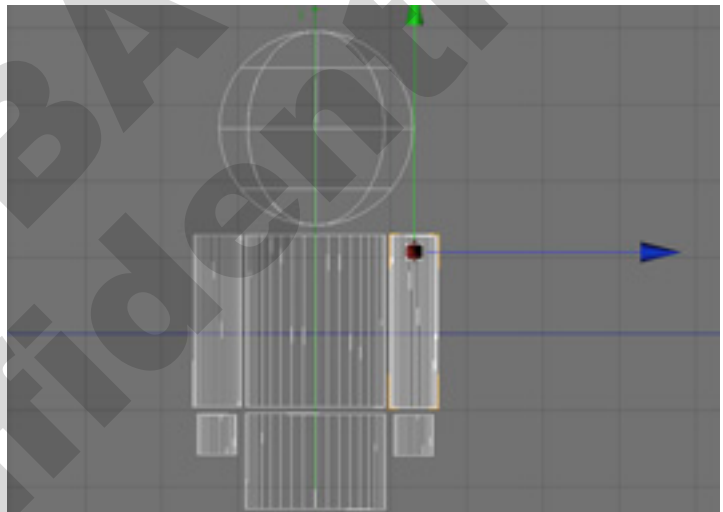
**Ask Students:** "Where does your arm rotate from? **Answer:** The Shoulder.

**24.** Move the **Axis Point** of the LEFT ARM up near the shoulder.

**\*Note to Teacher:** Notice that the shape does not move, only the Axis of the Gizmo.



**25.** Select the **RIGHT ARM** and move the **Axis Point** near the shoulder.

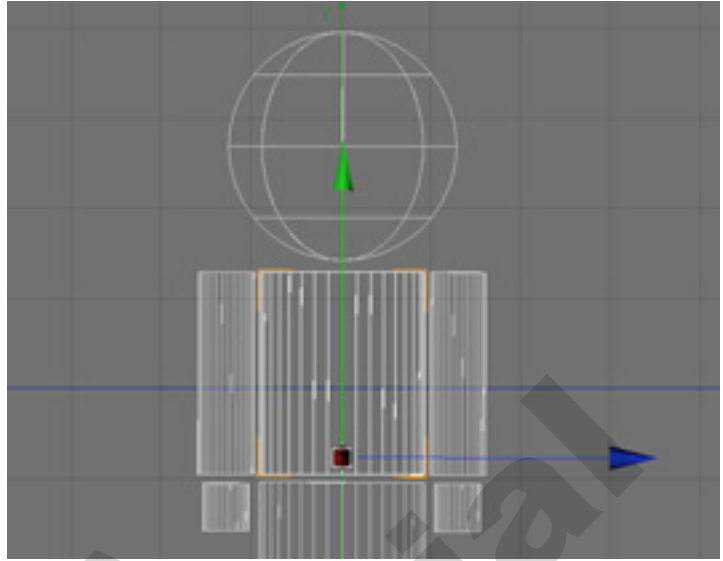
**80 - Meet B.O.B.**



**Class 2c: Label and Hierarchy B.O.B. continued from previous page**

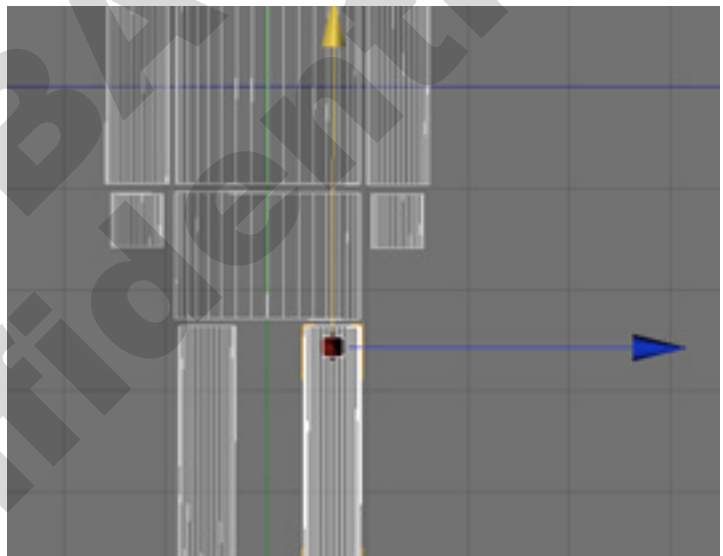
**Ask Students:** "Where does your body rotate from? **Answer:** Hip or Belly Button.

**26.** Select the BODY and Move the **Axis Point** closer to the HIP.



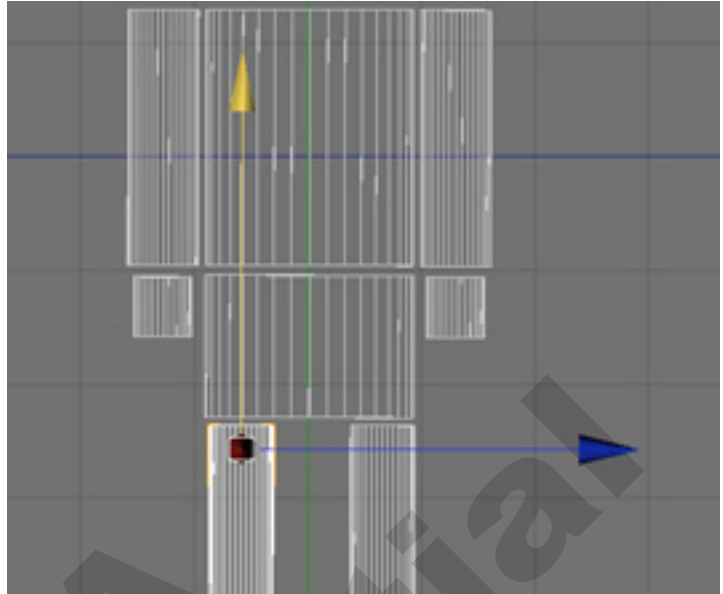
**Ask Students:** "Where does our leg rotate from? **Answer:** Near the Hip.

**27.** Select the RIGHT LEG and Move the **Axis Point** closer to the HIP.

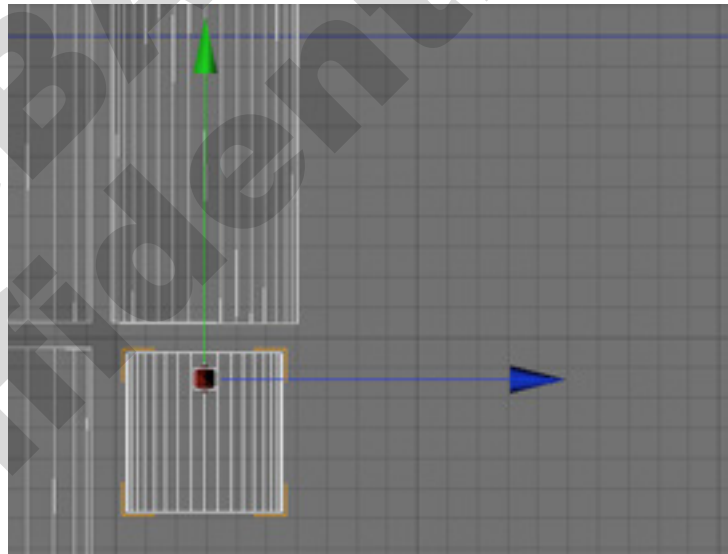


**Class 2c: Label and Hierarchy B.O.B. continued from previous page**

**28.** Select the LEFT LEG and Move the **Axis Point** closer to the HIP.



**29.** Select the RIGHT HAND and Move the **Axis Point** closer to where the wrist would be.



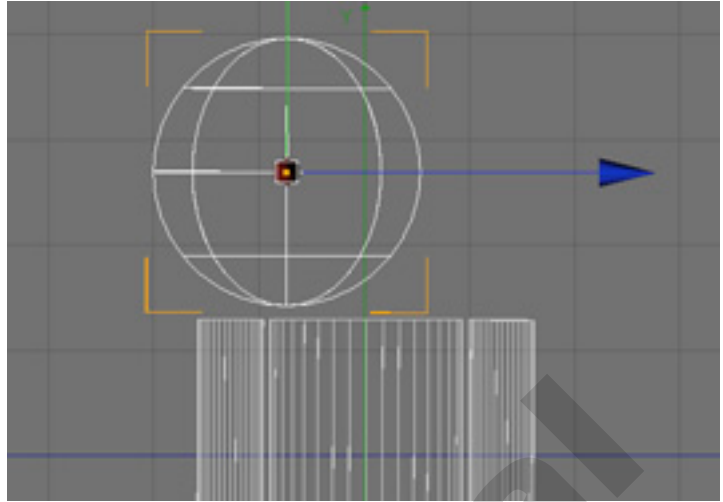
**30.** Select the LEFT HAND and Move the **Axis Point** closer to where the wrist would be.

**82 - Meet B.O.B.**

**Class 2c: Label and Hierarchy B.O.B. continued from previous page**

Now let's work with the HEAD.

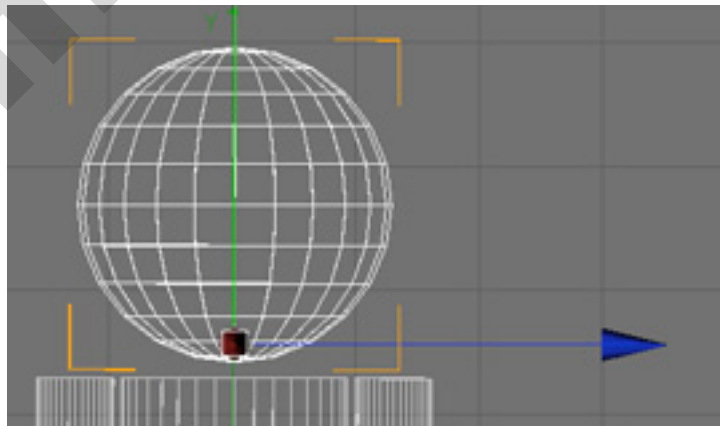
The HEAD does not allow us to move the **Axis Point**. This is because the Head was not Converted into an **Editable Polygon** like the other body parts.



31. Select the HEAD and **left-click** on the **Make Editable** button.



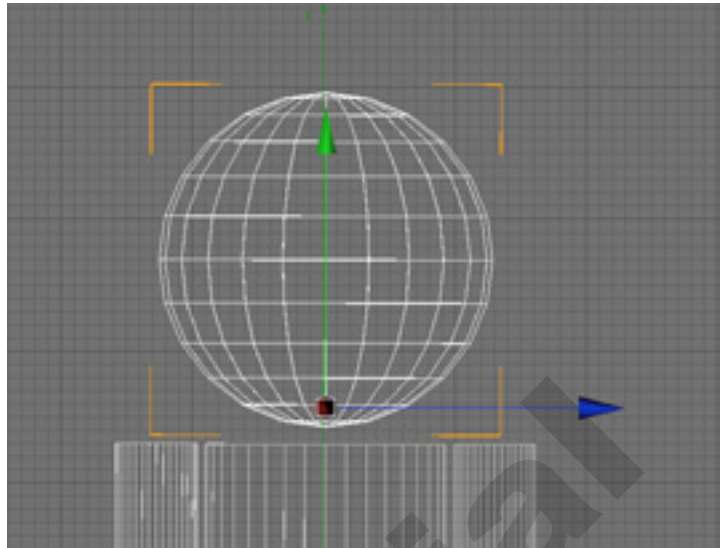
Now our Head is **Editable** and the Gizmo Axis can move freely.



**Class 2c: Label and Hierarchy B.O.B. continued from previous page**

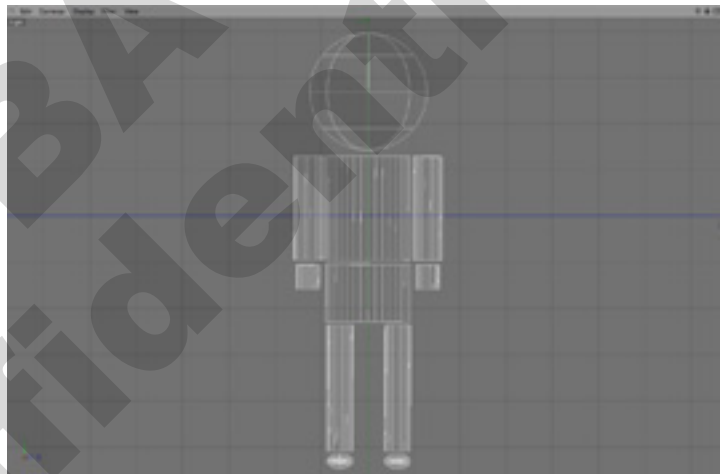
**Ask Students:** "Where does our Head Rotate from? **Answer:** The Neck.

**32.** Move the **Axis Point** near the Neck.



The last **Axis Points** that need to be repositioned are in the **RIGHT FOOT** and **LEFT FOOT**.

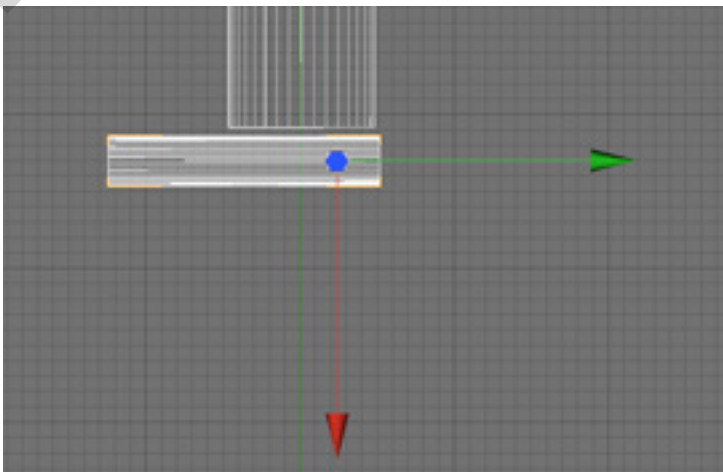
This is not possible using the Front View.



**33.** Press the middle mouse button to activate the 4 orthogonal views

**34.** Left-click your mouse anywhere in the **Right (Side) Viewport** and press the **Middle mouse button** to make the Right Viewport the full screen view.

**35.** Use the **Axis Tool** to **move** the **Axis Point** closer to where the Ankle would be.

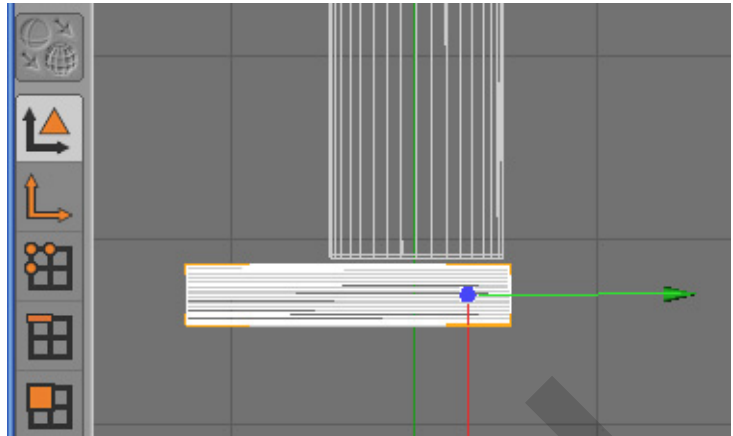
**84 - Meet B.O.B.**

**Class 2c: Label and Hierarchy B.O.B. continued from previous page****\*Very Important:**

Now that we are finished, be sure to return to the Model tool (Object tool).

**36.** In the tools area located on the left side of the Viewport area, **left-click on the Model tool.**

Return to the Perspective view.

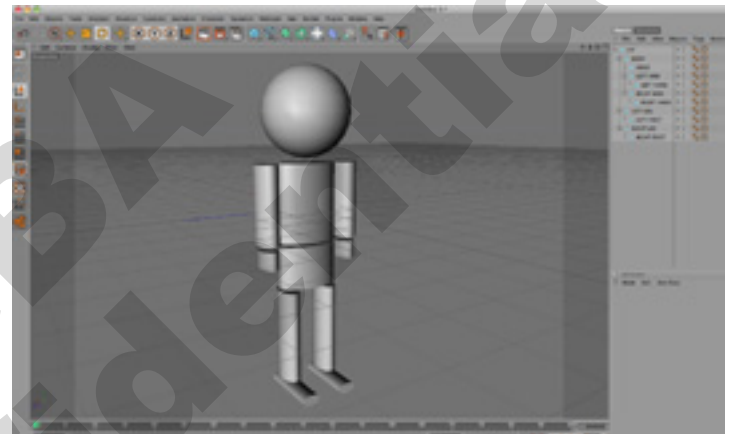


Now would be an excellent time to **Save** our progress.

**37.** Left-click on the top **File** menu and select **Save As** from the drop-down menu.

**38.** In the Save File dialogue box, navigate to your personal file folder for the Save in location, and name your file

**BOB\_HIERARCHY\_TEXTURED.**

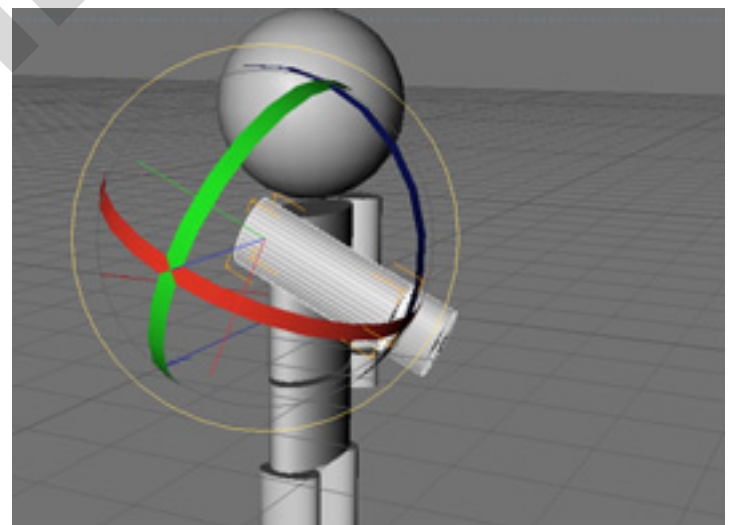


Now let's try moving B.O.B's arms.

**39.** Select the Rotate tool.

**40.** Select the LEFT ARM and rotate the selected arm along one of the axes.

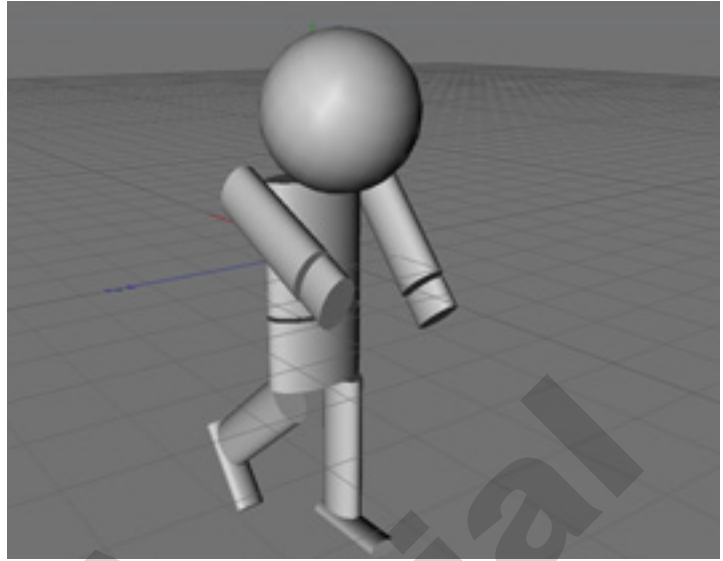
The arms will now move from the correct **Axis Point near the Shoulder.**



***Class 2c: Label and Hierarchy B.O.B. continued from previous page***

Give Students some time to experiment moving B.O.B.'s various body parts.

END ■

**86 - Meet B.O.B.**

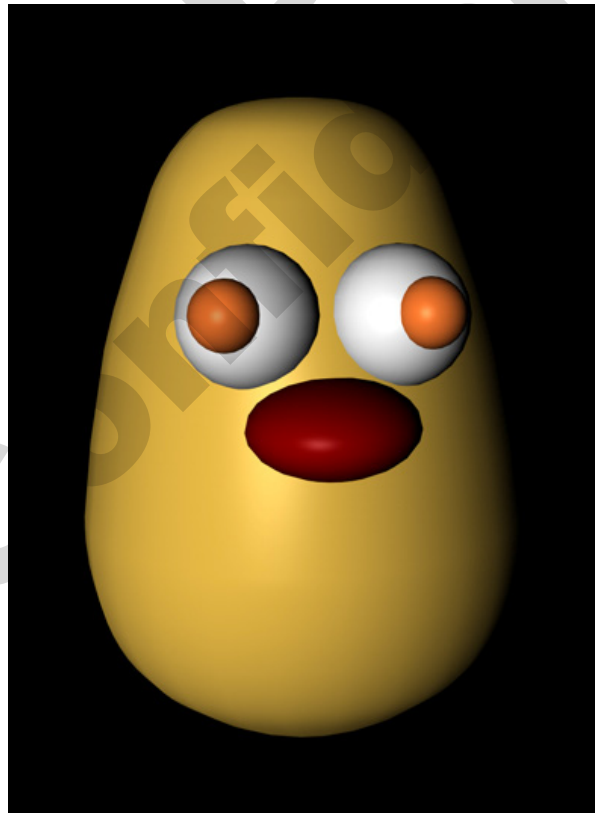


## Class 4: Modeling a Potato Head Body, Eyes, and Nose

**Question of the Day:** If you could have one 3D character “Super Power”, which would you pick?

**Possible Answers:** Anakin Skywalker’s Jedi Mind Tricks, Astro Boy’s Flying abilities.

<b>Brainteaser:</b> “Slug Alien” .....	<b>108</b>
<b>Class 4a:</b> Modeling the Potato Head Body.....	<b>109</b>
<b>Class 4b:</b> Modeling the Eyes .....	<b>140</b>
<b>Class 4c:</b> Modeling the Potato Head Nose .....	<b>158</b>



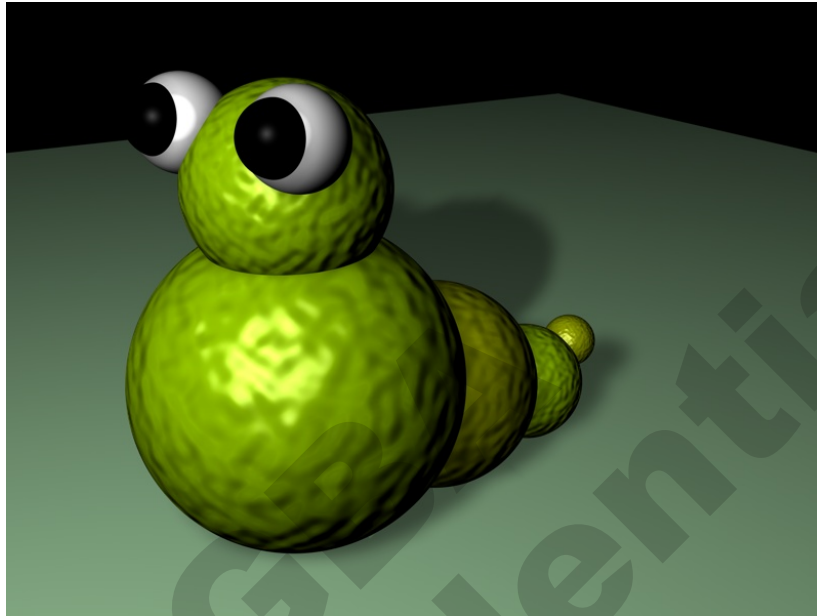
### Modeling a Potato Head Body, Eyes, and Nose - 107





## ***Brainteaser – “Slug Alien”***

Brainteasers are given at the beginning of each class and serve as a short review of the techniques learned in the previous class. Brainteasers are a great way to engage students in simple exercises and get them thinking about 3D again. Brainteasers can be projected on the screen in front of the classroom as students walk in. Only 10 – 15 minutes should be spent on each brainteaser in the beginning of the class.



This Brainteaser is called “Slug Alien”. The Slug Alien is made up of only 9 Spheres. The purpose of this Brainteaser is to get students more familiar with using the Move and Scale tool and creating colored materials as well as Copying/Pasting existing shapes. This exercise also includes a light and shadow added to the scene as well as bump maps on all the spheres. Be sure students are using their 4 viewports!



**Student Example**

END ■

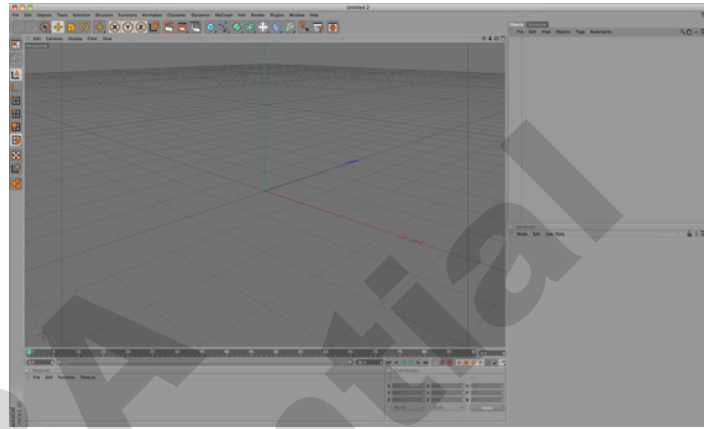
## **108 - Modeling a Potato Head Body, Eyes, and Nose**



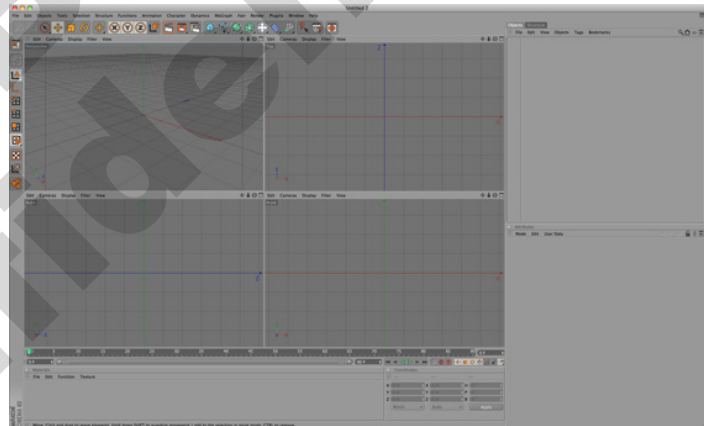
## ***Class 4a: Modeling the Potato Head Body***

We are ready to begin modeling a Potato Head using the tools in Cinema 4D. Modeling all the parts and pieces of Potato Head will introduce us to a list of new tools and modifiers that will give us the knowledge to model any shape. In this module we will model the body using the front view of our scene and create a B-Spline contour. A Lathe Modifier will be added to revolve our Spline creating the potato body geometry. The last step includes using a Free Form Deformer, (FFD), to reshape our geometry adding the final details.

**1. Open up a New Document in Cinema 4d.**



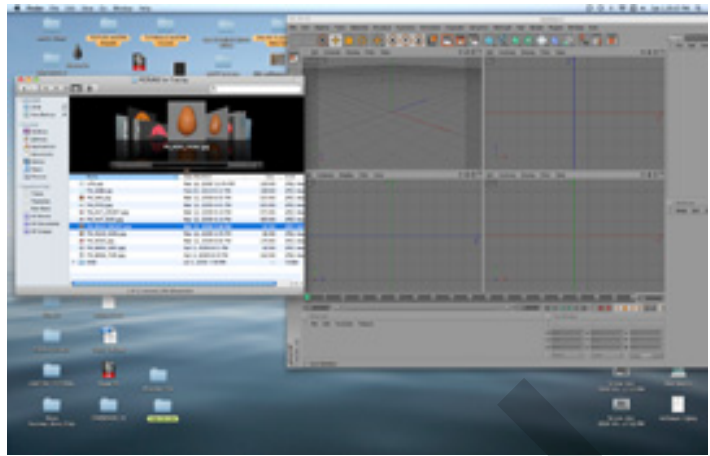
**2. Press the Middle mouse button to activate the 4 orthogonal views.**



**Class 4a: Modeling the Potato Head Body** continued from previous page

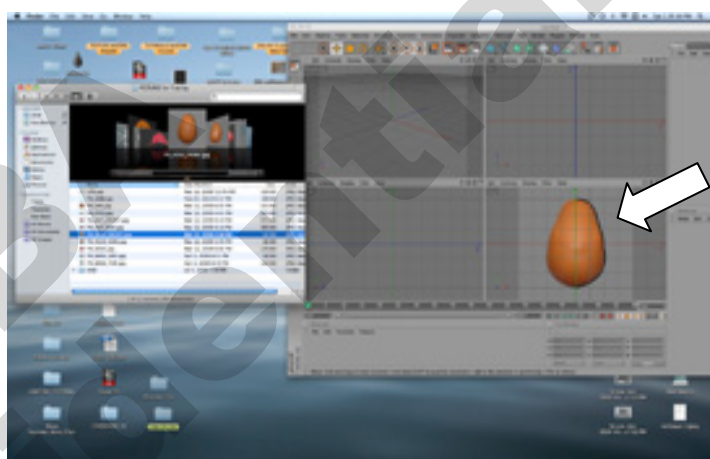
**3. Resize the Cinema 4D application window** and slide the window over to the right side of your screen.

**4. Open up the GBA Student Files folder for Class 4** and place the folder window next to the Cinema 4D window as shown.



**5. In the GBA Student Files folder for Class 4, locate the file called PH\_HEAD\_FRONT.jpg .**

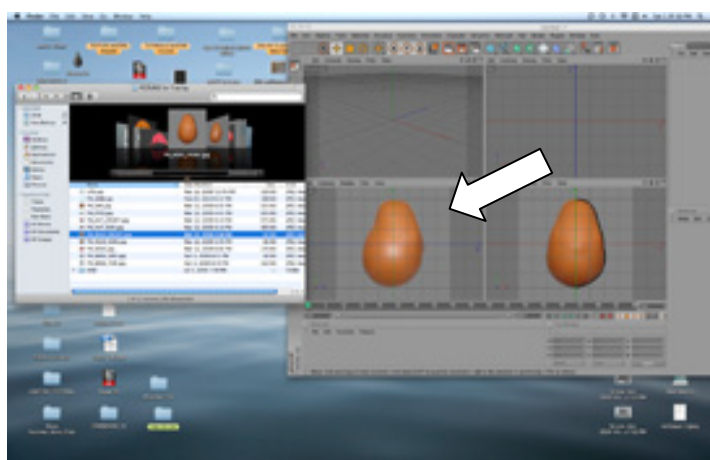
**6. Left-click on the file name or thumbnail and drag it onto the Cinema 4D Front Viewport.**



**\*Note to Teacher:** If a Student drags in the wrong image, or drags the right image to the wrong Viewport, simply close the document and start again!

**7. In the GBA Student Files folder for Class 4, locate the file called PH\_HEAD\_SIDE.jpg.**

**8. Left-click on the file name or thumbnail and drag it onto the Cinema 4D Right Viewport.**

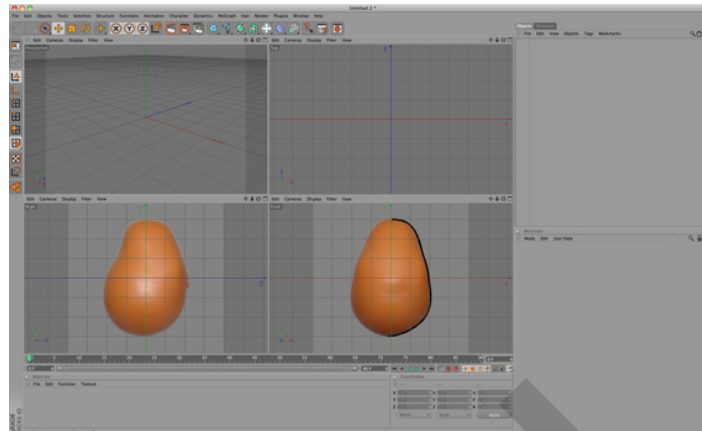
**110 - Modeling a Potato Head Body, Eyes, and Nose**



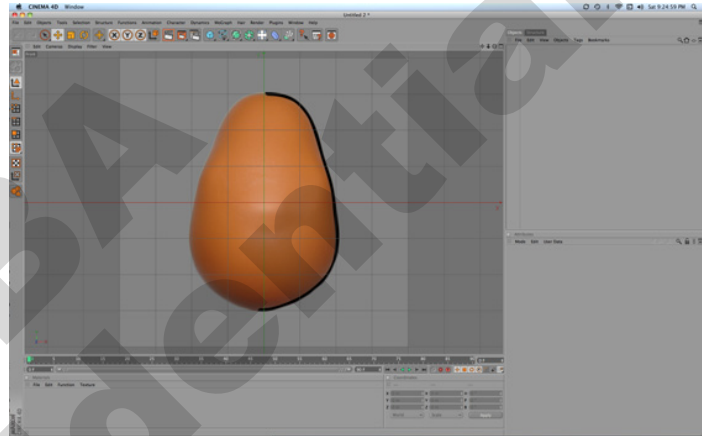
### Class 4a: Modeling the Potato Head Body continued from previous page

9. Maximize the Cinema 4D application window.

Your scene should look like the picture provided.

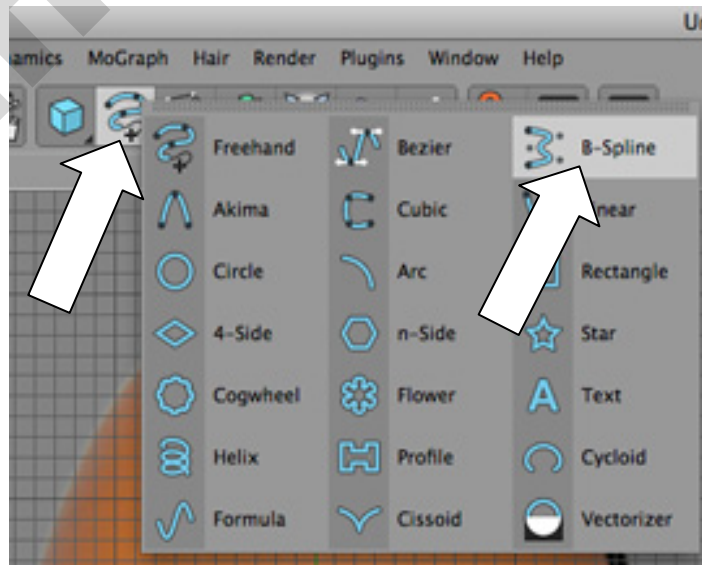


10. Left-click your mouse anywhere in the **Front Viewport** and press the **Middle mouse button** to make the Front Viewport the full screen view.



11. Along the top of Cinema 4D, left-click on the **Spline** menu and select **B-Spline** from the drop-down menu.

**\*Note to Teacher:** The Spline menu resembles a squiggly line and is located next to the add geometry tab.



**Class 4a: Modeling the Potato Head Body** *continued from previous page*

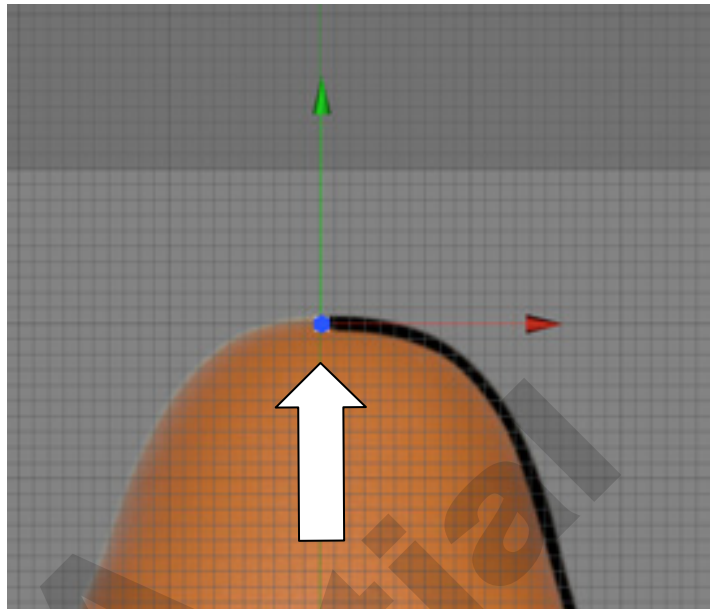
We are going to trace the outline of the Potato Head with the **B-Spline**.

During the tracing process, the **Gizmo** can get in the way.

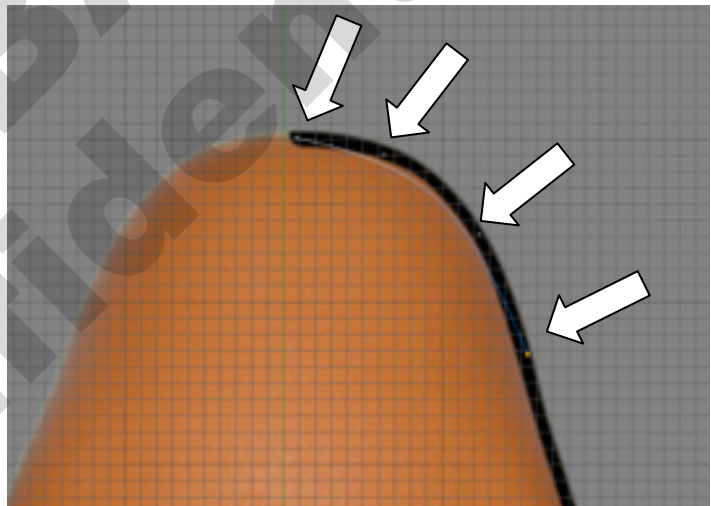
**12. To hide the Gizmo:**

Hold down the **Alt** key on the keyboard with one hand and Press the letter **D** on the keyboard with your other hand.

(Keyboard Shortcut ALT + D) to temporarily hide the **Gizmo**.

**13. Left-click your mouse to make points** along the black outline provided.

**\*Note to Teacher:** The B-Spline will automatically create curves between each point.

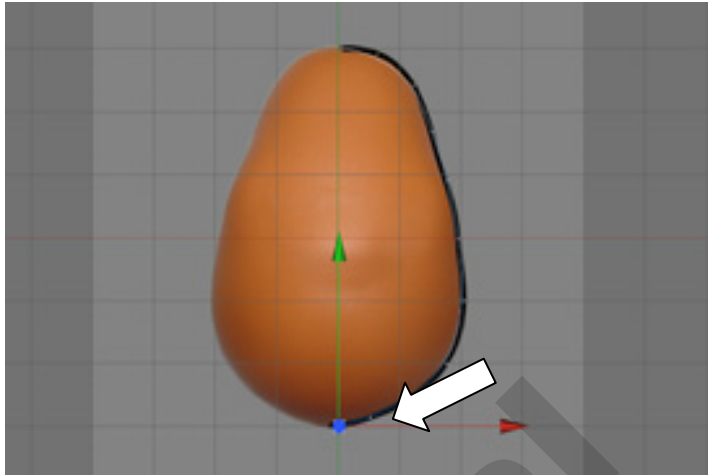
**112 - Modeling a Potato Head Body, Eyes, and Nose**



**Class 4a: Modeling the Potato Head Body** *continued from previous page*

**14. Stop** clicking when you reach the end of the black outline on the Potato Head image. You will only need to click points on one half of the Potato Head body.

**\*Note to Teacher:** Be sure that points are evenly spread out with half an inch to an inch distance between points. The B-Spline in the example was created with 11 points.

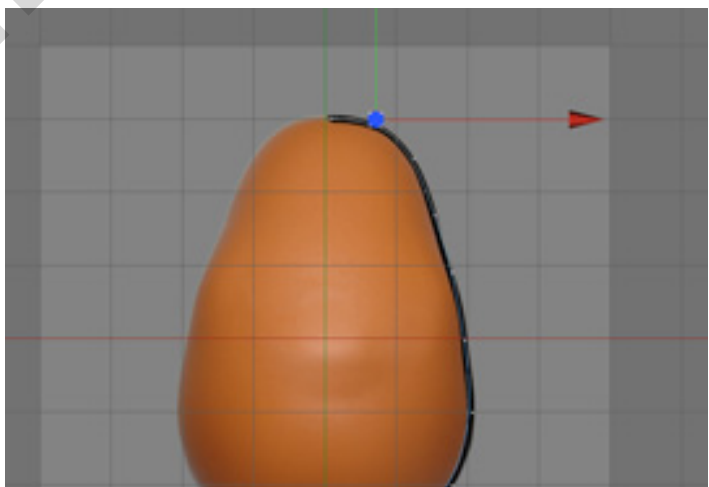
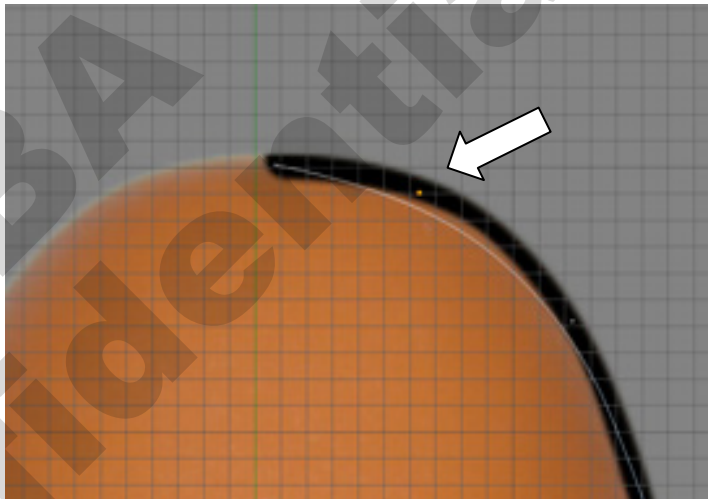
**15. Unhide the Gizmo:**

**Hold down the Alt key on the keyboard with one hand and Press the letter D on the keyboard with your other hand.** (Keyboard Shortcut ALT + D) to unhide the Gizmo.

Note: If Students click off of the Spline, use CTRL + Z to get the Spline back.

Fix any stray points that are not centered on the outline by selecting the desired point first, then moving it with the Move Tool.

**\*Note to Teacher:** This process can only be done in vertex mode. Vertex Mode (point mode) is automatically activated when working with Splines. If a student accidentally clicks out of Point Mode, press the Point Mode button seen below to reactivate it.

**Modeling a Potato Head Body, Eyes, and Nose - 113**



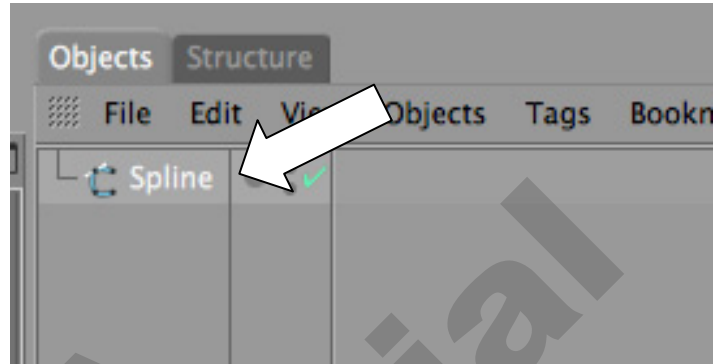
**Class 4a: Modeling the Potato Head Body** continued from previous page

Vertex Mode button located on the left tool bar of Cinema 4D.

16. Press Enter on the keyboard.

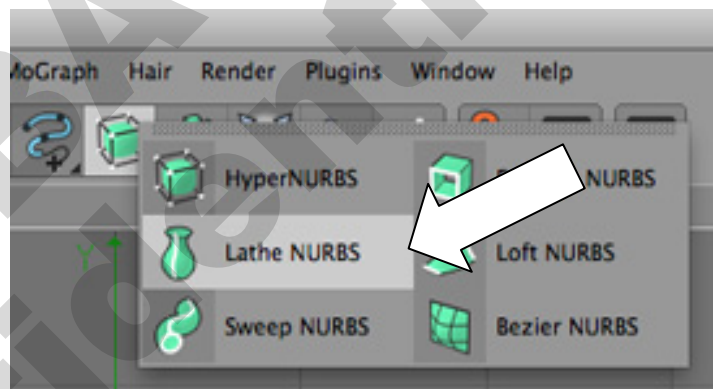
The **Spline** is complete.

Notice that a Spline appears in the Objects Manager.

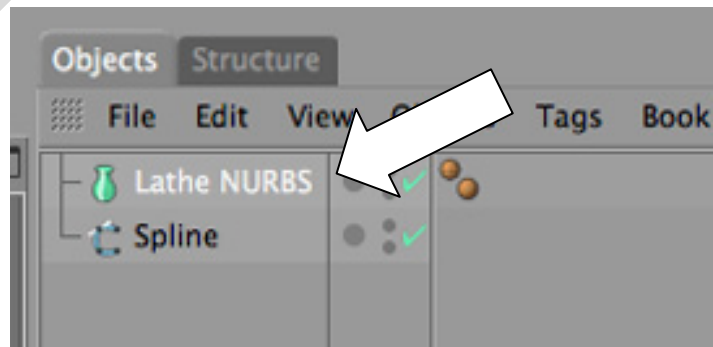


17. Along the top of Cinema 4D, left-click on the **Modifiers** menu and select **Lathe NURBS** from the drop-down menu.

***\*Note to Teacher:** Discuss with Students what a lathe is. A Lathe is a machine for shaping a piece of material like wood or metal by rotating it along its axis. Baseball bats and railing posts are examples of things created on a lathe.*

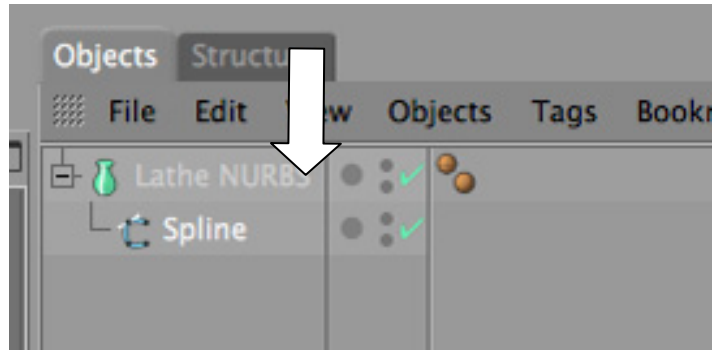


Notice that the **Lathe NURBS** appears in your **Object Manager**.

**114 - Modeling a Potato Head Body, Eyes, and Nose**

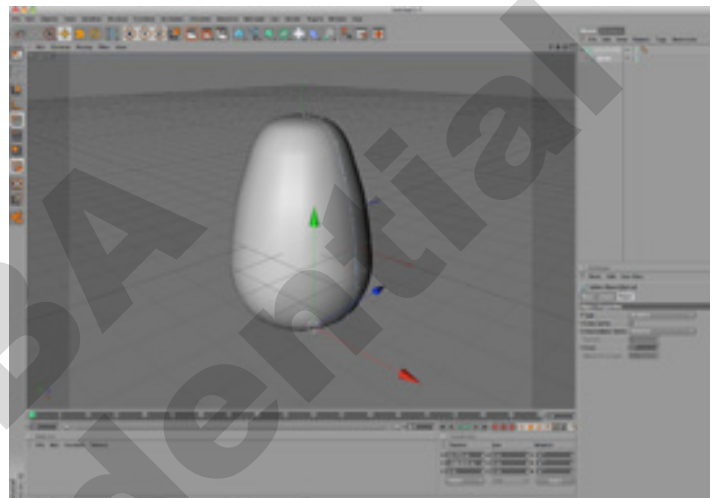
**Class 4a: Modeling the Potato Head Body** continued from previous page

18. In the **Objects Manager**, left-click on the **Spline** and **Drag and Drop** it into the **Lathe NURBS**. Be sure to look for a downward facing arrow. This is similar to what we did in the B.O.B. hierarchy of Objects.



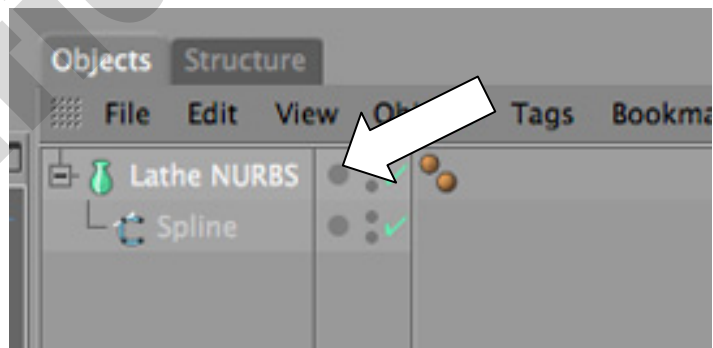
19. Return to the **Perspective Viewport**.

The **Spline** has now been Lathed or revolved and an entire Potato Head body has been created.



***\*Note to Teacher:** Discuss with Students how the Spline has been revolved 360° to create our geometry.*

20. In the **Objects Manager**, left-click **Lathe NURBS** to select it.

**Modeling a Potato Head Body, Eyes, and Nose - 115**

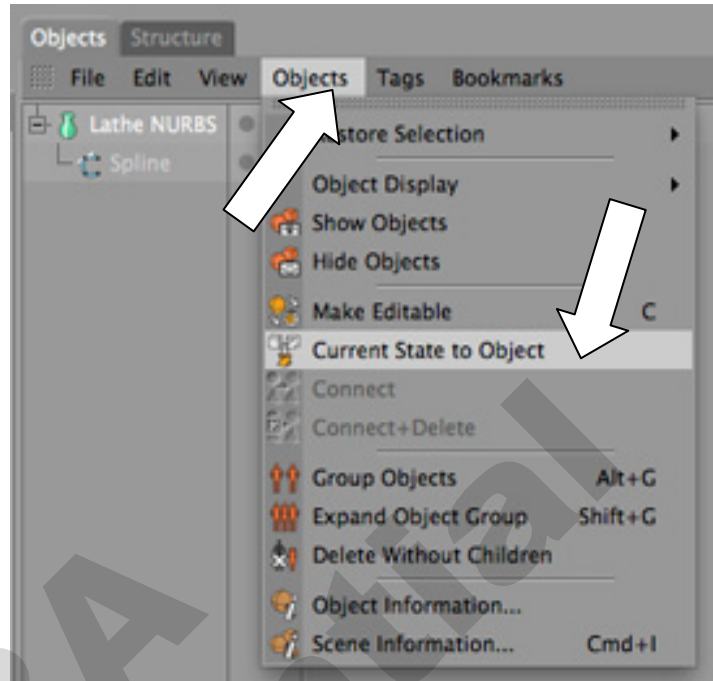


### Class 4a: Modeling the Potato Head Body continued from previous page

We will now break down our lathed shape into simple geometry.

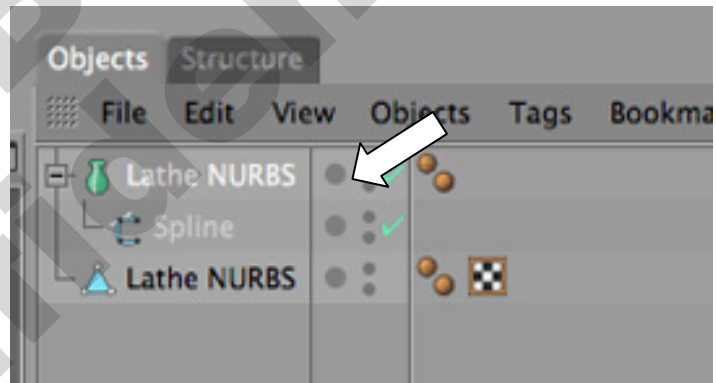
21. In the Objects Manager, **left-click the Objects tab and choose Current State to Object** from the drop-down menu.

**\*Note to Teacher:** *Current State to Object is a function that merges our Potato shape and lathe NURBS together, creating a simple piece of geometry.*

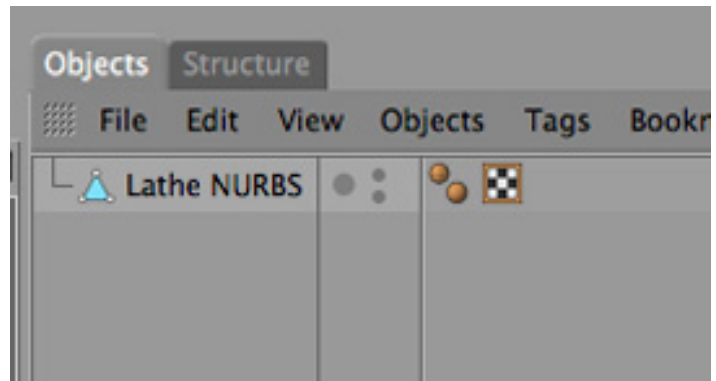


After selecting **Current State to Object**, **Two Lathe NURBS** appear in the Object Manager.

22. **Left-click on the Top Lathe NURBS** and press **delete on your keyboard**.



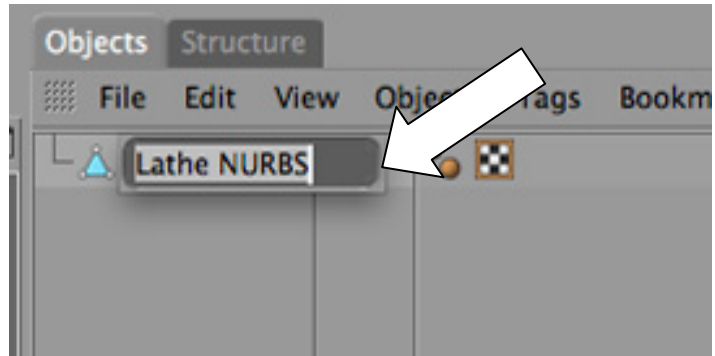
We are now left with the new merged geometry without the **Lathe NURBS** modifier.



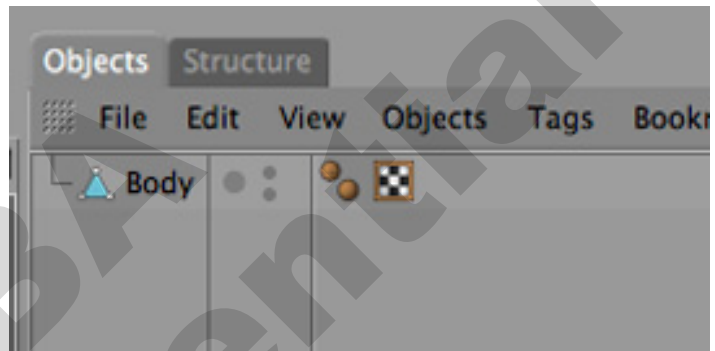
## 116 - Modeling a Potato Head Body, Eyes, and Nose

**Class 4a: Modeling the Potato Head Body** *continued from previous page*

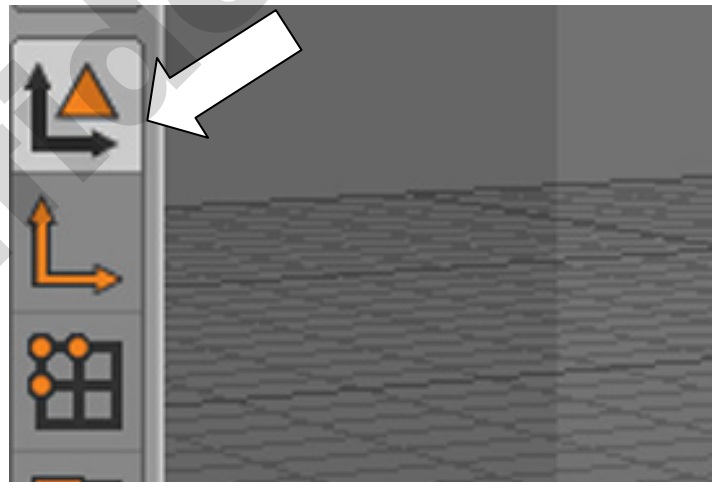
23. In the Objects Manager, **double-click on Lathe NURBS** and rename it **Body**.



Your **Objects Manager** should look like the picture provided.

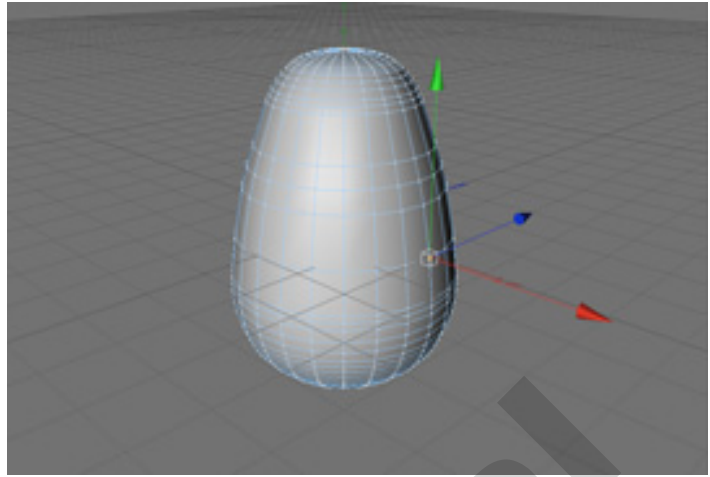


24. In the tools area located on the left side of the Viewport area, **left-click on the Object (Model) tool**.

**Modeling a Potato Head Body, Eyes, and Nose - 117**

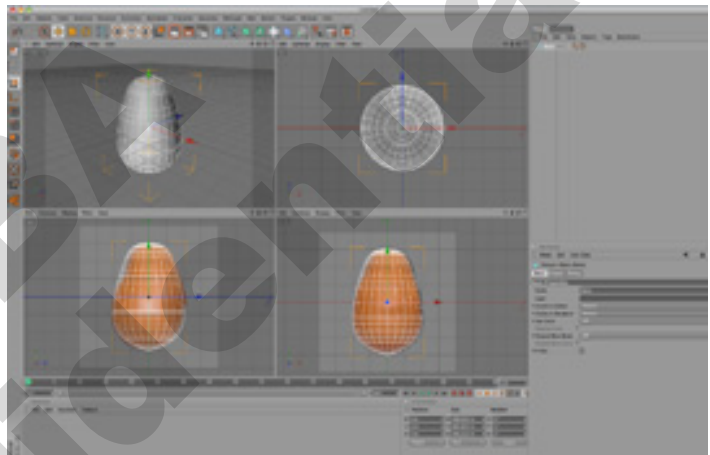
**Class 4a: Modeling the Potato Head Body** *continued from previous page*

Our Potato body is completely symmetrical.

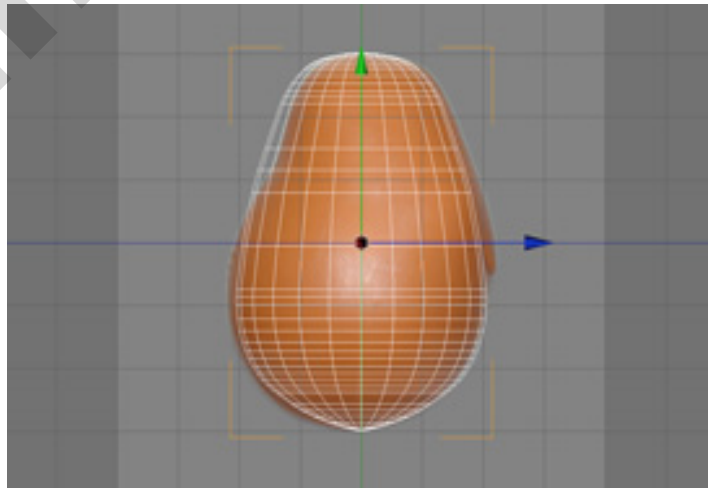


**25. Press the Middle Mouse button** to activate the 4 orthogonal views.

In the next few steps we will mold our Potato body to fit the right view picture.



**26. Left-click your mouse anywhere in the Right Viewport** and press the **Middle mouse button** to make the Right Viewport the full screen view.

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