Course: 3D Design
Title: First Animated Model – Yellow Submarine
Blender: Version 2.6X
Level: Beginning
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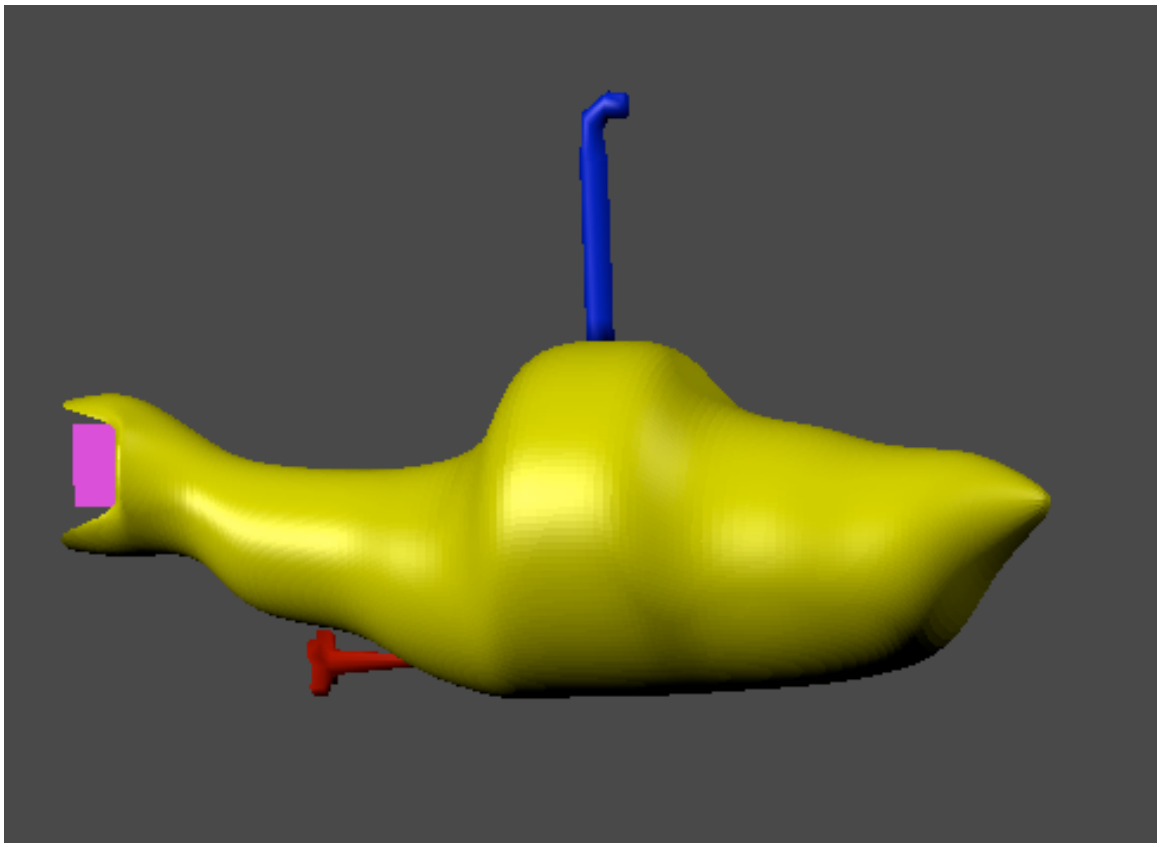
(May 2012)

# First Animated Model – Yellow Submarine



View Yellow Submarine animation HERE

Most of you are perhaps too young to remember the Beatles song "Yellow Submarine". In this tutorial we will create a simple animated model of a yellow submarine.

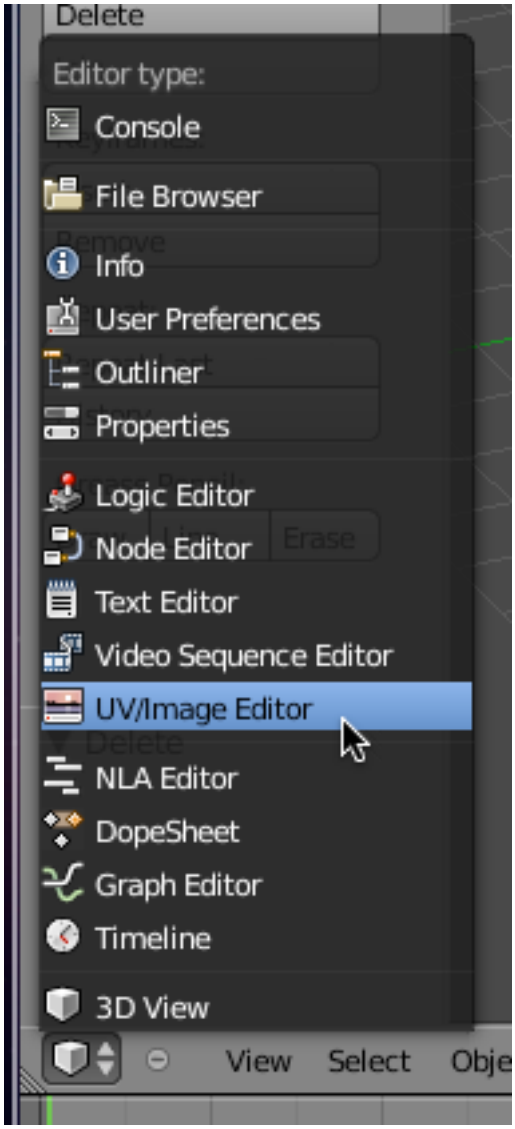
Open Blender. If a default cube object exists, right-click to select it and then press the XKEY and delete the cube.

## Background Image:

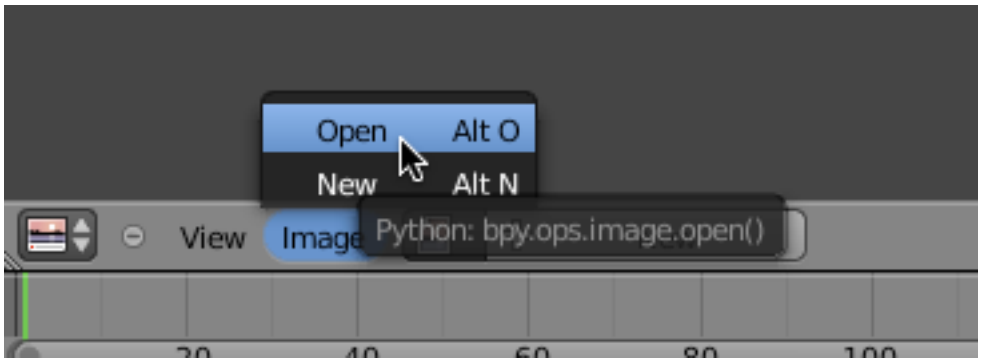
We will use a background image taken from the Beatles Yellow Submarine album cover. This image file called Yellowsub.jpg can be downloaded HERE.

Before we can add a background image file to the Background Image tool we must first add the image to the UV editor

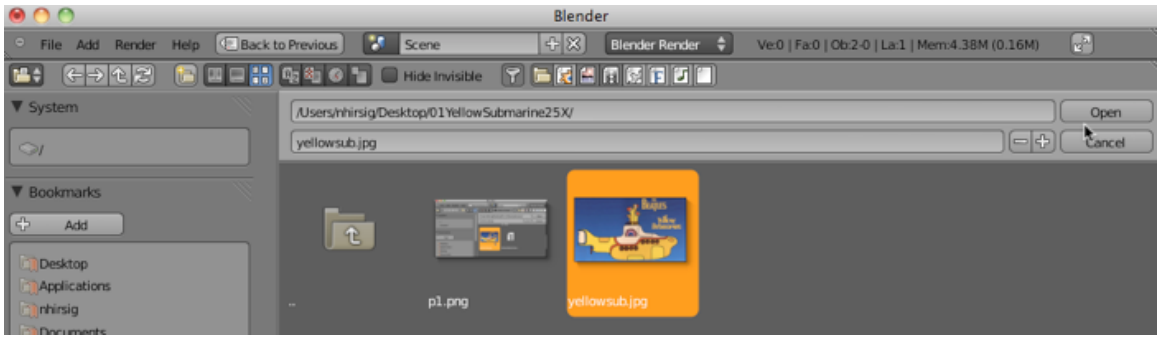
Click on the Editor Type button in the lower left corner of the 3D Editor Viewport Header and select UV Image Editor.




This will open Blender's UV Image Editor. Click on the Image Button in the UV Editor Header and select "Open".



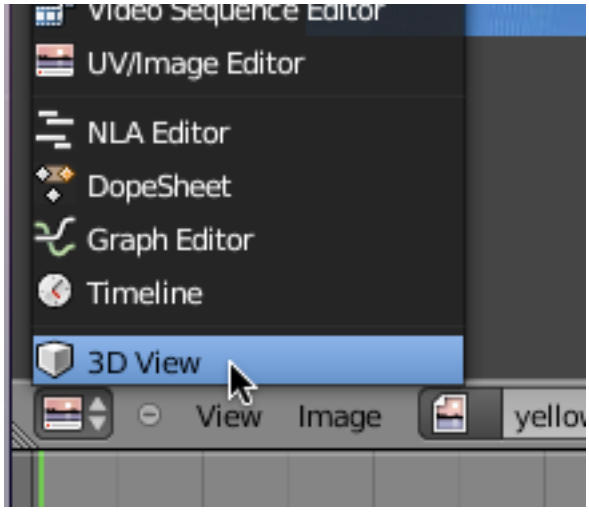

This will open Blenders file Browser. Locate the Yellowsub.jpg file, select it and press on the Open button.




This will place the Yellowsub.jpg image into the UV Editor.

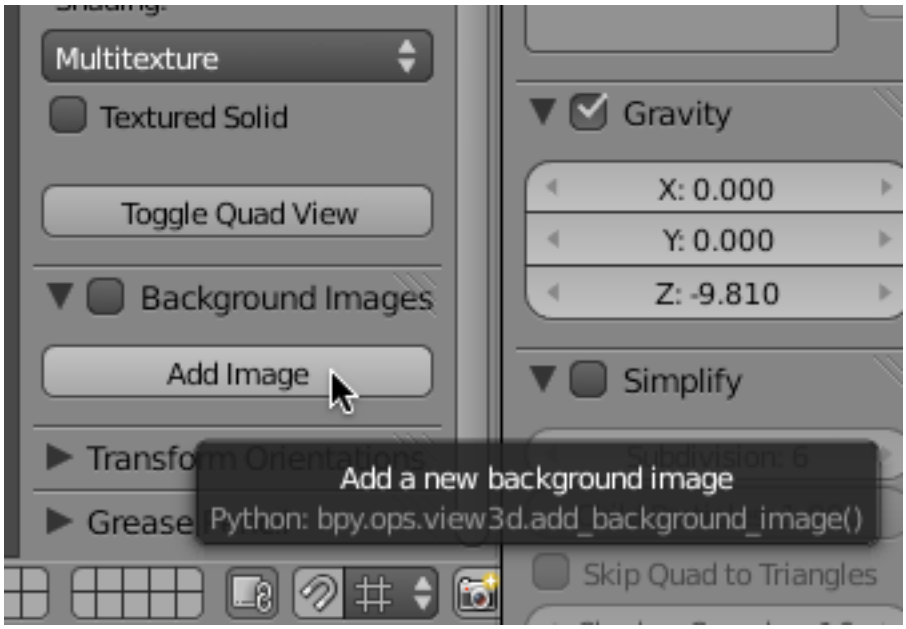

Now we will add the image to the Background Images Panel.

Click on the Editor Type button in the lower left corner of the UV Image Editor Header and select 3D View.



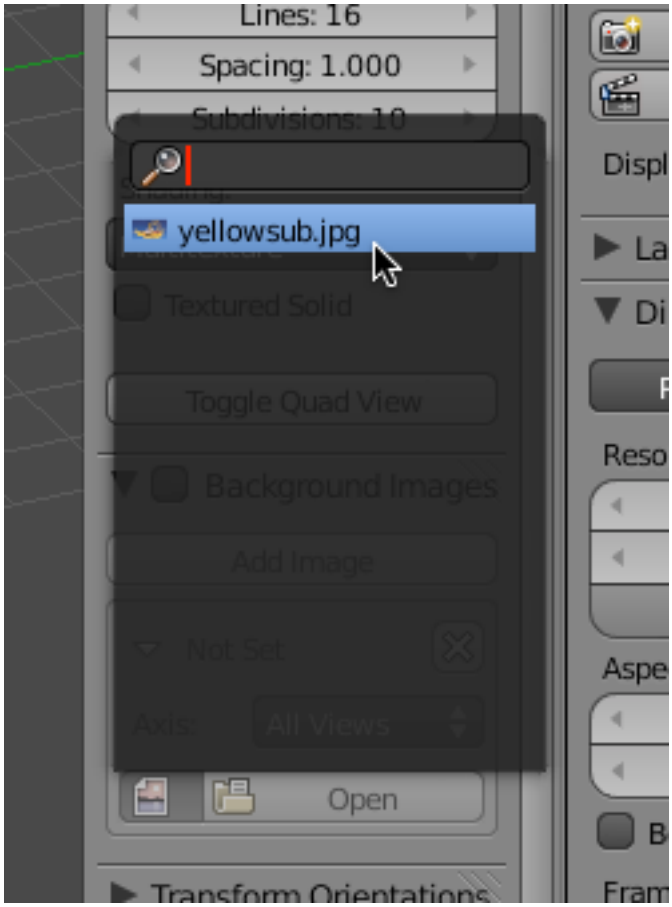
To incorporate this image into our Blender scene open up the right properties panel of the 3D Editor by clicking on the plus (+) in the upper right corner of the 3D view port or press the NKEY


Scroll down to the Background Images Panel and click on the “Add Image” button.

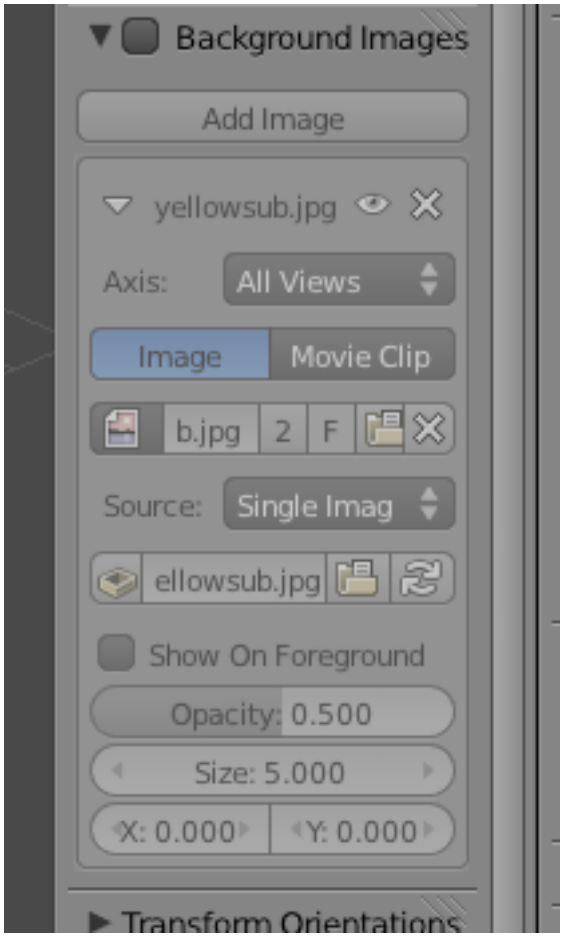



Click on the Browse ID Data button located to the left of the open button.


Select the Yellowsub.jpg image file from the list.



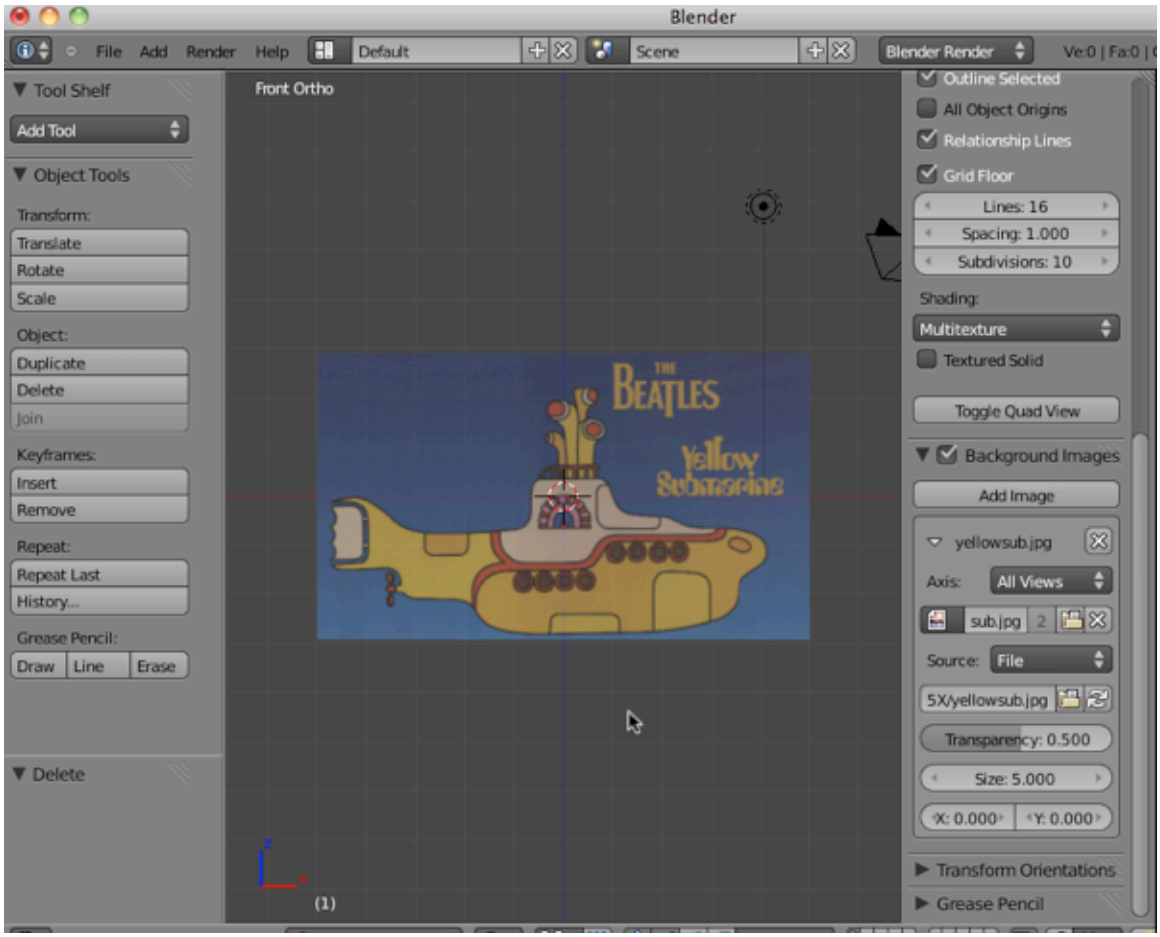
This will add the Yellowsub.jpg image file to the background image tool and it will be listed in the Background Images panel.




Note that at this point the “Background Images” panel is a bit grayed out. This is because we have not yet activated the Background Image tool. Place a checkmark into the checkbox to the left of the Background Image panel name (by clicking on it). This, will active the tool.


This will display the Background Image panel on your display. To see the background image go to front orthographic view (NUMPAD-1)

NOTE: BACKGROND IMAGES ONLY DISPLAY WHEN IN ORTHOGRAPHIC PROJECTION MODE. IF YOU IN PERSPECTIVE MODE, PRESS (NUMPAD-5) TO GO INTO ORTHOGRAPHIC PROJECTION MODE.




The background image will not render. It is used only as a guide.

We will be using this background image as a modeling guide in Left Side view only. By default the image will be displayed in all orthographic views. Click on the Views dropdown box and select Left side view.


We also want the image to be scaled a bit larger than the default scale of 5. Click (repeatedly) on the control arrow to the left of the Size control until the Size scale is set to 7.


Notice now that the yellow sub background image will only be displayed in Left Side Orthographic view. Press CTRL-NUMPAD-3. This is the Blender shortcut for Left Side view. The background image should appear on your display (slightly grayed out).

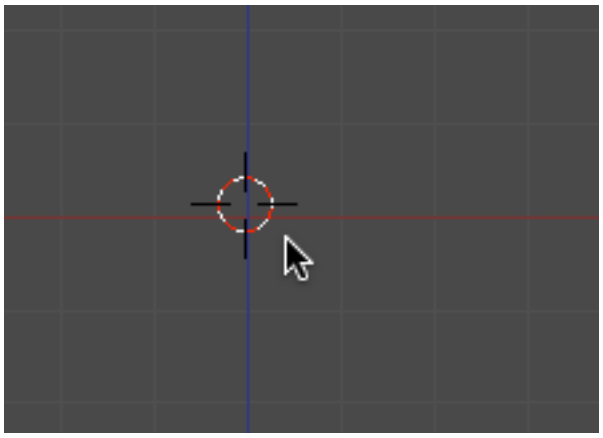
(Note: If you are in Left Side Perspective view click NUMPAD-5 to switch to Orthographic view)


## First, Some Practice:

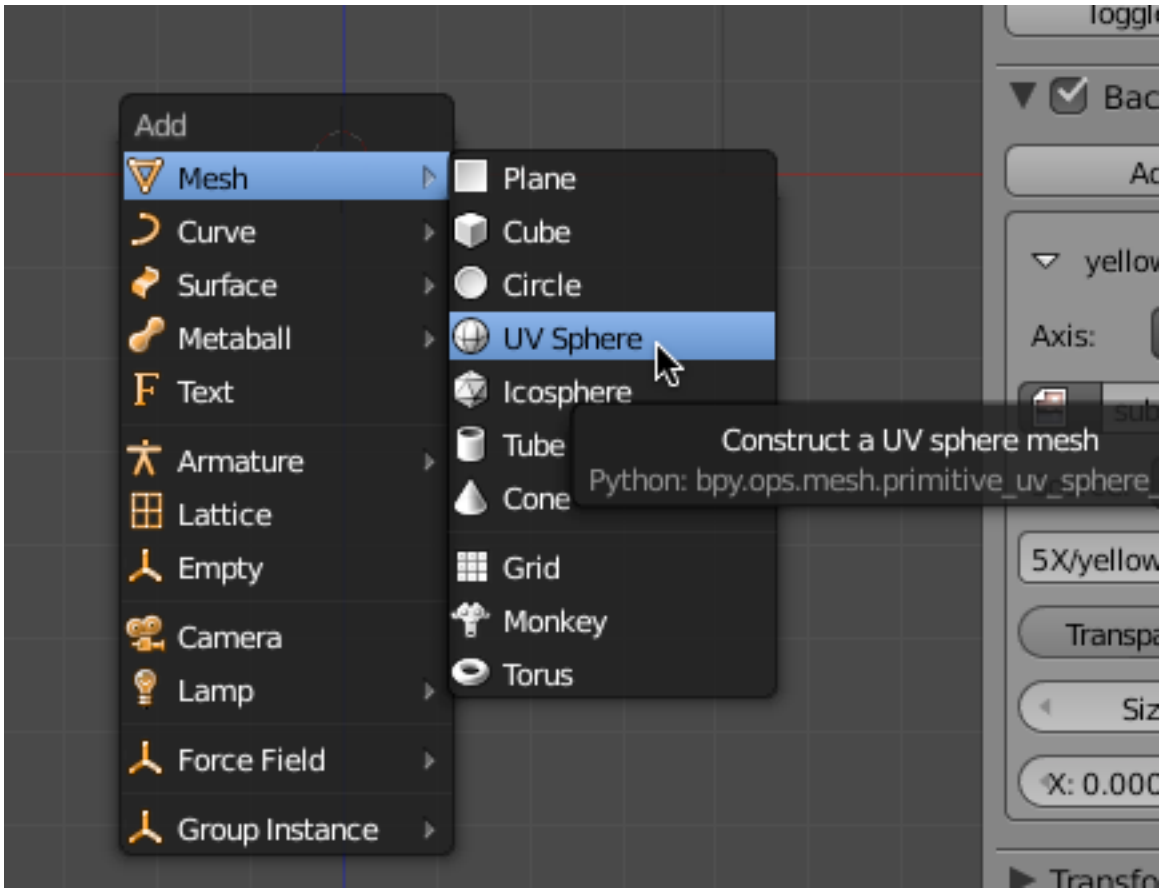
Before we model the submarine we will create a UV sphere objects and look at some of Blender's basic tools.

Go to Front View (NUMPAD-1)

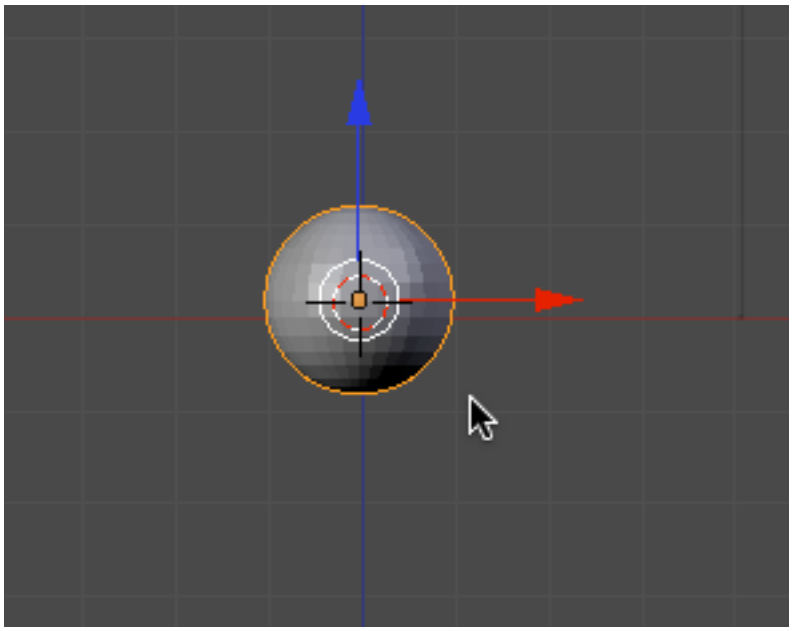
Left click in the center of the display to set your 3D cursor.



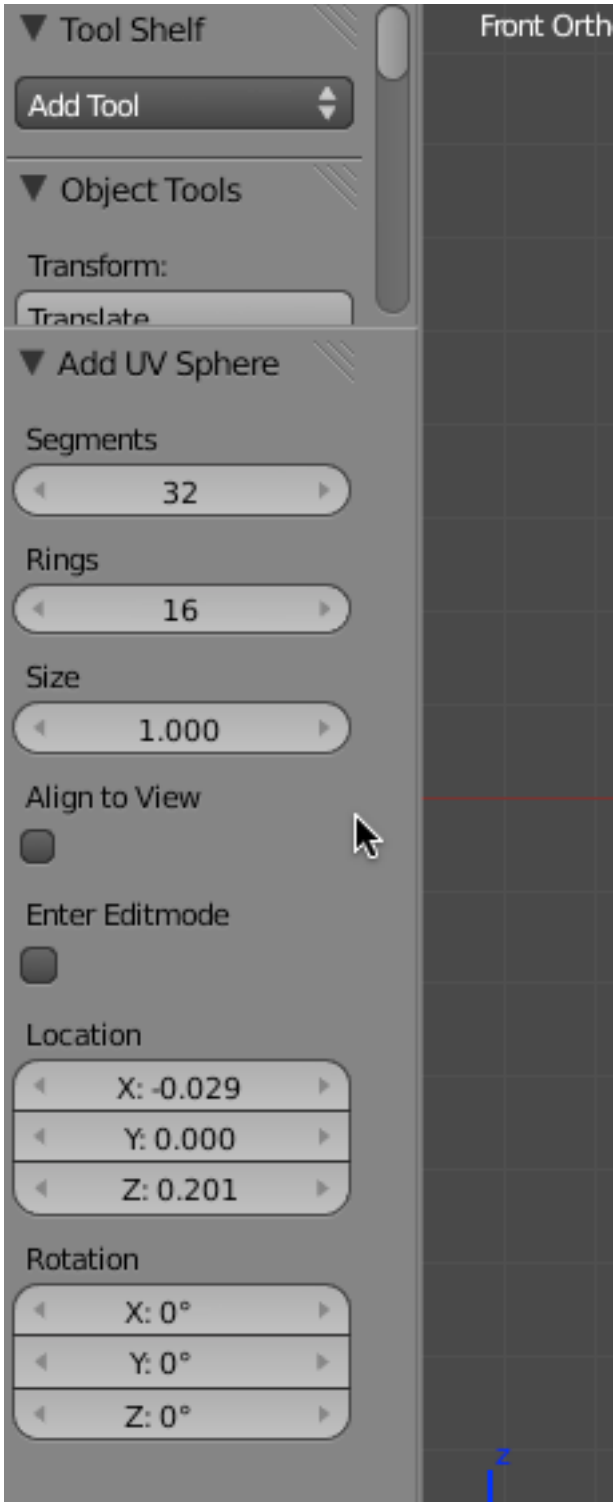
Press SHIFT-A. This will display Blender's ADD menu. Select Mesh / UV Sphere.




This will place a primitive UV Sphere object in your Blender Scene with its center point at the location of your 3D cursor.

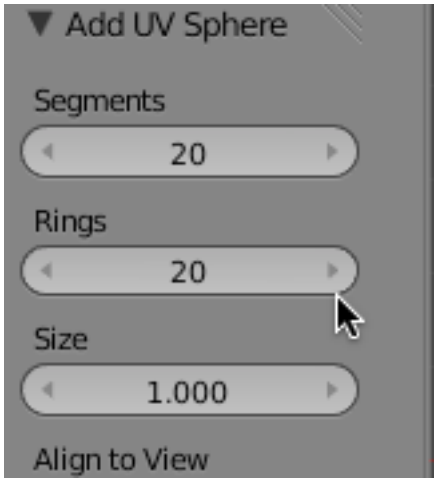


Notice the Add UV Sphere controls now available in the left 3D Viewport panel (You may have to drag this window up a bit to see all of the controls)

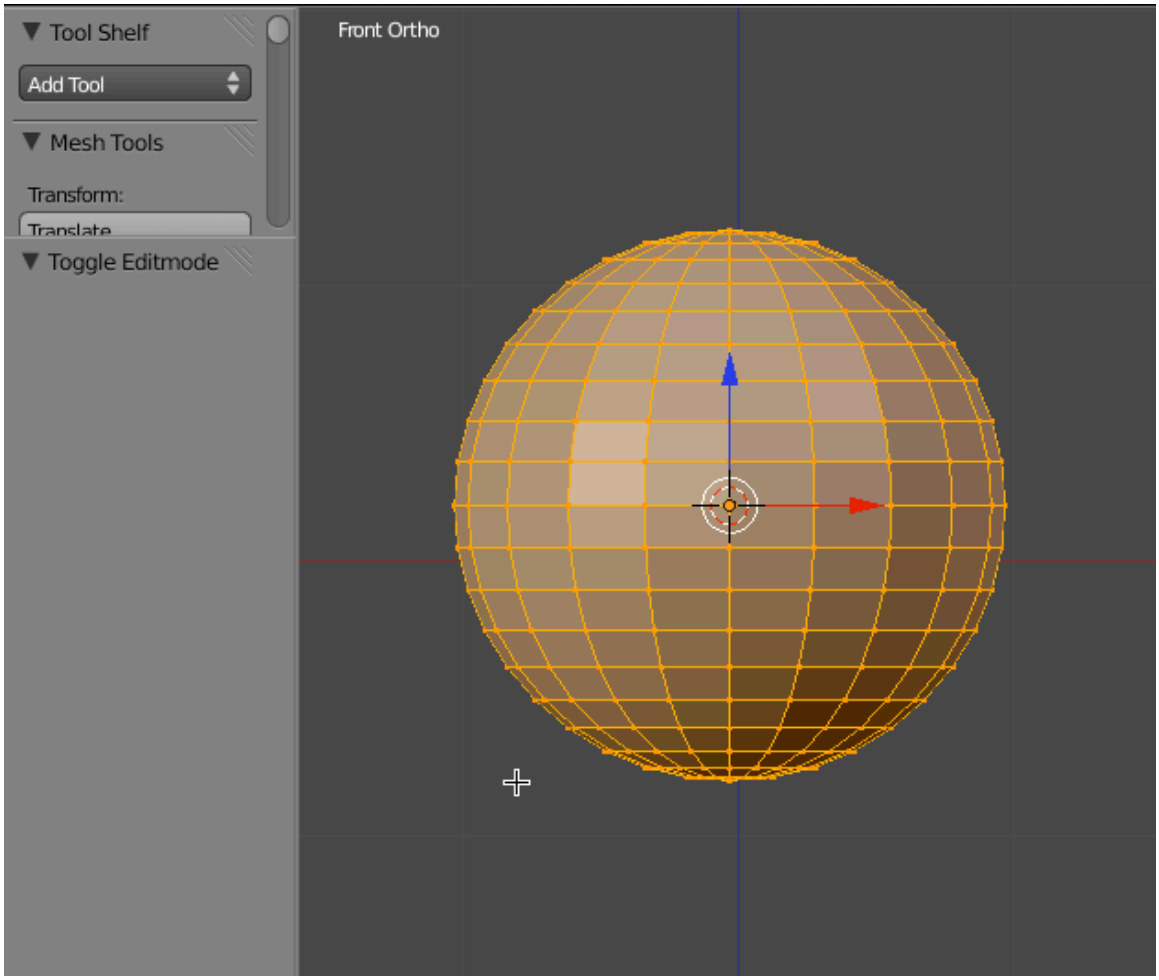



Click on the arrow to the left of the default 32 segments and make it 20 segments.

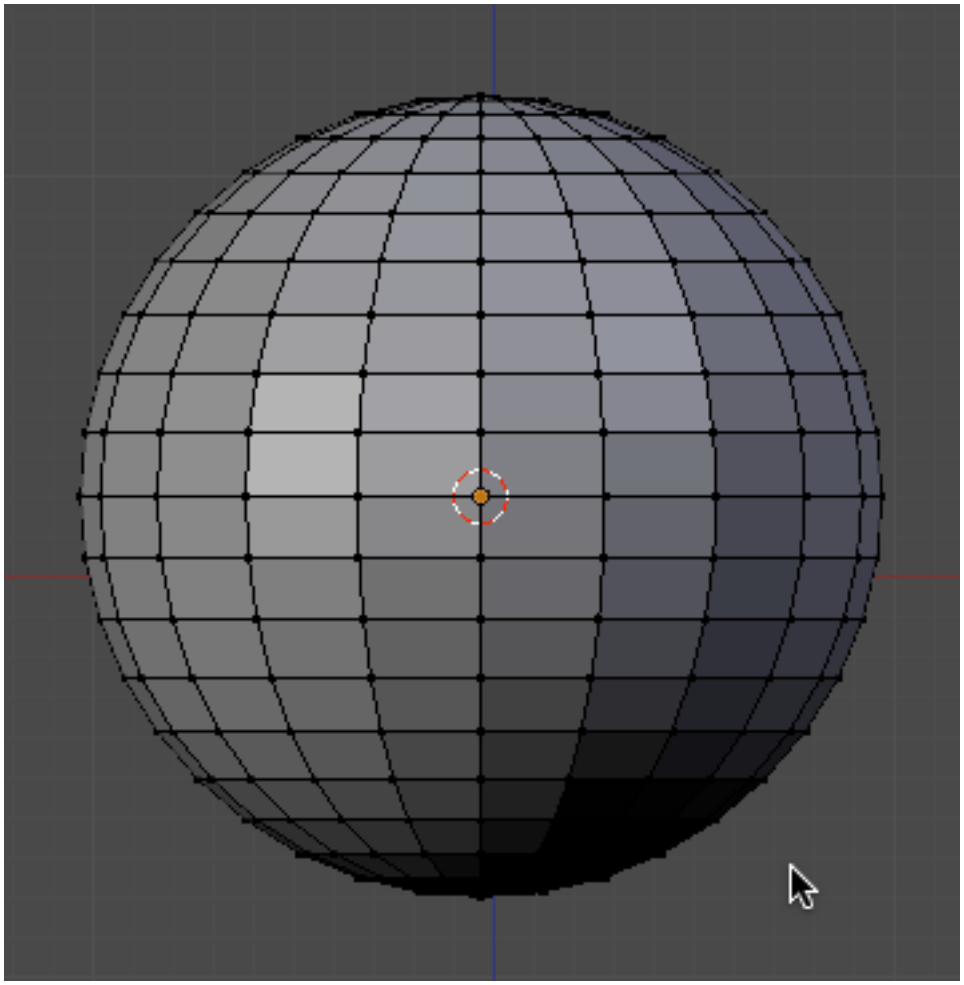
Click on the arrow to the right of the default 16 rings and make it 20 rings.




Zoom in a bit by scrolling up your scroll wheel. The new UV Sphere object is currently in Object Mode. Click on the TAB key to place the object in EDIT mode.

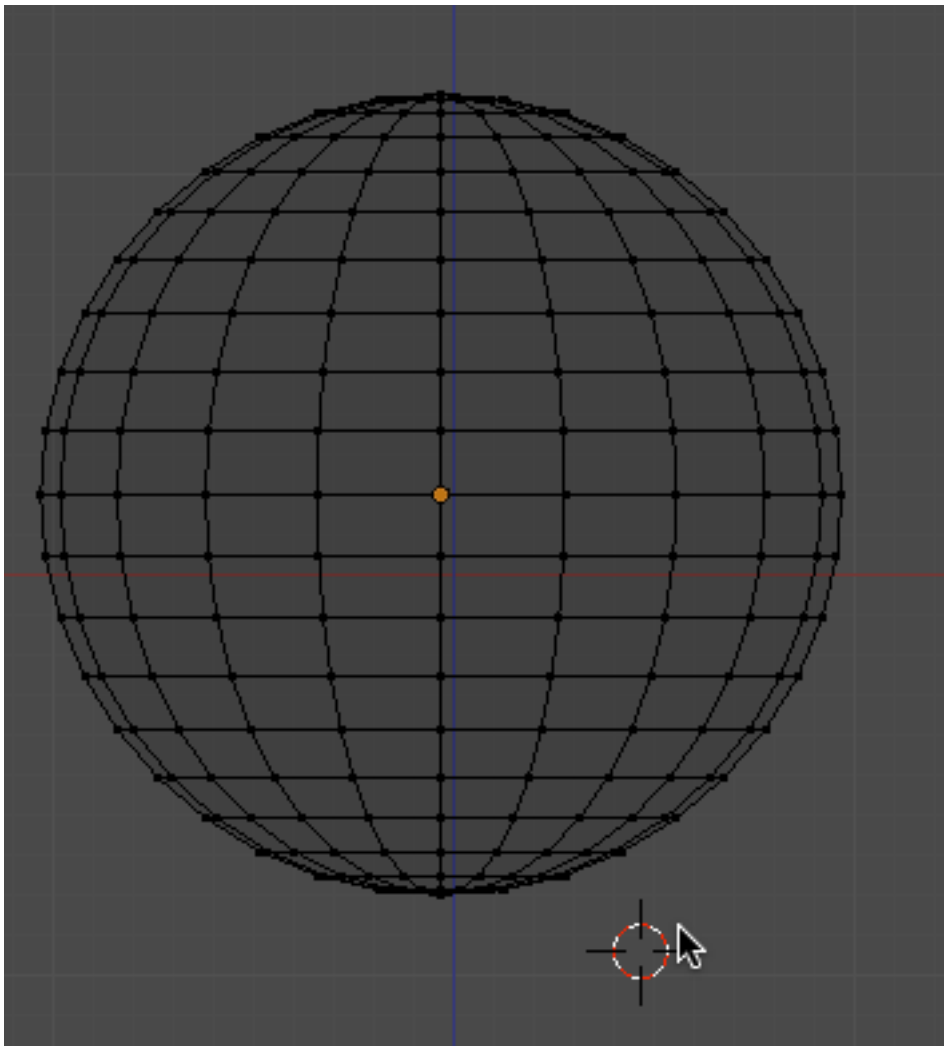


The TAB key toggles between Object mode and Edit mode. By default all of the vertices, edges and faces of the object are selected. Press the AKEY to deselect all of the spheres sub-objects.



The AKEY toggles between selecting everything and de-selecting everything.

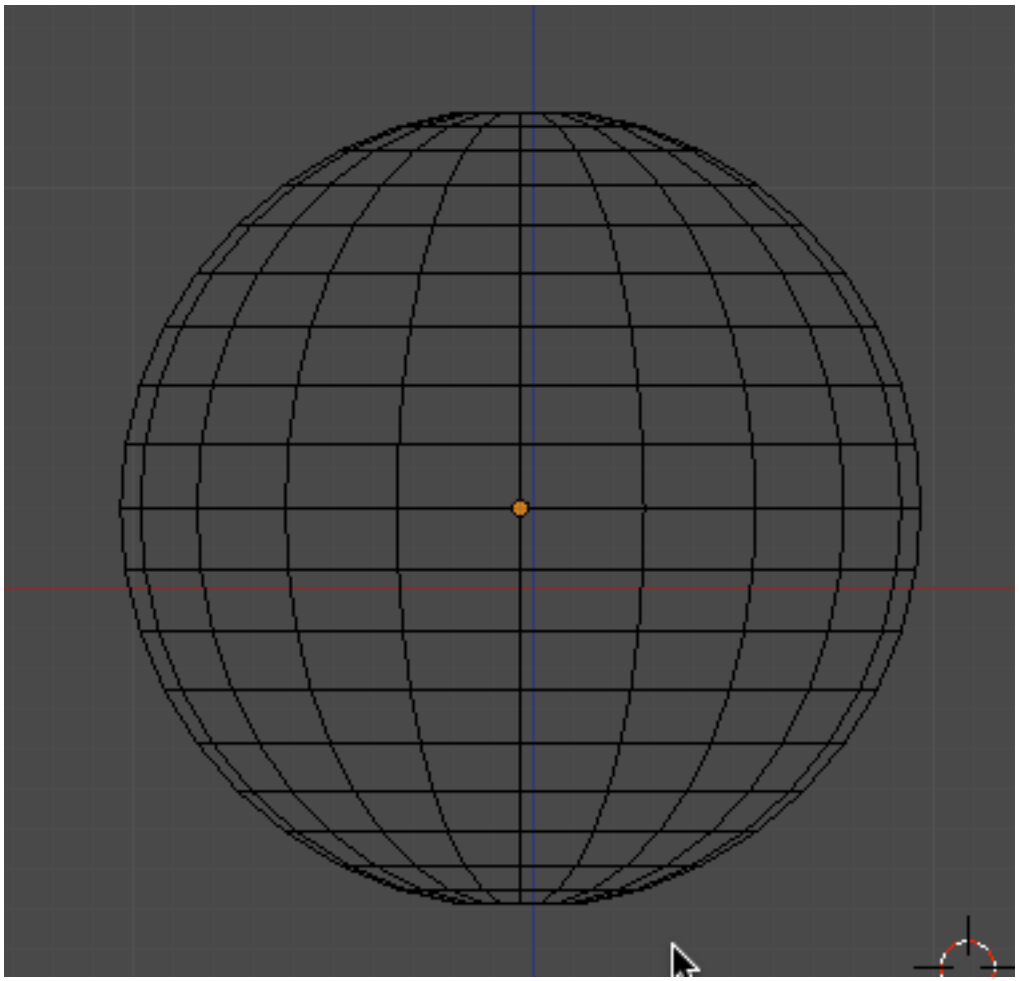
Press the ZKEY. The sphere is now displayed in wireframe mode.



The ZKEY toggles between solid shading mode and wireframe shading mode.

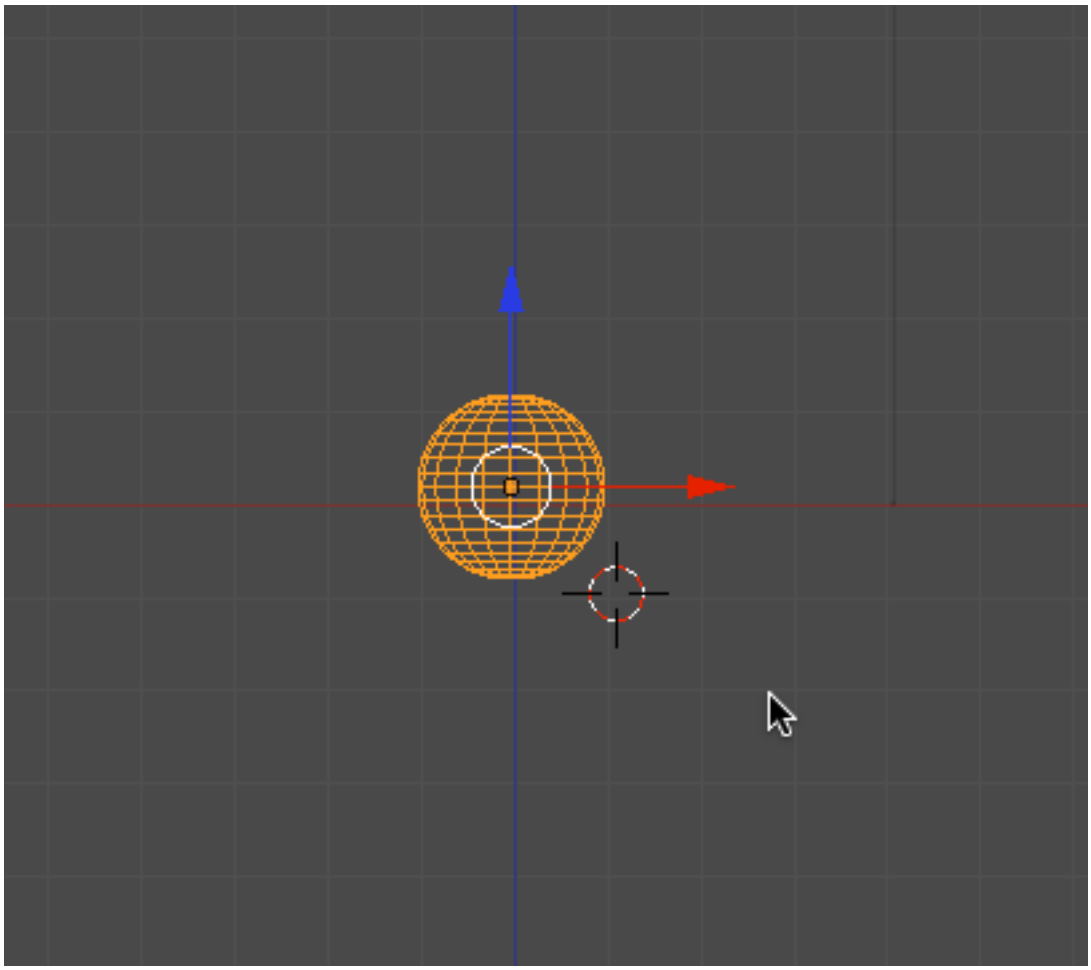
Go back to Object mode (TAB).

Press the AKEY to deselect the sphere.



Select the UV Sphere by right clicking on any of the wireframe lines.

Zoom out a bit by scrolling down your scroll wheel.



Notice that with the UV Sphere selected, Blender's Transform Widget is displayed at the sphere's center. The Transform widget has a red arrow and a blue arrow.

Click and drag the red arrowhead. This allows you to move an object along the object's X-axis. (Try it)

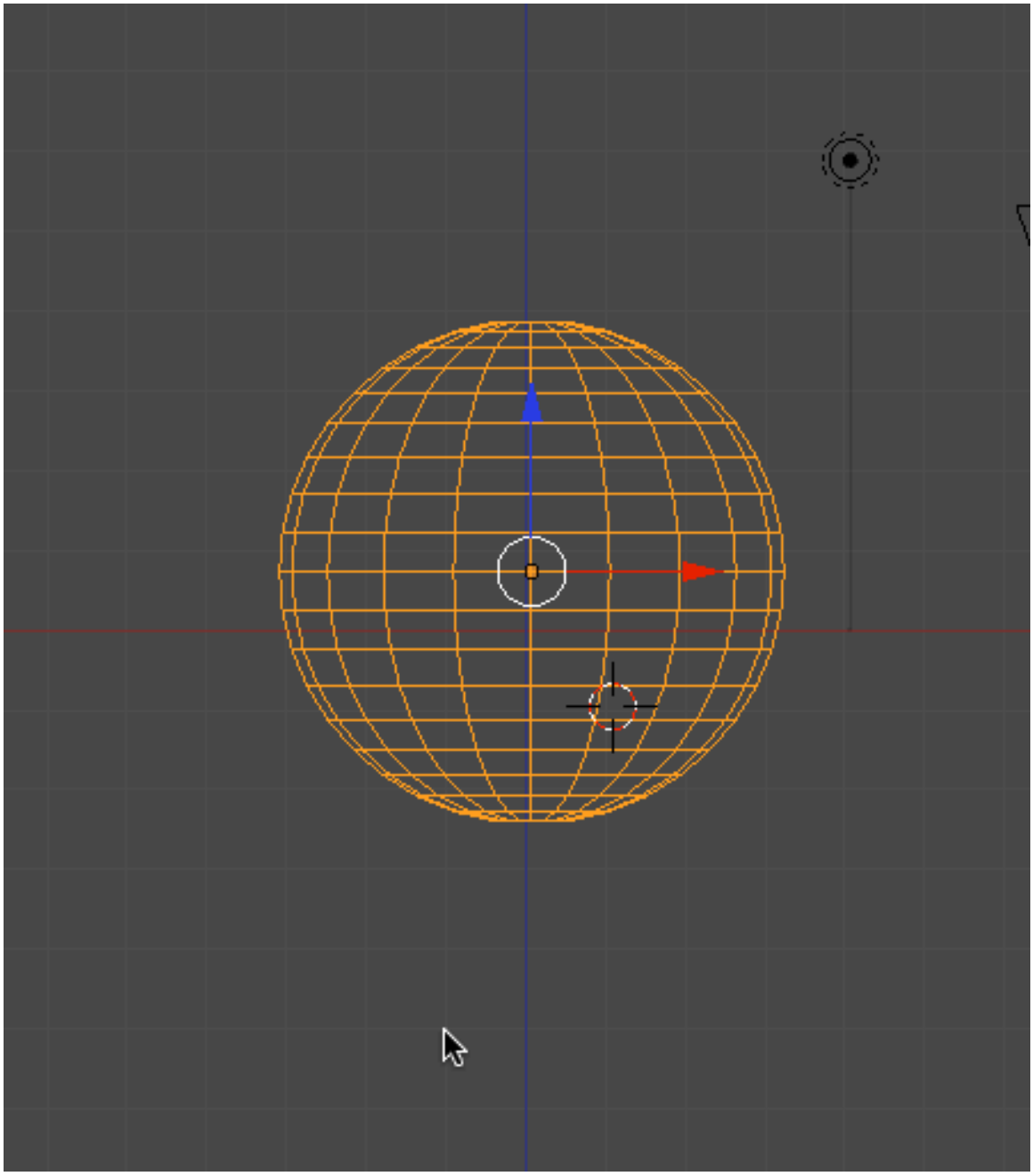
Click and drag the blue arrowhead. This allows you to move the object along the object's Z-axis. (Try it)

Another way to move (translate) the sphere is to press the GKEY (Grab). This allows you to move the sphere anywhere in the display. Left click to drop the sphere into place. (Try it)

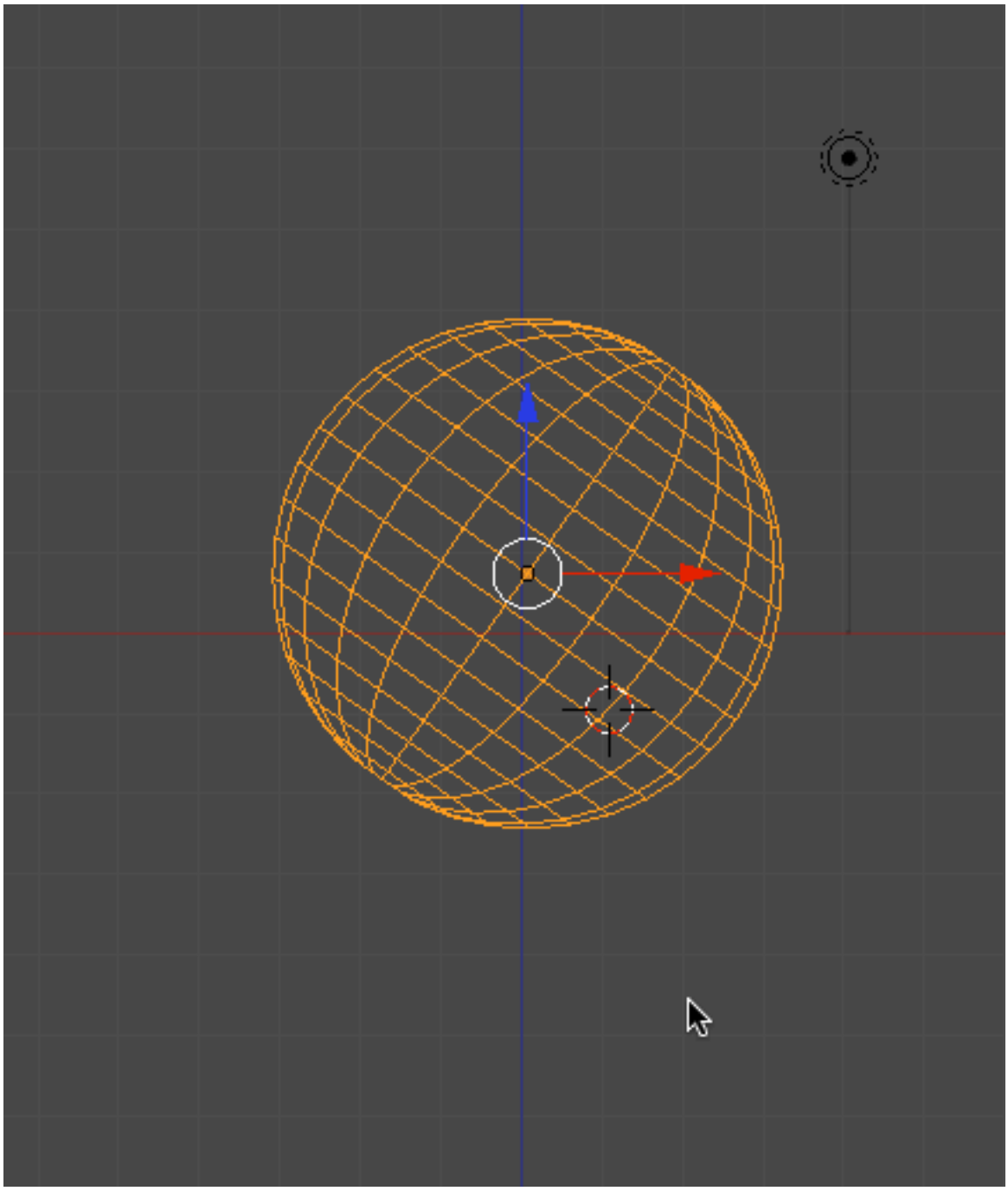
Press CTRL-Z. This is Blender's UNDO command. Notice that the UV sphere returns to the last position.

Most of Blender's operations can also be canceled in the middle of the operation. Press the **GKEY** and grab the sphere and move it about. Instead of left-clicking to place it, press the **ESC** (Escape) Key. This cancels the grab operation.

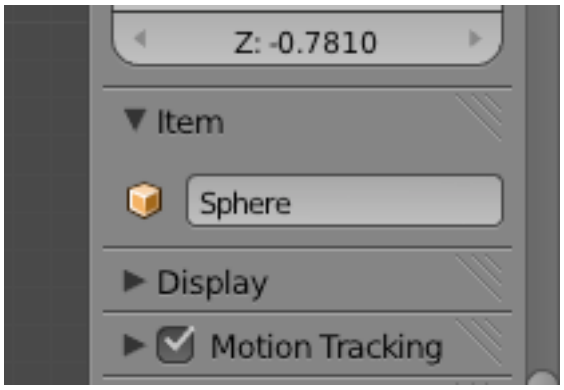
Press the **SKEY** (Scale). Move your cursor toward the object's center to scale it down or away from the object's center to scale it up. Left-click to place the scale.



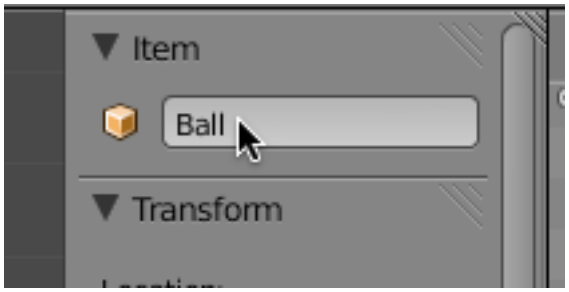
Press the **RKEY** (Rotation). This places the object in Rotation mode. Move your cursor in a circular pattern and the object will revolve with it. Left-click to place the rotation.



Notice at the middle of the right side 3D Editor panel the UV Sphere is named “Sphere”. Each object in Blender has a unique name.



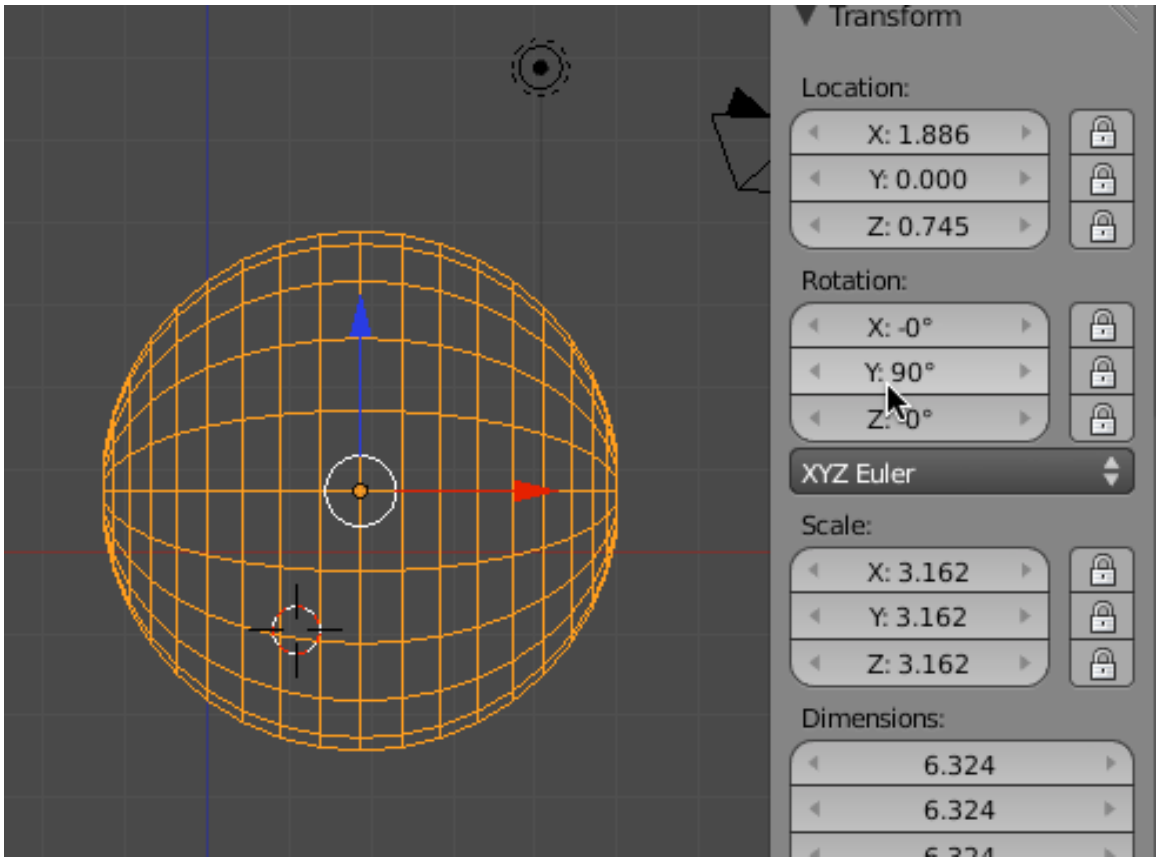

Change the name to “Ball” by clicking on the name and typing in Ball, then enter




Note that the object “Ball” also appears in the Outliner panel


The right side 3D Editor control panel (called the properties panel) also allows for changing the object’s Location, Scale or Rotation (Transforms) numerically. Click on the

arrow button to the right or left of the ROTATION-Y entry or click on the number and type in a new one. (Press enter when done typing)




Press CTRL-Z to UNDO.

Press CTRL-Y to REDO.

Press the XKEY and delete the sphere.

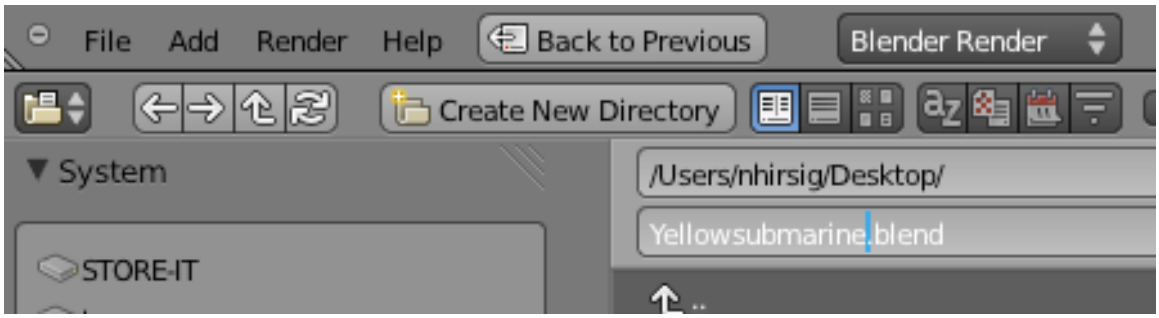
Go to Left Side View (CTRL-NUMPAD-3). Note that the yellow sub background image is displayed in this view.

(Note: If you are in Left Side Perspective view click NUMPAD-5 to switch to Orthographic view)


If you are using a MAC computer - Press SHIFT-COMMAND-S to save your Blender file.

If you are using a PC computer – Press SHIFT-CTRL-S to save your Blender file.

This displays Blender's File Browser Editor. Locate the folder you want to save your Blender file (.blend). Here I have chosen my desktop. Type in "yellowsubmarine" in the filename line and press on the "Save as Blender File" button.




Your Blender file (.blend) is now saved.


Note that Blender adds the file extension (.blend) automatically. Once a file is saved once you can use the shortcut **COMMAND-S (MAC) or CTRL-S (PC)** to save your file.

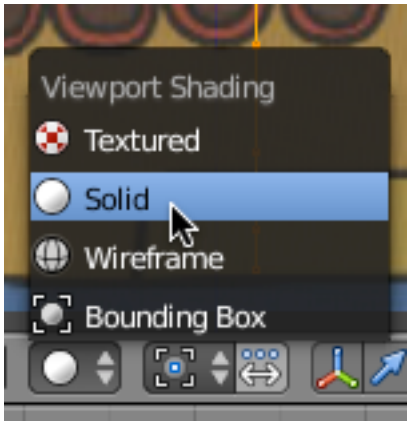
These are many of the basic Blender tools you will need to model the submarine. We can now get down to the real modeling.

## Modeling:

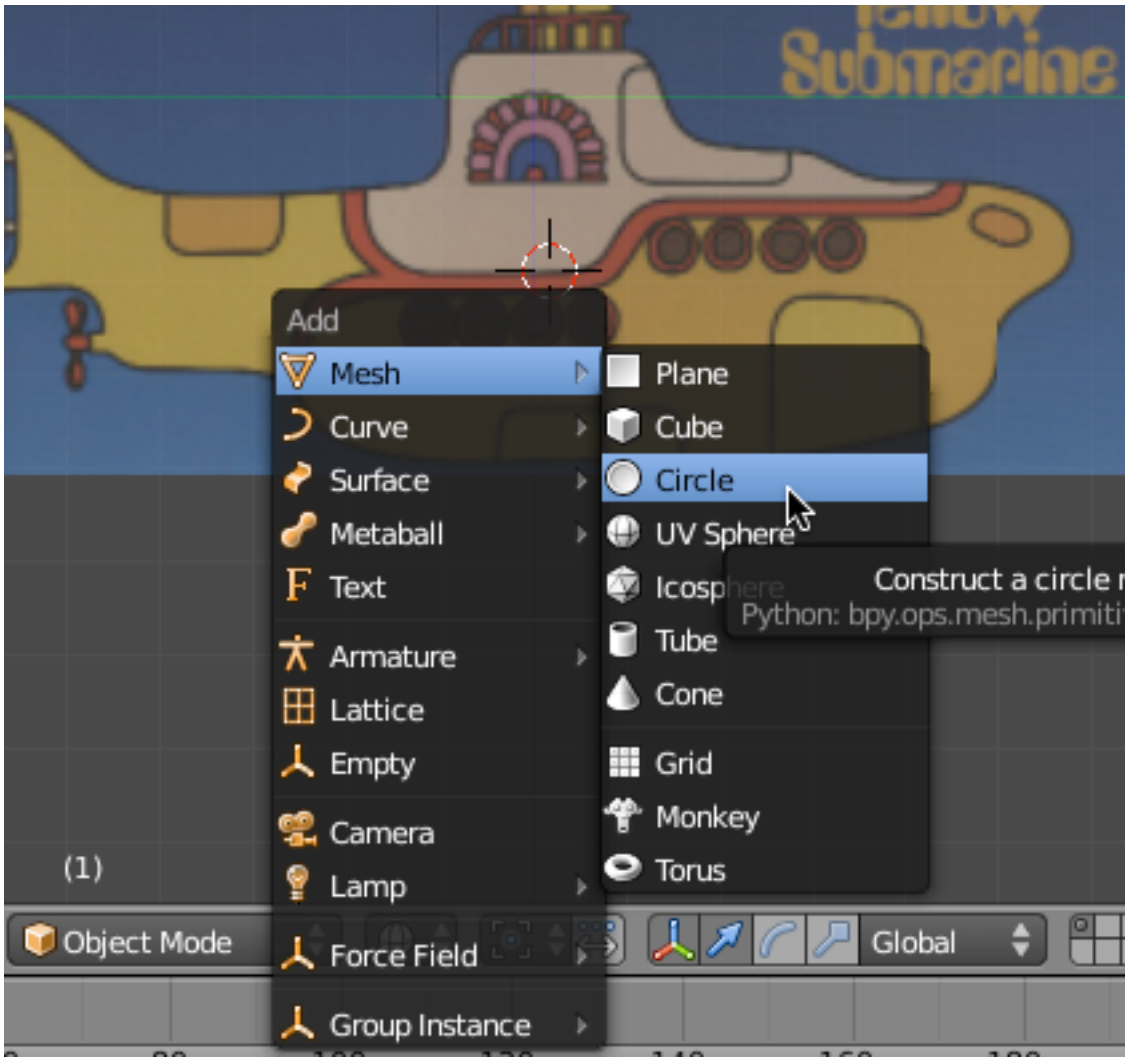
You should now be in Left Side Orthographic View (CTRL-NUMPAD-3)

Place your 3D cursor in the center of the yellow sub background (by left-clicking there).

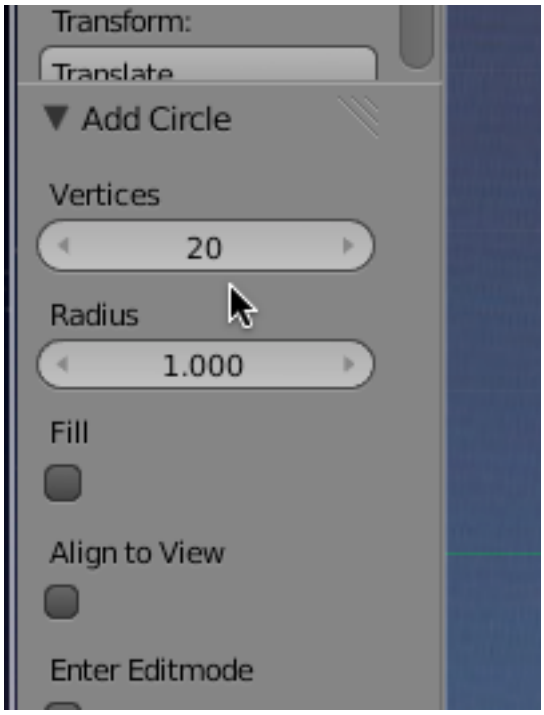

Make sure you are in solid shading mode. Click on the shading display dropdown box on the 3D viewport header and make sure it is set to solid.



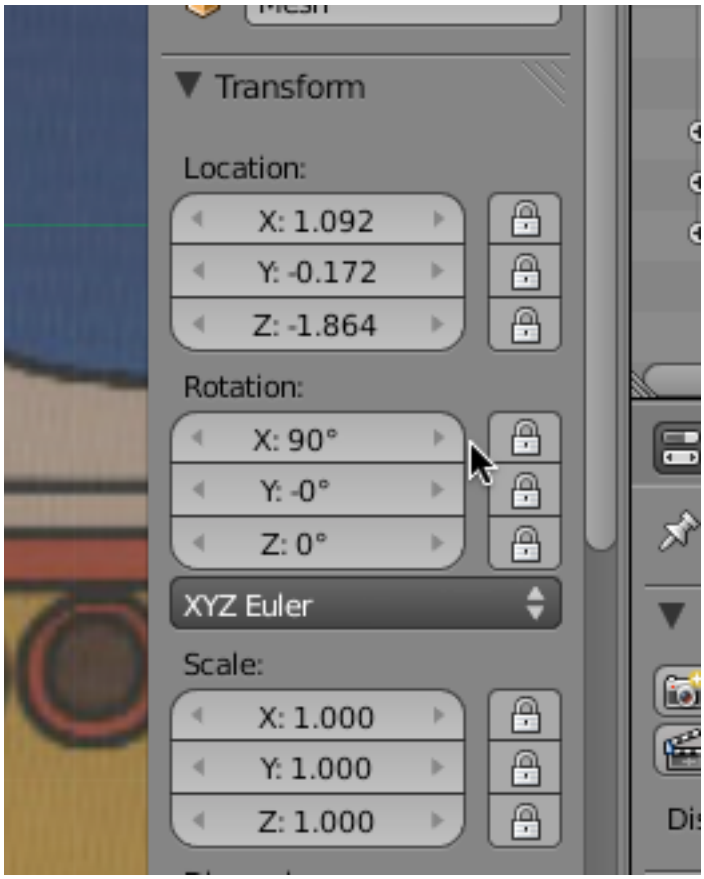

Press SHIFT-A. This will display Blender's ADD menu. Select Mesh / Circle.



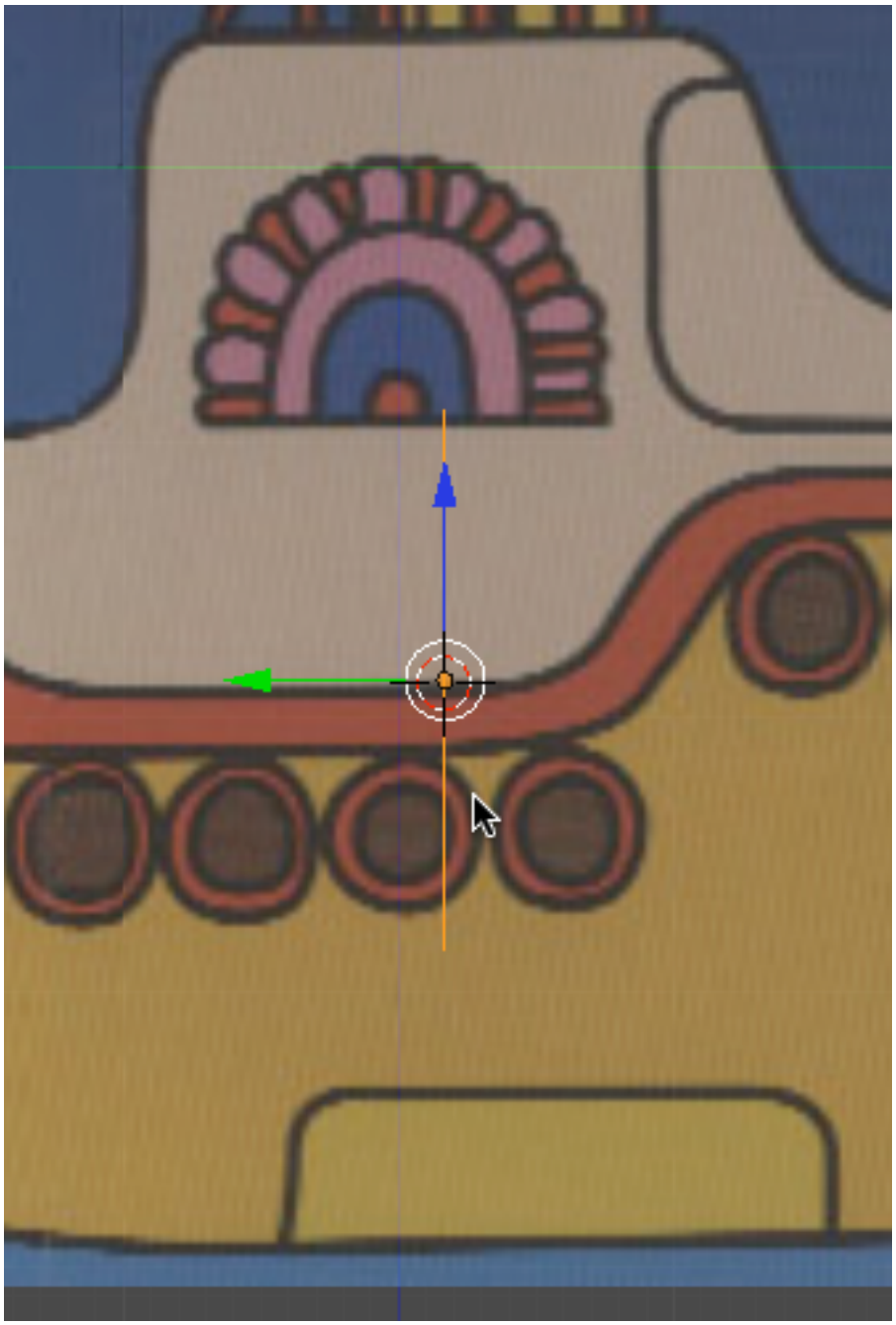

In the Add Circle panel on the left 3D Editor viewport panel set the number of vertices to 20.



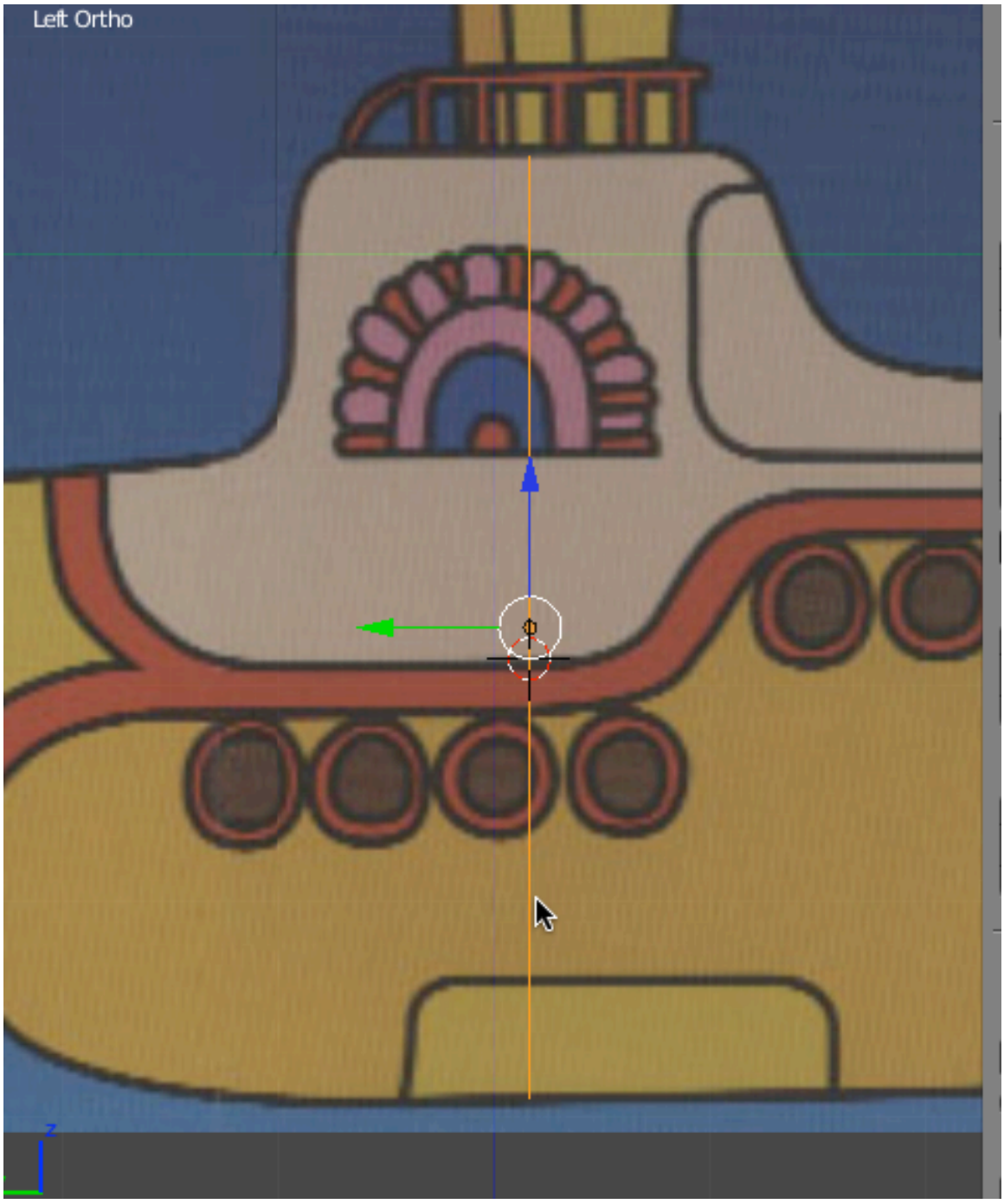

In the right 3D Editor Viewport properties panel set the Rotation X to 90 degrees.



Zoom in a bit and look at the circle object.

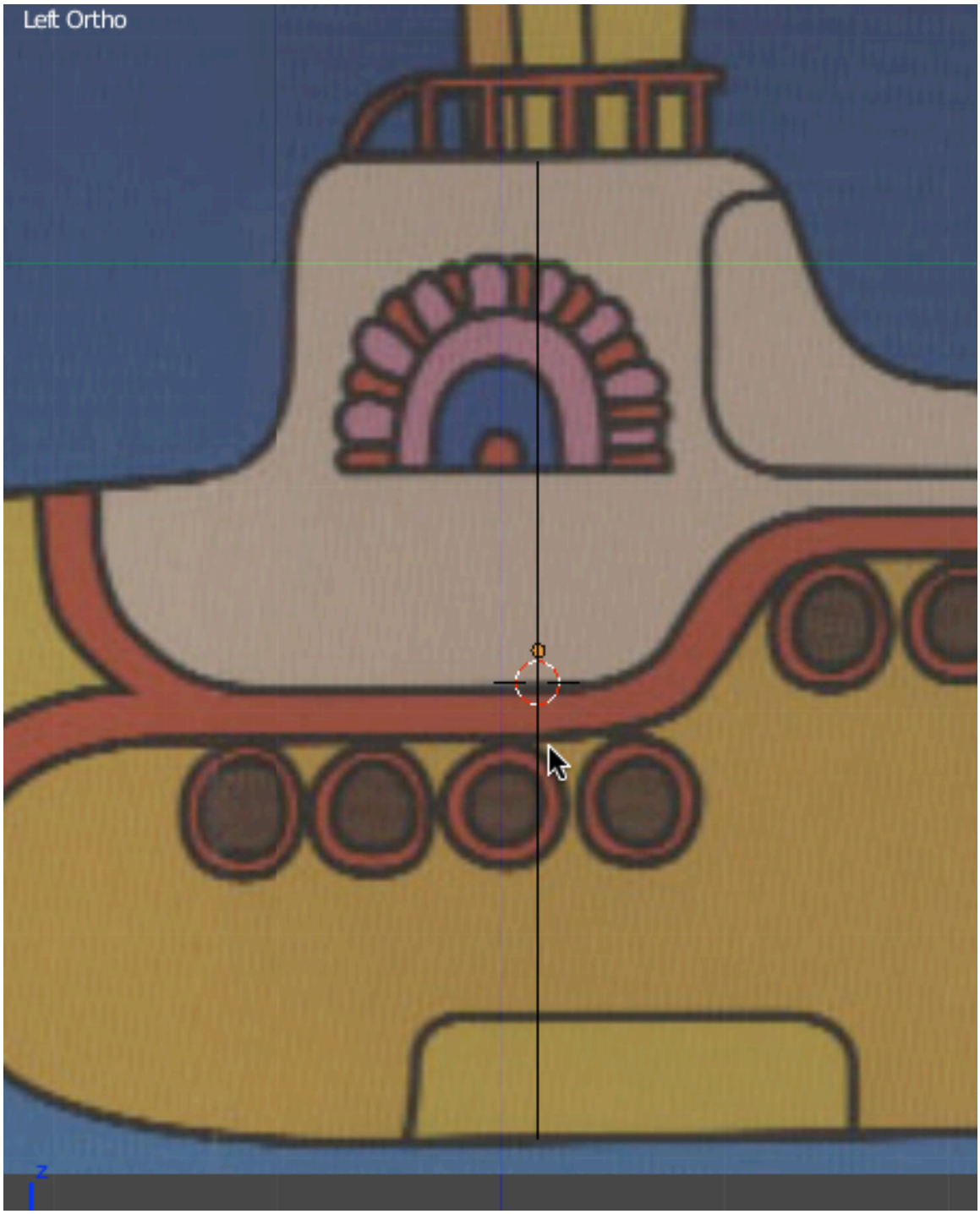


At this point it look like a yellow line running vertically on the display.  This is because we are looking at the circle from the side and thus it looks like a 2 dimensional line. Press the SKEY (Scale) and scale up the circle object until it is as large (vertically) as the largest part of the sub.

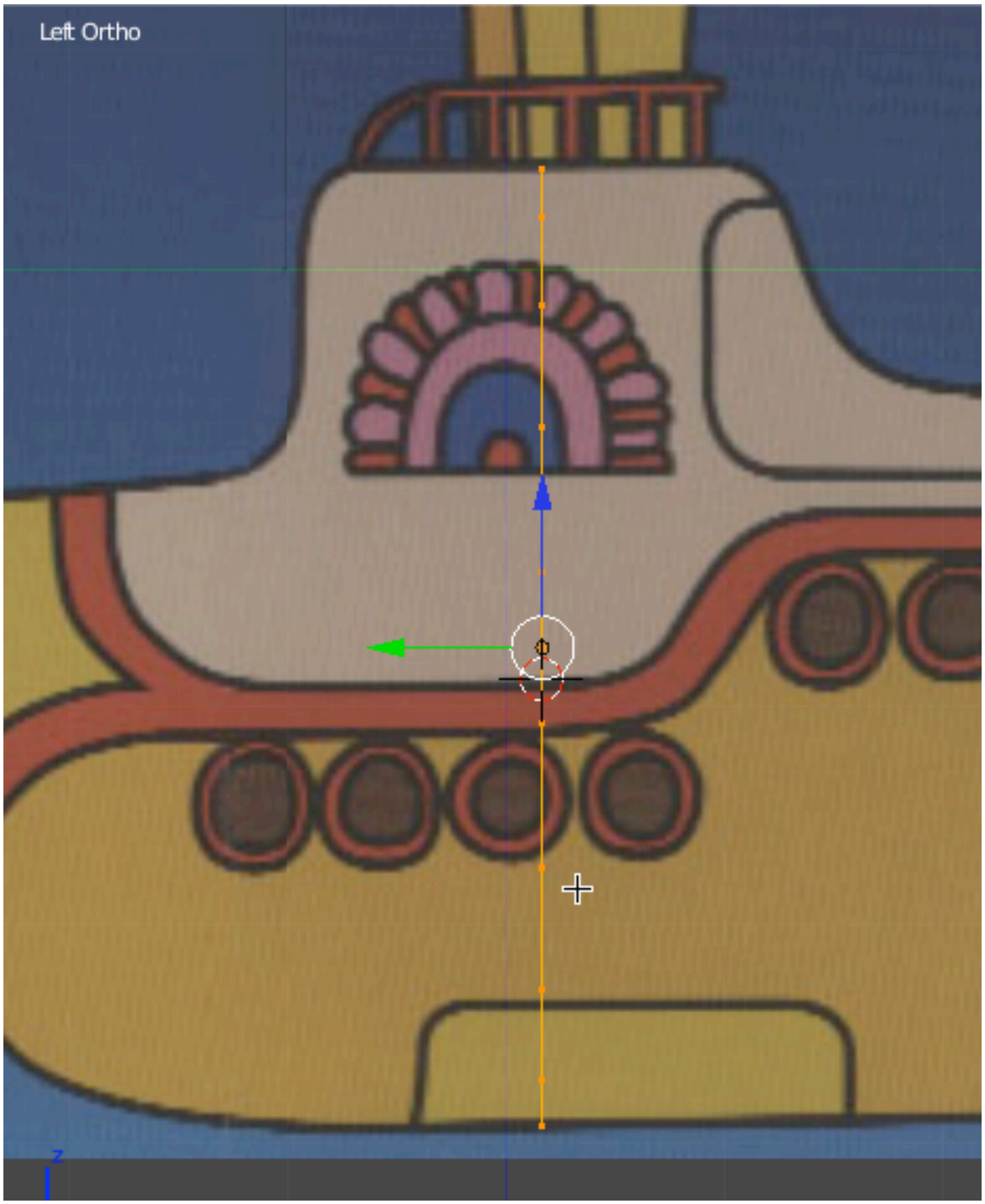



Note: You may have to use the green and blue translate (move) arrowheads to position the circle object as shown above - perhaps even SKEY (Scale) it a bit up or down.

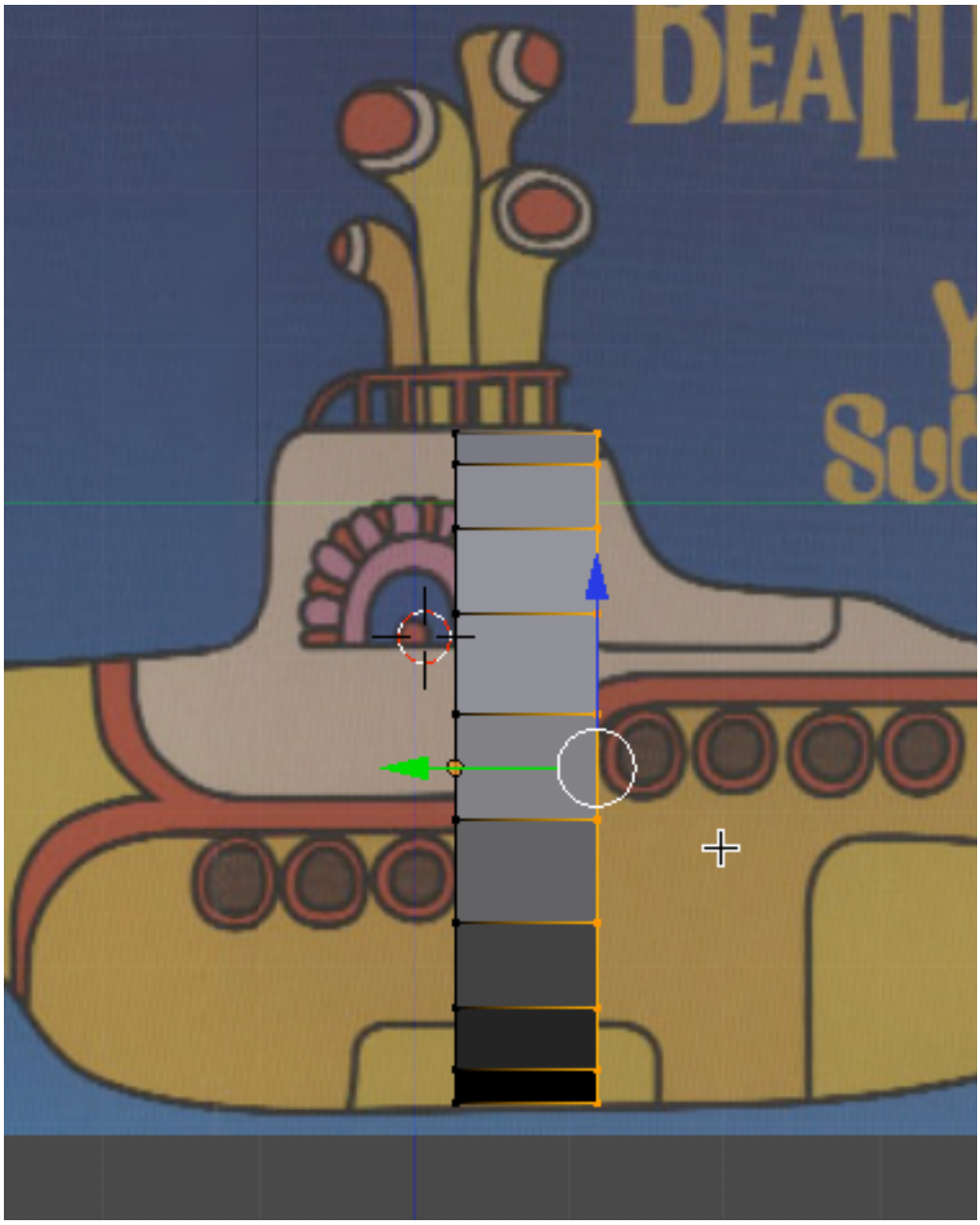
Press the AKEY to deselect the circle. In Left Side View, it looks like a black line running vertically.



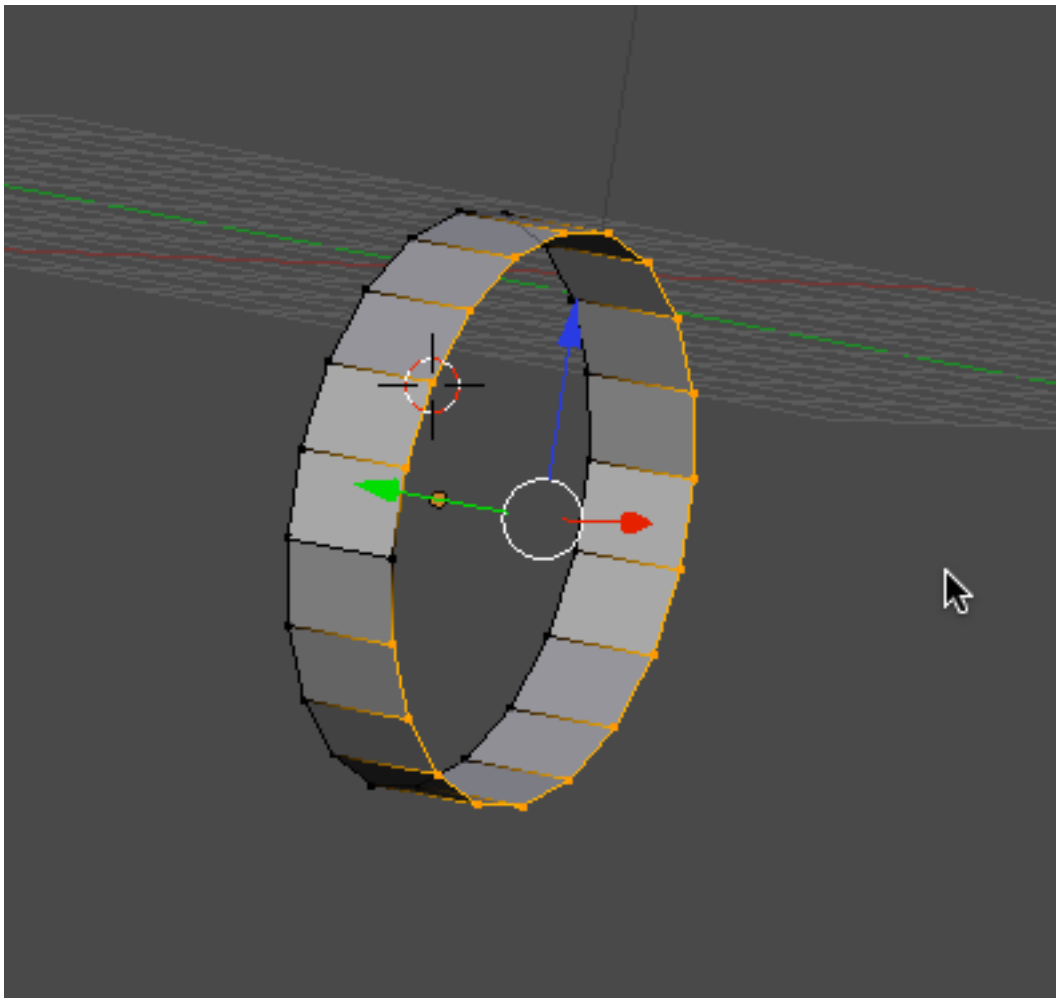

Right-click select the circle object again. Press the **TAB** Button to enter **EDIT MODE**. (Note: Press the **AKEY** to select all of the vertices if they are not already selected).




We will now EXTRUDE the selected vertices to give the circle mesh some dimension. Press the EKEY (Extrude) then press the YKEY and extrude the circle shape along the Y-axis until it looks like the image below. Left click to set the extrusion in place.

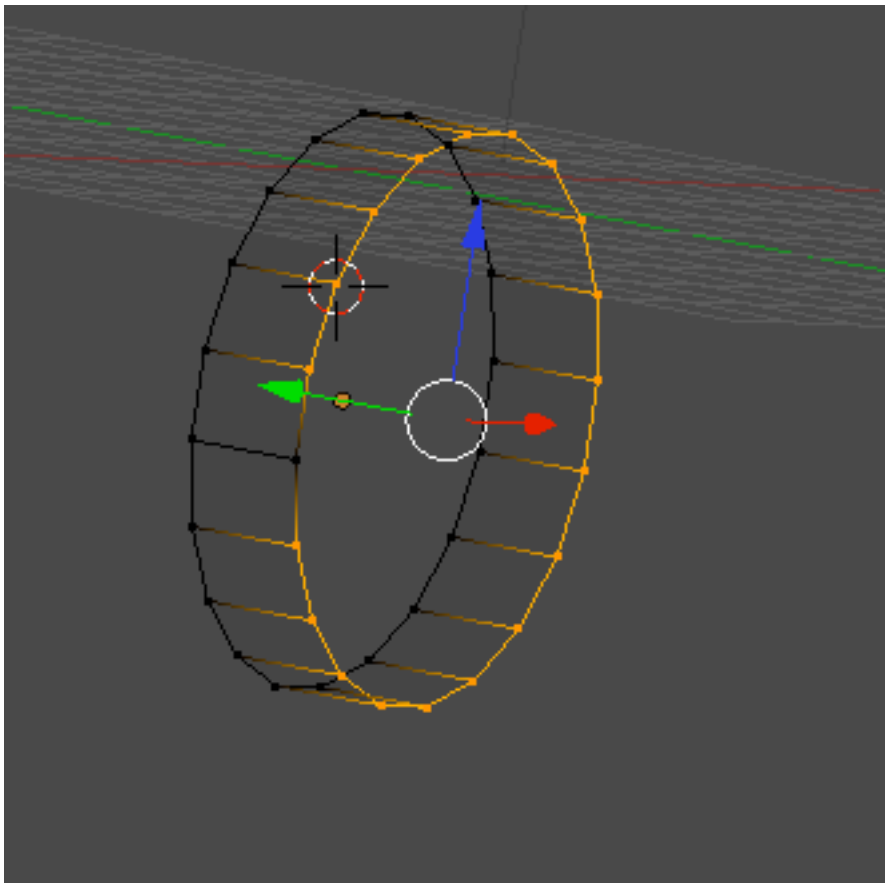



Hold you Middle Mouse Button (**MMB**) down and drag a bit to orbit your view to 3 dimensions.

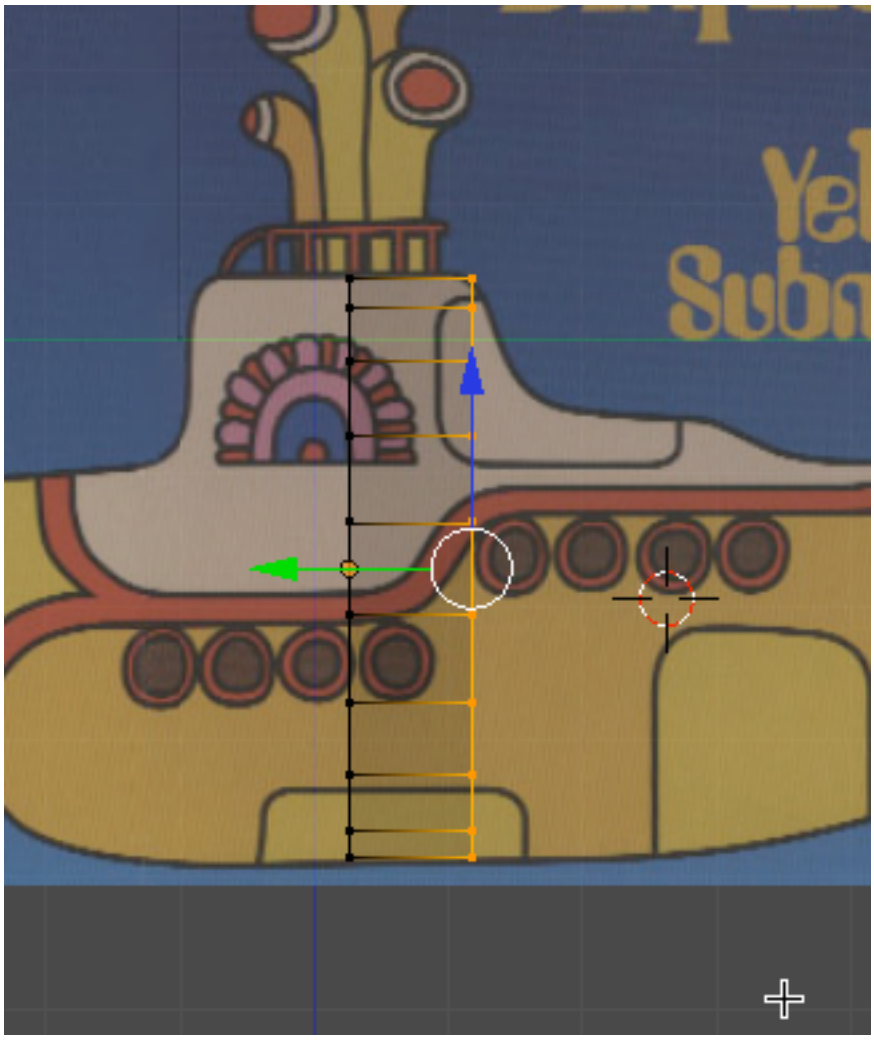


Notice that the background image does not display in a rotated dimensional user view.

Press the ZKEY to go to wireframe shading mode.

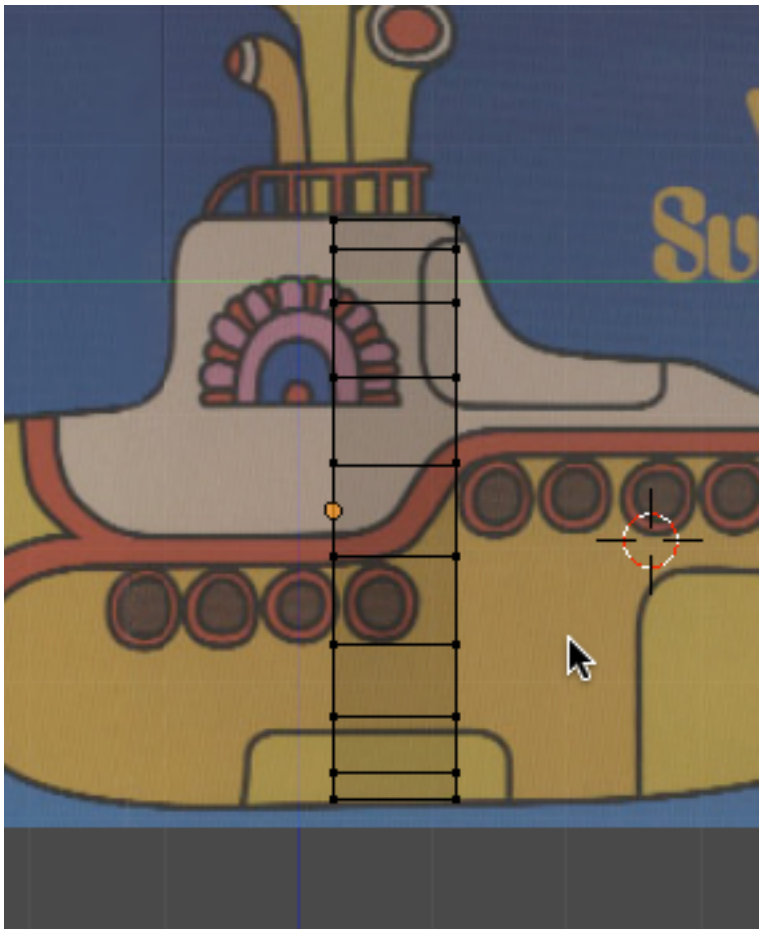


Go to Left Side View (CTRL-NUMPAD-3)

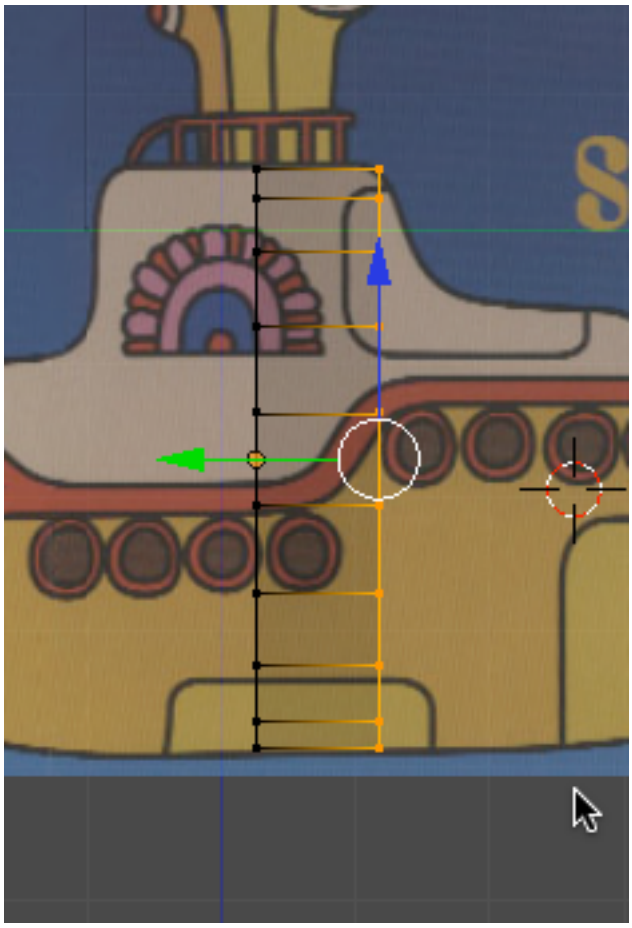


Notice that when we extrude a set of vertices we are actually creating a new set of vertices and moving them (in this case) along the Y-axis.

Press the AKEY to deselect the vertices.

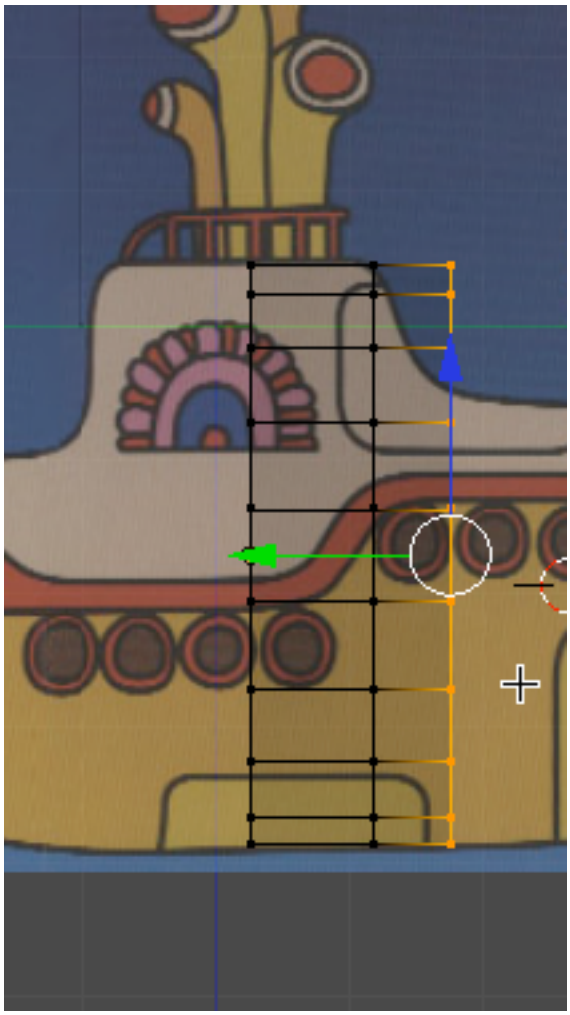


Press the BKEY (Box Select) and drag a selection box around the right set of vertices selecting them.

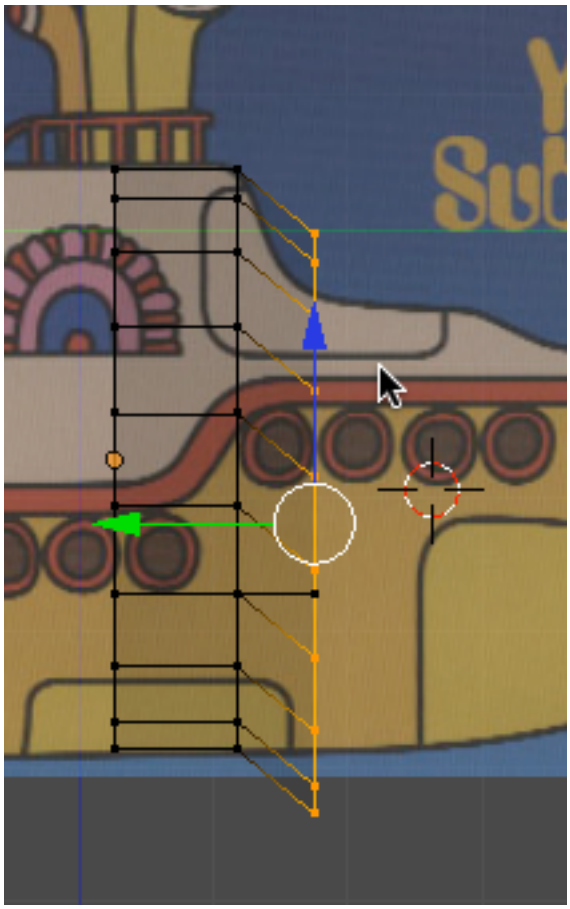


Note: Box selecting a group of vertices as we have done above in wireframe mode selects not only the vertices we can see but also the vertices located directly behind (thus the whole circle of vertices is selected).

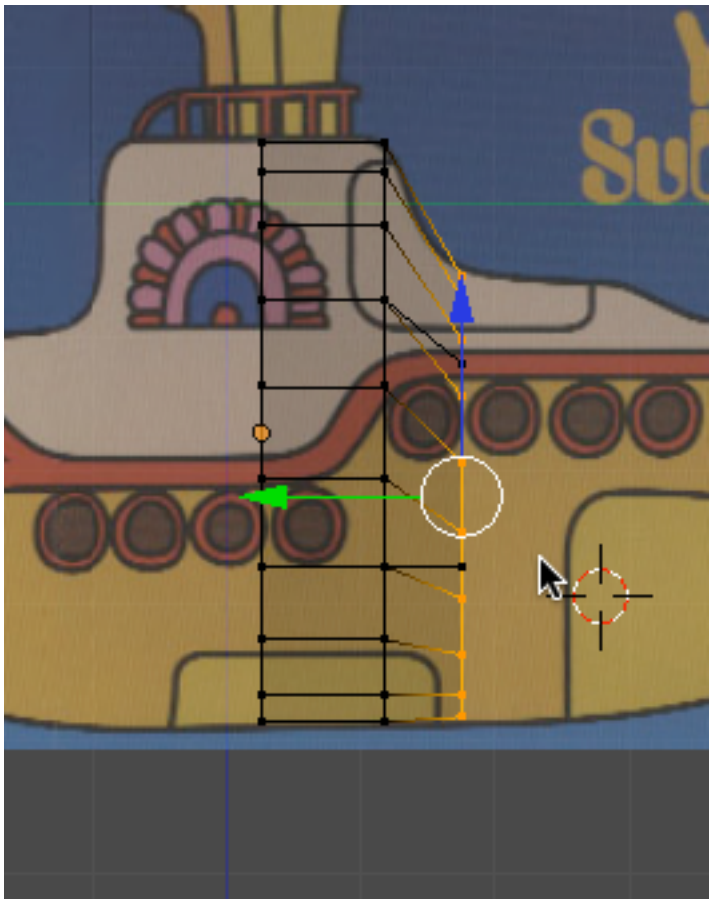
Press the EKEY (Extrude) and then press the YKEY and extrude the vertices along the Y-axis as shown below. Left click to set the extrusion.



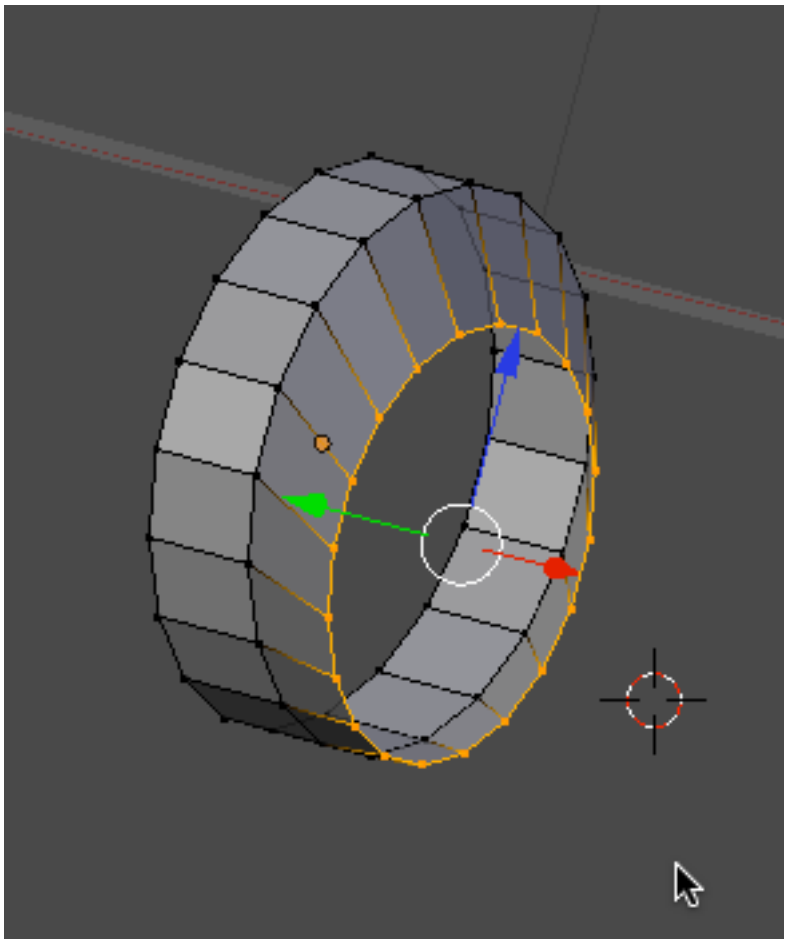
Click on the blue translation arrowhead and move the set of vertices down as shown below.



Press the SKEY (Scale) and scale the set of vertices down a bit as shown below.



Press the ZKEY and go to solid shading mode. Click and drag your middle mouse button to a more dimensional user view.

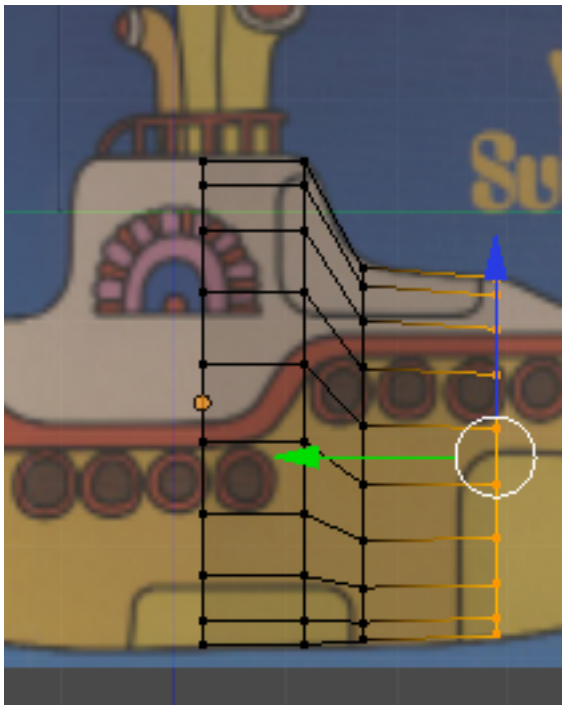


Press the ZKEY to go back to wireframe.

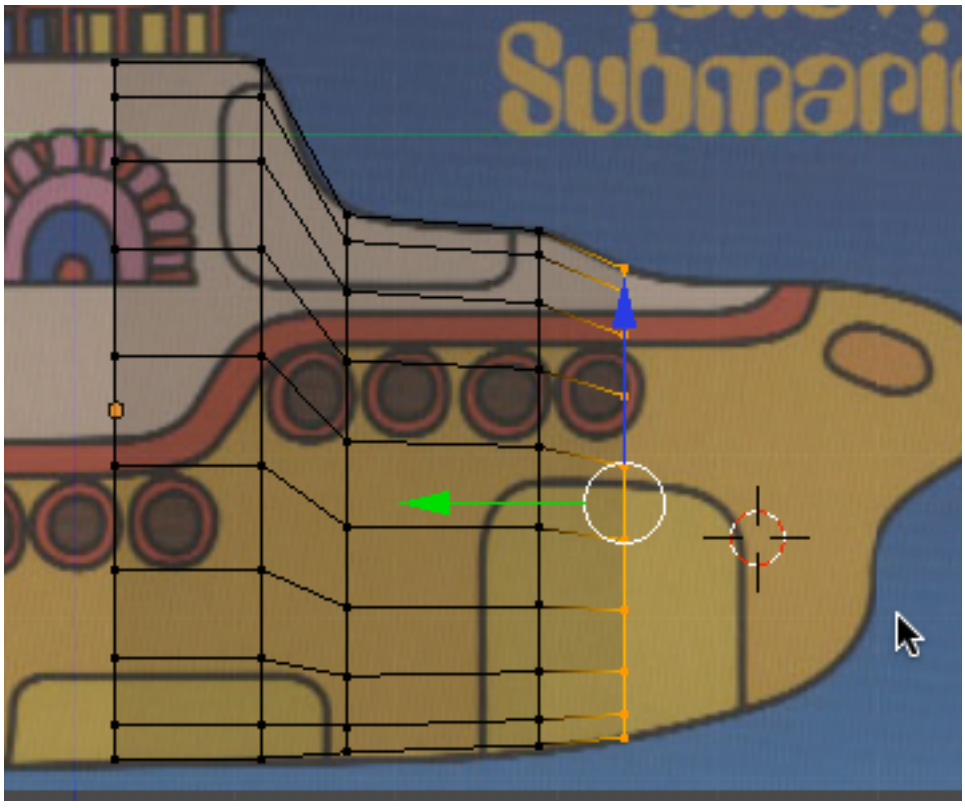
Go to Left Side View (CTRL-NUMPAD-3)

The new set of vertices remain selected, so we can continue without having to reselect.

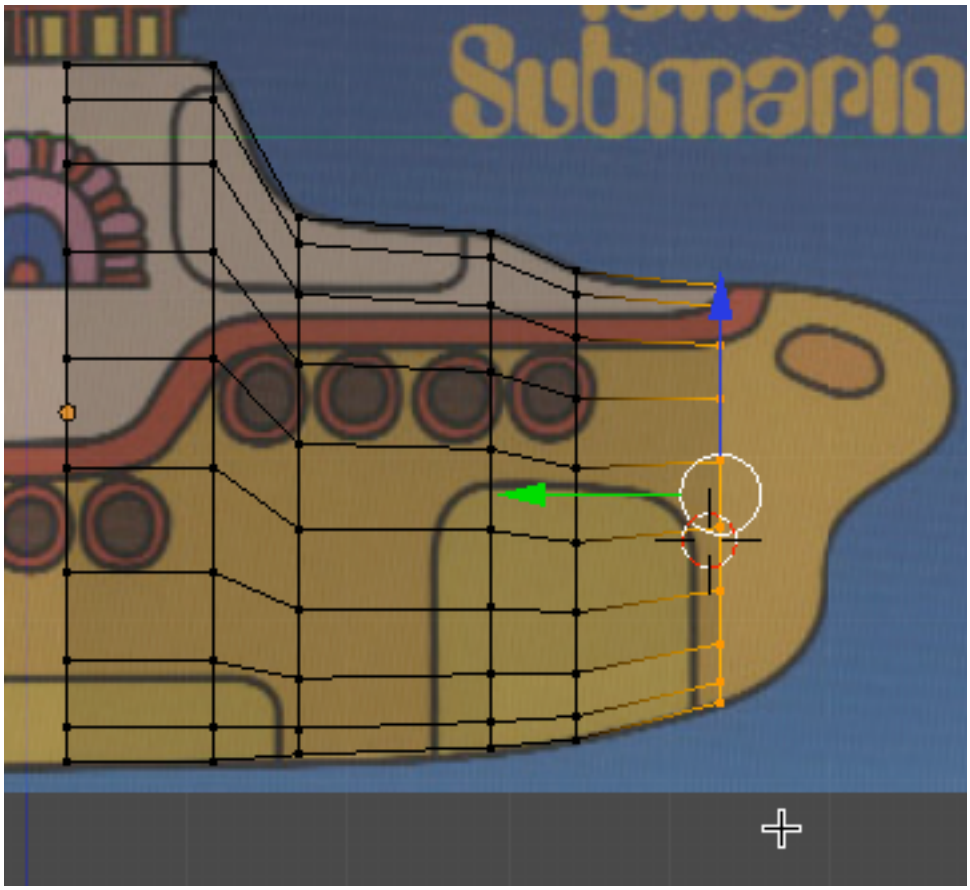
Press the EKEY (Extrude), followed by the YKEY and extrude the vertices a bit more along the Y-axis. Move and/or scale them so that they tend to fit the background image as shown below.



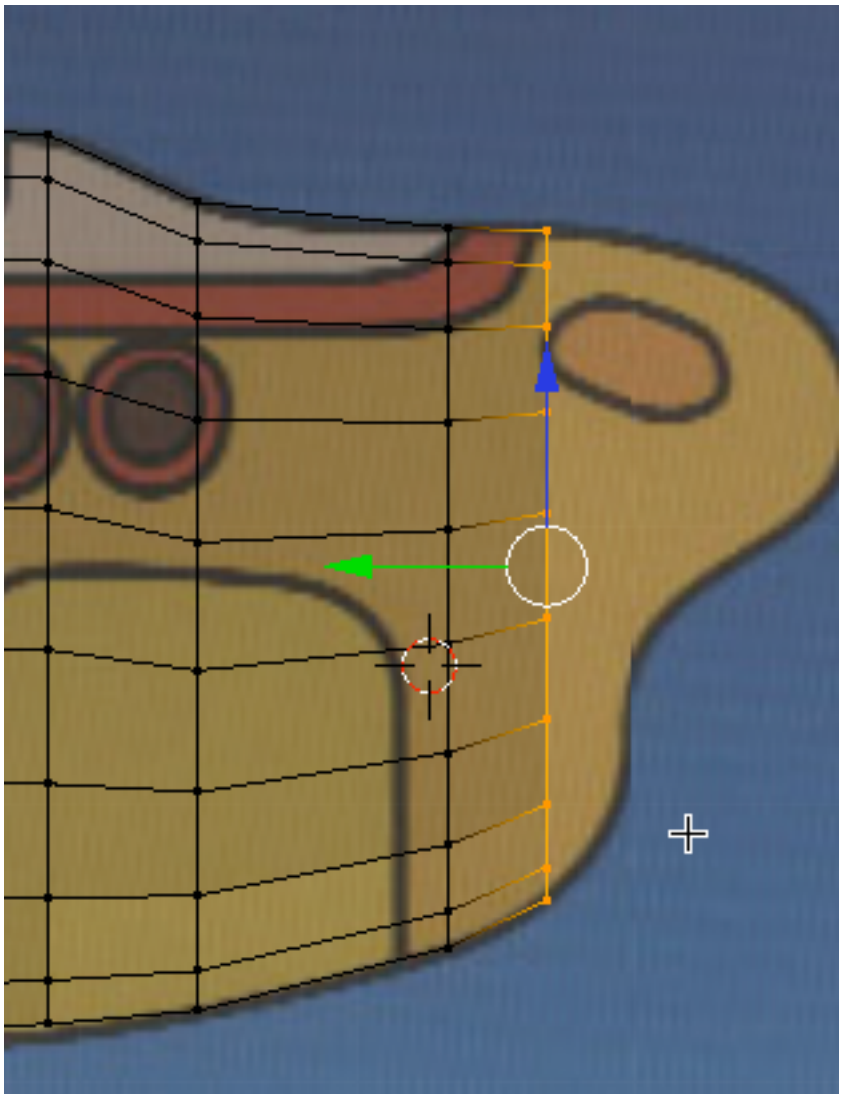
Do this again



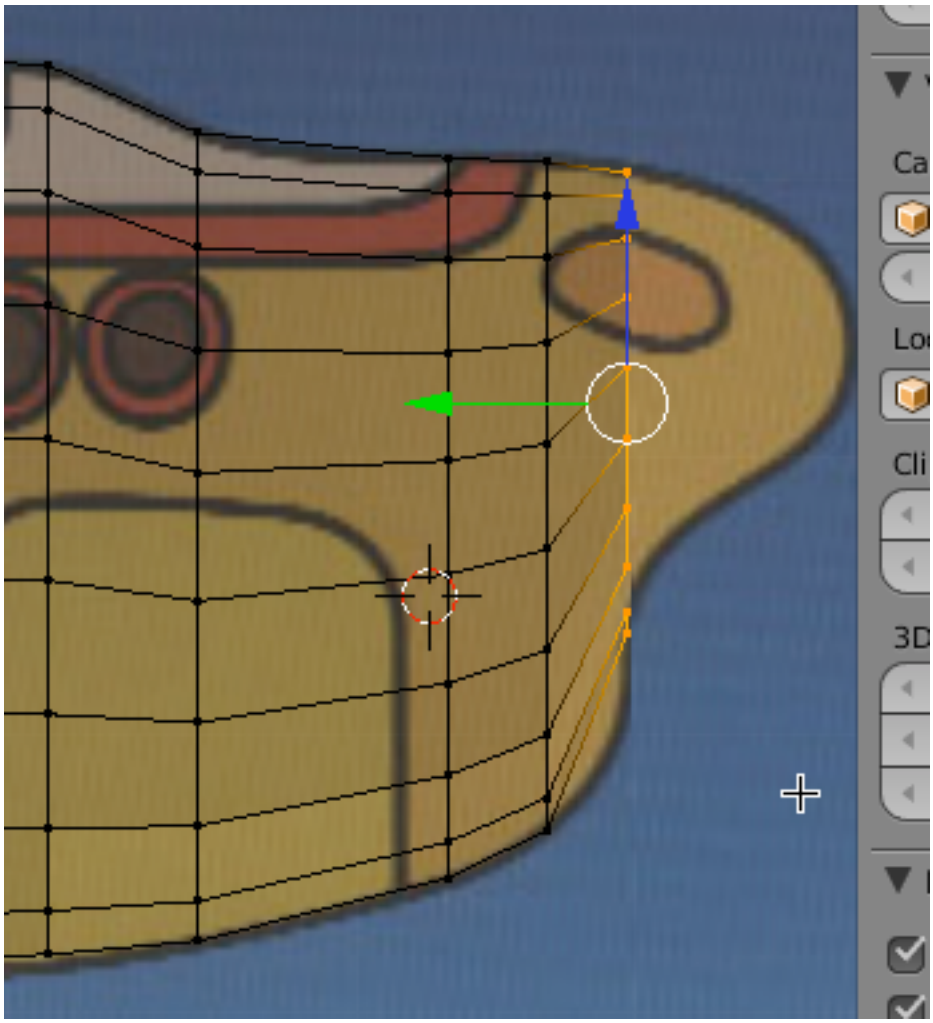
And again.



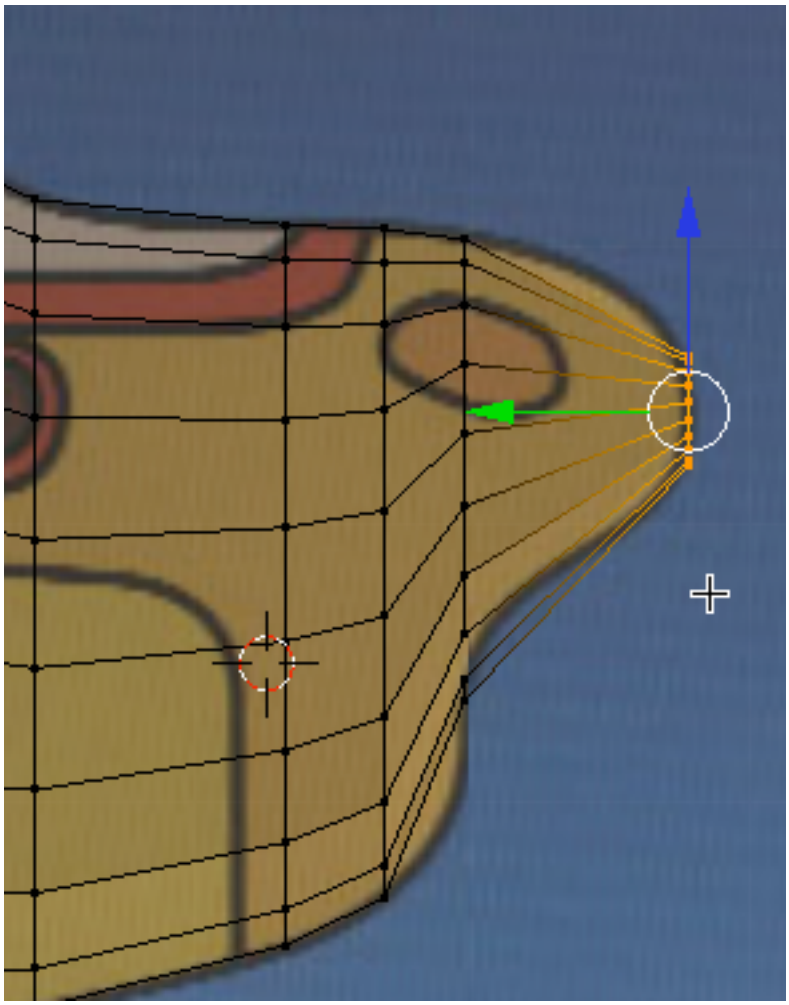

And again.



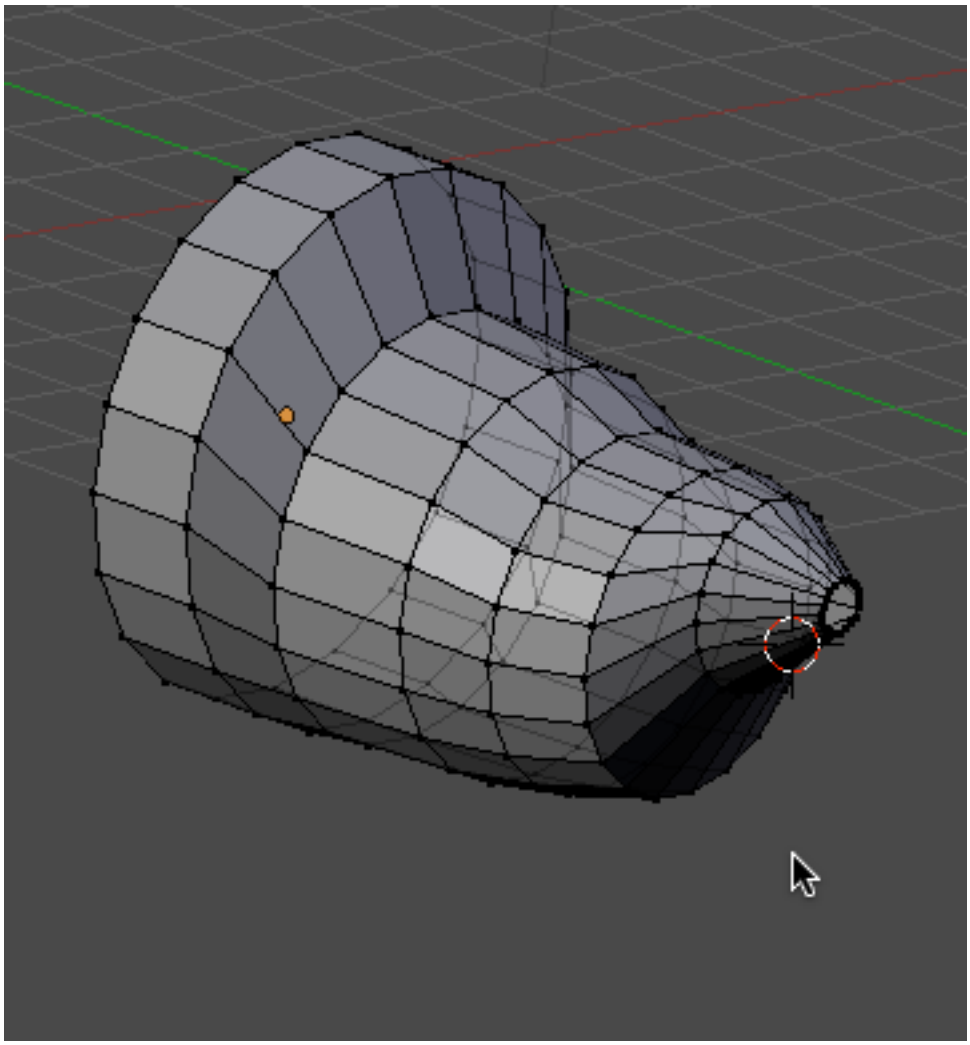
And again.



And Again.



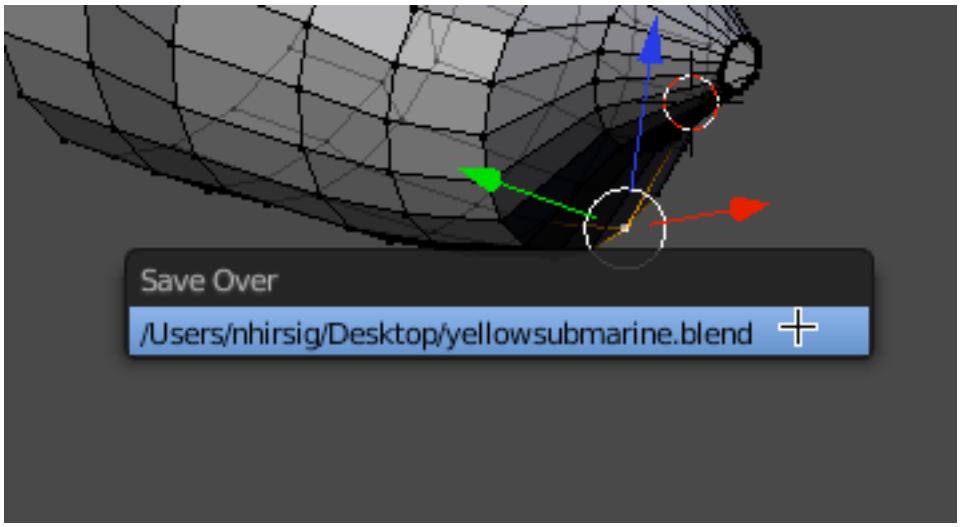
Press the **AKEY** to deselect the vertices. Press the **ZKEY** to enter shaded mode. **MMB drag** to orbit your view a bit to 3 dimensions.



If you are missing some of the faces, it is because you failed to select some of the vertices to extrude. You can CRTL-Z (UNDO) and go back and make sure the full set of vertices are selected before you extrude.

Save your file by pressing **CRTL-W.**

**Make sure click on the file path and name to confirm saving over an already-saved .blend file.**

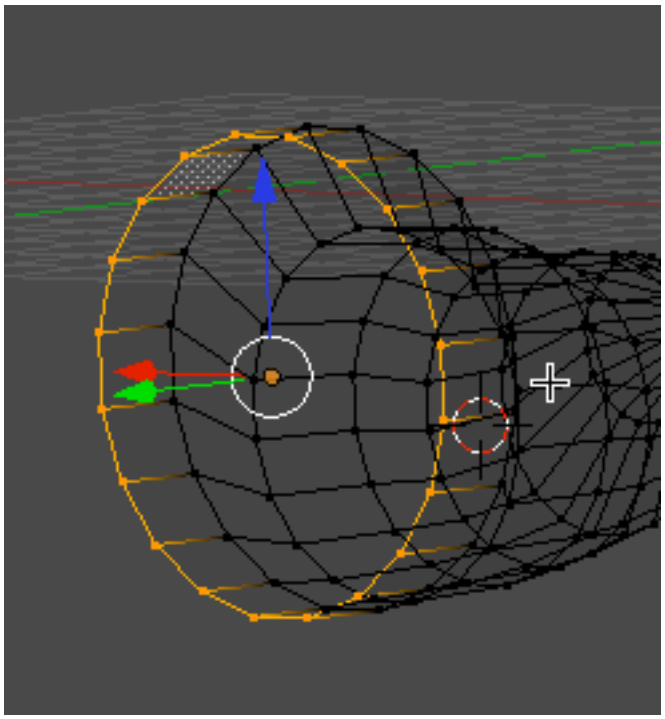



Press the ZKEY to return to wireframe mode. Go to Left Side view (CTRL-NUMPAD-3)

Press the AKEY to deselect any vertices.

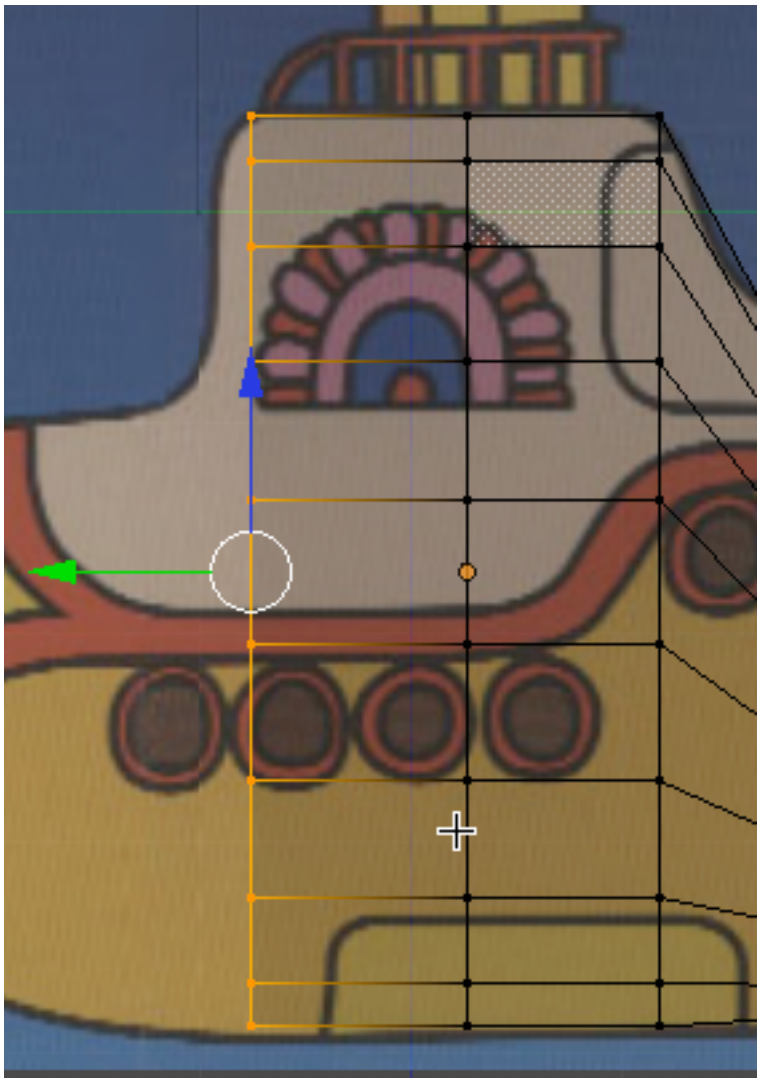
Press the BKEY and box select the left side set of vertices.

You may want to click your middle mouse button and drag into a 3D view to make sure you have selected the correct vertices.

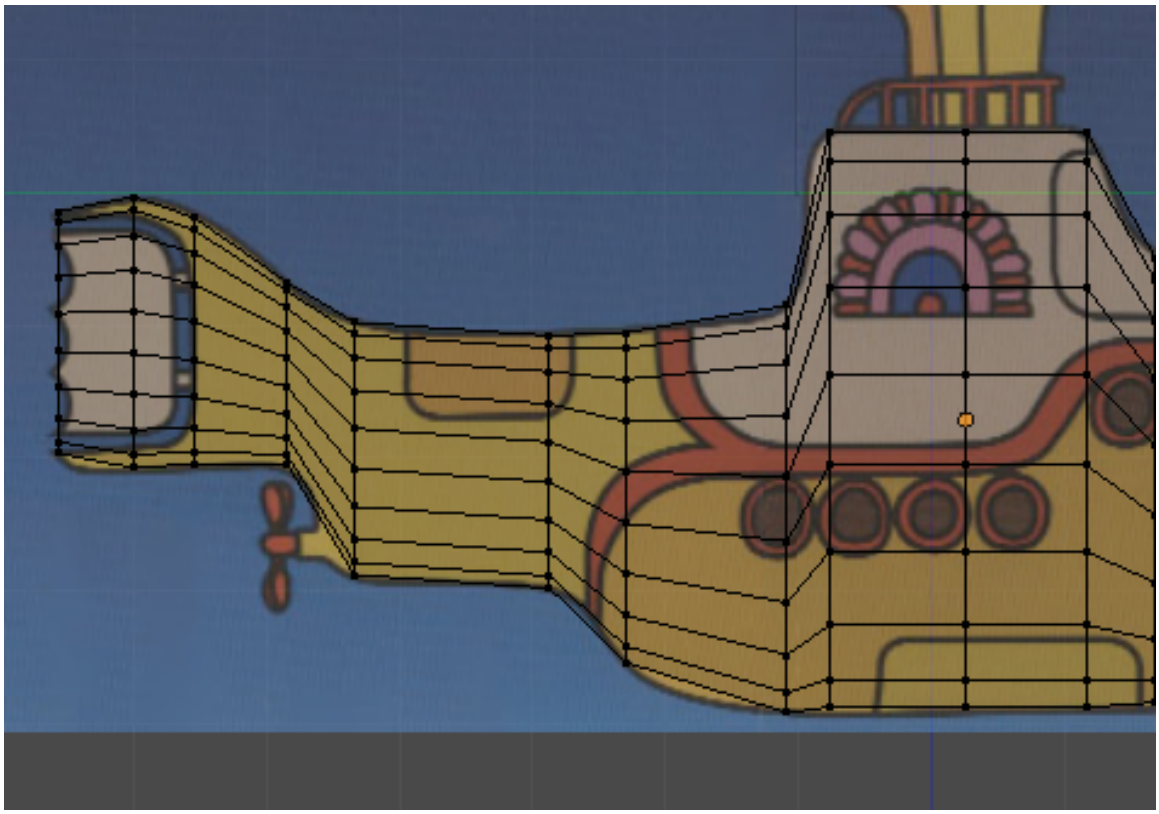


Return to Left Side View (CTRL-NUMPAD-3)

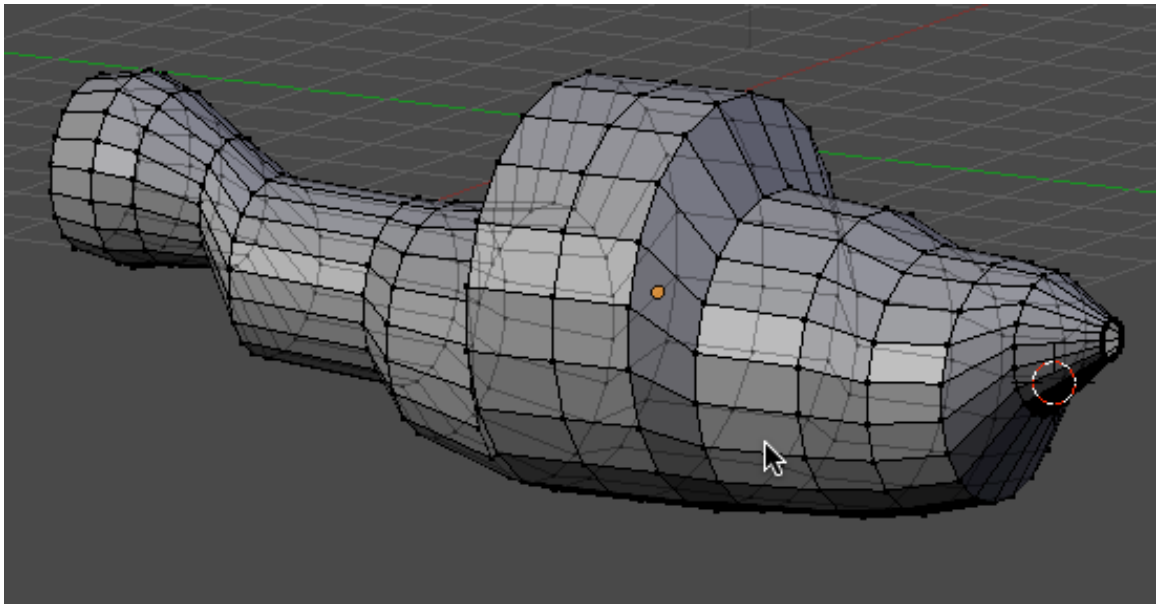
Extrude (EKEY) these vertices to the left along the Y axis (YKEY) as shown below.



Perform the next 8 extrusions to the left along the Y-axis as shown below.

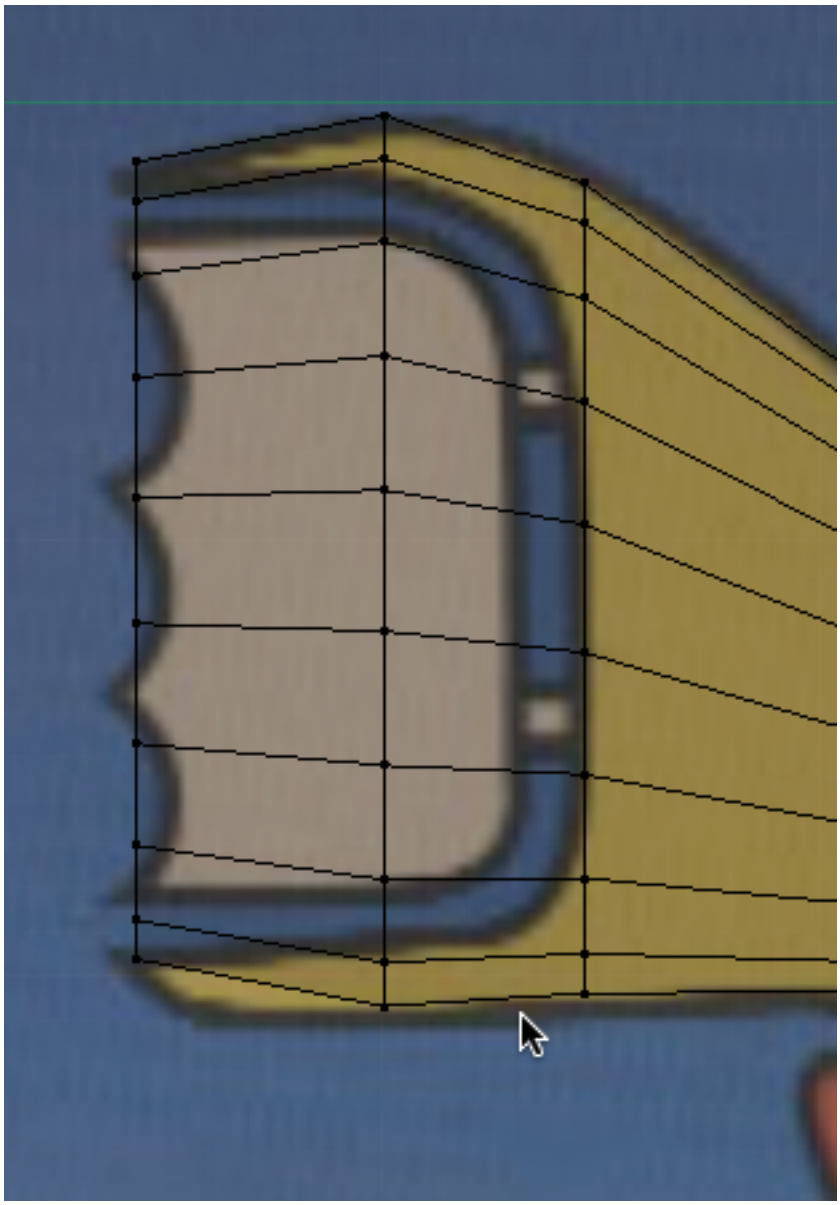


If you have not already done so, press the AKEY to deselect the vertices. Press your Middle mouse button and drag into a more dimensional user view.

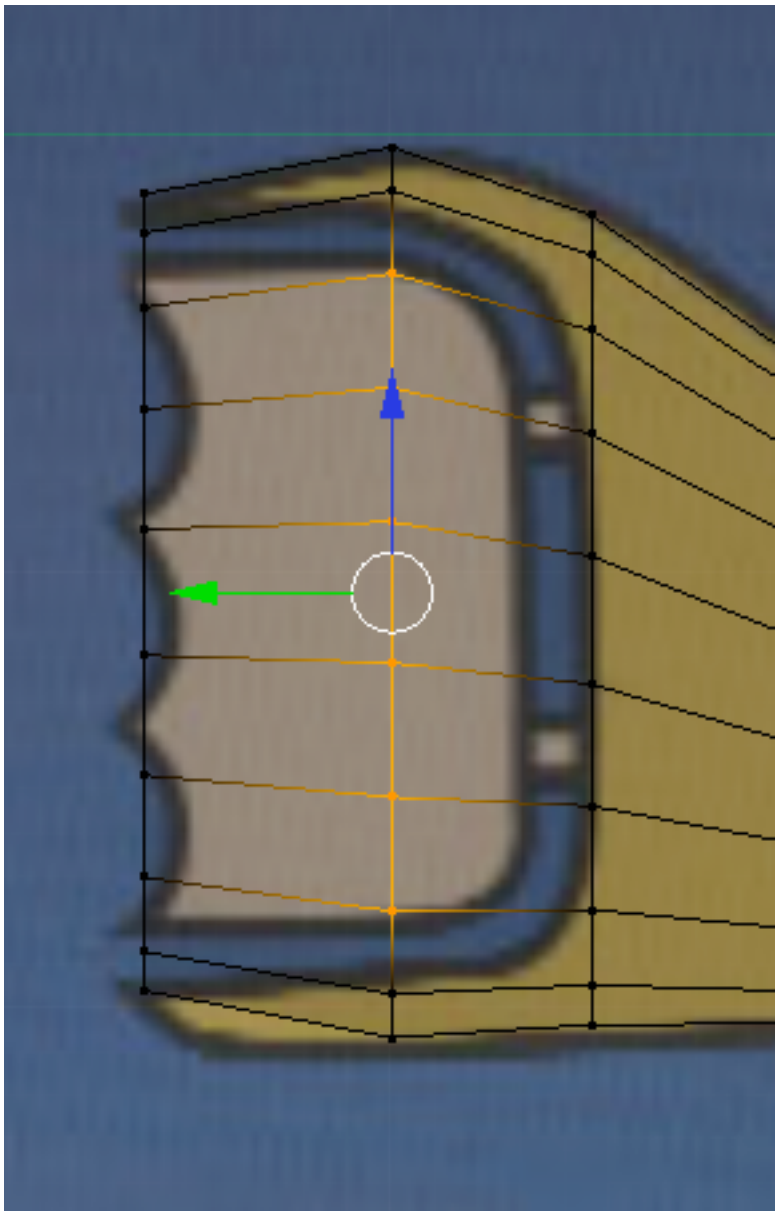


Press the ZKEY to return to wireframe shading. Go to Left Side View (CTRL-NUMPAD-3

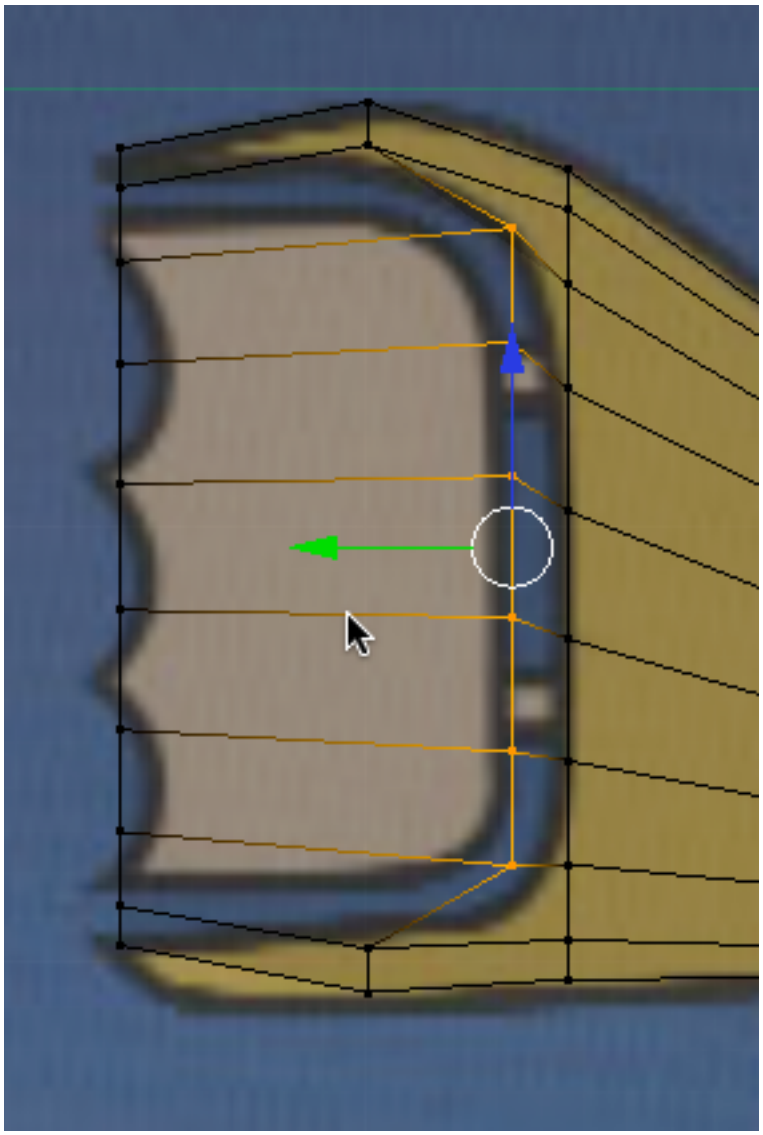
Zoom in on the submarine's rudder area.



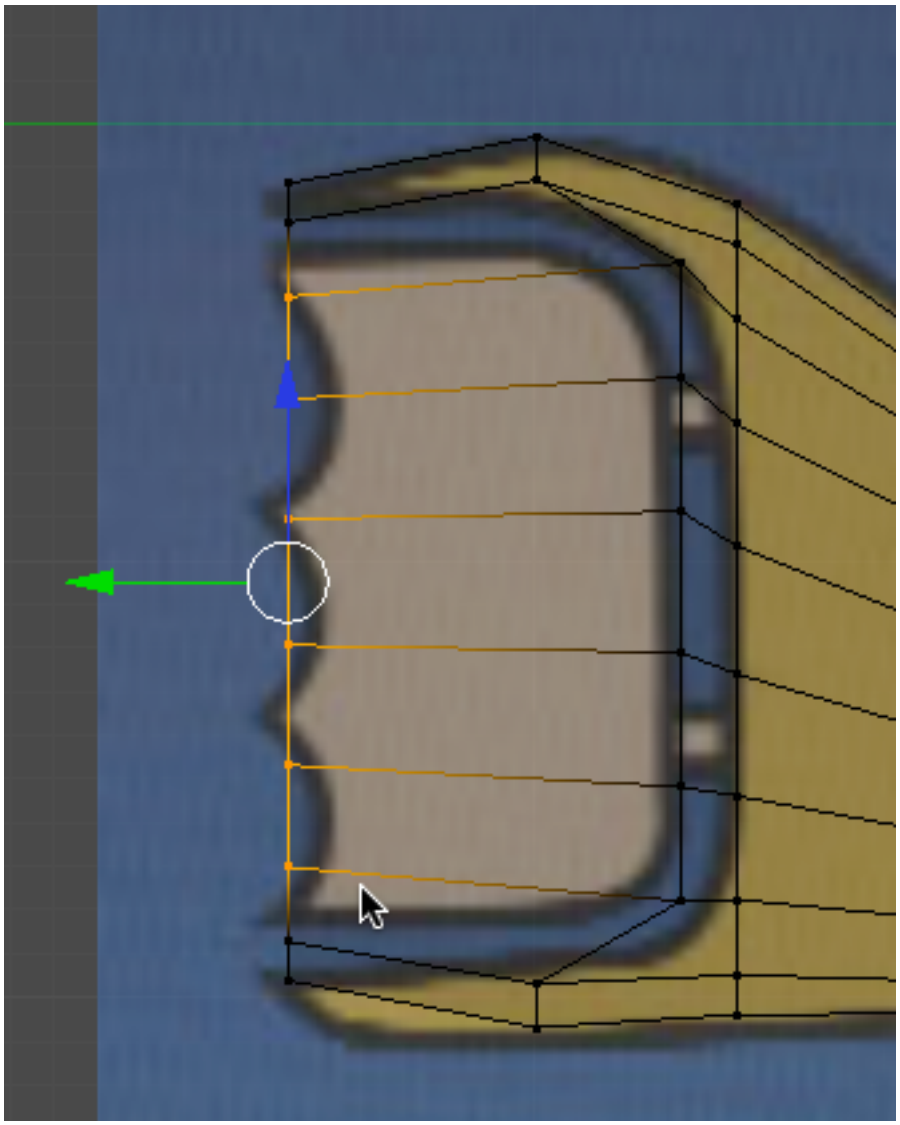
Box select (BKEY) the middle set of vertices as shown below. (Note that not all of the vertices in the set are selected)



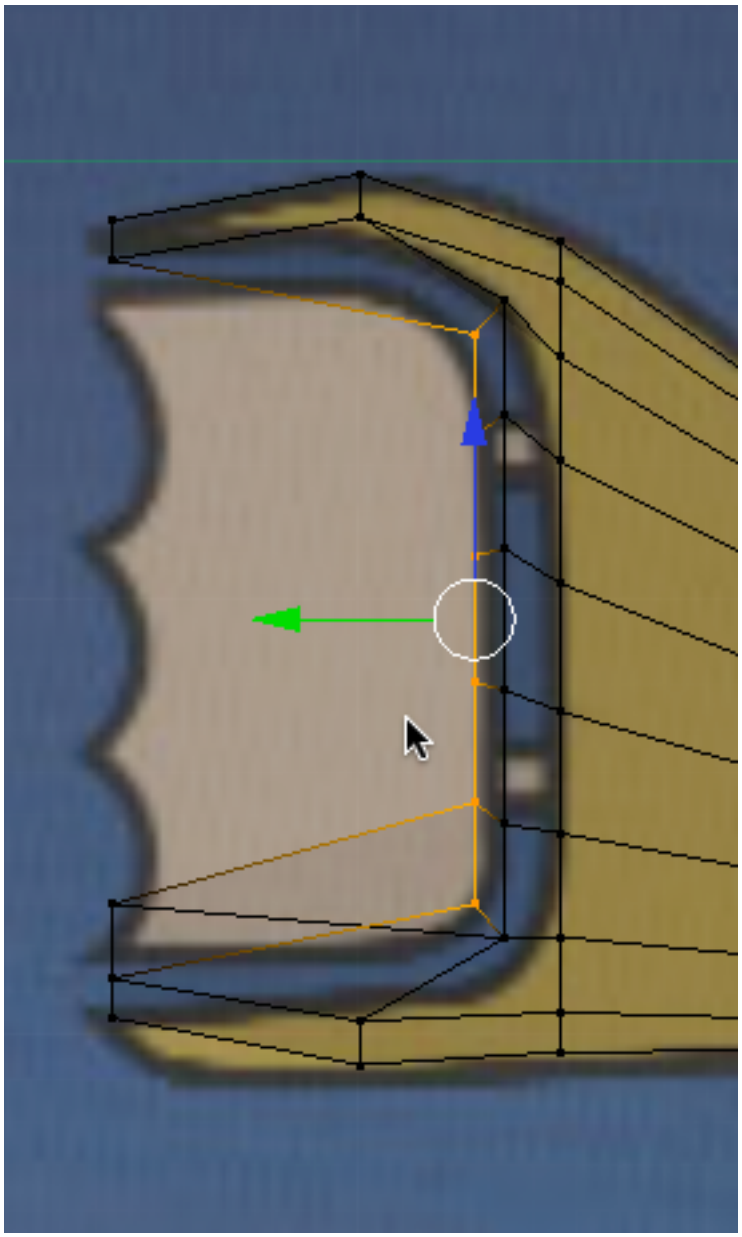
Use the transform widget green arrow to move these vertices to the right along the Y-axis as shown below.



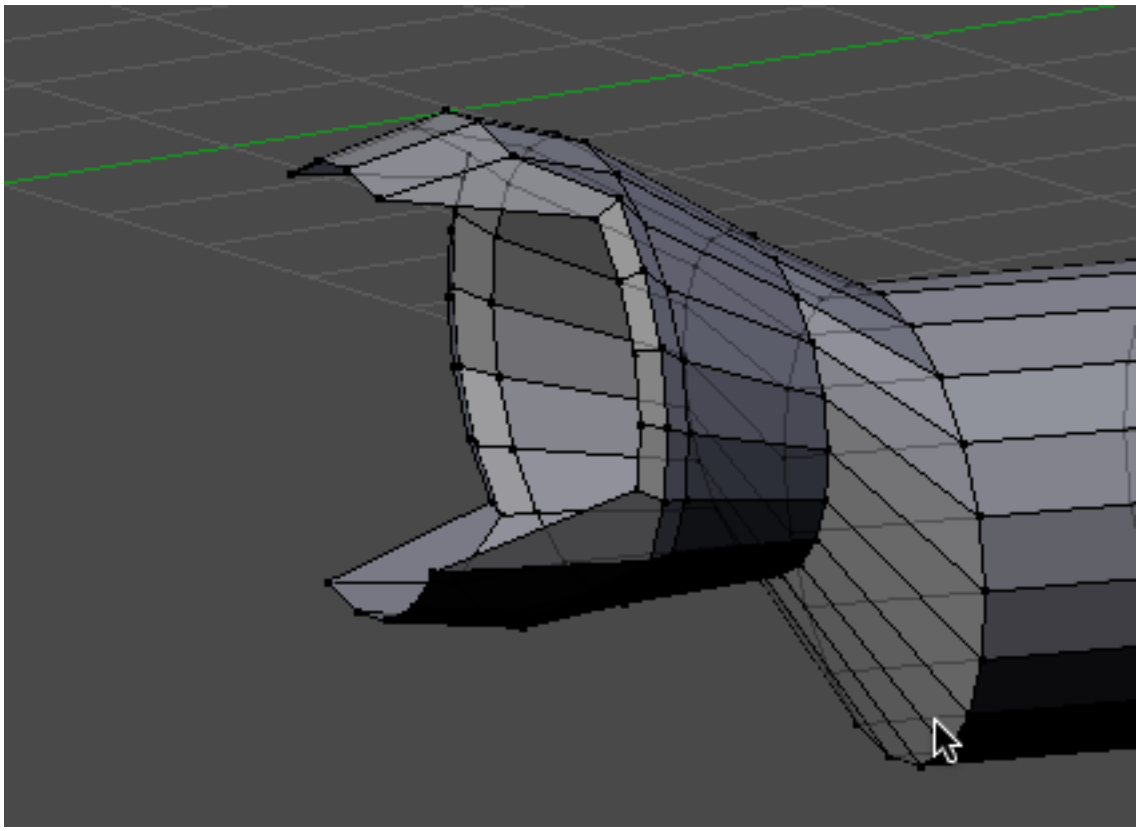
Press the AKEY to deselect the vertices. Box select (BKEY) the middle set of vertices on the left as shown below. (Note that not all of the vertices in the set are selected)



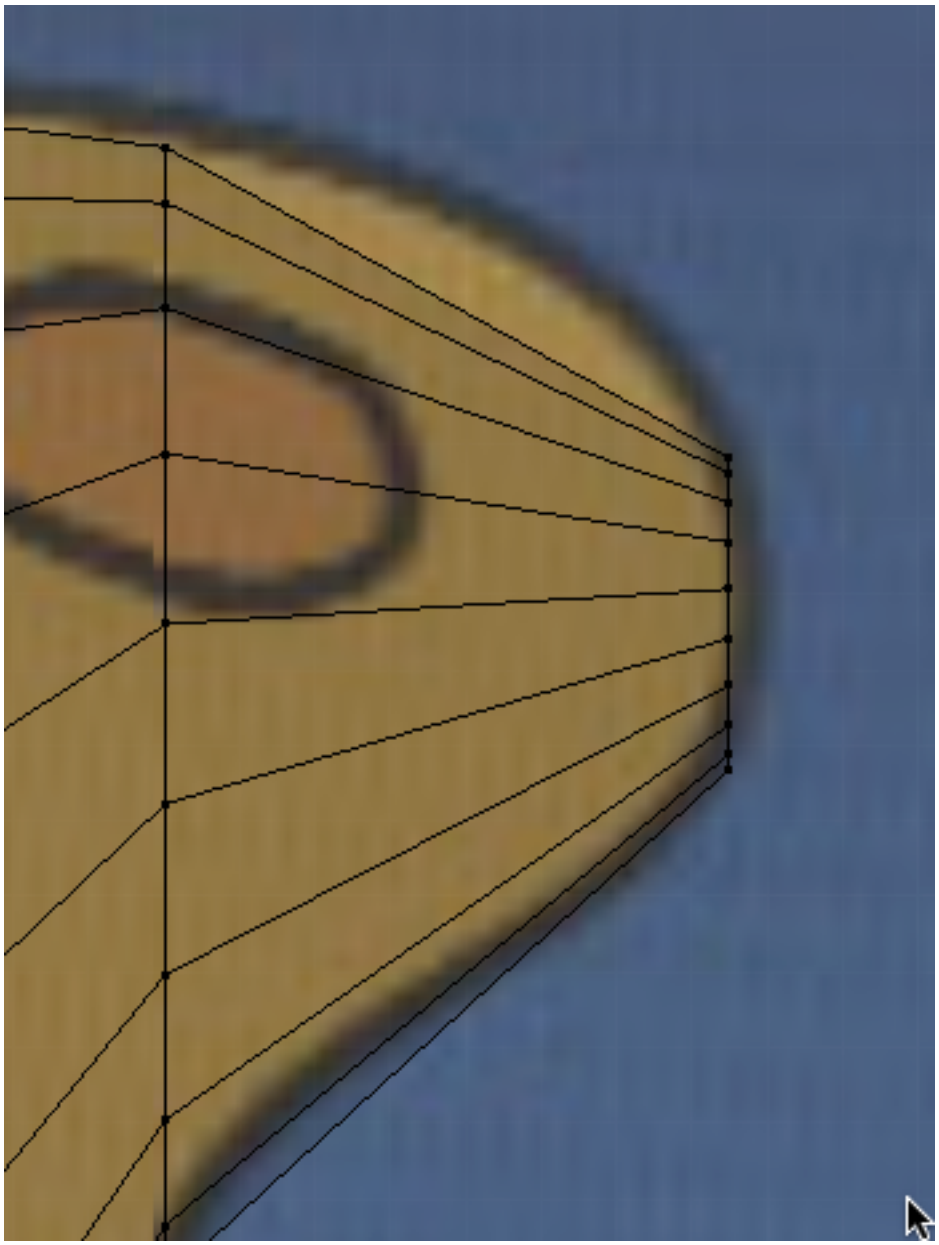
Use the transform widget green arrow to move these vertices to the right along the Y-axis as shown below.



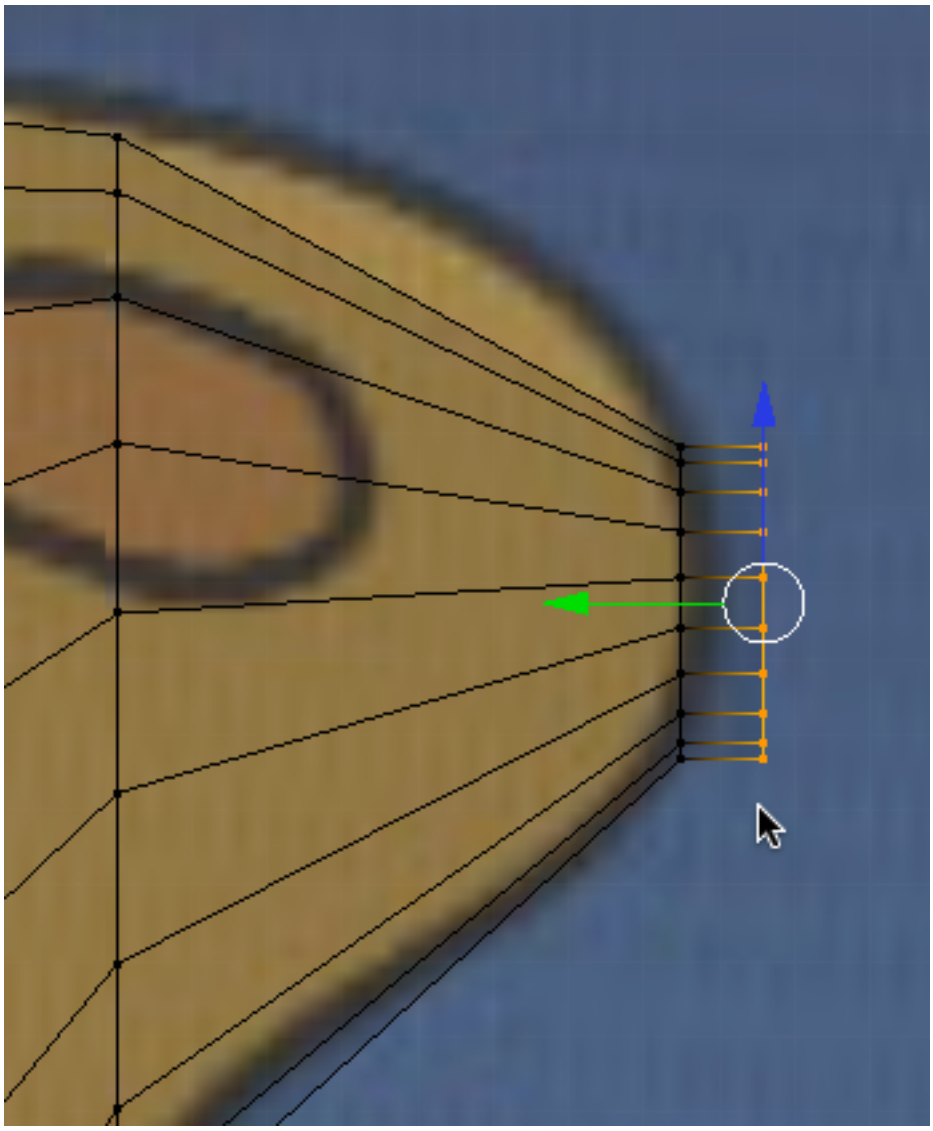
Press the AKEY to deselect the vertices. Press the ZKEY to enter solid shading mode. Middle mouse drag to a more dimensional user view.



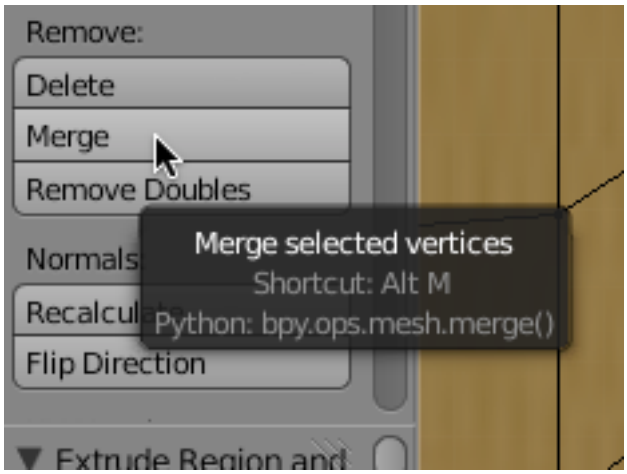
Go back to Left Side View (CTRL-NUMPAD-3). Press the ZKEY to enter wireframe display mode. Zoom in on the nose of the submarine.

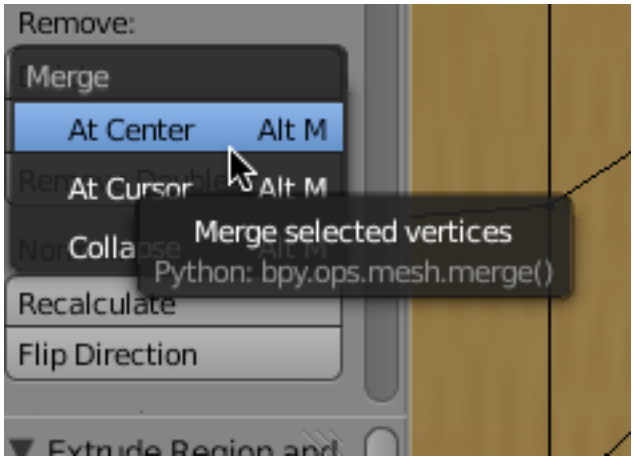


BKEY (Box select) the right set of vertices and EKEY (Extrude) them to the right a bit along the Y Axis (YKEY).

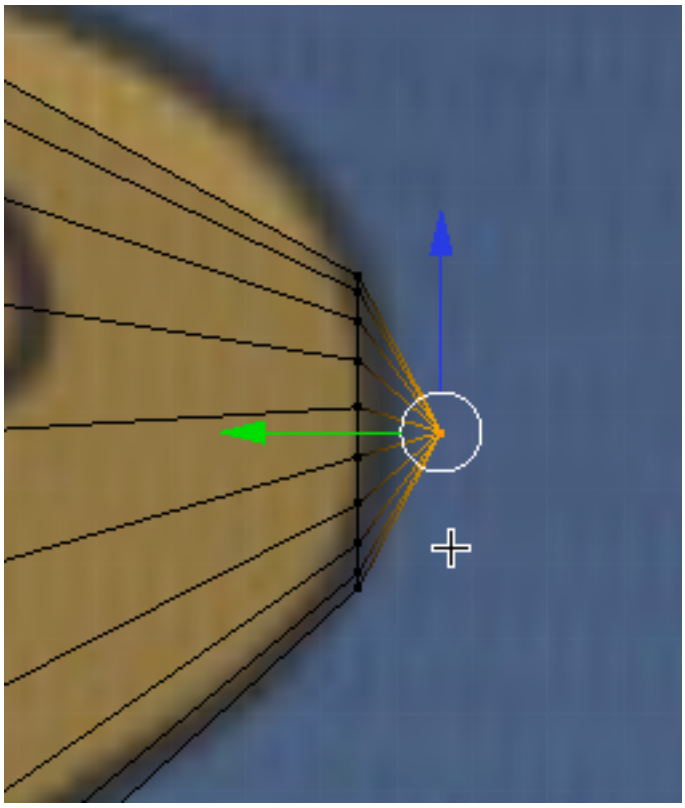


With the vertices still selected, Press the Merge button located in the left 3D Editor Tools panel. Then select “At Center”.

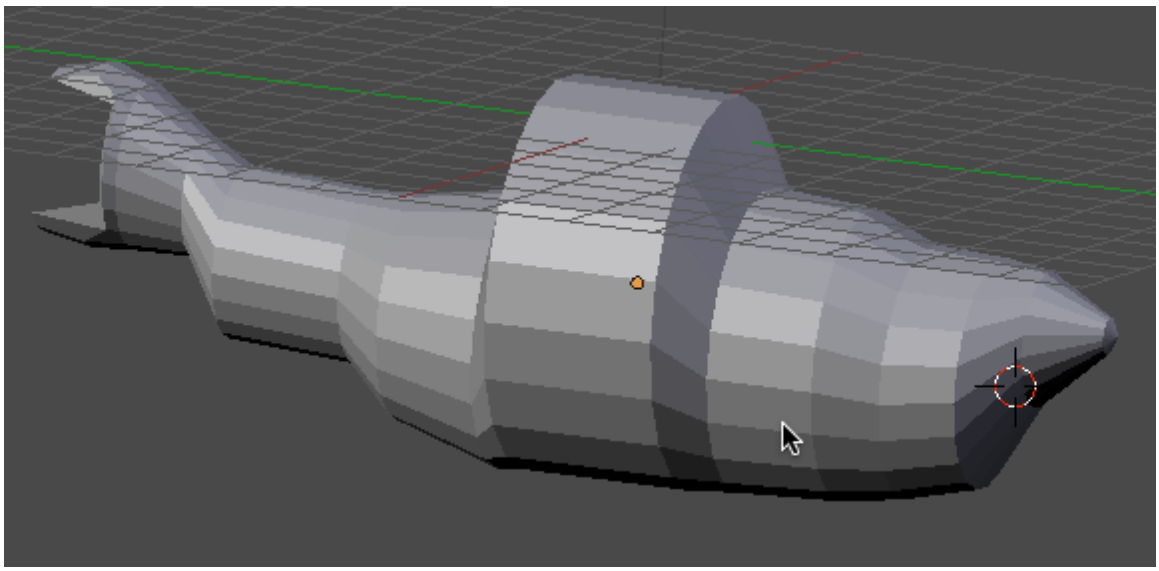



This will merge the selected vertices into one vertex.

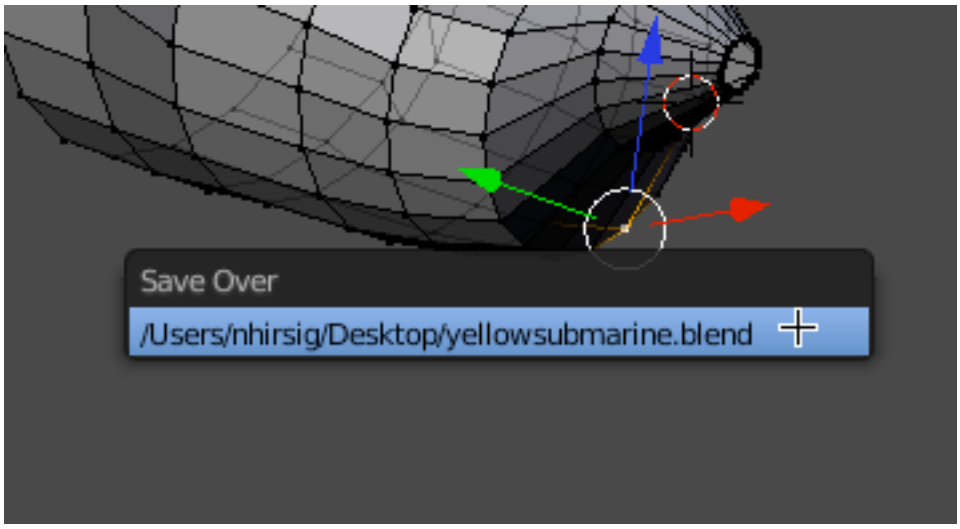


Press the AKEY to deselect the vertices. Press TAB to enter Object Mode. Press the ZKEY to enter solid shading display mode. Rotate your model to a more dimensional user view.

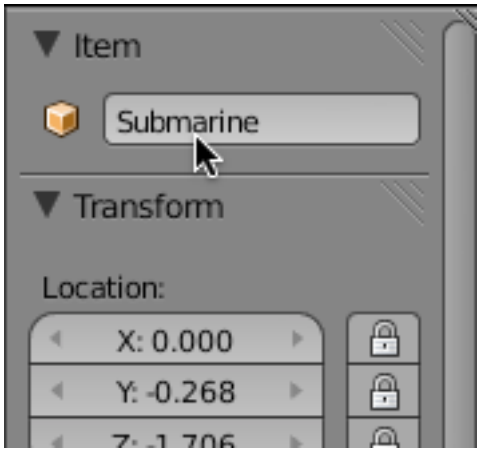


Save your file by pressing **CRTL-W.**

**Make sure click on the file path and name to confirm saving over an already-saved .blend file.**

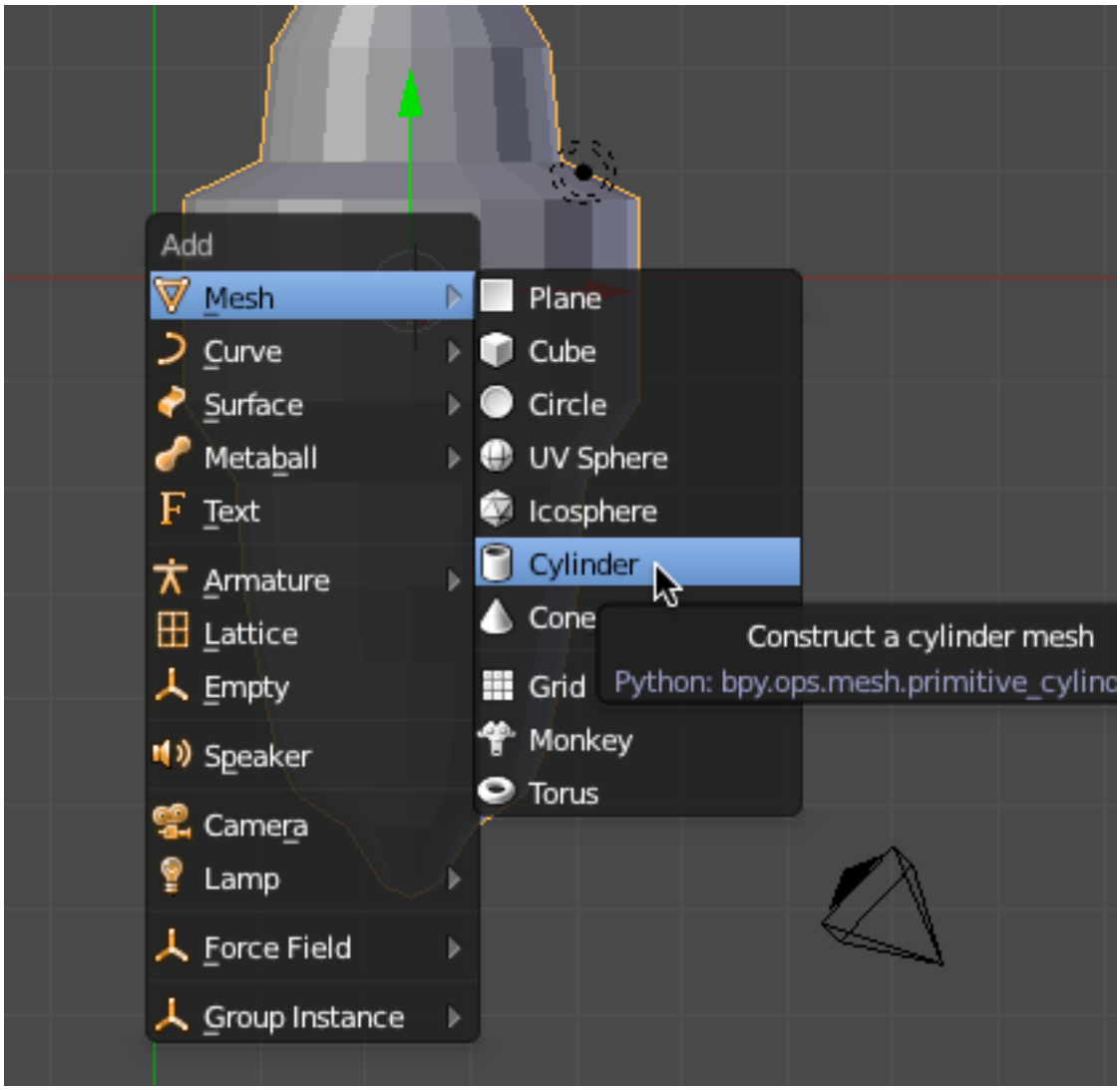



Name the object “Submarine” in the right 3D Editor viewport properties panel.

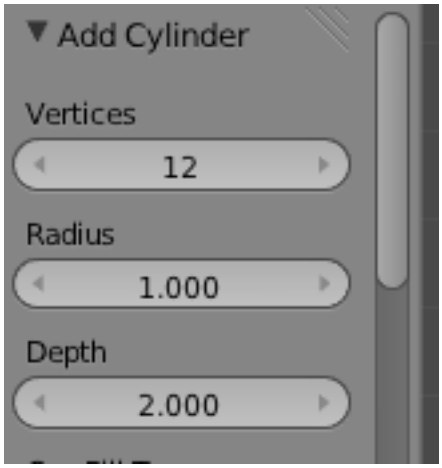



We now need to add a few more elements. Go to Top view (NUMPAD-7). Place your 3D cursor in the center of the sub as shown below.

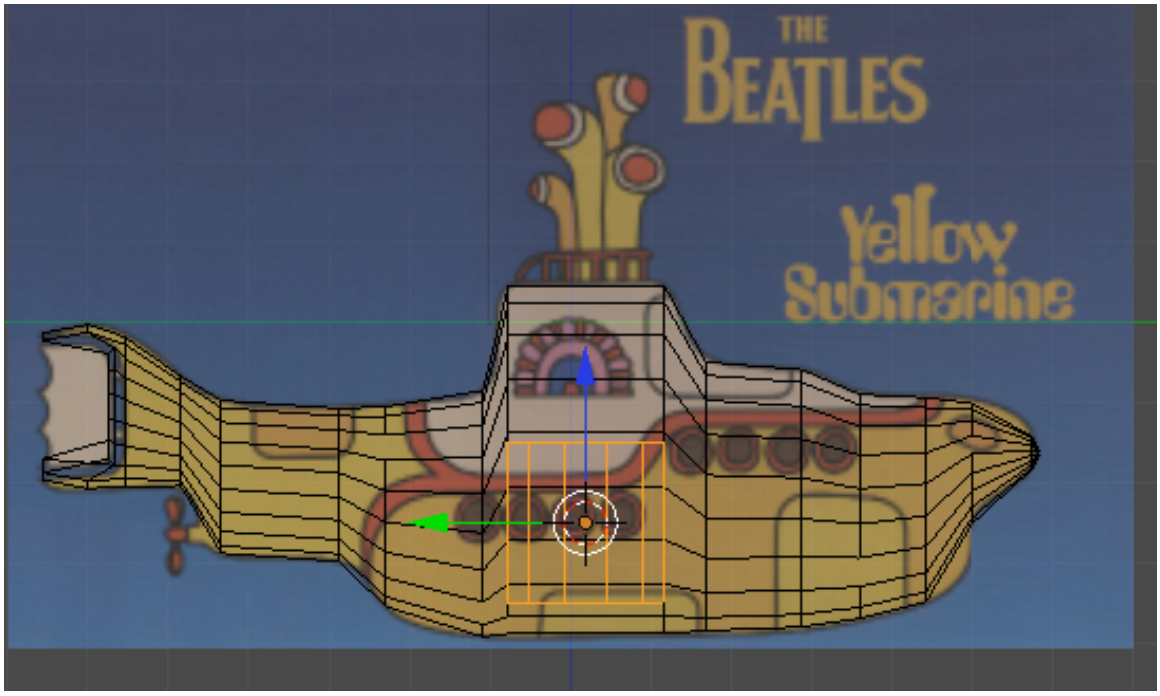
Press SHIFT-A and add a Cylinder object.



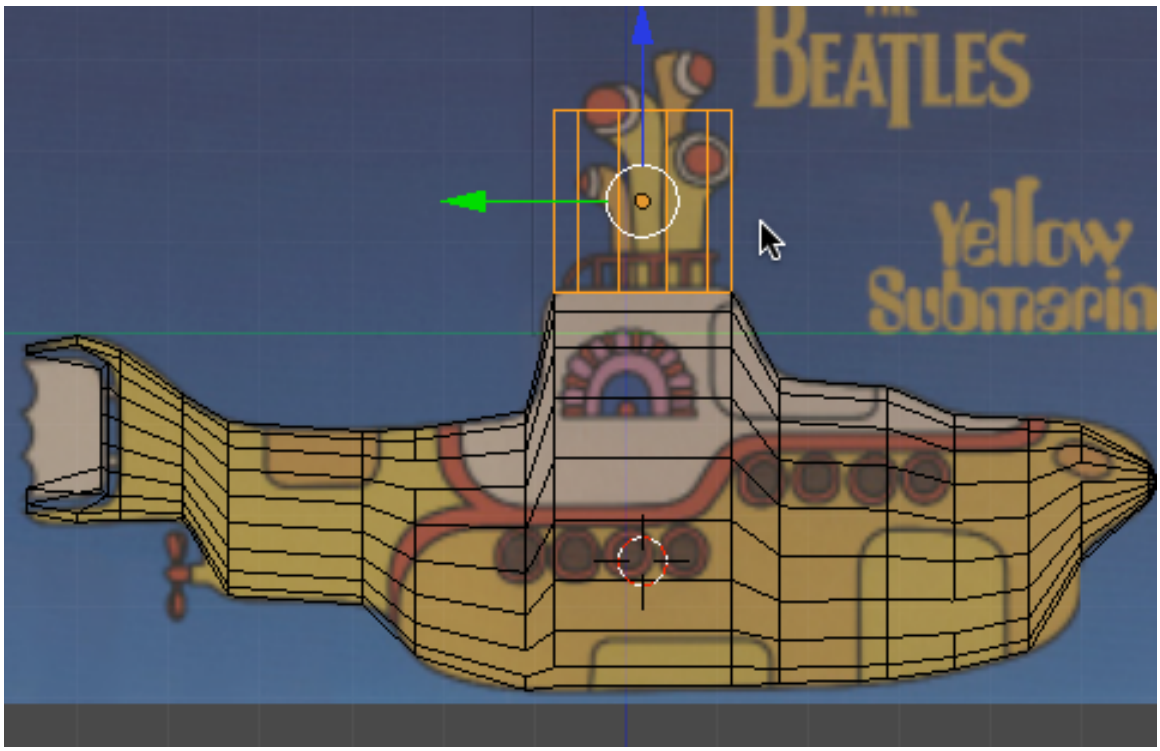

In the left 3D Editor viewport tool panel, under Add Cylinder, set the number of vertices to 12.



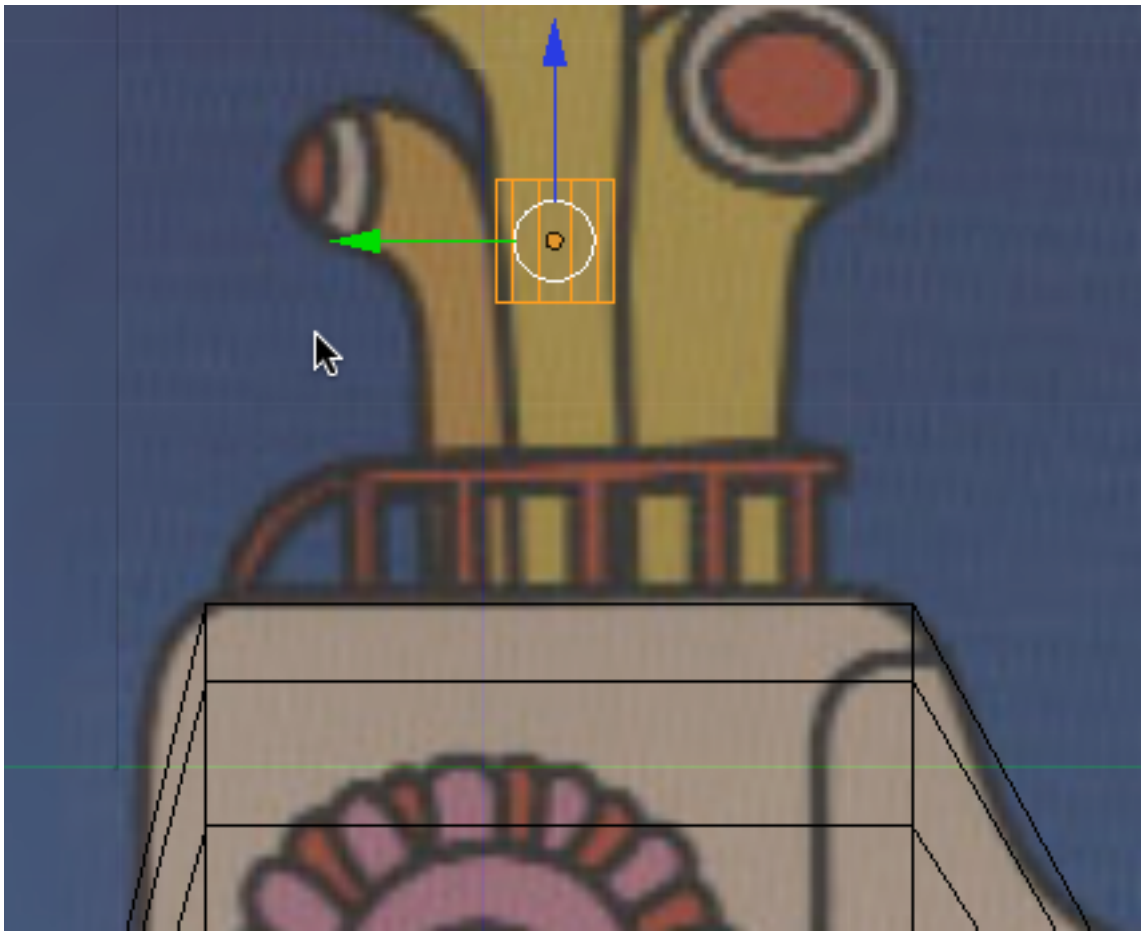
Go to Left Side View (CTRL-NUMPAD-3). Press the ZKEY to enter wireframe display mode. Notice that the tube object is located somewhere inside (or below) the submarine object.




Use the transform widget blue arrowhead to move the tube object up along the Z-axis.



Zoom in a bit. Press the SKEY (Scale) and scale down the tube object as shown below.



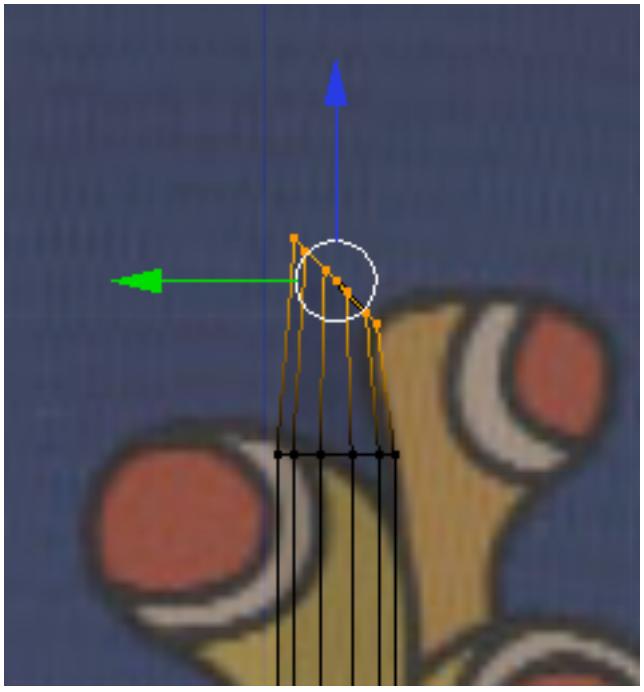
Use the transform widget blue arrowhead to move the object down a bit along the Z-axis.

TAB into Edit mode and press the AKEY to deselect the vertices.

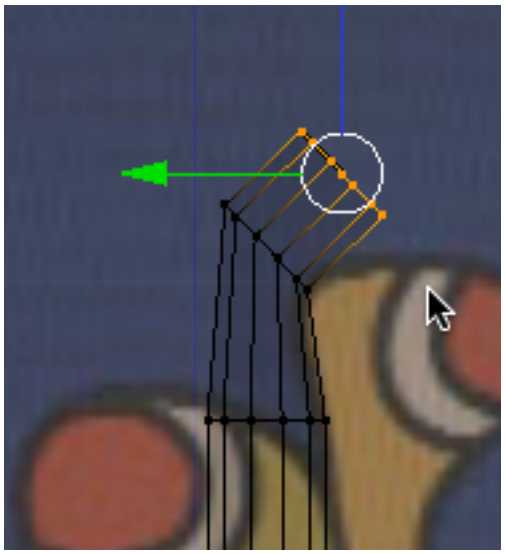
BKEY (Box select) the top vertices. Press the EKEY (Extrude) followed by the ZKEY and extrude the vertices up along the Z-axis as shown.

EKEY (Extrude) the vertices again along the Z-axis a bit higher.

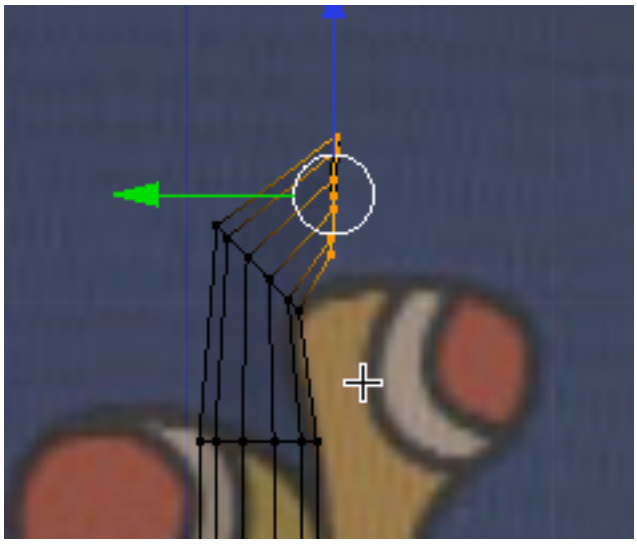
With the vertices still selected, press the RKEY (rotate) and rotate the vertices about 45 degrees as shown.



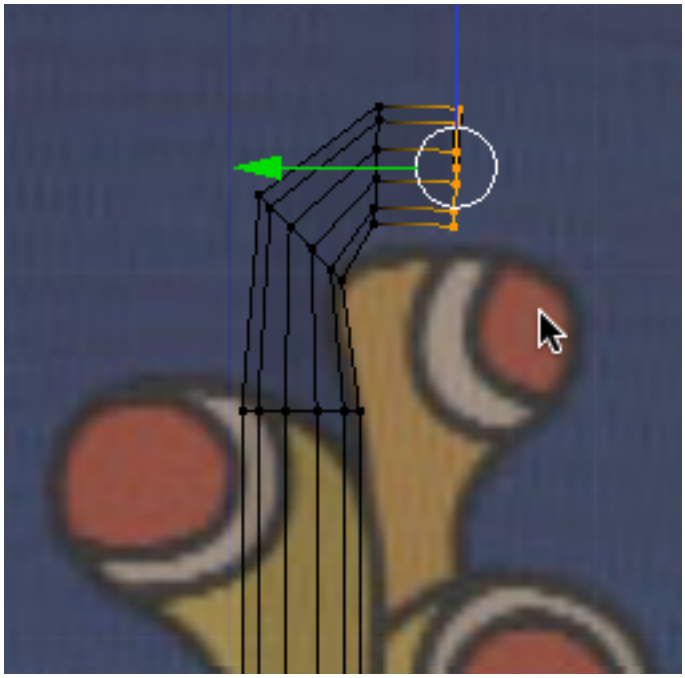
EKEY (Extrude) the vertices a bit more as shown below.



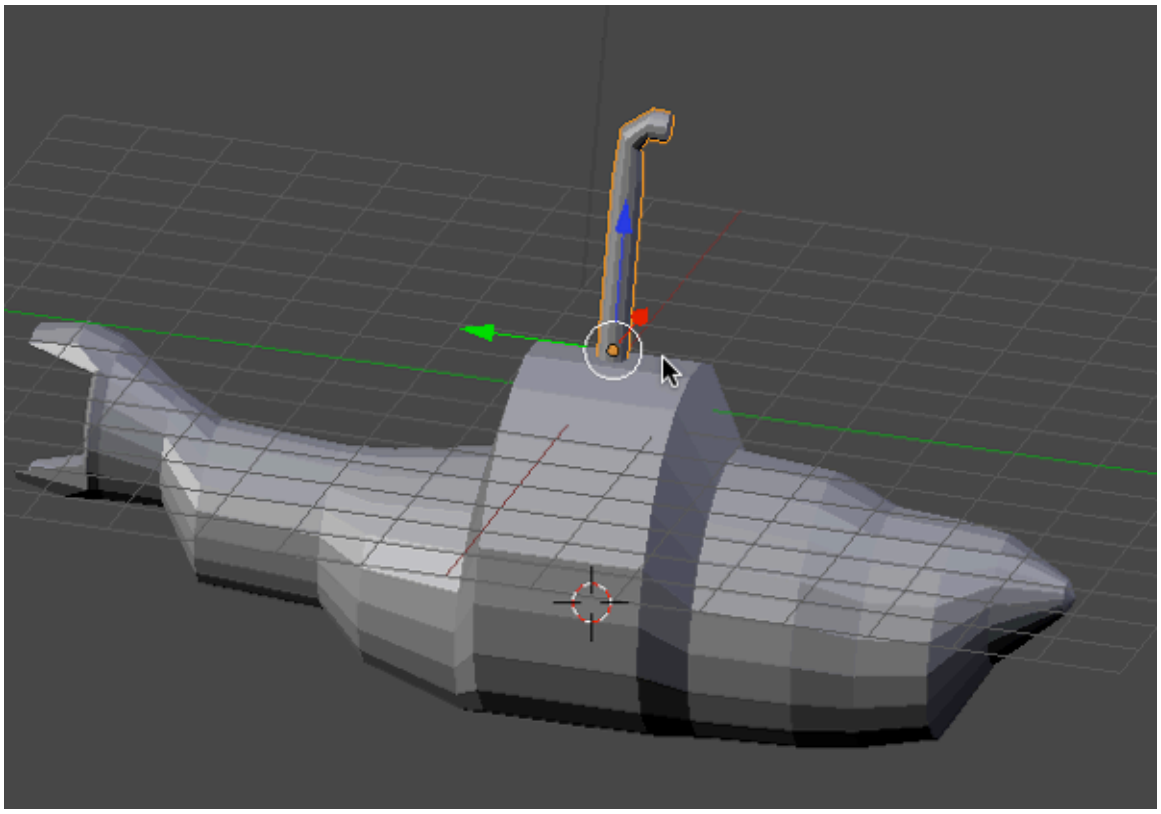
With the vertices still selected, press the RKEY (rotate) and rotate the vertices about 45 more degrees as shown.



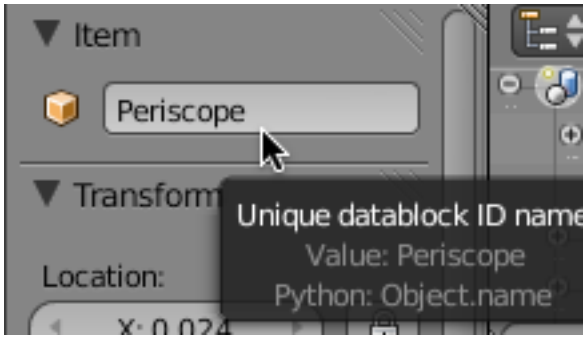
EKEY (Extrude) the vertices a bit more as shown below.



This object will be the sub's periscope. Press the AKEY to deselect the vertices. ZKEY into solid shading display mode. Rotate your model to a more dimensional user view.

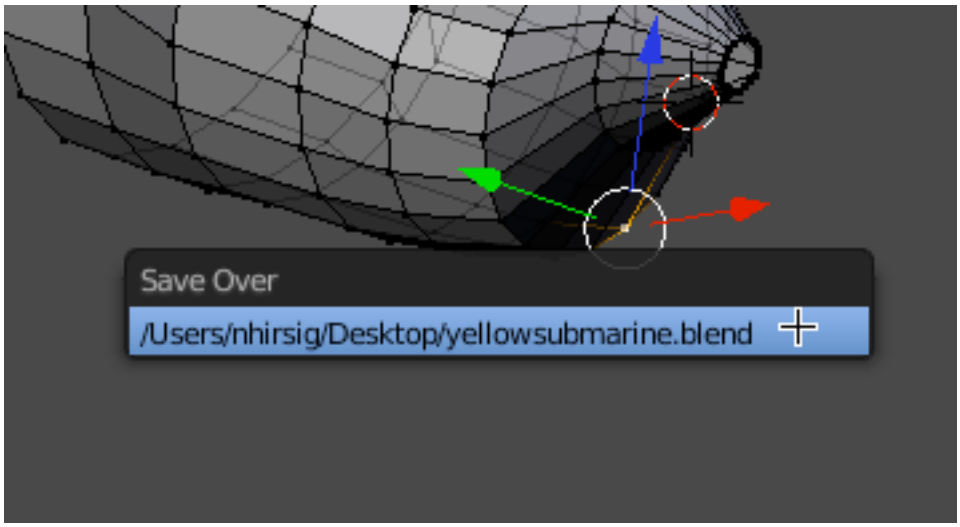


Name this object “Periscope” in the right 3D Editor viewport properties panel.



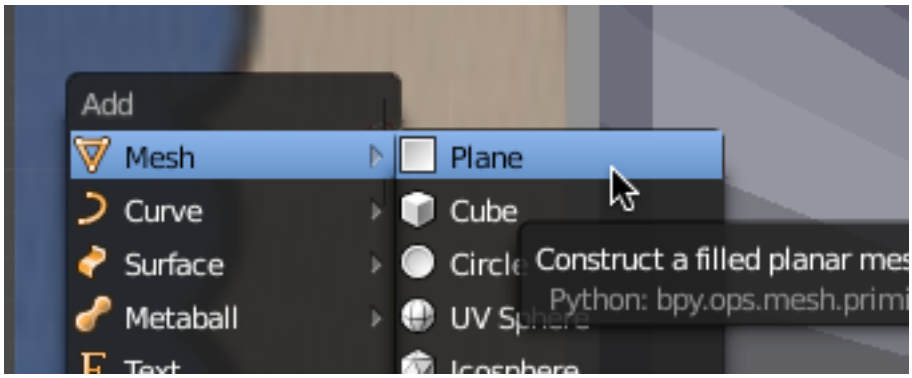

Save your file by pressing **CRTL-W.**

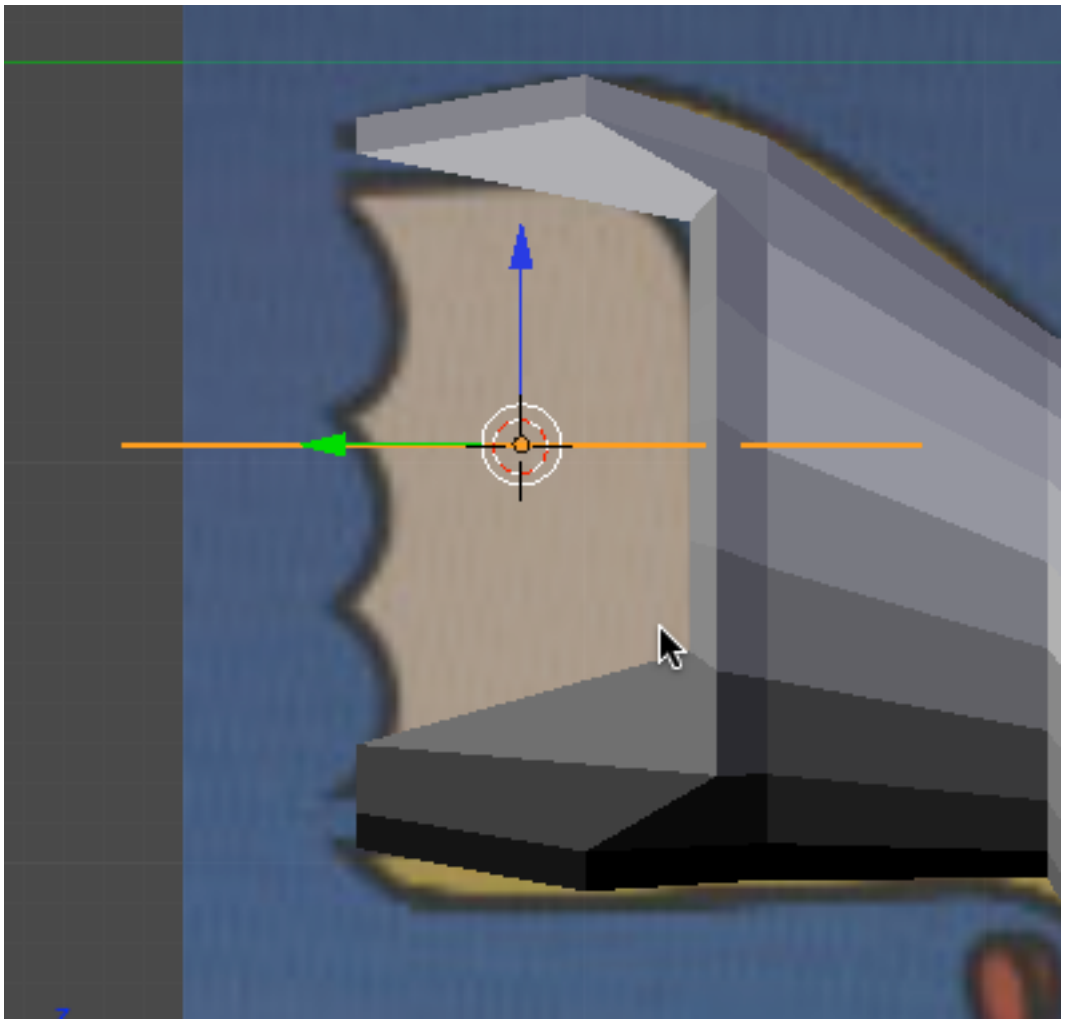
**Make sure click on the file path and name to confirm saving over an already-saved .blend file.**



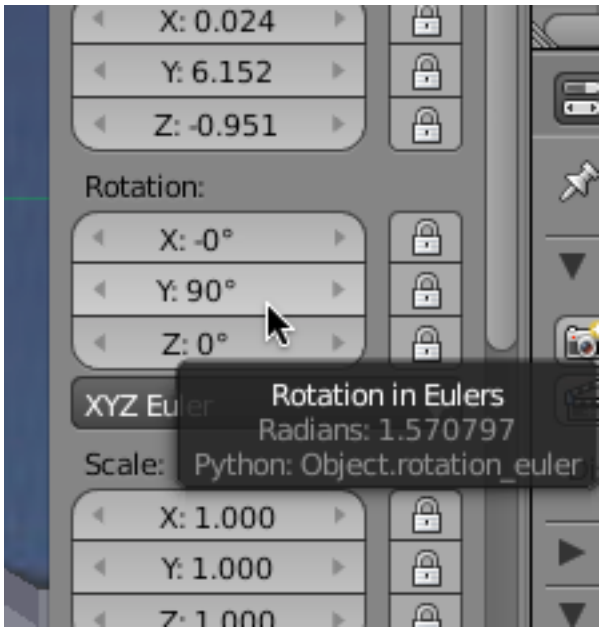

Go to Left Side View (CTRL-NUMPAD-3). Zoom in a bit on the rudder area of your submarine. Make sure you are in solid shading display mode and nothing is selected. Place your 3D cursor in the center of the rudder area as shown below.

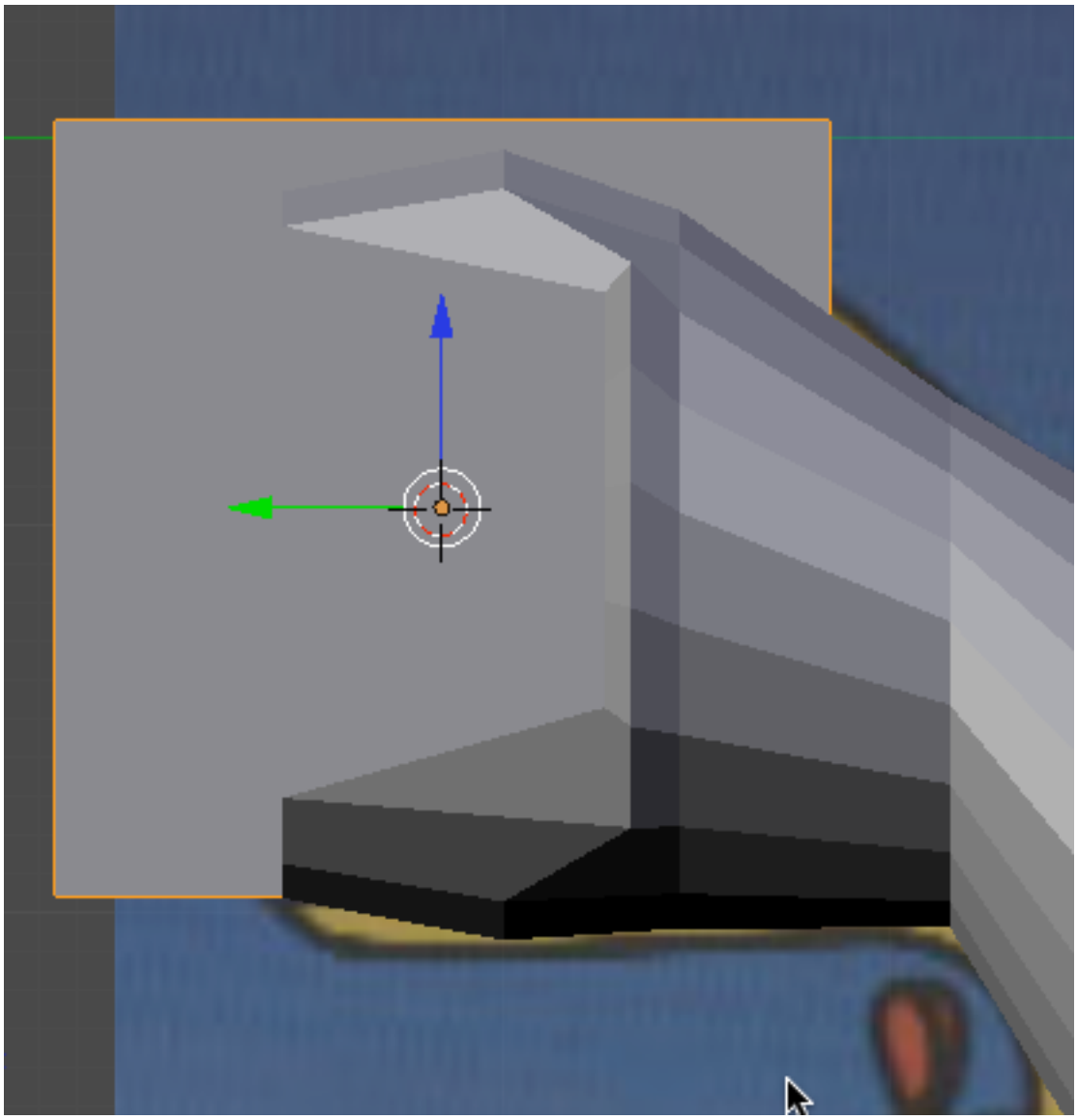
Press SHIF-A and add a plane object.



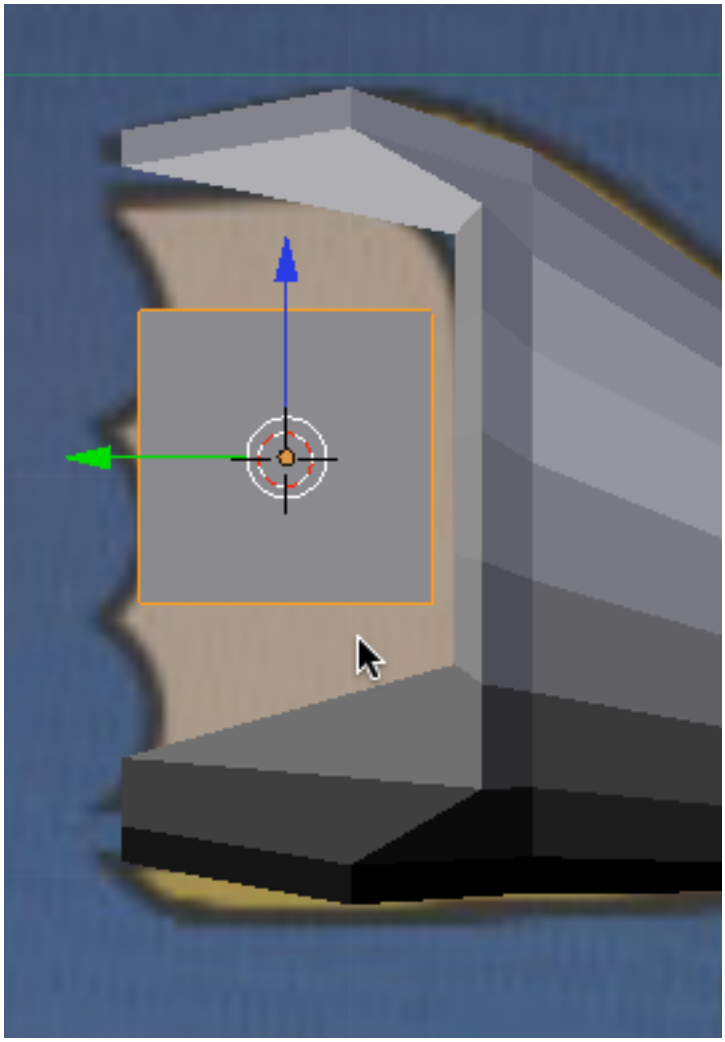


In the right 3D Editor viewport properties panel, set the Y-axis to 90 degrees.

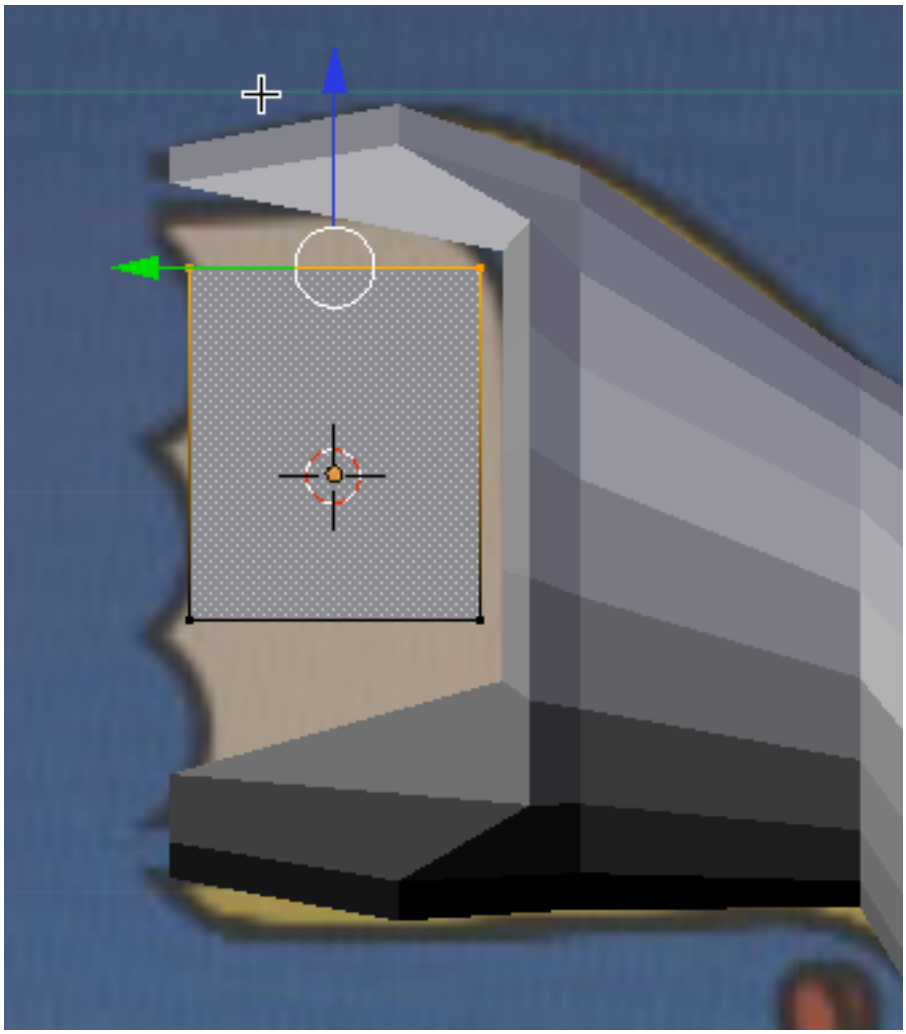

X: 0.024
Y: 6.152
Z: -0.951
Rotation:
X: -0°
Y: 90°
Z: 0°
XYZ Eu
Rotation in Eulers
Radians: 1.570797
Python: Object.rotation_euler
Scale:
X: 1.000
Y: 1.000



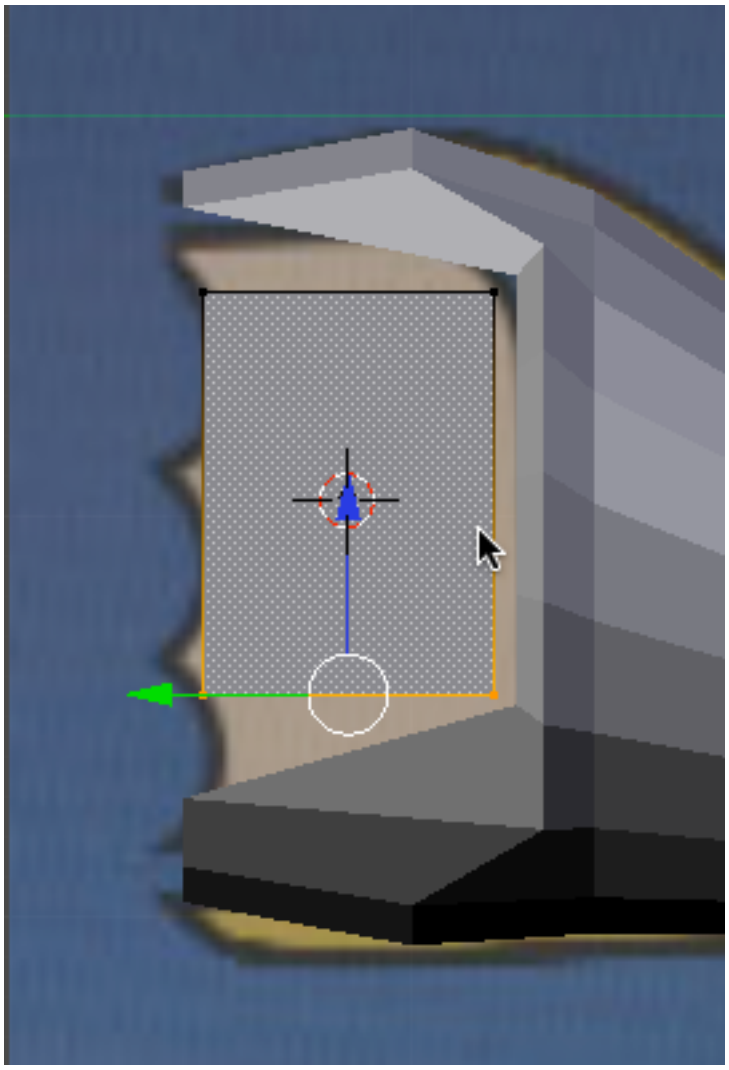
Press the SKEY (Scale) and scale the plane object down as shown below.



TAB into edit mode. Press the AKEY to deselect the vertices. Box select the upper vertices and using the transform widget arrowhead, move the vertices up a bit as shown below.

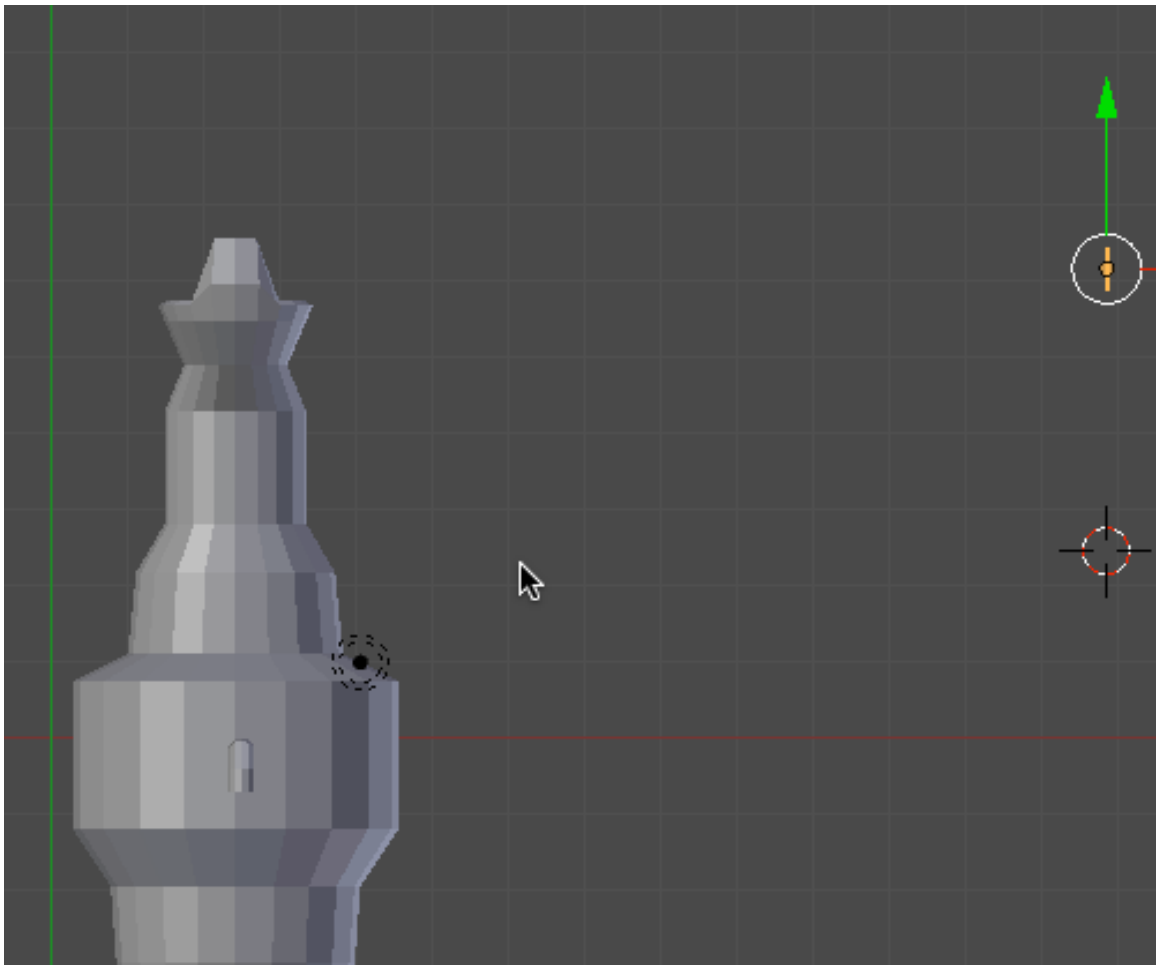


Do the same thing with the lower vertices as shown below.

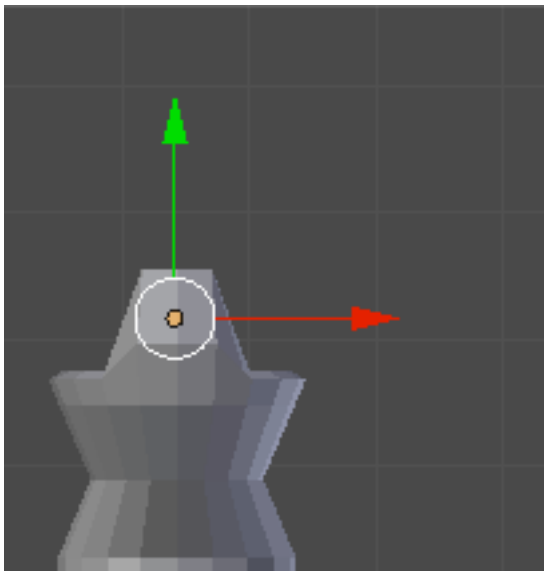


Go to Top View (NUMPAD-7)

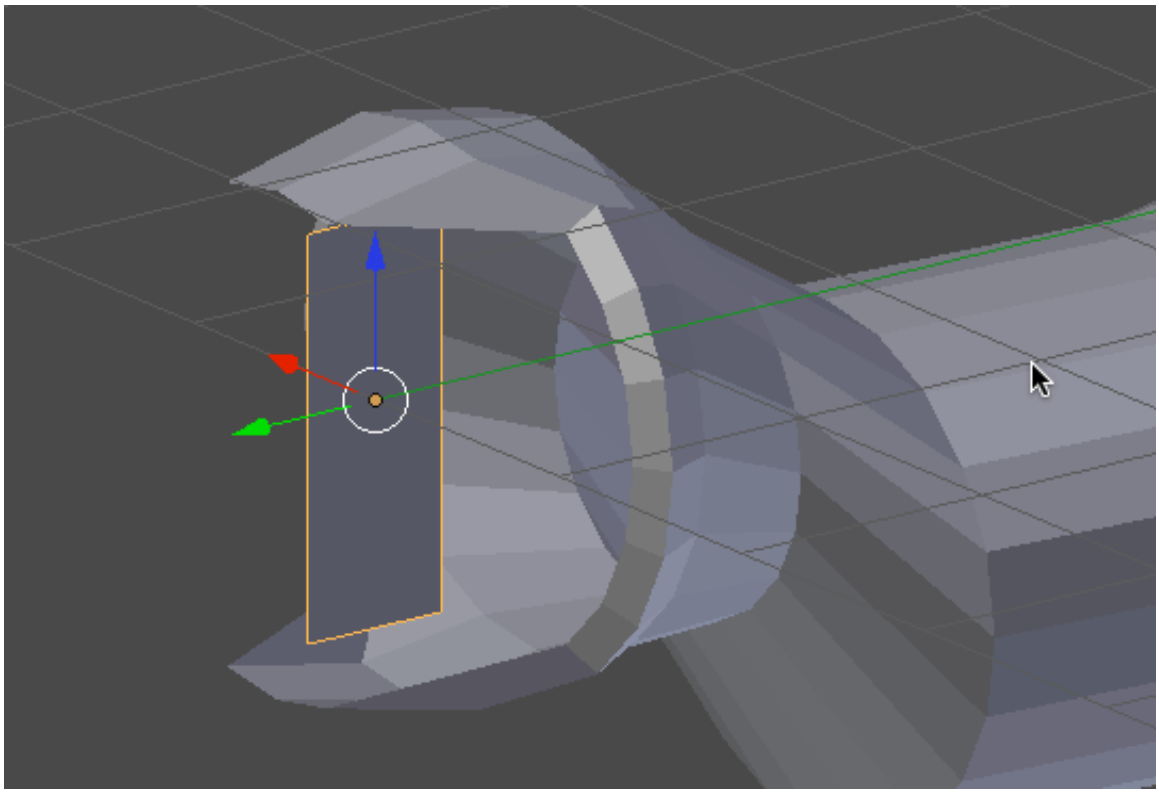
Note that the rudder object may not be in line with the body of the submarine.



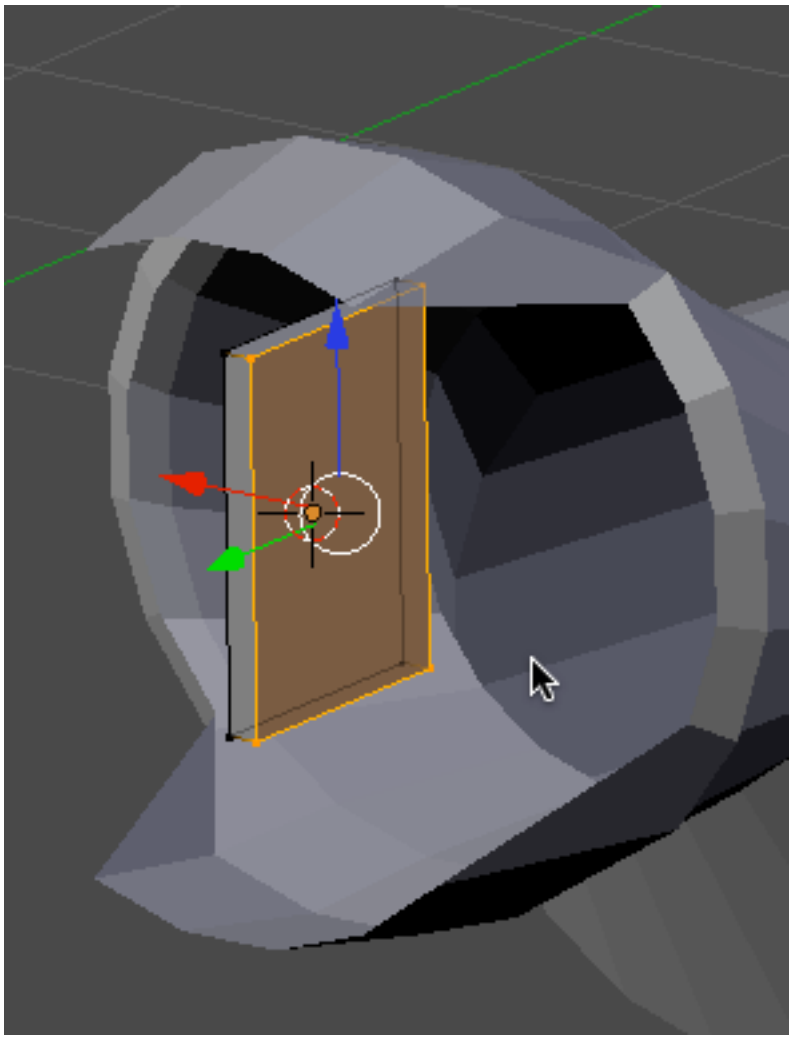
If this is the case, press the GKEY followed by the XKEY and drag the rudder object so it is aligned with the submarine.



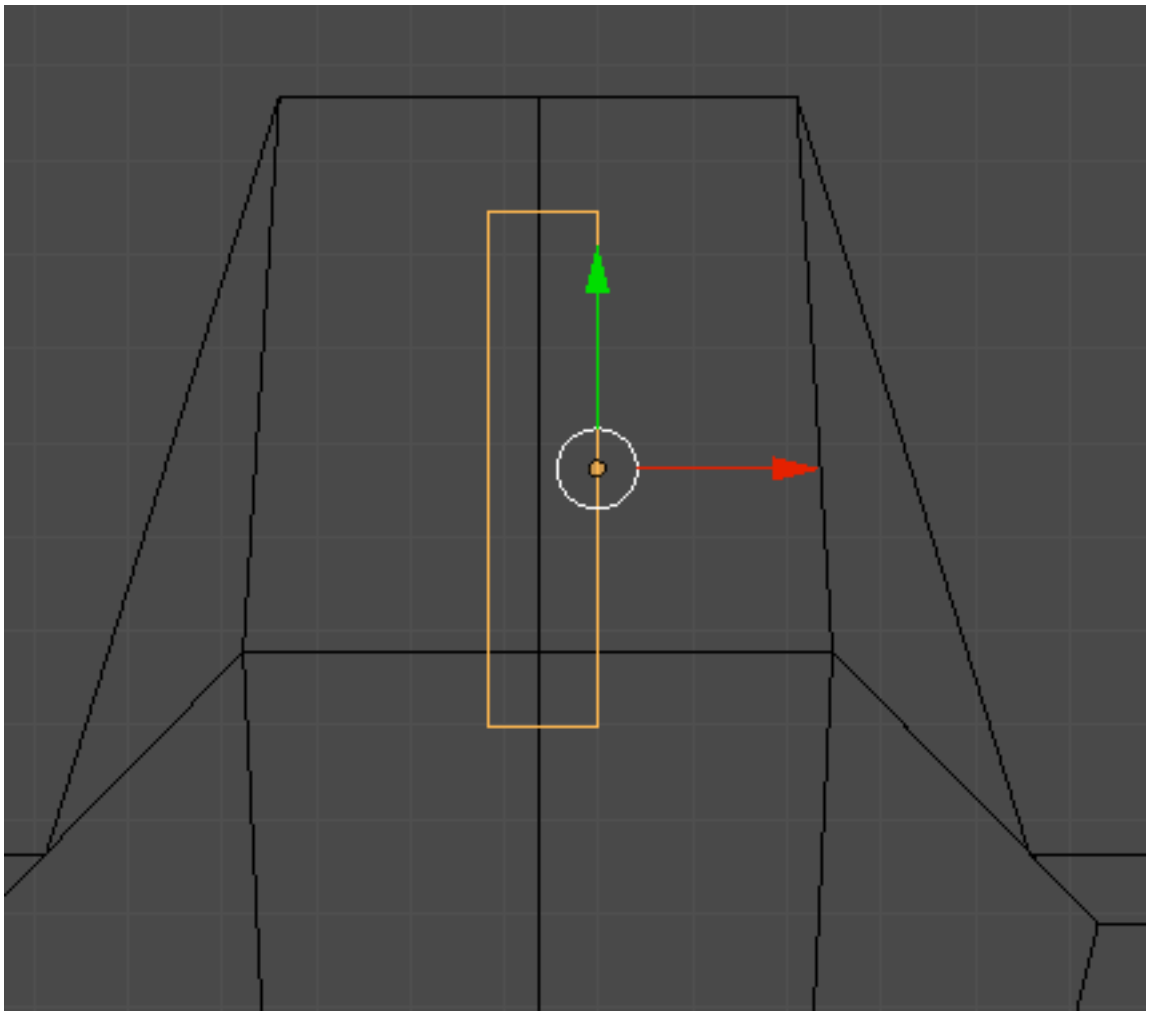
Rotate you view a bit and focus in on the rudder area as shown below.



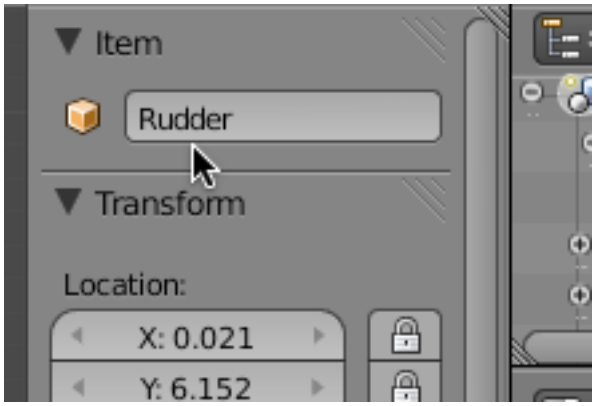
Make sure you are in Edit Mode (TAB) - Press the AKEY twice to select all of the vertices. Press the EKEY (Extrude) and extrude them a bit as shown below.



Press the AKEY to deselect the vertices. Press TAB to enter object mode. Select the object. Press the ZKEY to enter wireframe shading display mode. Go to Top View (NUMPAD-7). Make sure the rudder is positioned in the center of the rudder area.

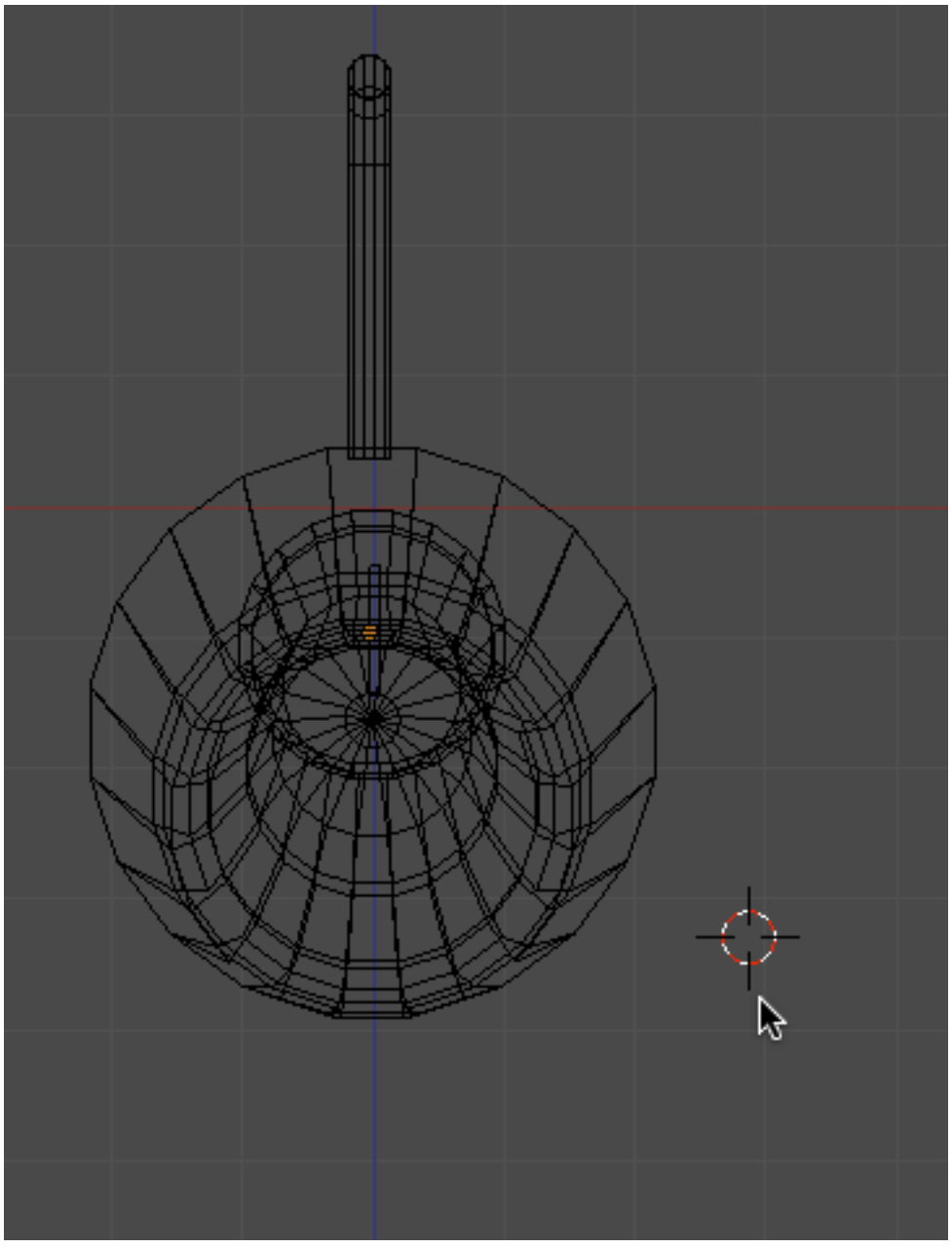


Name this object “Rudder”.

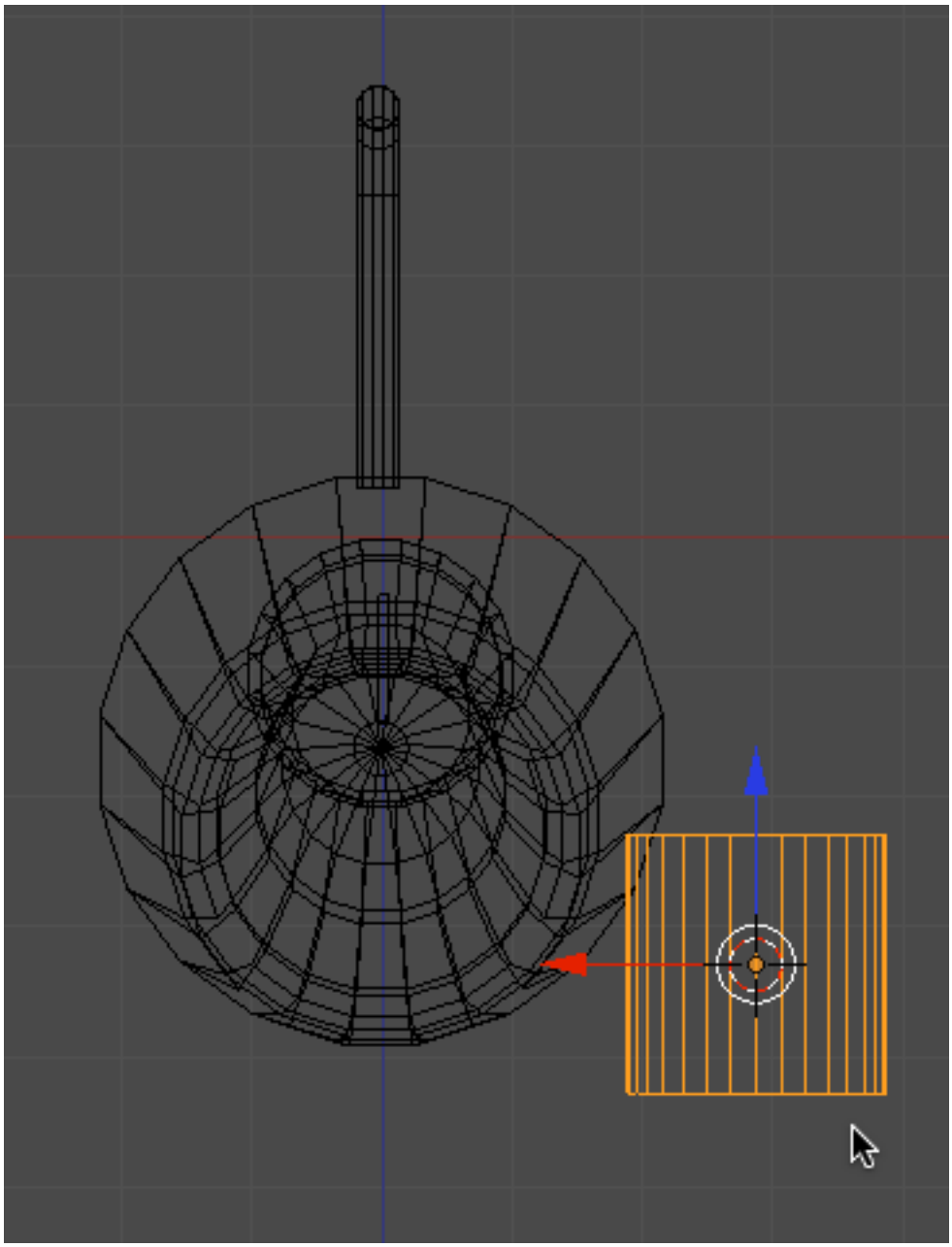



Press **COMMAND-S (MAC) or CTRL-S (PC)** and save your file.

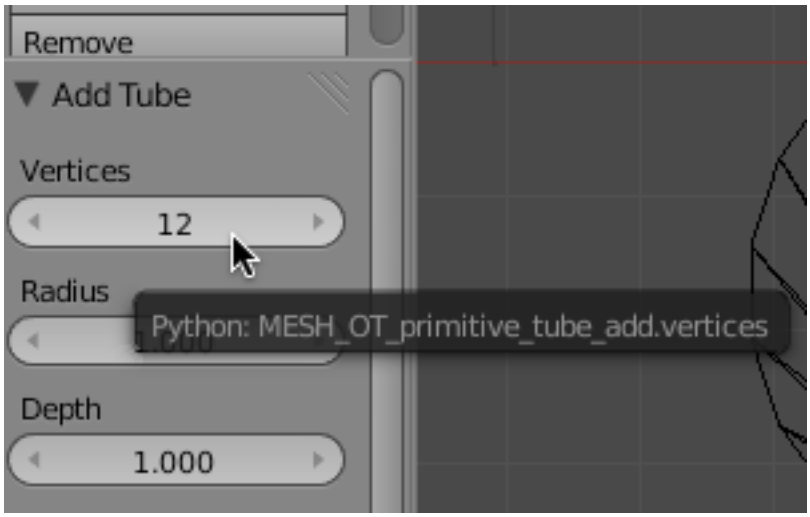
Go to Back View (CTRL-NUMPAD-1). Place your 3D cursor to the side of the submarine as shown below.



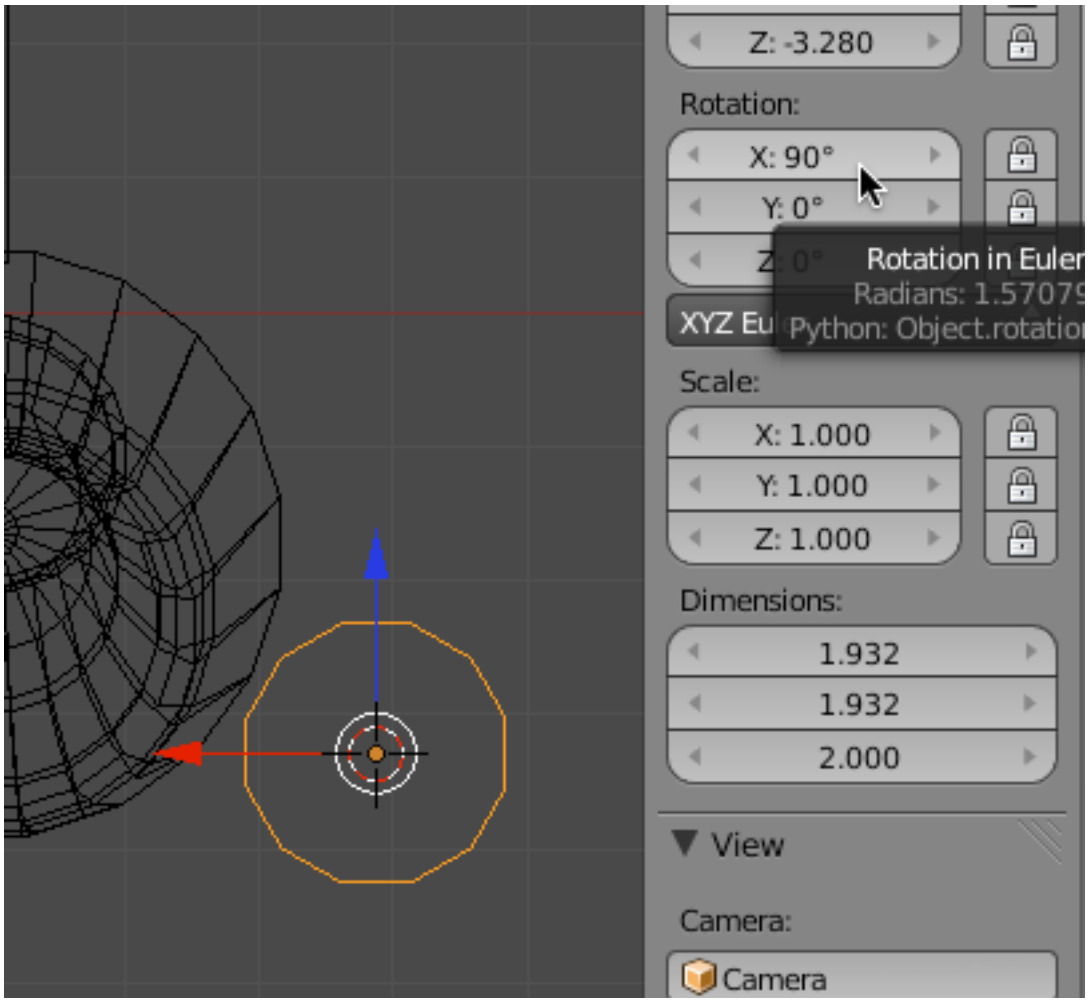
Press SHIFT-A and add a cylinder object.



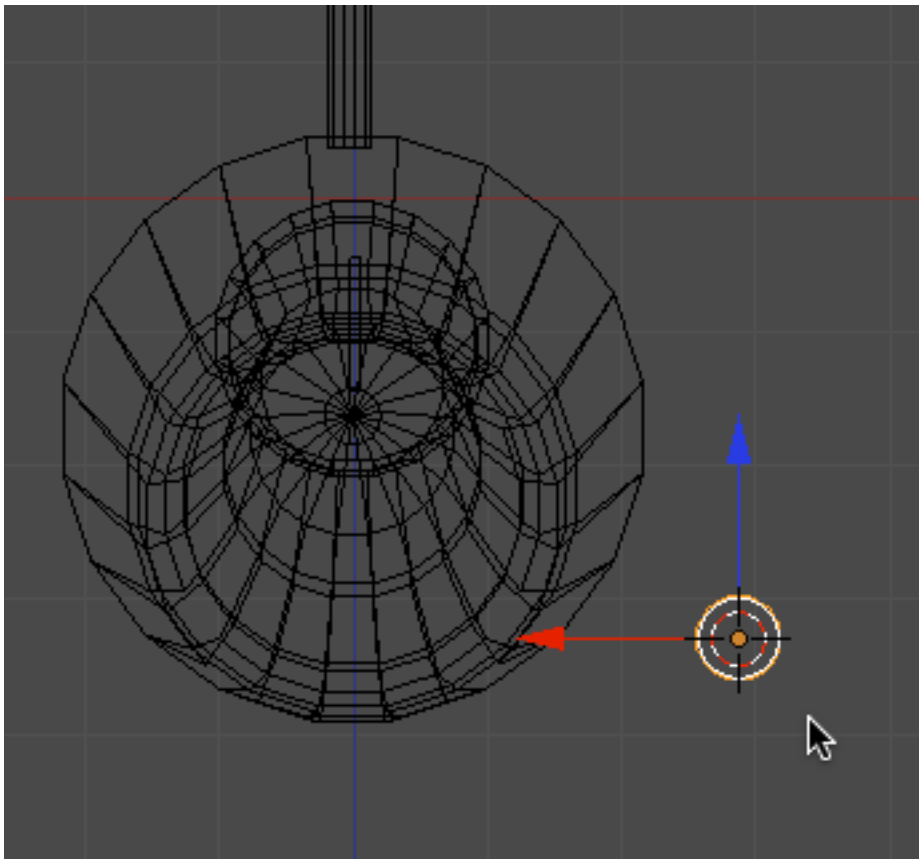
In the ADD cylinder panel on the left 3D Editor Tool panel set the vertices to 12.



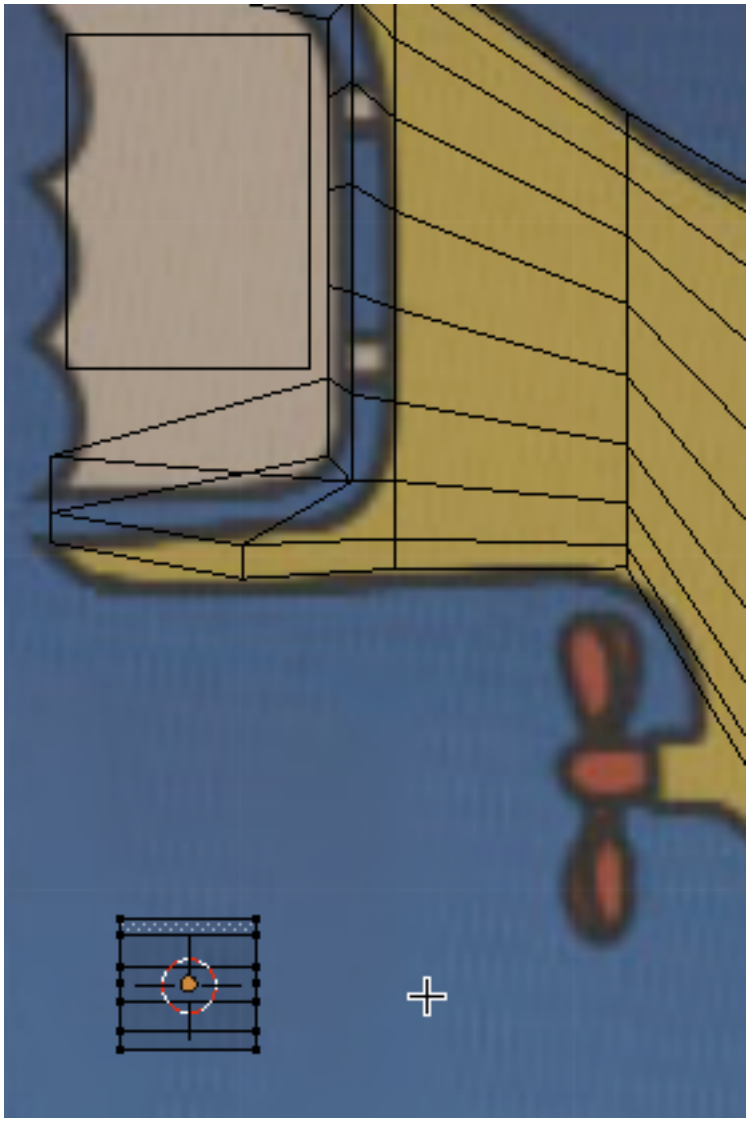

In the right 3D Editor viewport properties panel set the X Rotation to 90 degrees.



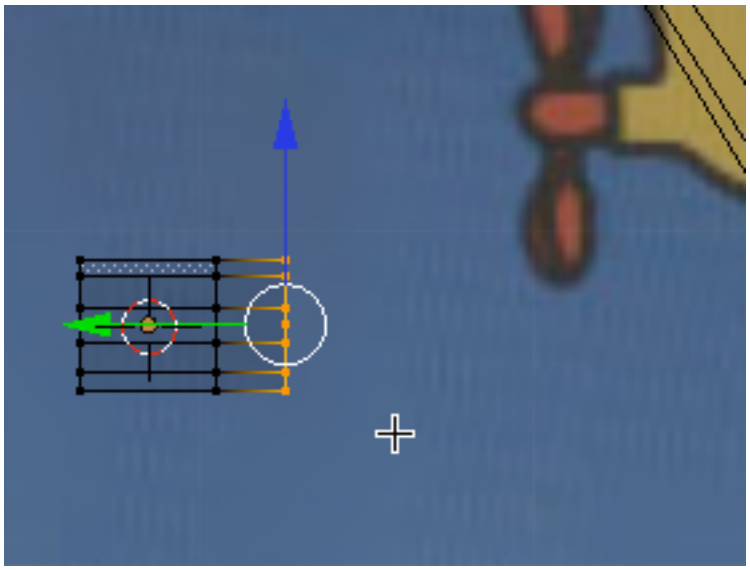

Press the SKEY (Scale) and scale the tube down as shown below.



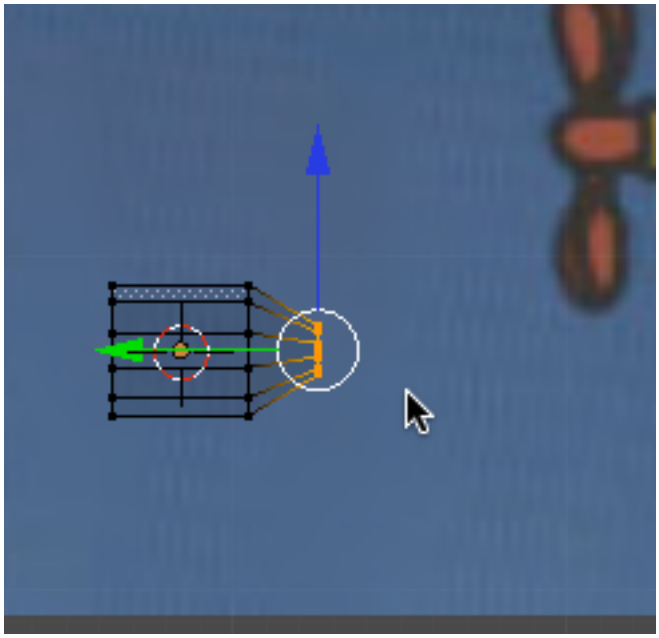
Go to Left side view (CTRL-NUMPAD-3). TAB into Edit mode. With all of the vertices selected scale the object down a bit more as shown below and press the AKEY to deselect the vertices.



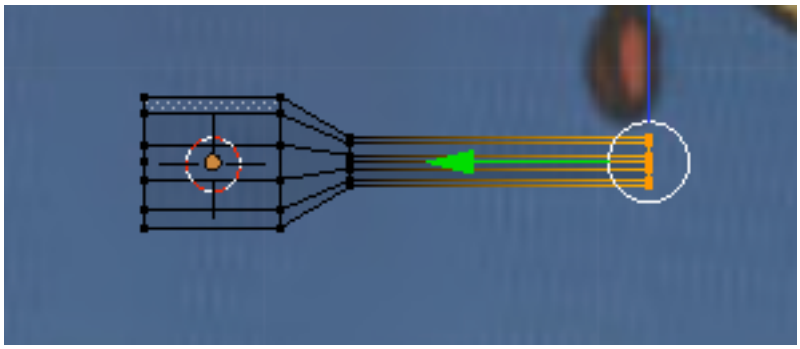
BKEY (Box select) the right side vertices and EKEY (Extrude) them a bit as shown along the Y Axis (YKEY).



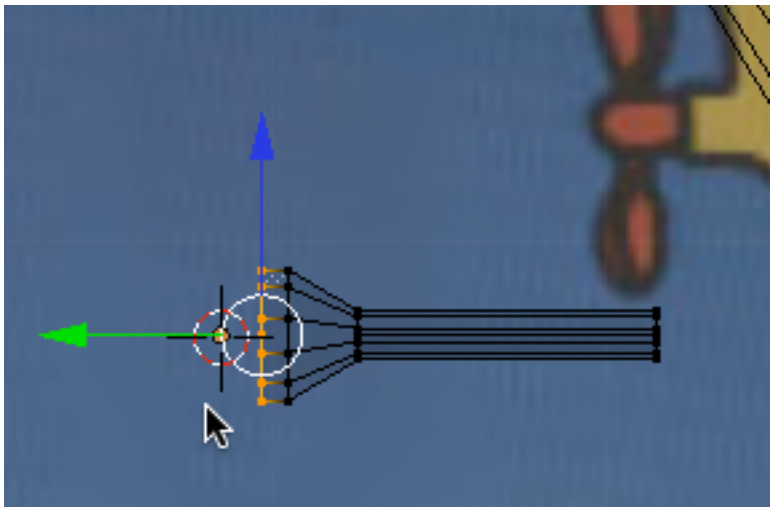
With the vertices still selected, press the SKEY (Scale) and scale them down a bit as shown below.



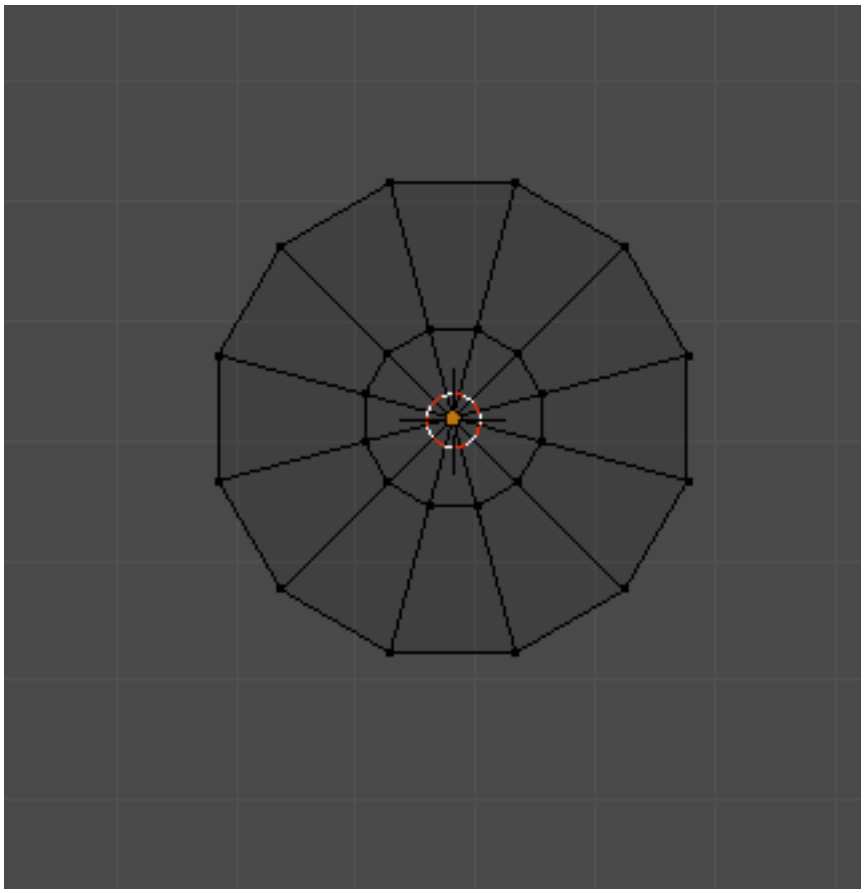
With the vertices still selected press the EKEY (Extrude) and extrude them along the Y axis (YKEY) as shown below.



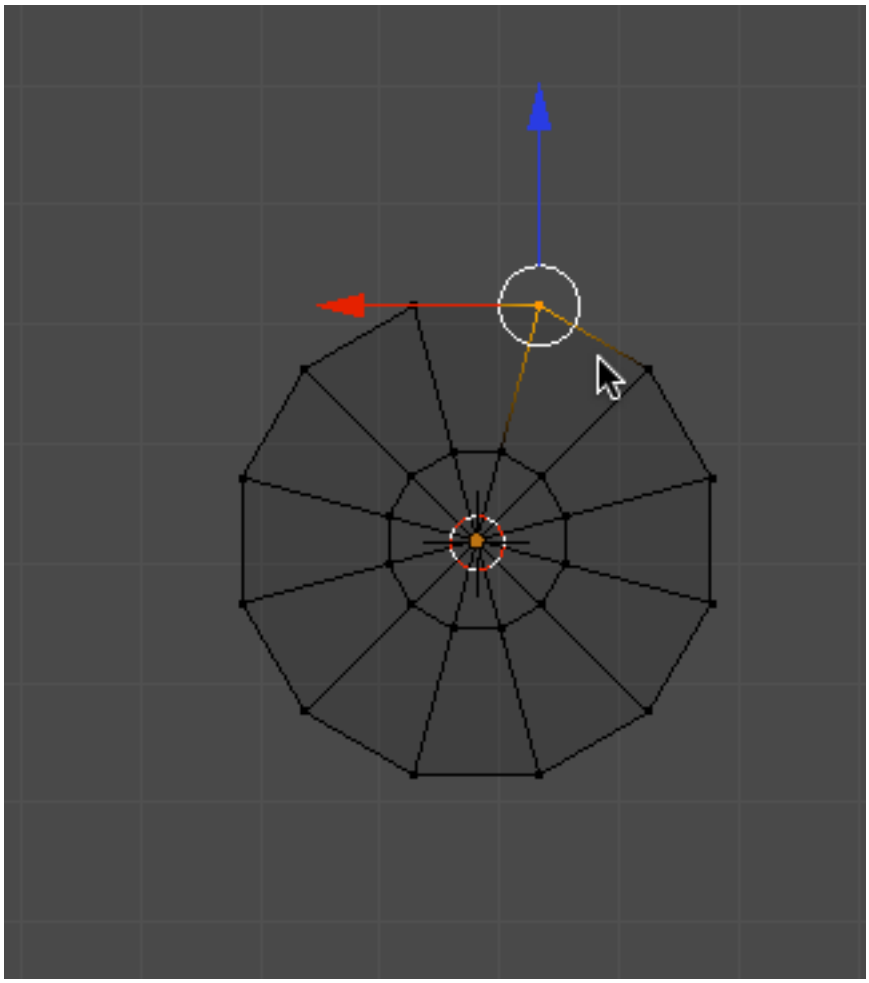
Press the AKEY to deselect the vertices. Box select (BKEY) the left set of vertices and using the transform widget green arrowhead move them to the left a bit as shown below.



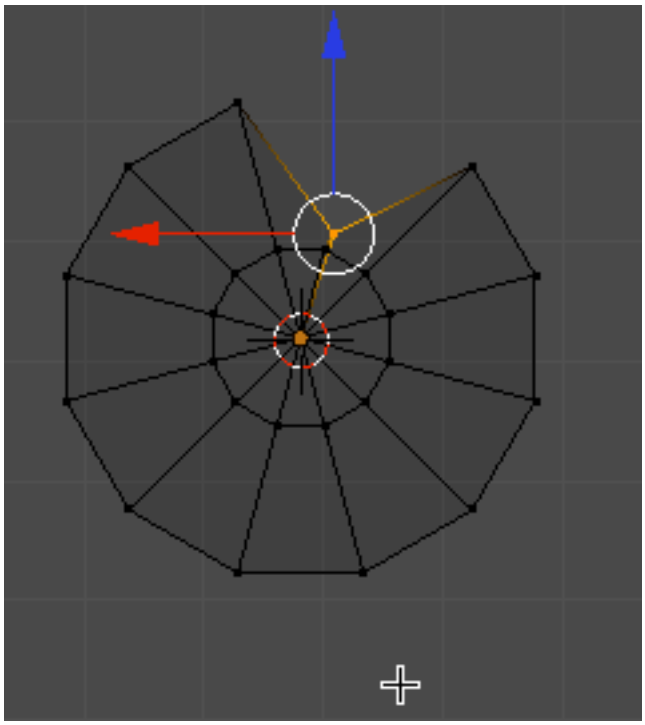
Press the AKEY and deselect the vertices. Go to Back view (CTRL-NUMPAD-1). Zoom in on the object.



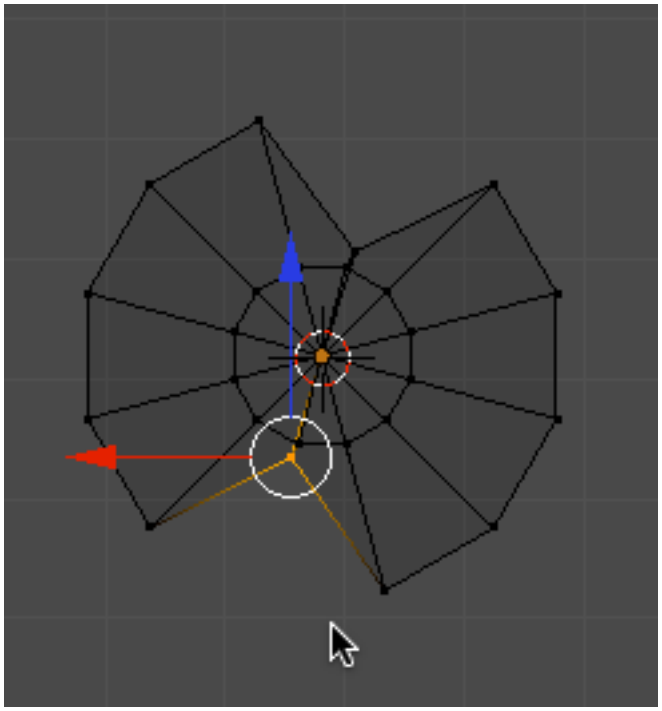
Box select (BKEY) one of the top vertices as shown.  (Note that since we are in wireframe mode the vertex directly behind the selected vertex is also selected.



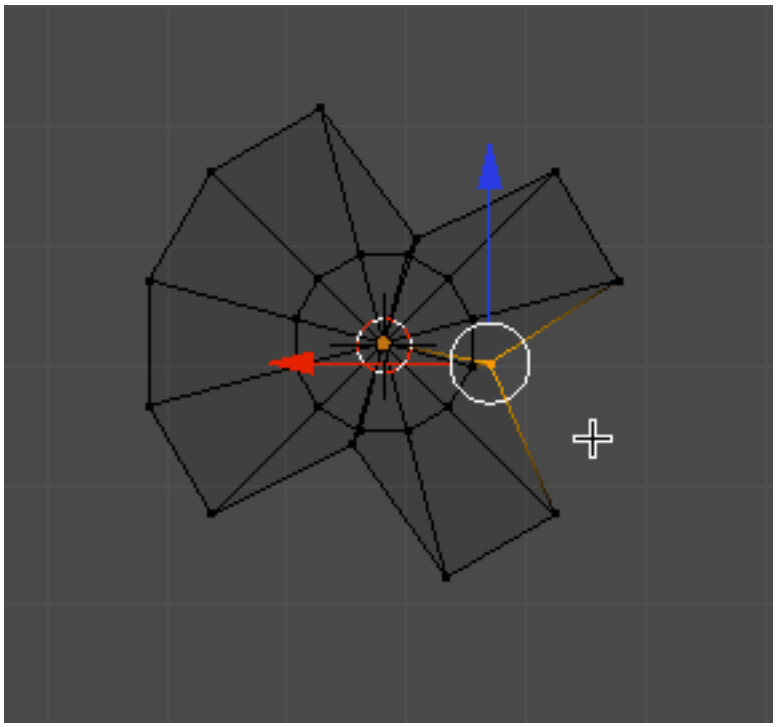
Press the GKEY (Grab) and move these vertices to the center as shown below.



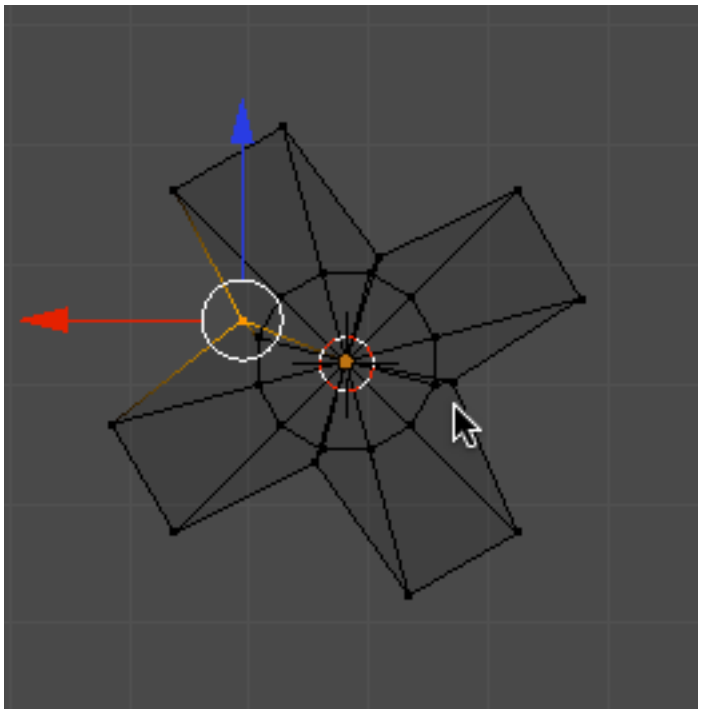
Press the AKEY to deselect the vertices. Box select (BKEY) the vertices directly opposite of the one you just moved and move them to the center as shown below.



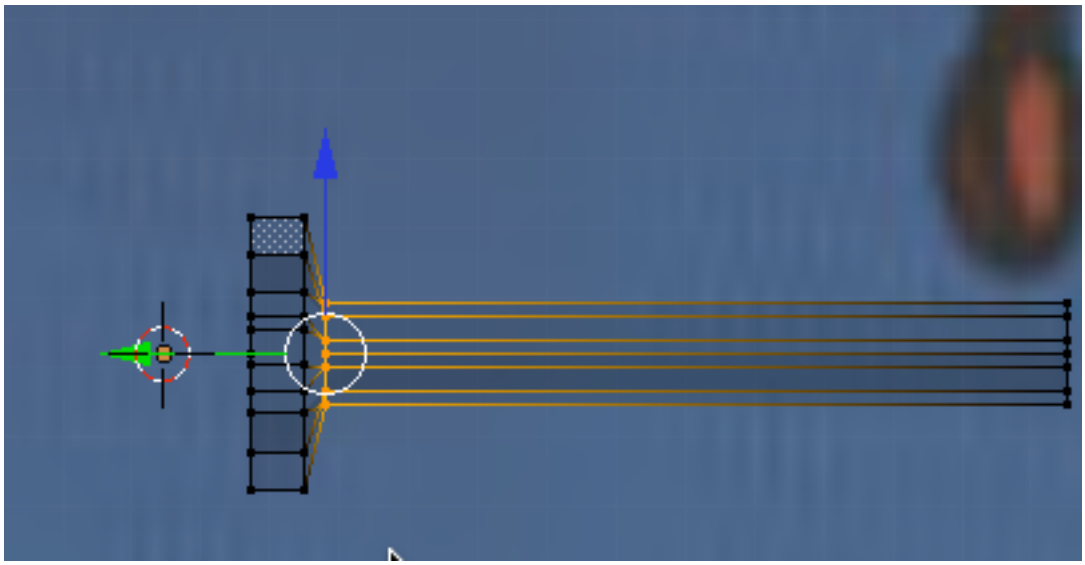
Press the AKEY to deselect the vertices. Box select (BKEY) a set of vertices on the right as shown and GKEY move them toward the center.



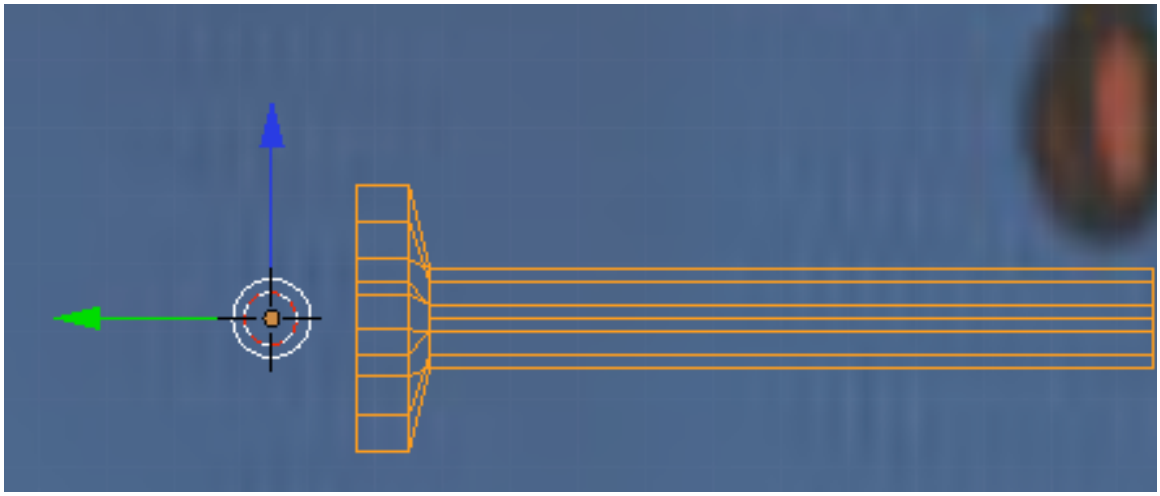
Do the same on the other side.



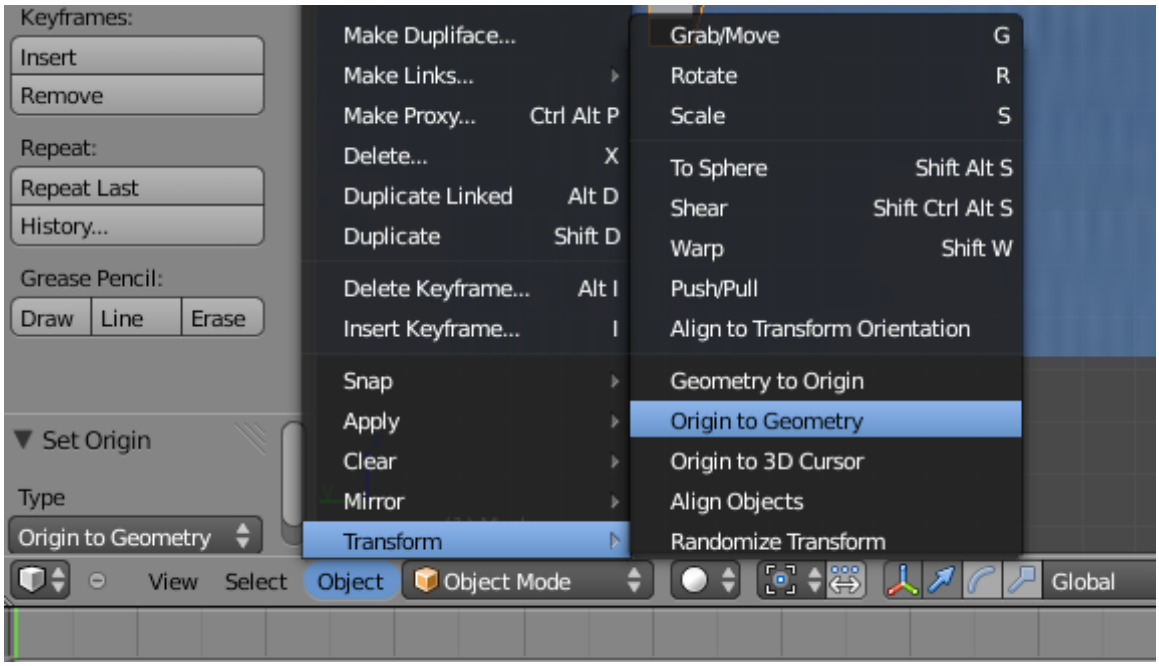
Press the AKEY to deselect the vertices. Go to Left Side View (CTRL-NUMPAD-3). Box select (BKEY) the middle set of vertices as shown and move them to the left a bit as shown below.



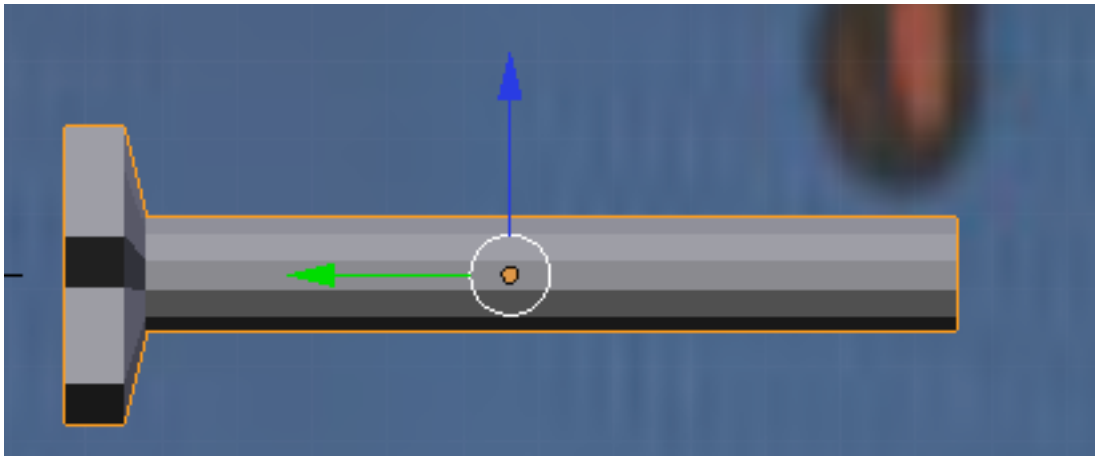
Press the AKEY to deselect the vertices. TAB into object mode. Note that the center point (origin) of the object is outside of the object. You can tell this by the location of the transform widget when the object is selected in object mode. We need to recent this center point.



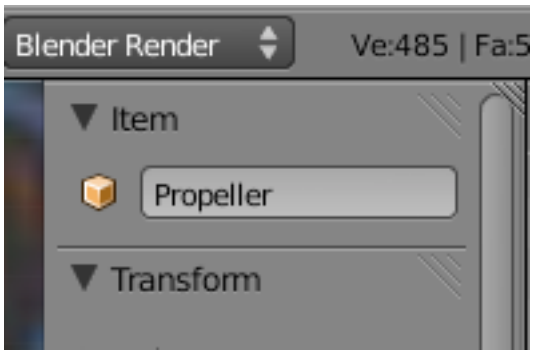
With the object selected in object mode, press the Object button on the 3D Editor viewport header and select Transform / Origin to Geometry



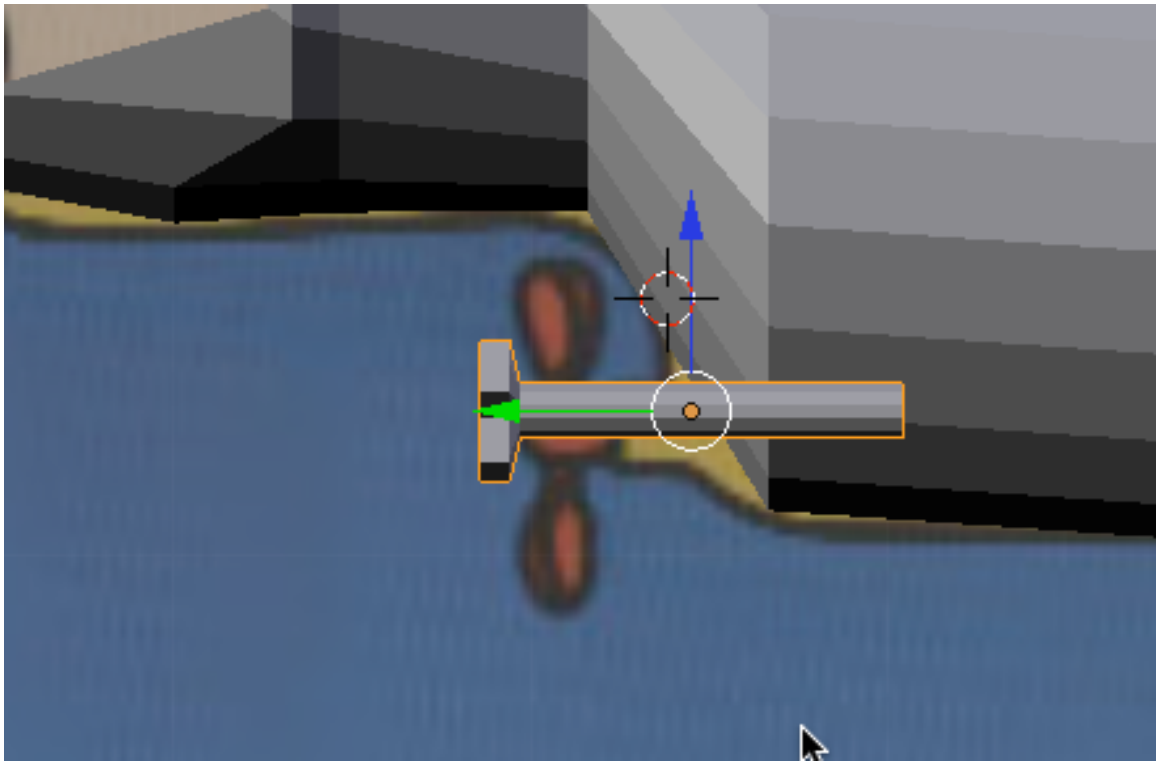

This will align the objects origin center point to the center of the object.



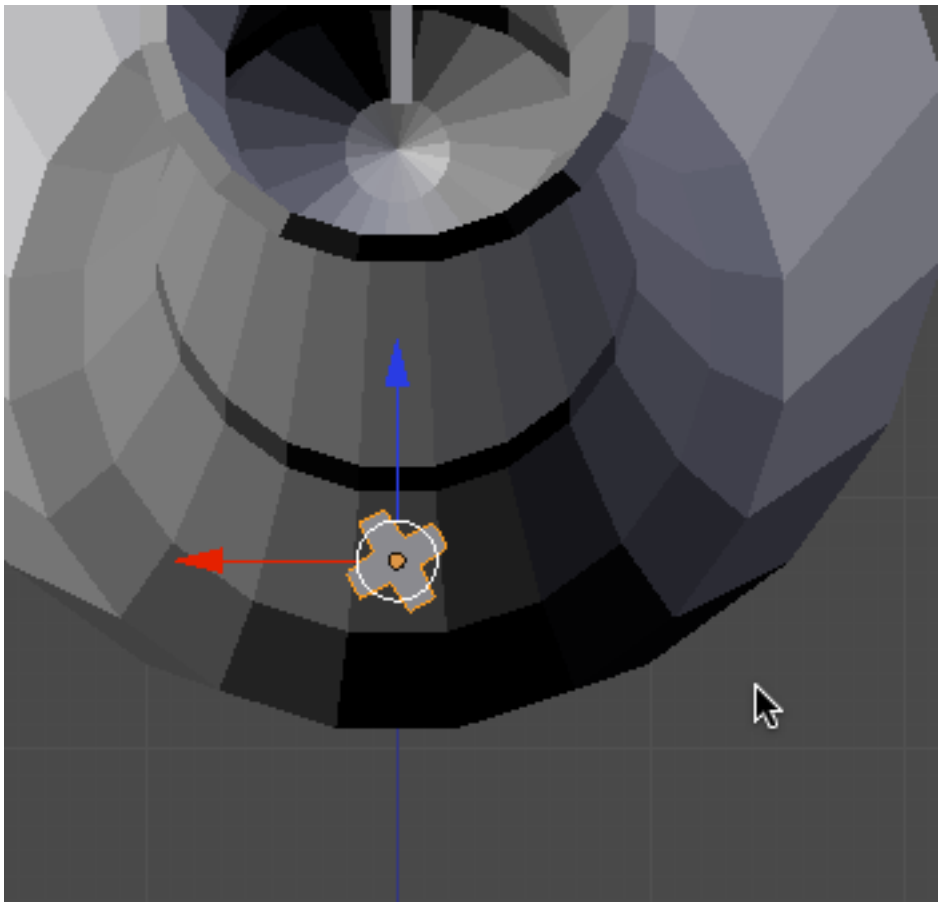
Name this object “Propeller”.



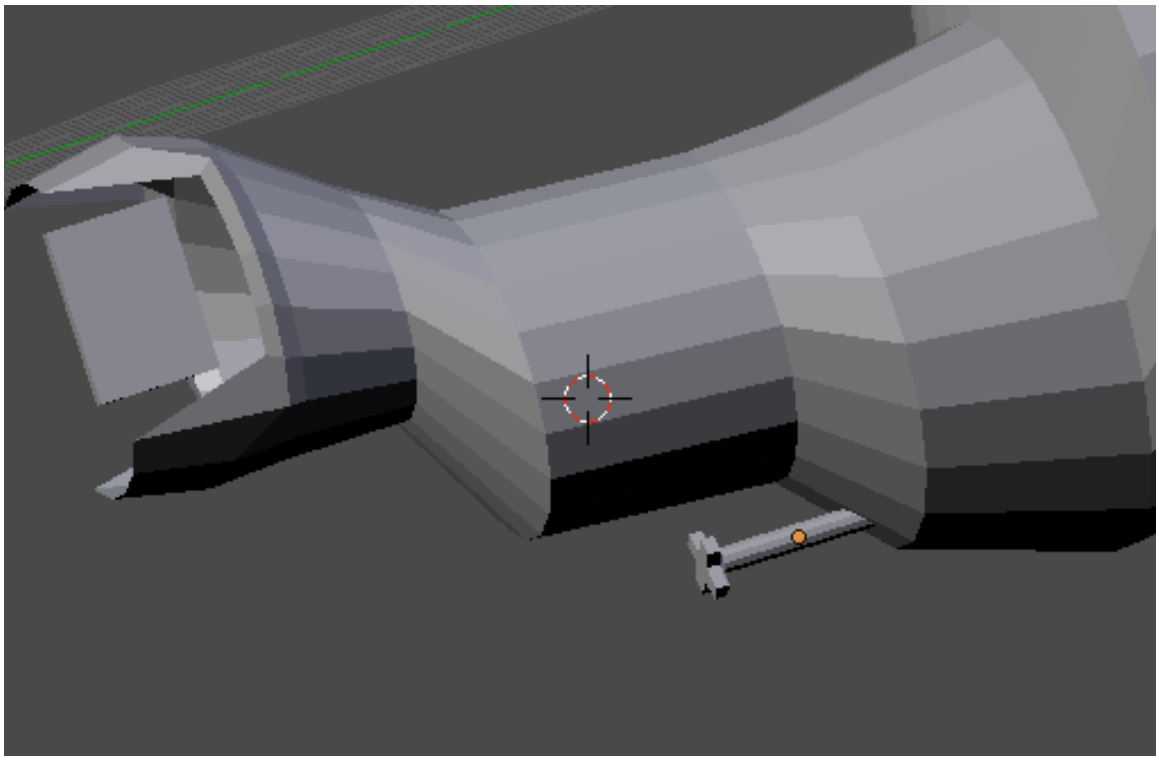
Zoom out a bit and select the object and press the GKEY (Grab) and place the object as shown below.



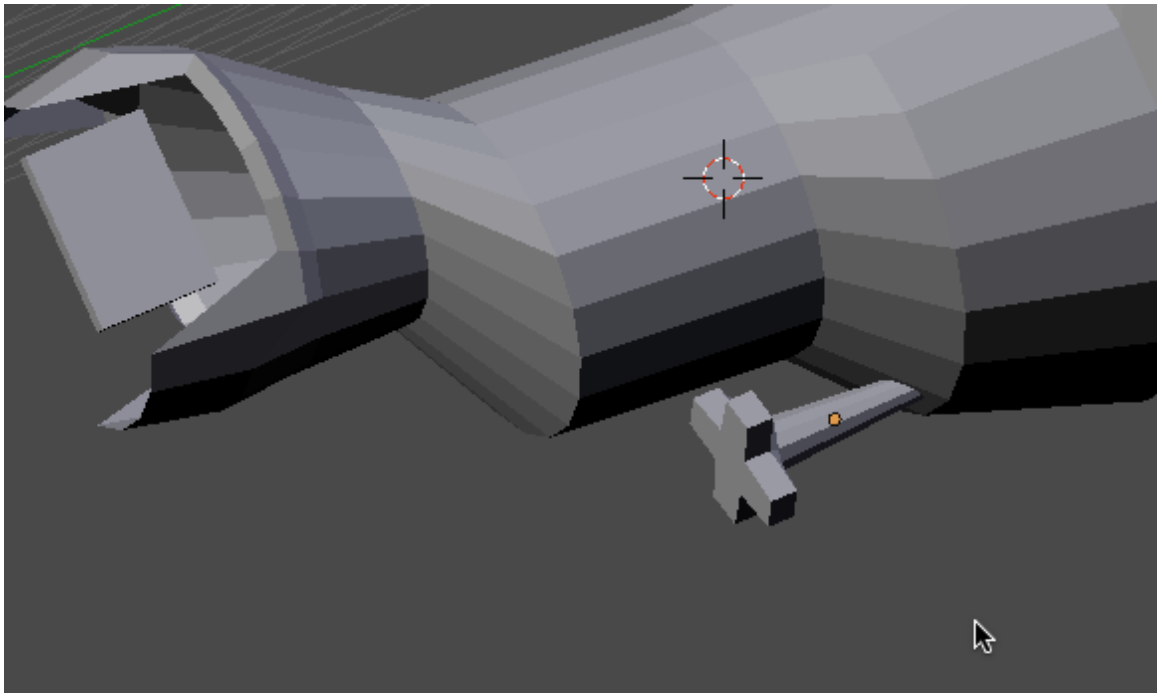
Go to Back View (CTRL-NUMPAD-1). Grab (GKEY) the propeller object and move it to the position as shown below.



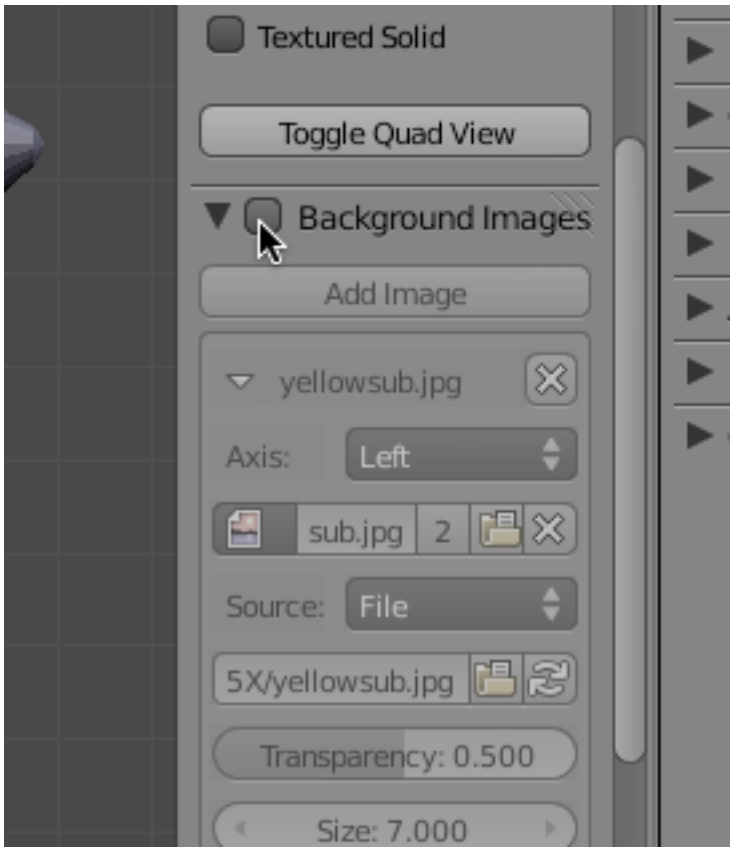
Rotate your model to a user dimensional view. Make sure the propeller is properly placed.



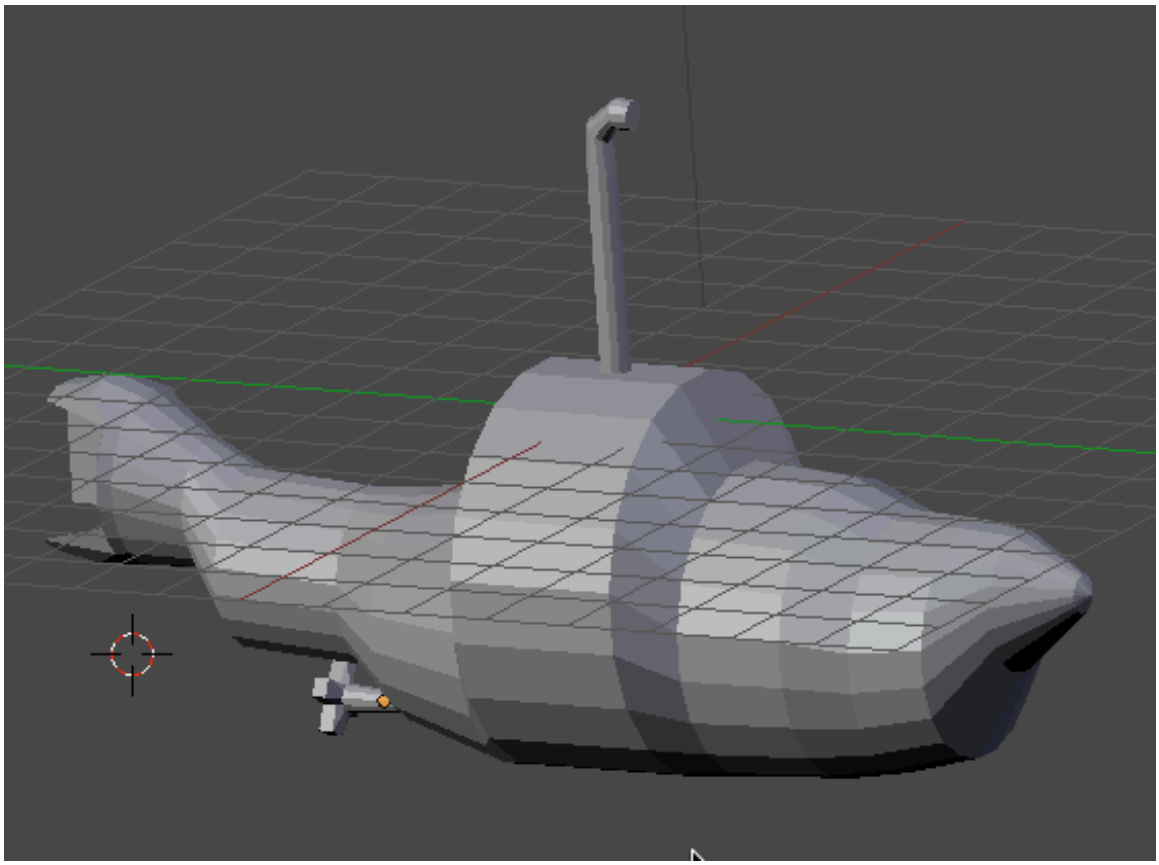
You may want to TAB into EDIT mode and select the blade vertices and scale them up a bit.



Go to Left Side View (CTRL-NUMPAD-3). Uncheck the Background Image checkbox in the right 3D Editor Viewport properties panel. This will turn off the background image.




Rotate your model to a user view.

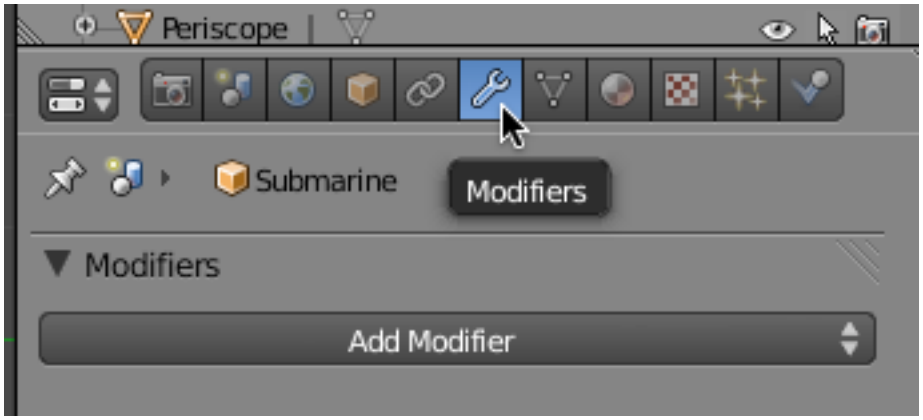


Press **COMMAND-S (MAC) or CTRL-S (PC)** and save your Blender file.

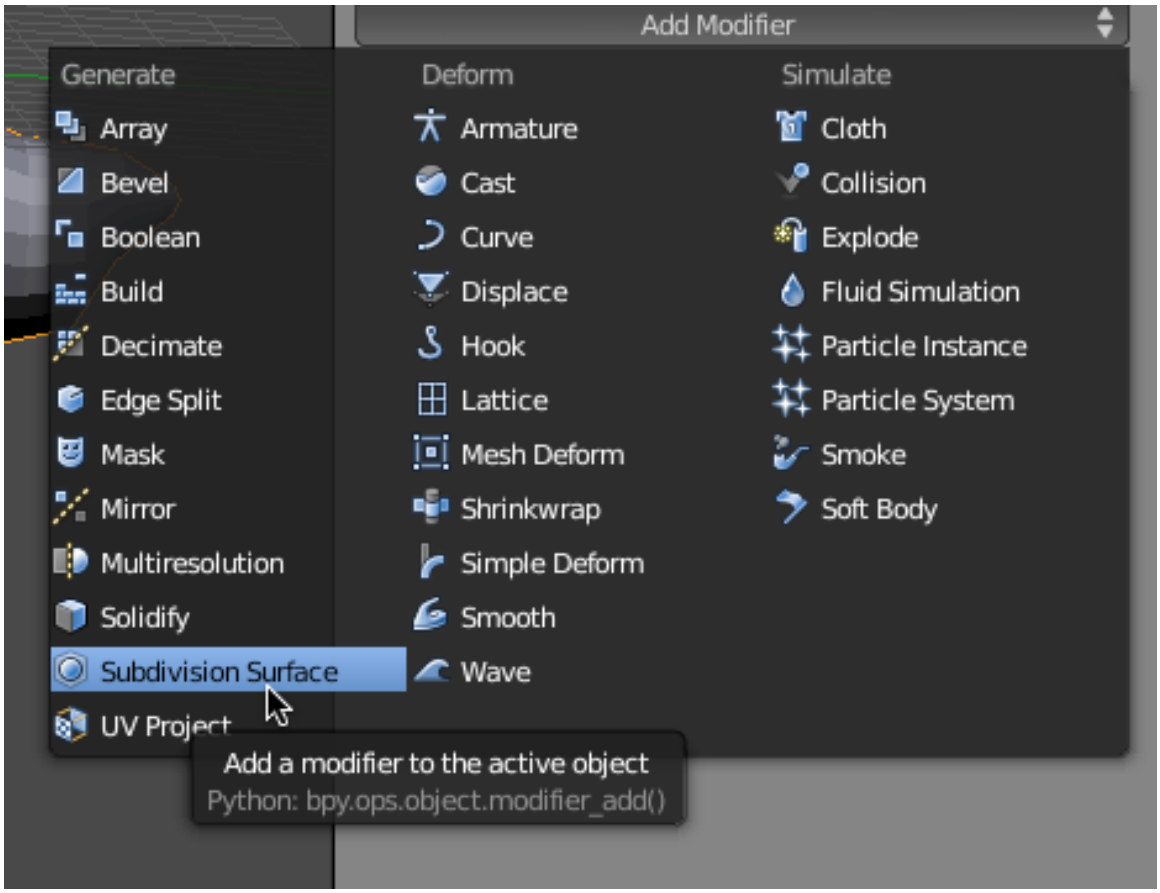
## SMOOTHING:

We will now do some smoothing operations on our submarine model. Go to Left Side view (CTRL-NUMPAD-3). Make sure you are in object mode and solid view with nothing selected.

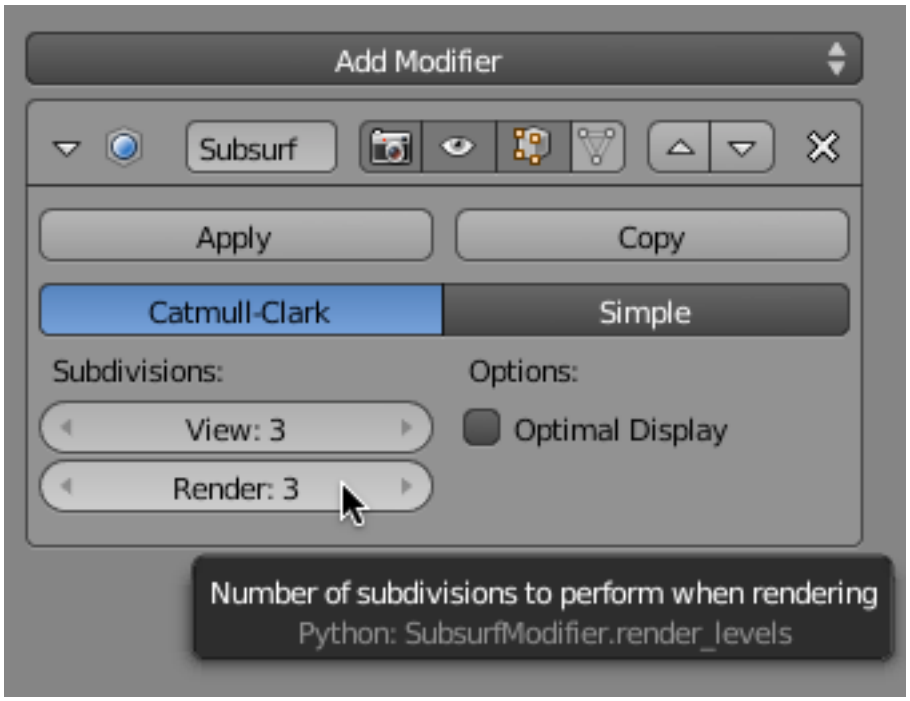
Select the submarine object only. Click on the Modifiers context button in the Properties Editor.



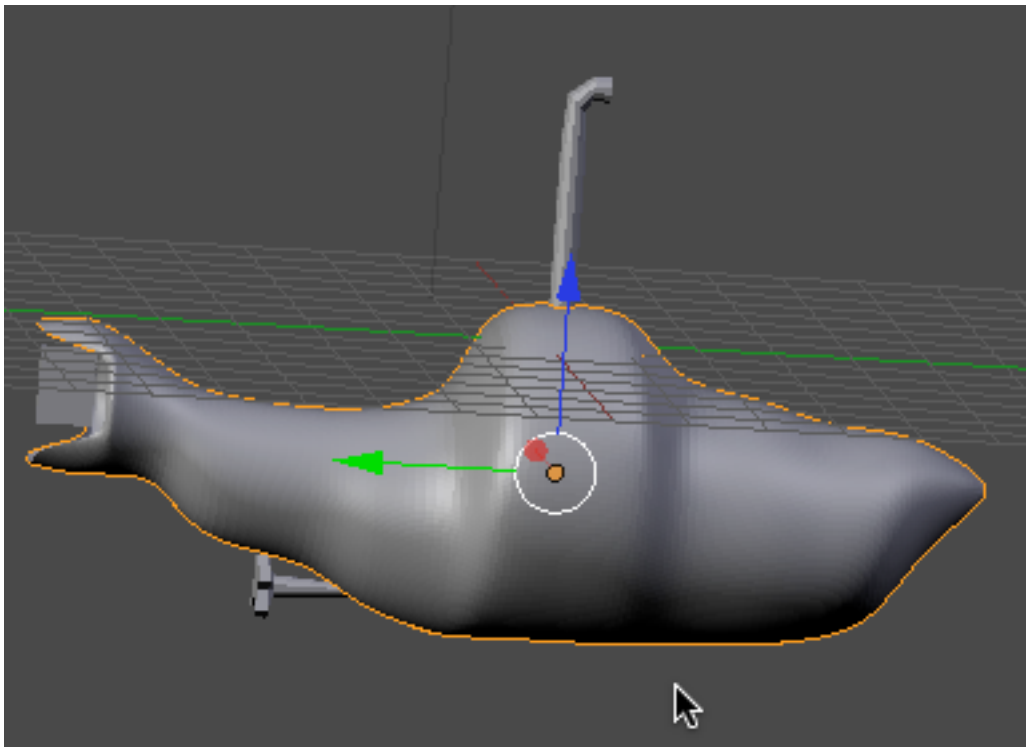
Click on Add Modifier and choose a Subdivision Surface (Subsurf) modifier.



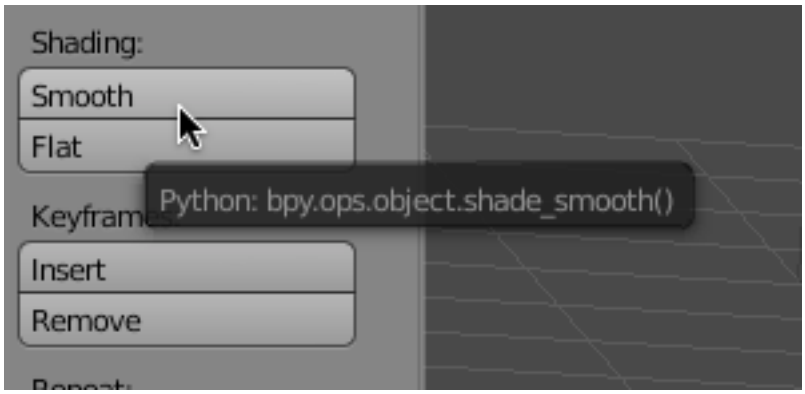

In the Subsurf modifier panel set the Subdivisions for View and Render to 3.



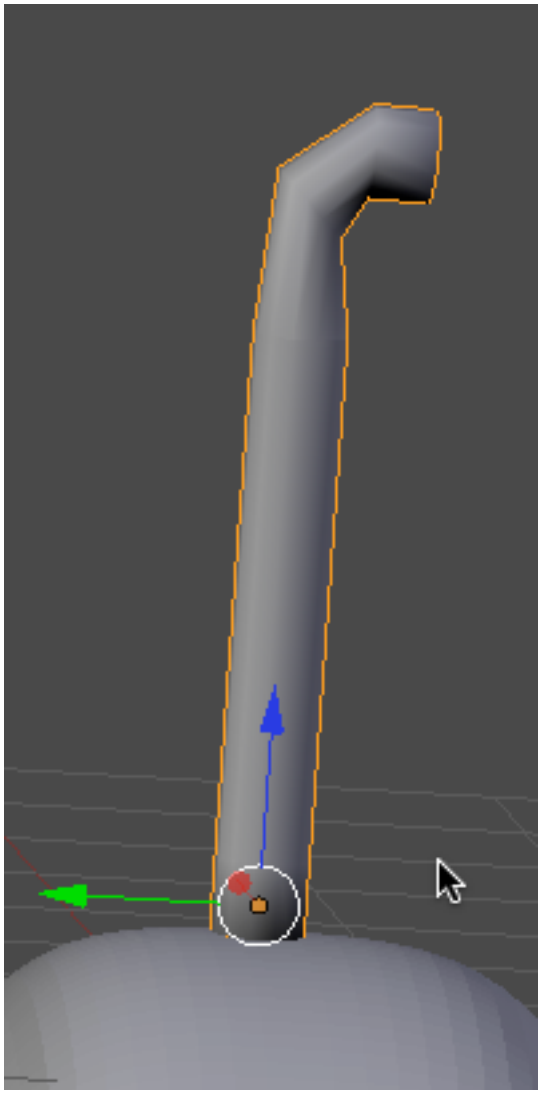

The submarine object is now very smooth and it will render very smooth.



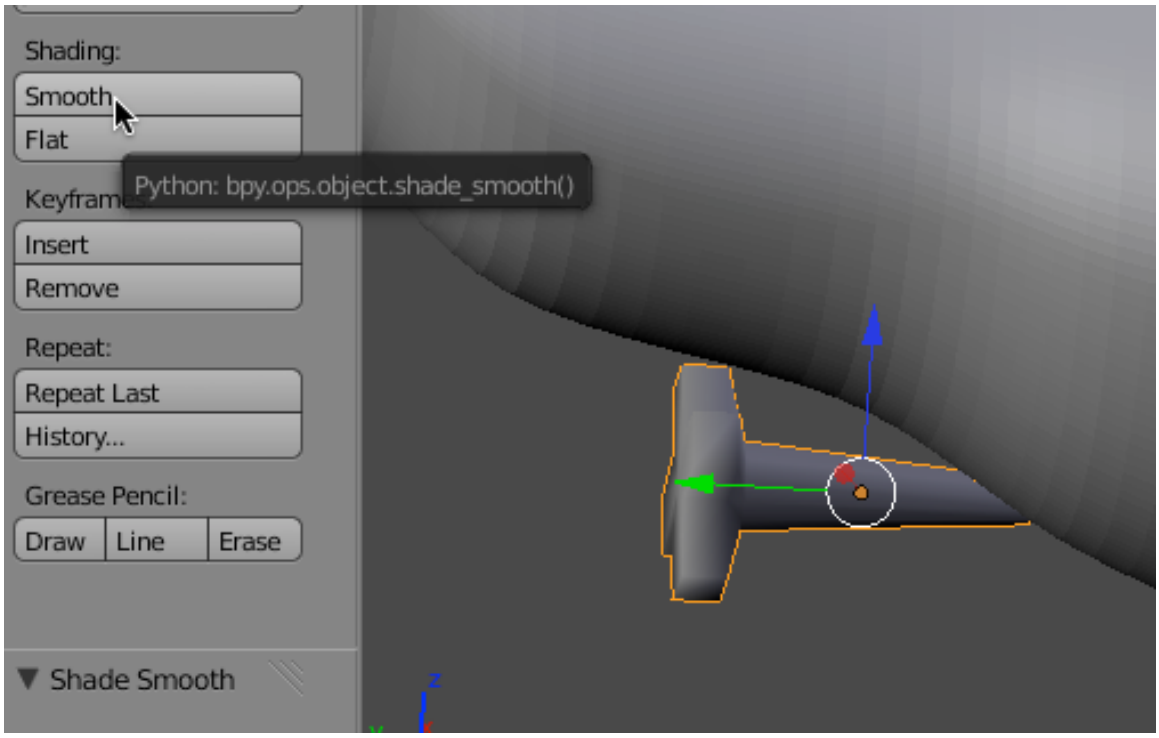
Press the AKEY to deselect the submarine object. Select the periscope object. In the left 3D Editor Viewport Tool panel click on the Smooth button.




This will smooth the periscope object.



Select the Propeller object and do the same.



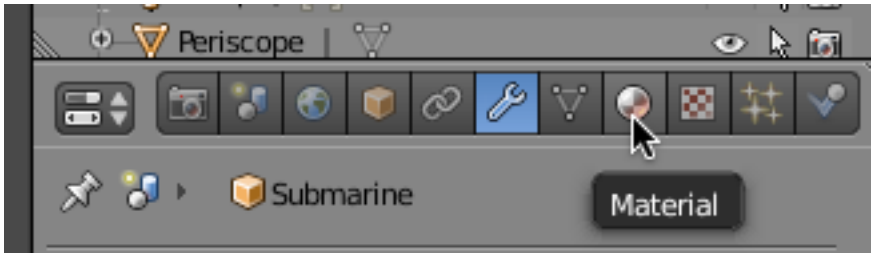

Save your Blender file (**COMMAND-S (MAC) or CTRL-S (PC)**)

## MATERIALS:

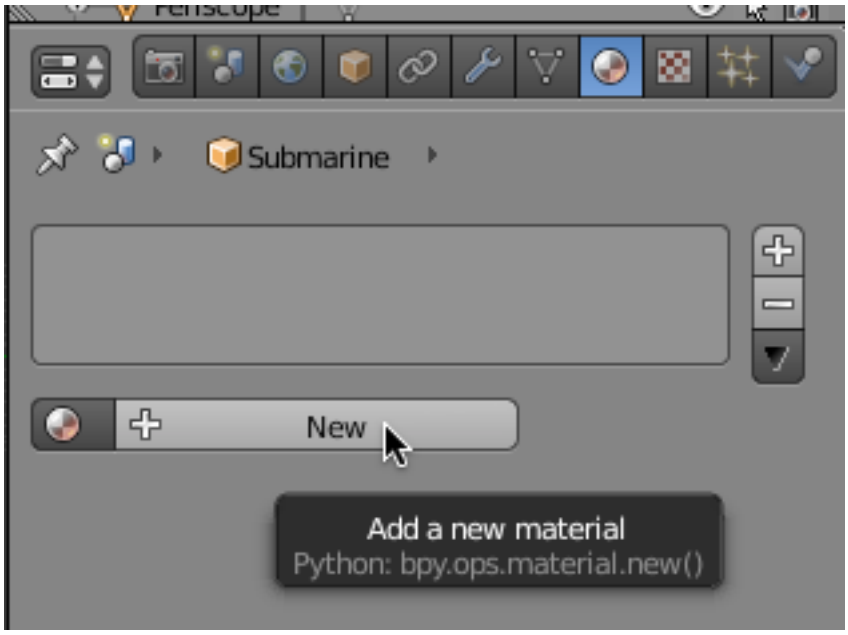
We will now add some colored materials to our submarine model.

Select the Submarine object only.

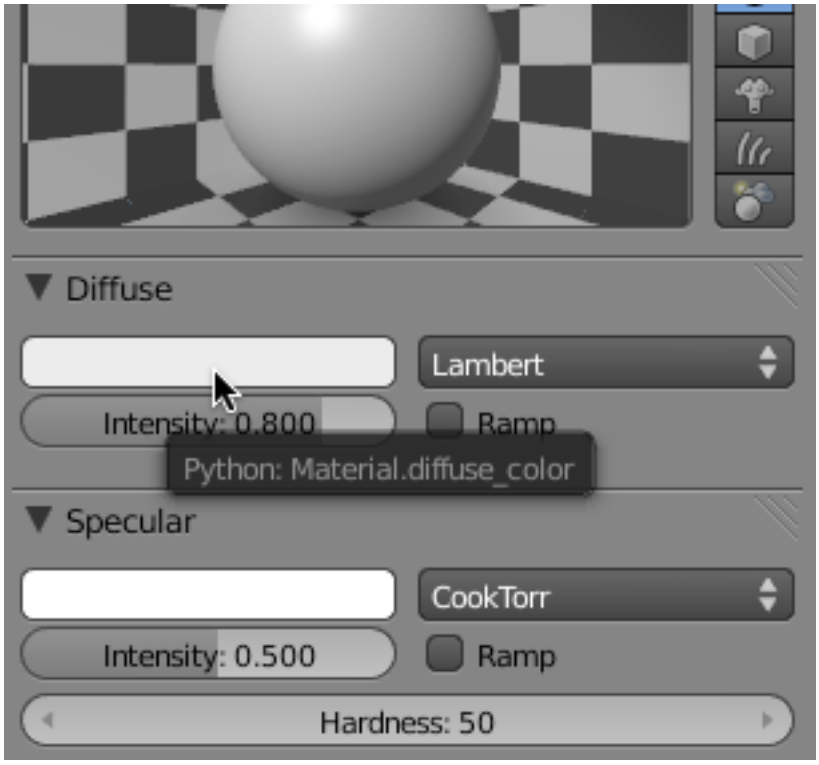
Click on the Materials context button in the Properties Editor.



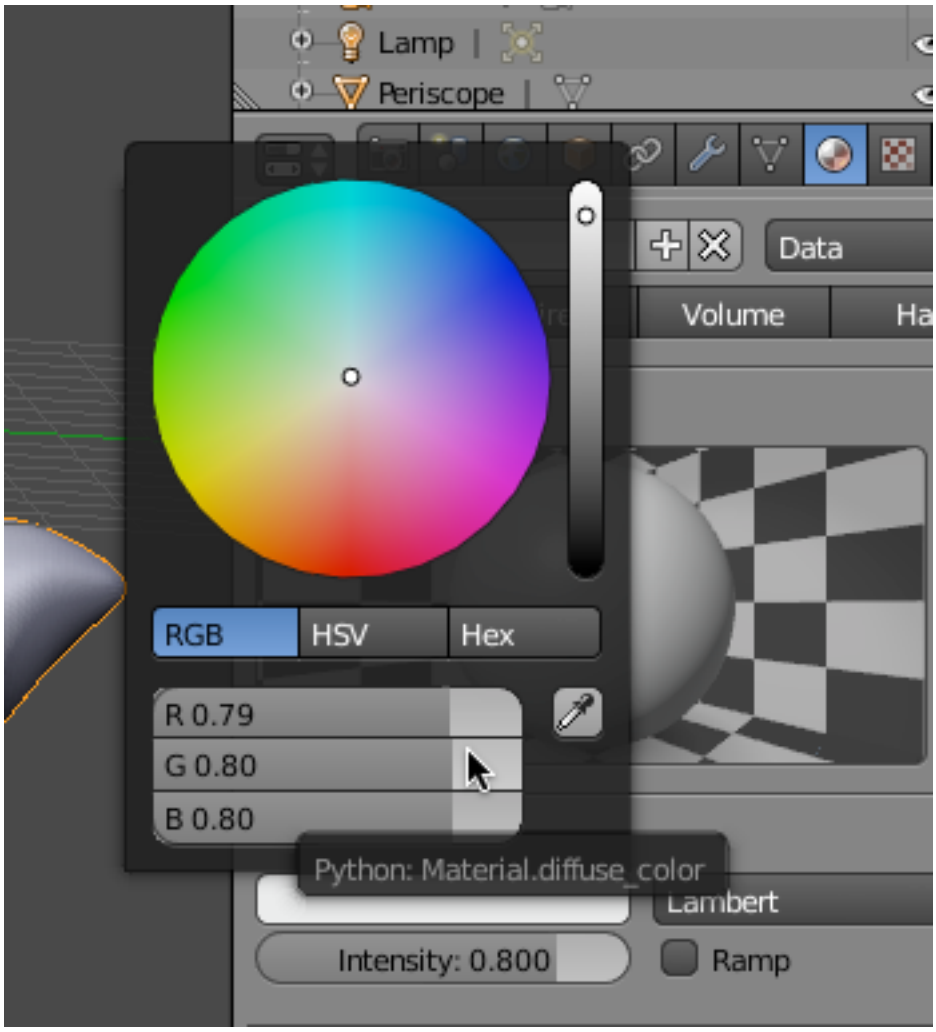

Click on the New button.




Click in the Diffuse color box (It is the white box in the diffuse panel)

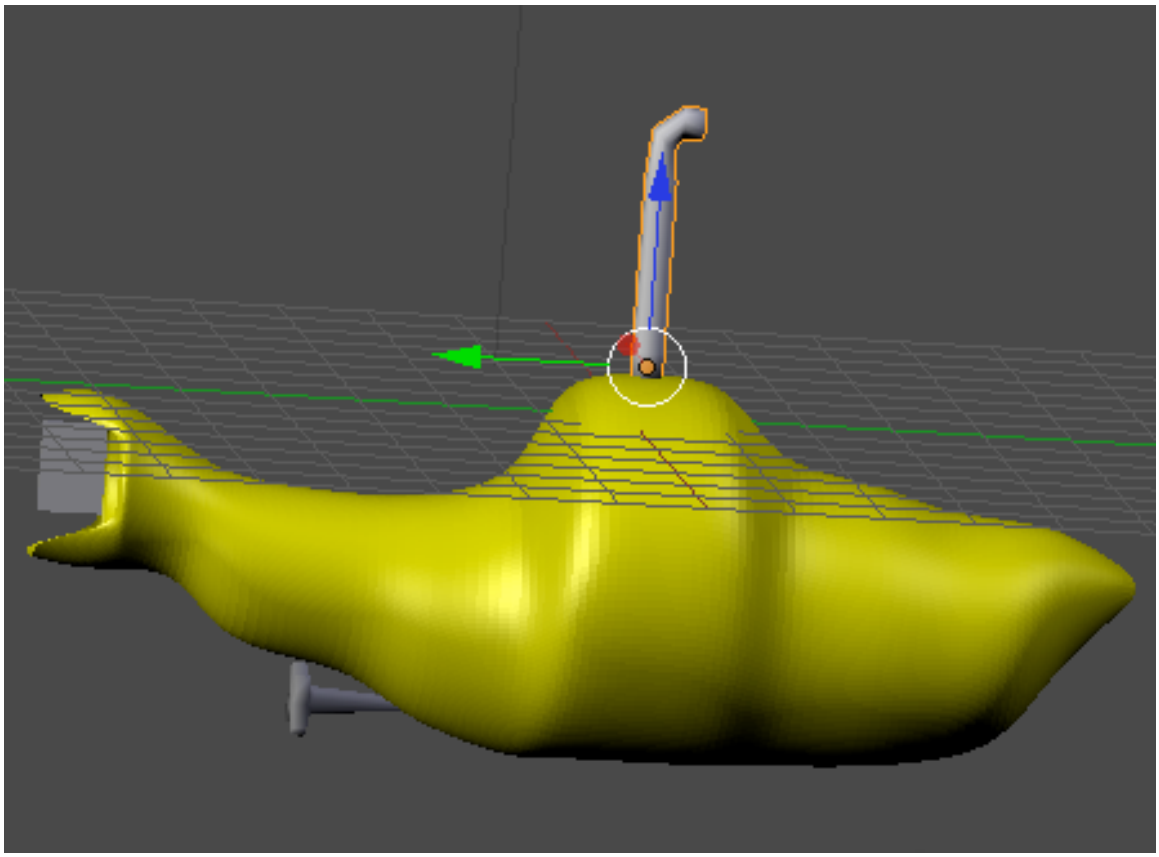



This will display Blender's color selector.

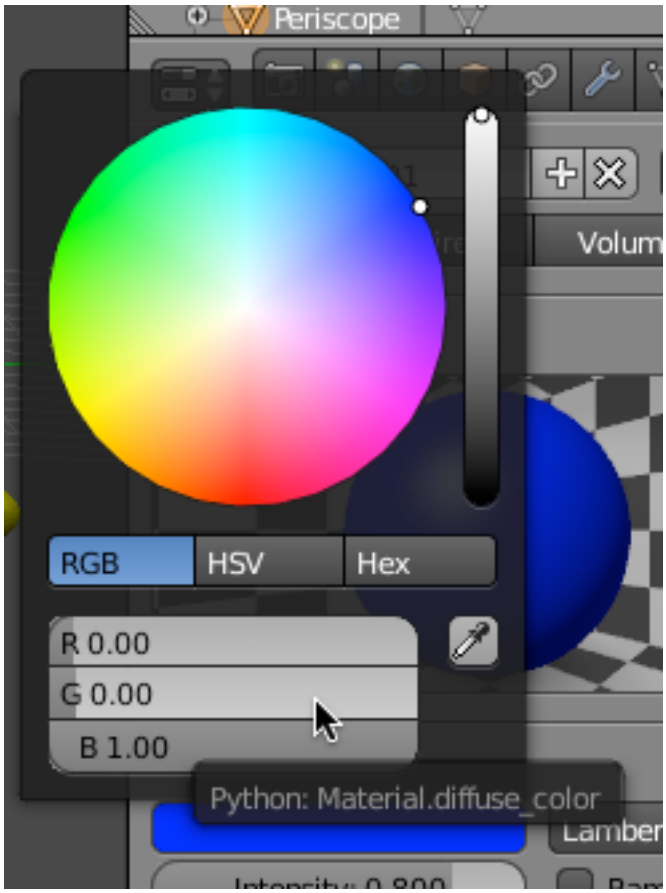



Click and drag the R (Red) and G (Green) sliders to the right (to full or 1.0).
Click and drag the B (Blue) slider to the left (to zero)

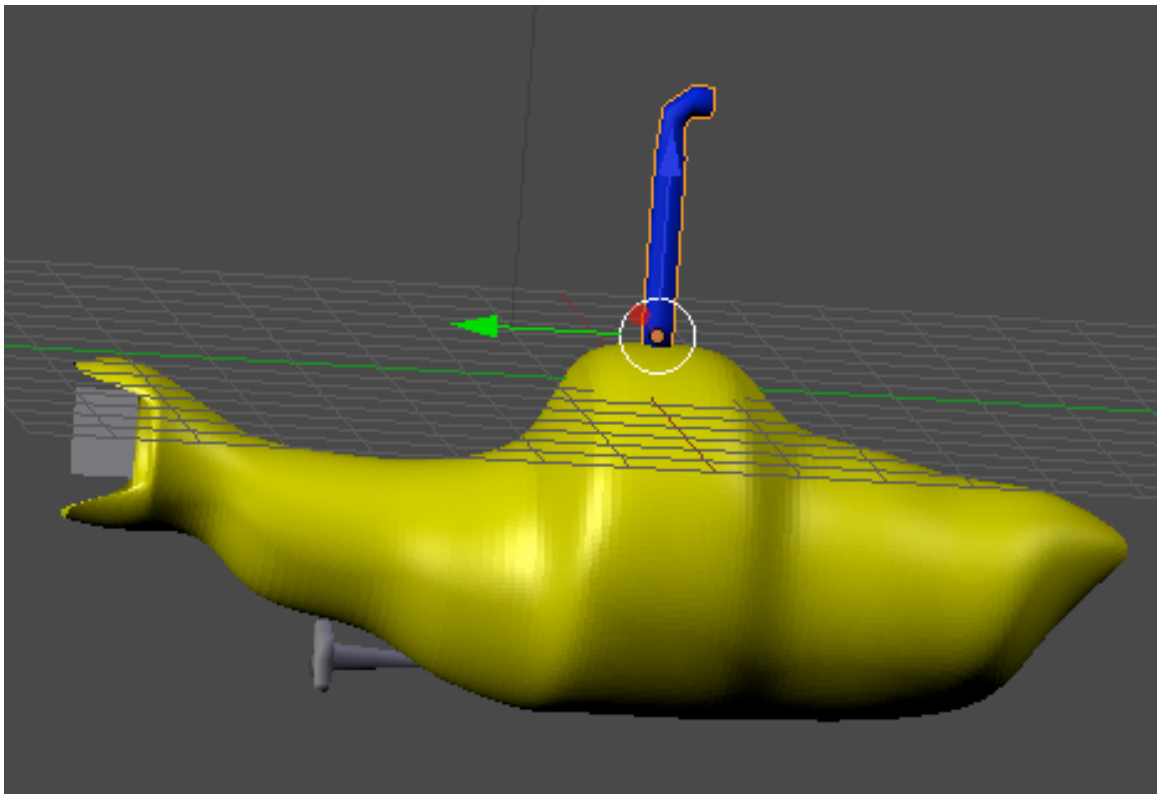

This adds a yellow color material to the submarine object.



Select the Periscope object and click on the Materials context button, press the New button, and then the diffuse color box. Set the Periscope color material to Blue (R=0, G=0, B=1)

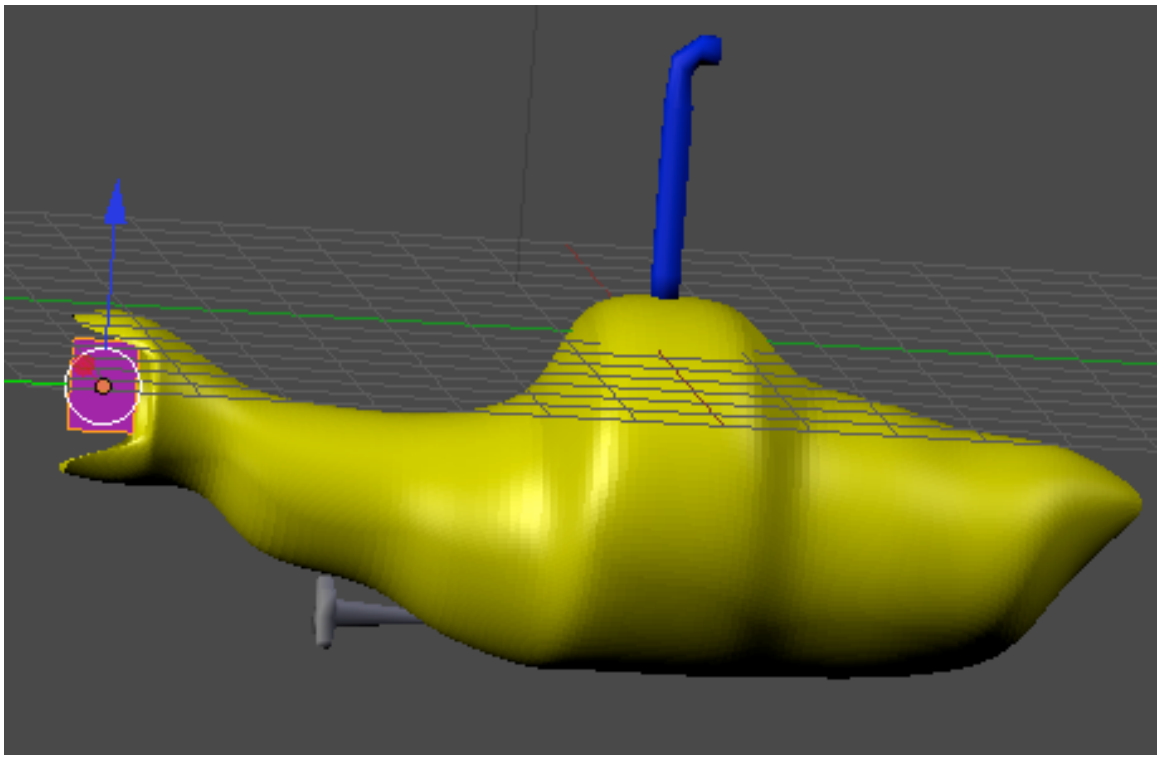



This will add a Blue colored material to the Periscope object.



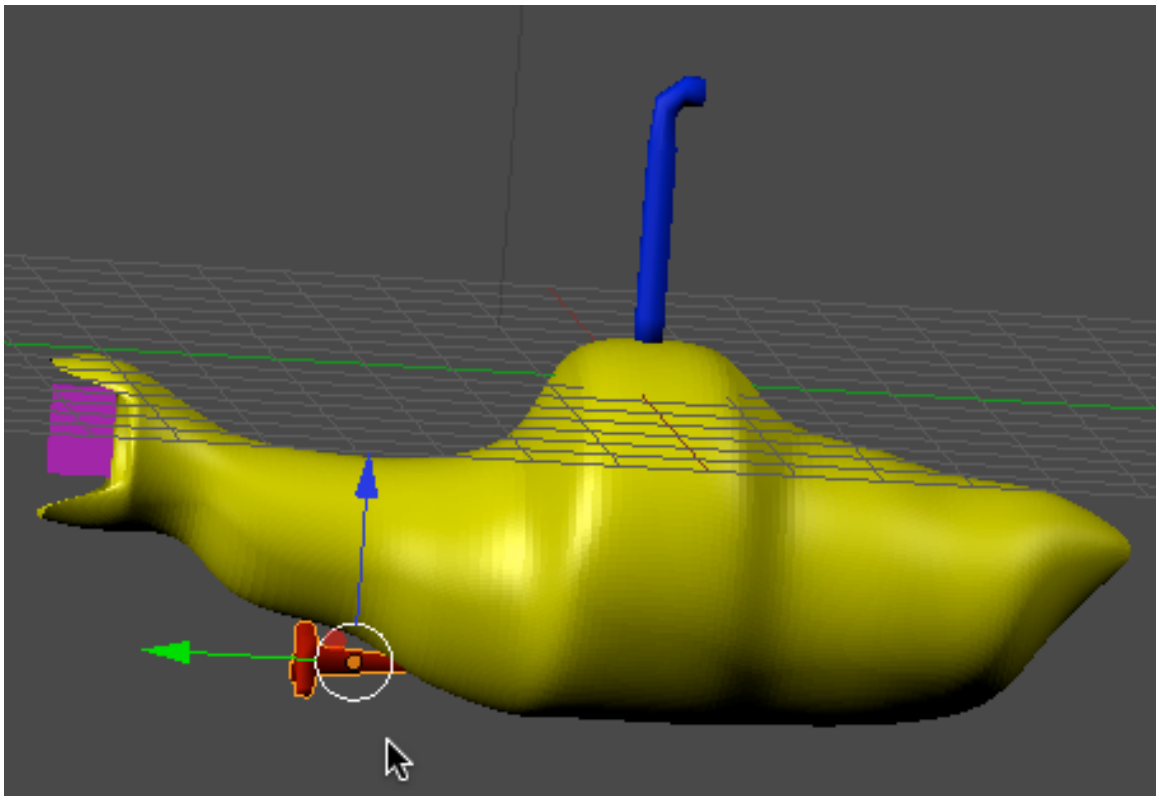
Select the Rudder object and click on the Materials context button, press the New button, and then the diffuse color box. Set the Rudder color material to Magenta (R=1, G=0, B=1).


This will add a magenta colored material to the rudder object.



Select the Propeller object and click on the Materials context button, press the New button, and then the diffuse color box. Set the Propeller color material to Red (R=1, G=0, B=0).

This will add a red colored material to the propeller object.



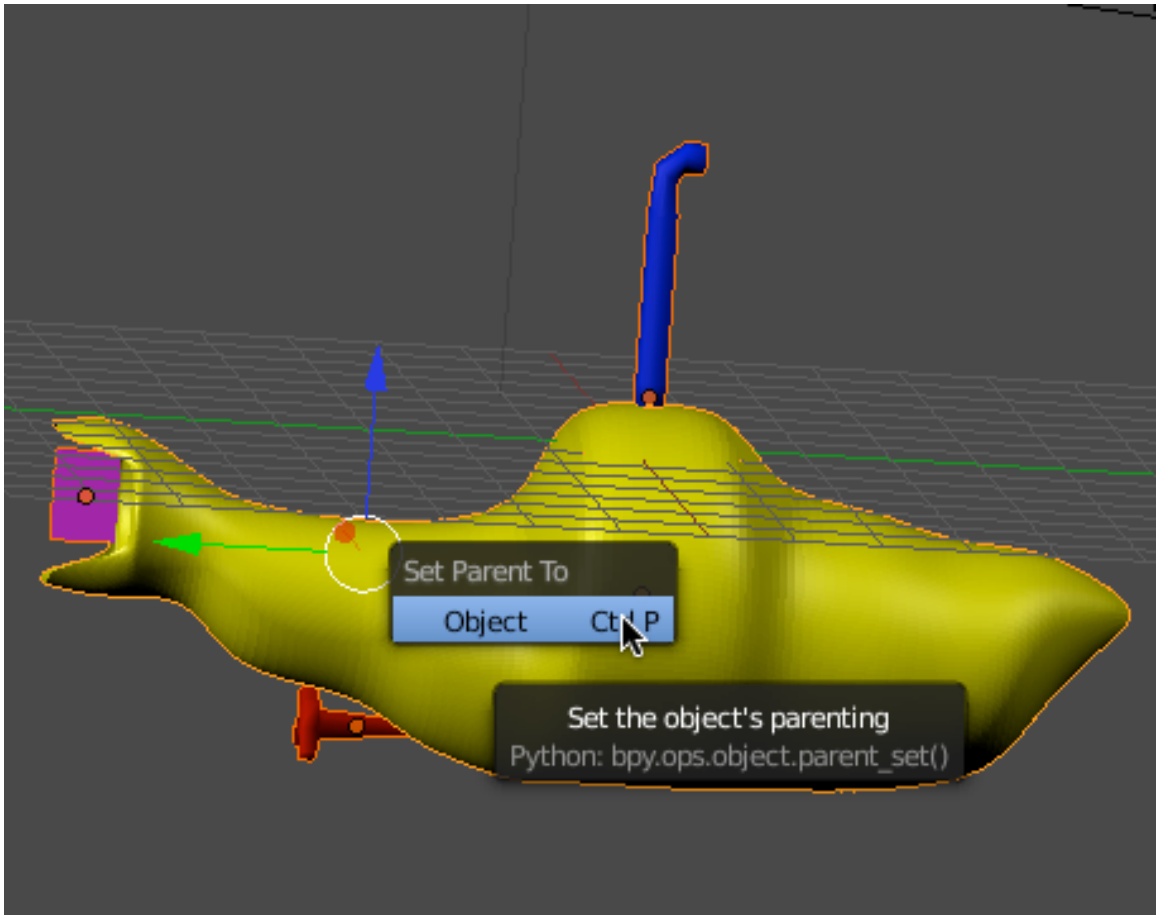
Save your Blender file (**COMMAND-S (MAC) or CTRL-S (PC)**)

## LINKING:

We now need to link the objects together so they move as one unit. We will make the Submarine object a “Parent” to the other objects. To do this we must create a sequential selection with the Submarine object being the last item selected.

Press the AKEY to make sure nothing is selected.

Select the Periscope alone by right-clicking on it. Hold your SHIFT Key down and right-click the Rudder object. This adds the rudder to the selection. Hold down the SHIFT Key and right-click on the propeller adding that to the selection. Finally, hold down the SHIFT Key and right-click on the Submarine object adding it last to the selection sequence. The last object added to a selection sequence is called the “active” object. Now press **CTRL-P** (Parent) and make the Submarine object a parent to the rest of the objects.

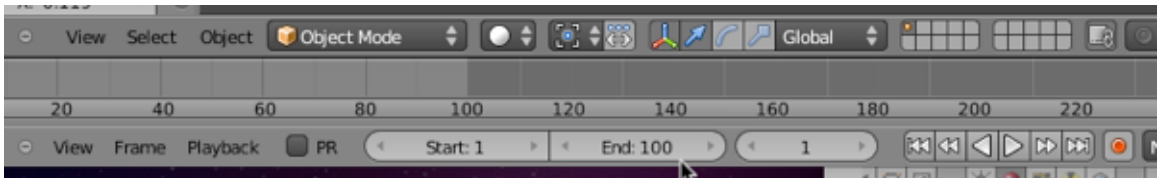



Press the **AKEY** to deselect the objects. Now select the Submarine object and press the GKEY (Grab) and move it about. All the other objects will follow it. Wherever a parent object moves the child objects move with it. However, as in real life, the child object can move on its own without affecting the parent object.

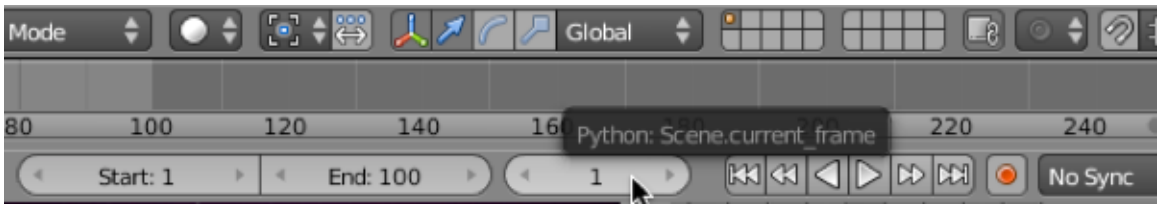
Save your Blender file (**COMMAND-S (MAC) or CTRL-S (PC)**).

## ANIMATION:

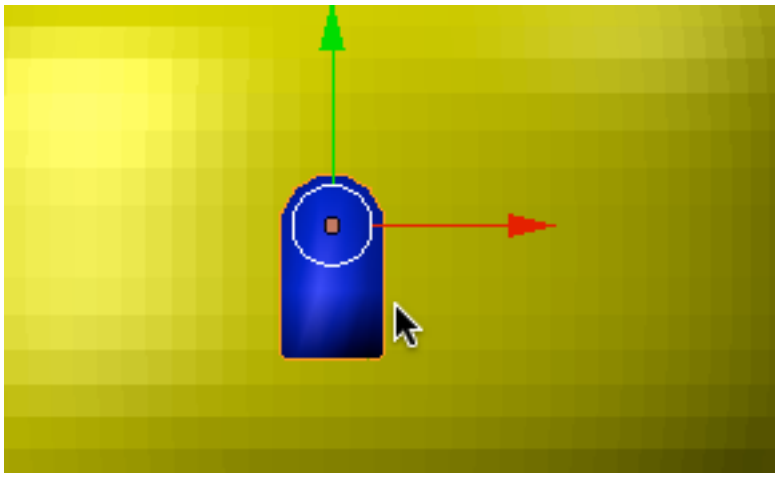
We will now add some animation to our Blender Scene. We will start by animating the Periscope. First we need to set the animation length. In the Animation Timeline Editor at the bottom of the display set the animation END to 100 frames. (Make sure the start is set at 1)



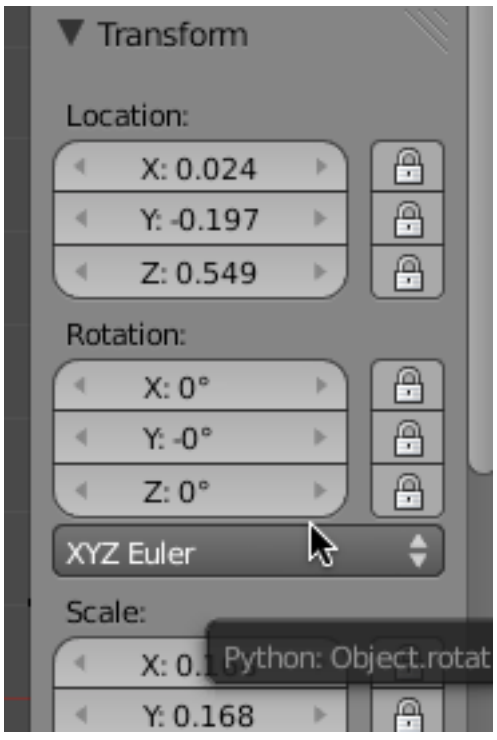

Make sure you are in frame 1 of the animation.



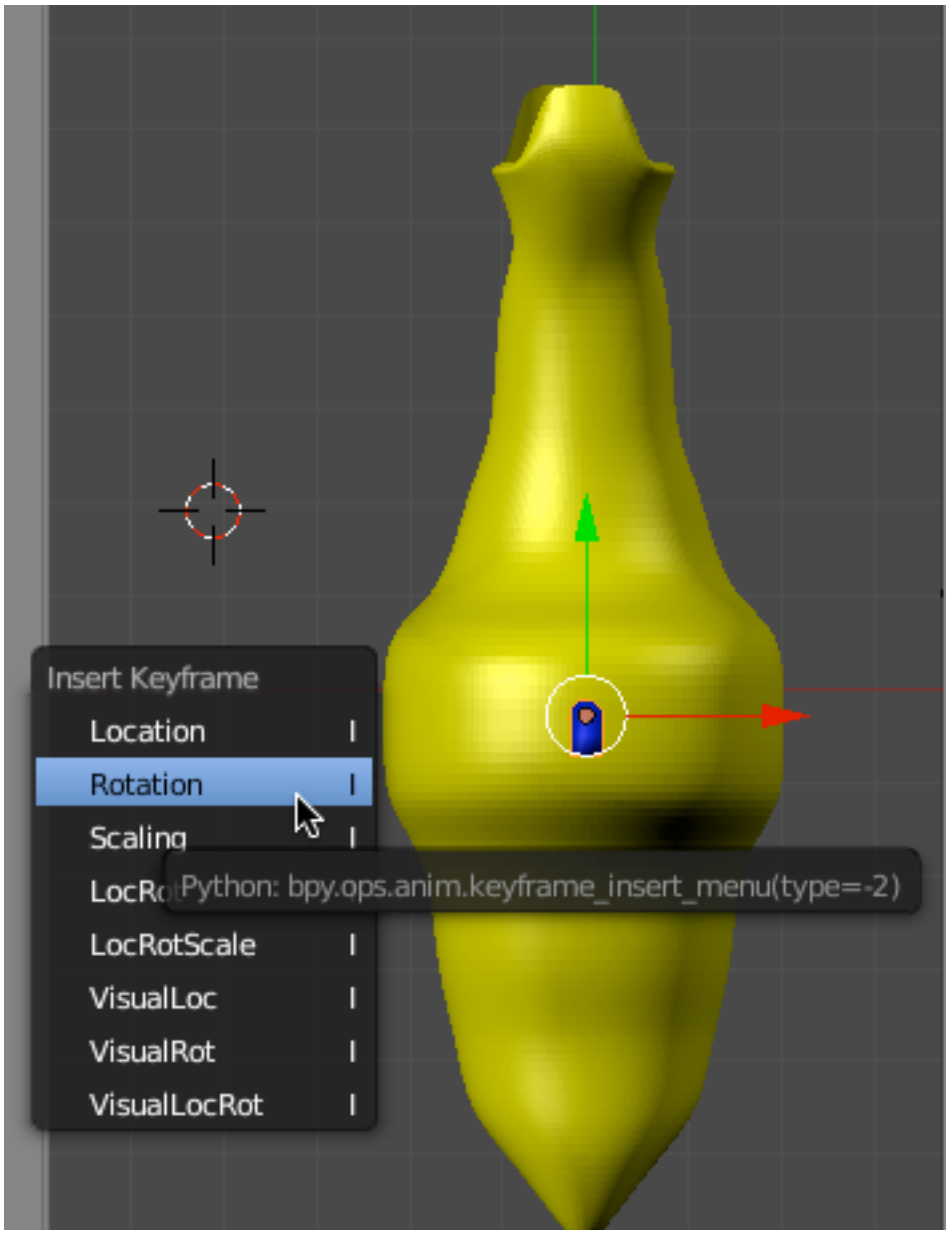

Go to top view (NUMPAD-7). Select the Periscope object alone.



Notice in the right 3D Editor Viewport properties panel that the periscope has its rotation set at X=0, Y=0 and Z=0 degrees.

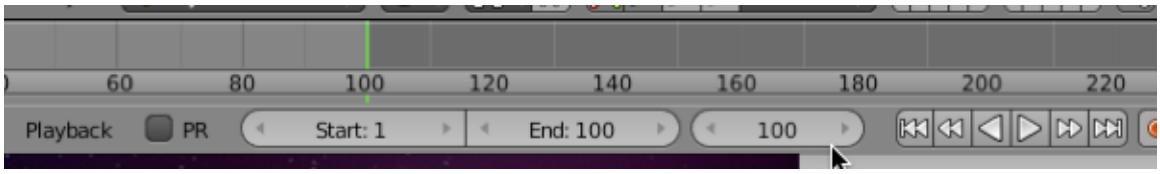


Make sure you cursor is inside of the 3D Editor Viewport with the periscope object selected only and press the IKEY (Insert Keyframe) and add a Rotation keyframe to frame 1 for the Periscope object.

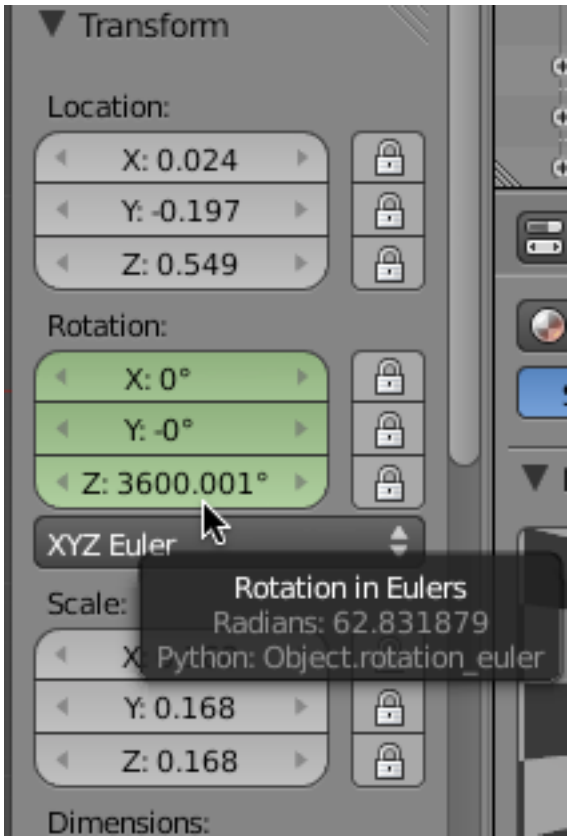



This, in effect says that at frame #1, the periscope object should have its rotation set at X=0, Y=0 and Z=0.

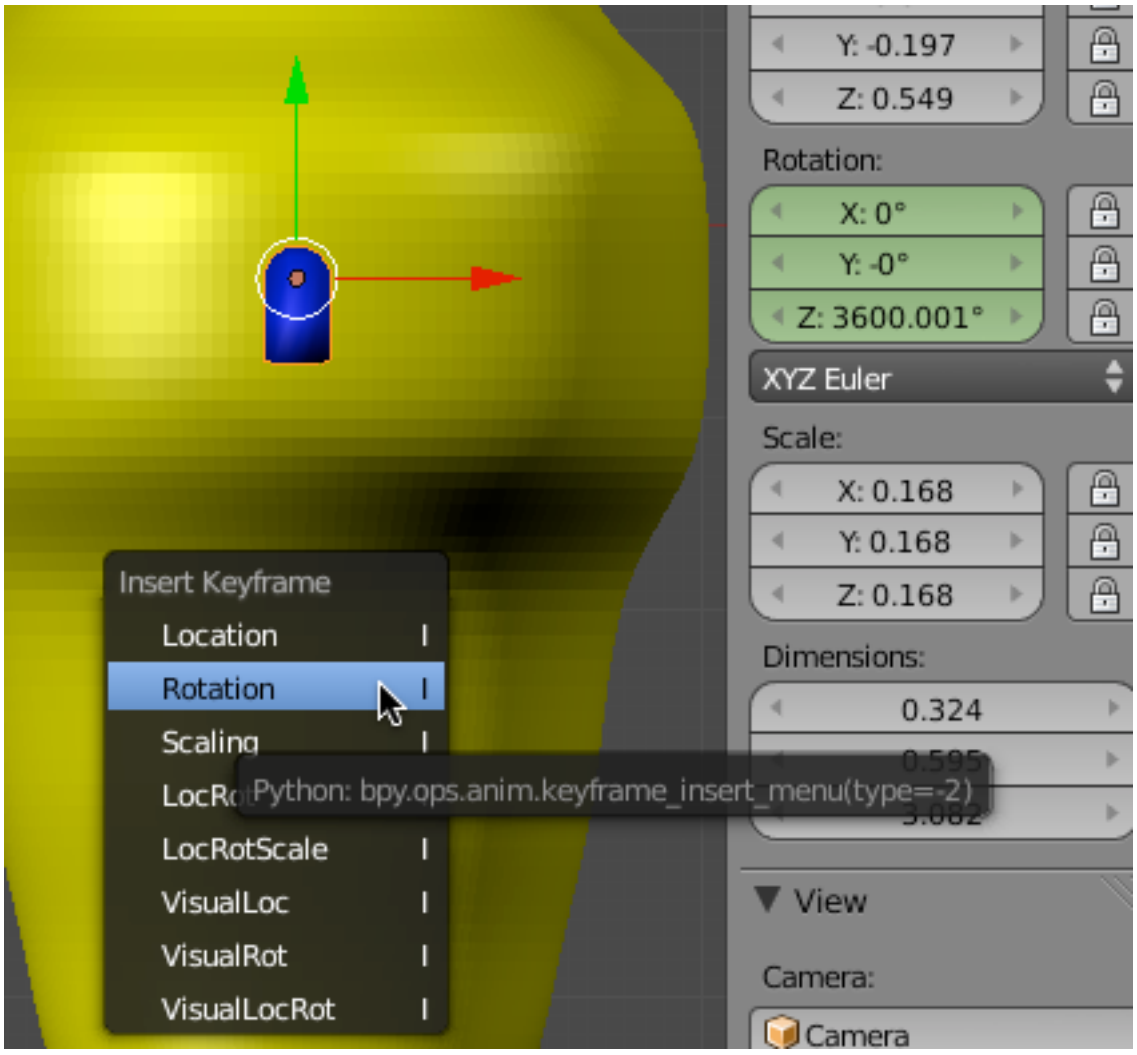
Go to frame 100.




In the right 3D Editor Viewport properties panel set the Z rotation to 3600.

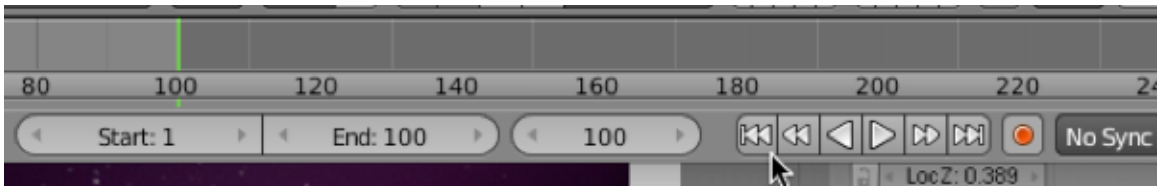



Make sure you cursor is inside of the 3D Editor Viewport with the periscope object still selected and press the IKEY (Insert Keyframe) and add a Rotation keyframe to frame 100 for the Periscope object.

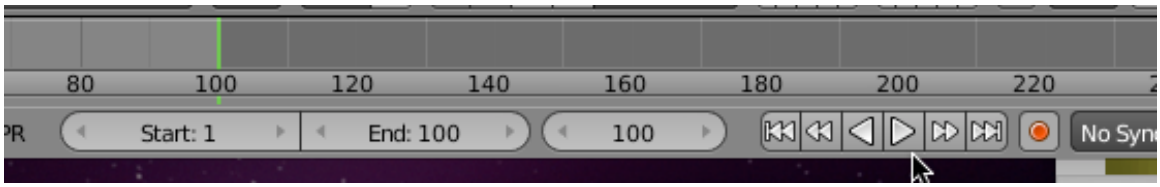



This, in effect says that at frame #100, the periscope object should have its rotation set at X=0, Y=0 and Z=3600. That is, over the course of 100 frames the periscope object should rotation around 10 times.

Go to the first frame of the animation (1) by clicking on the Go to First Frame button on the Animation Timeline animation controller.



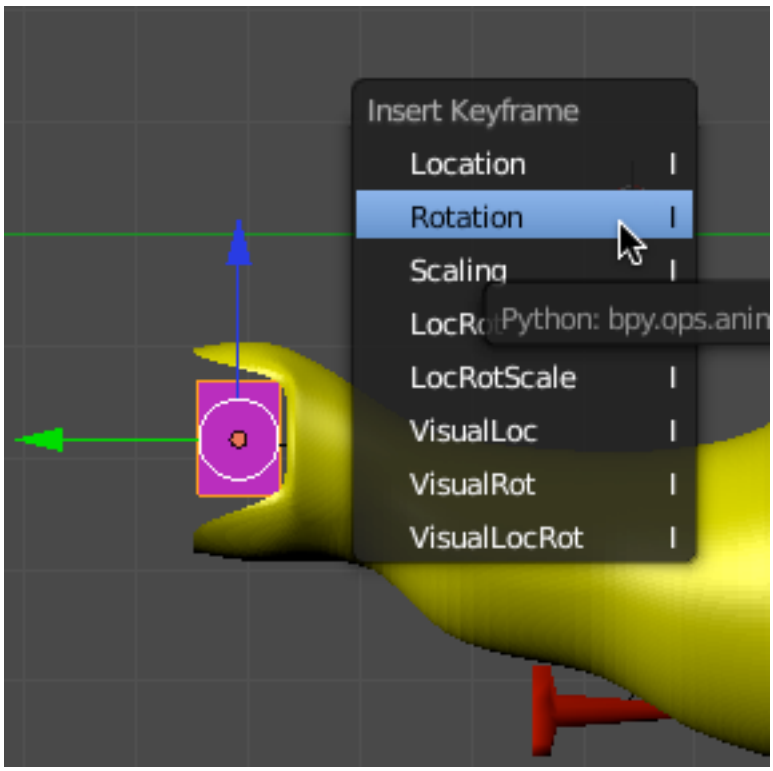

Play the animation by pressing on the play button.



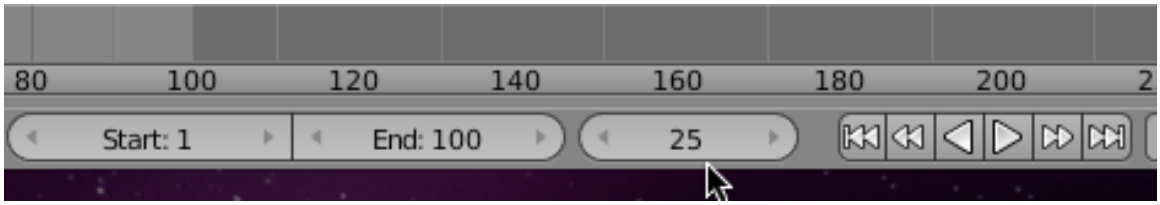

Your periscope object should now rotate around its center point 10 times throughout the animation.

Press the ESCAPE button (or the stop button on the animation control panel) to stop the animation.

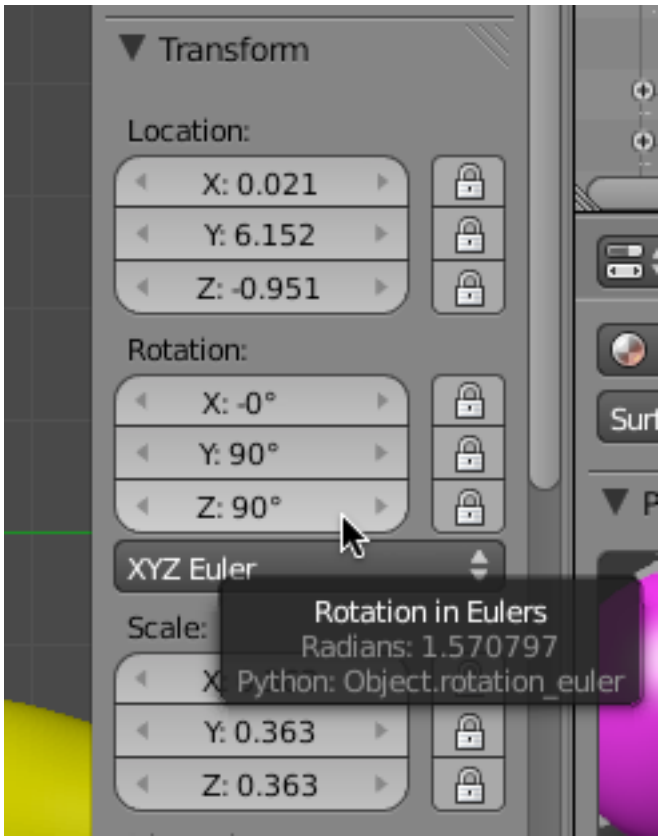
Go to Left Side View (CTRL-NUMPAD-3). Select the Rudder object only. MAKE SURE YOU ARE IN FRAME #1). Press the IKEY (Insert Keyframe) and add a Rotation keyframe for the rudder object in frame #1.




Go to frame 25.

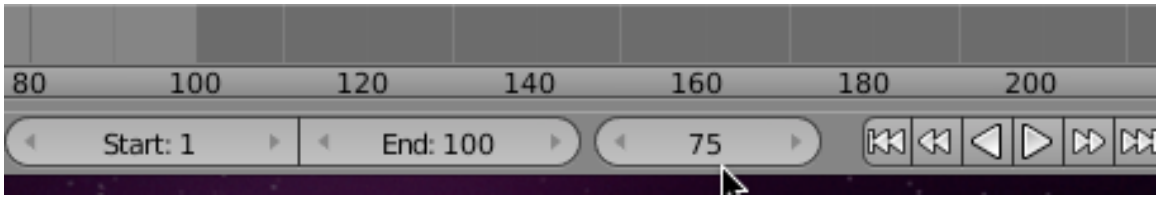



In the 3D Editor Viewport properties panel set the Z rotation for the rudder to 90 degrees

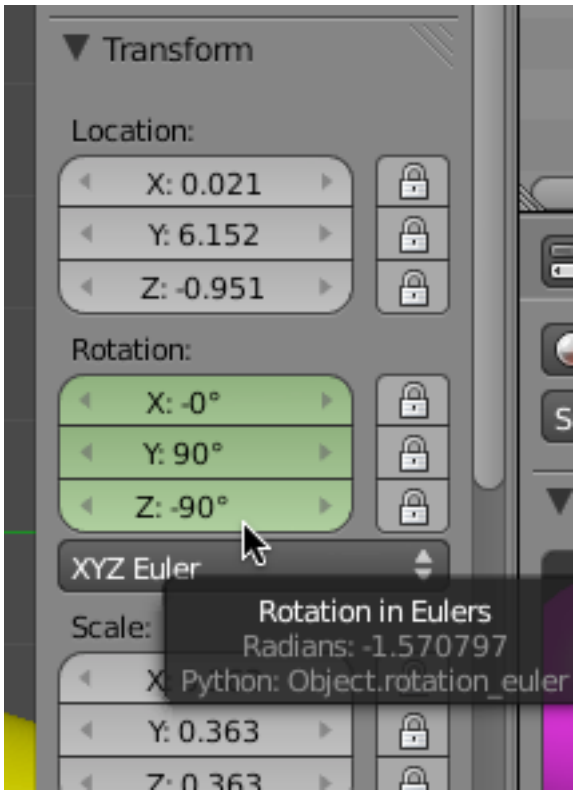



Make sure you cursor is inside of the 3D Editor Viewport with the rudder object still selected and press the IKEY (Insert Keyframe) and add a Rotation keyframe to frame 25 for the Rudder object.

Go to frame 75

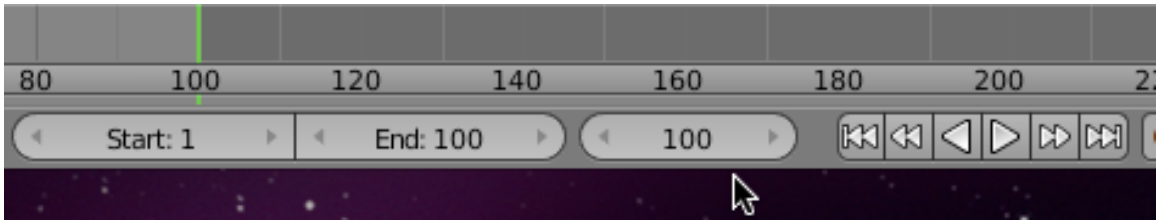



In the 3D Editor Viewport properties panel set the Z rotation for the rudder to -90 degrees

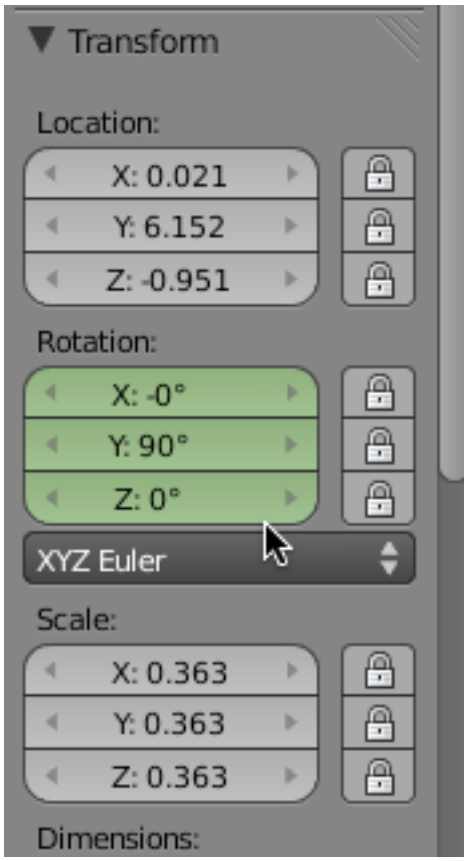



Make sure you cursor is inside of the 3D Editor Viewport with the rudder object still selected and press the IKEY (Insert Keyframe) and add a Rotation keyframe to frame 75 for the Rudder object.

Go to frame 100.

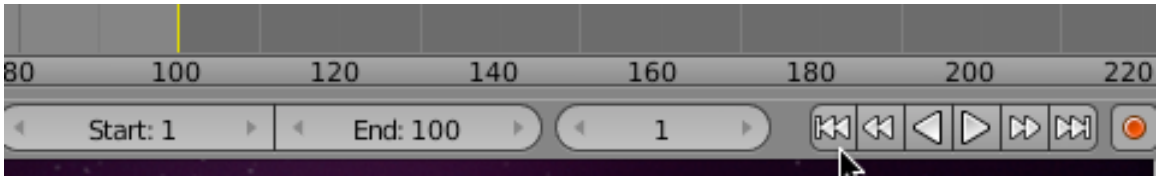



In the 3D Editor Viewport properties panel set the Z rotation for the rudder to 0 degrees.




Make sure you cursor is inside of the 3D Editor Viewport with the rudder object still selected and press the IKEY (Insert Keyframe) and add a Rotation keyframe to frame 100 for the Rudder object.

Go to the first frame of the animation.




Press the play button on the animation control panel. Your rudder should now rotate 90 degrees in one direction from frame 1 to 25. Then rotate in the opposite direction 180 degrees from frame 25 to 75 and then return to 0 by frame 100.

Notice the periscope should also be rotating.

Press the stop button or the ESCAPE key to stop the animation.

Go to Back View (CTRL-NUMPAD-1). Select the Propeller object only. MAKE SURE YOU ARE IN FRAME 1.

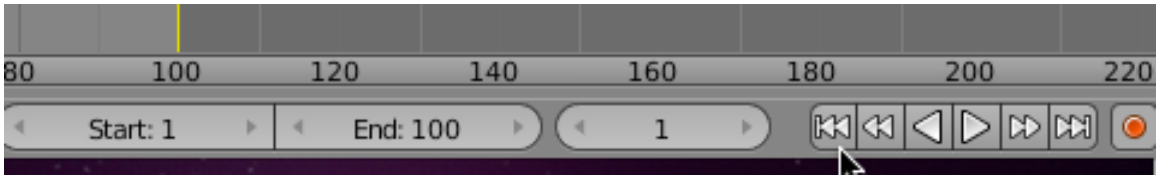
Press the IKEY (Insert Keyframe) and add a rotation keyframe for the propeller object in frame #1.

Go to frame 100.

In the 3D Editor Viewport properties panel set the Y rotation for the rudder to 3600 degrees.

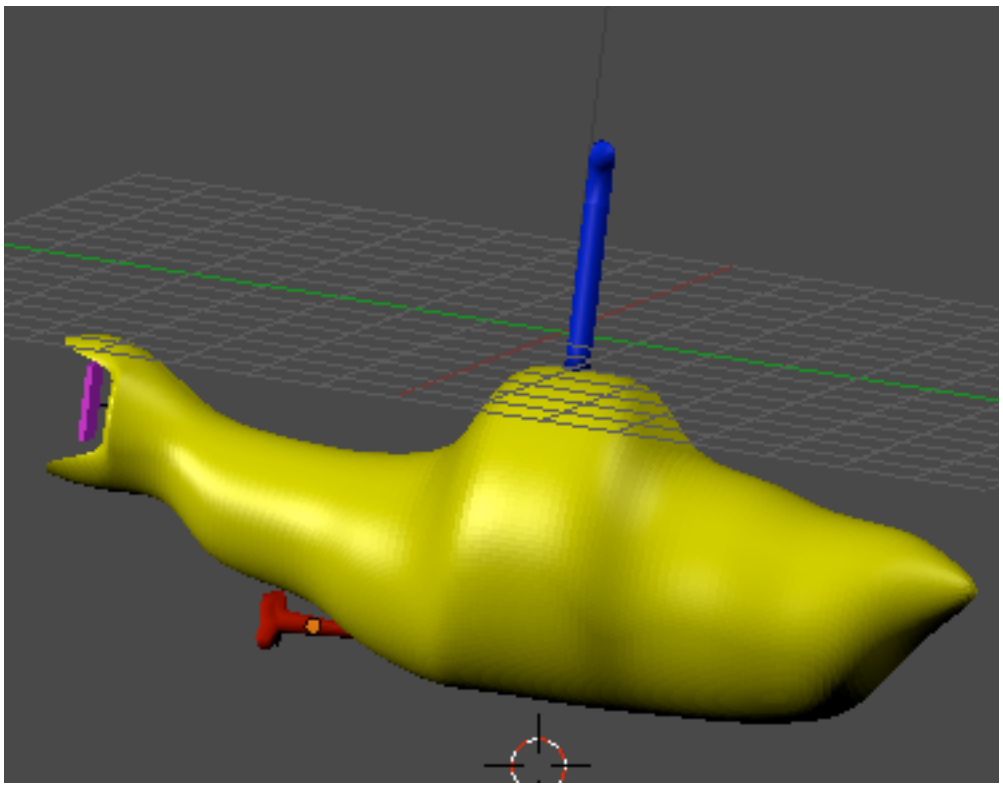
Make sure you cursor is inside of the 3D Editor Viewport with the propeller object still selected and press the IKEY (Insert Keyframe) and add a Rotation keyframe to frame 100 for the propeller object.

Go to the first frame of the animation.




Press the play button on the animation control panel. Your propeller should rotate 10 times over 100 frames. Your rudder should rotate back and forth. Your periscope should rotate 10 times over 100 frames.

You can rotate your move to a more dimensional view while the animation is running.

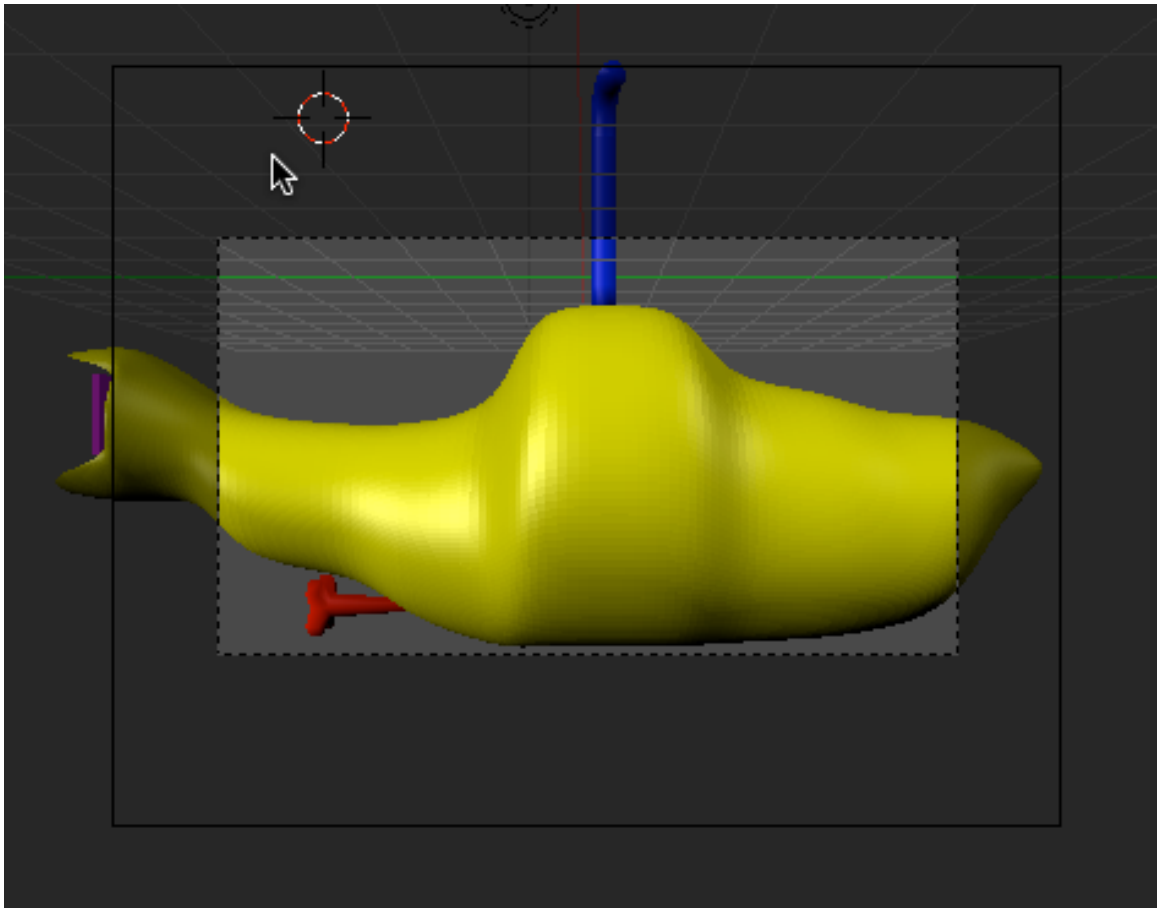


Press the stop button or the ESCAPE key to stop the animation.

Save your Blender file (**COMMAND-S (MAC) or CTRL-S (PC)**).

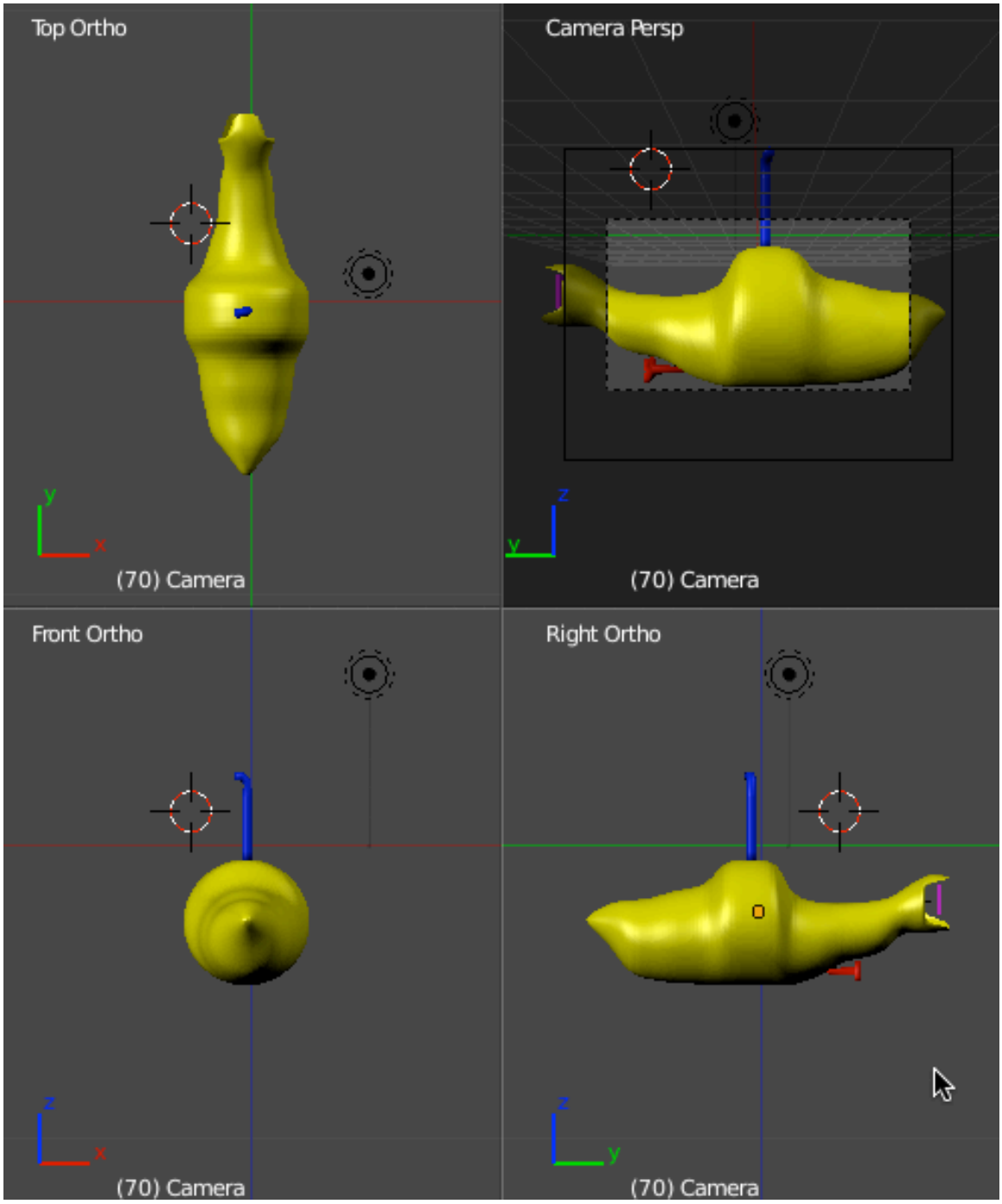
## CAMERA:

We will now set up the Blender camera and complete the animation. Go to Left Side view (CTRL-NUMPAD-3). With your cursor in the 3D viewport Press CTRL-ALT-0. This will align Blender's default camera with the Left View. It will also change the viewport to Camera View.



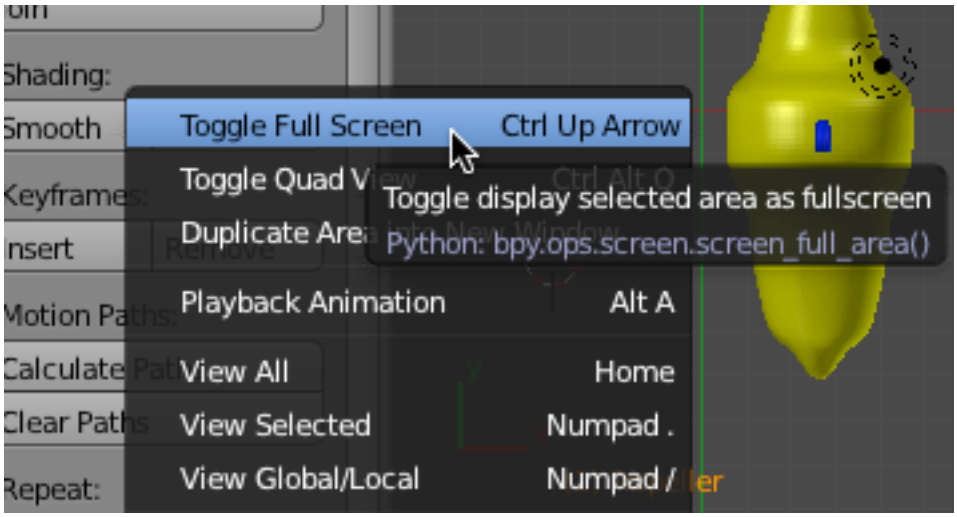
Press CTRL-ALT-Q.

This places your Blender scene in Quad view. There are 4 viewports (top, camera perspective, front and right).



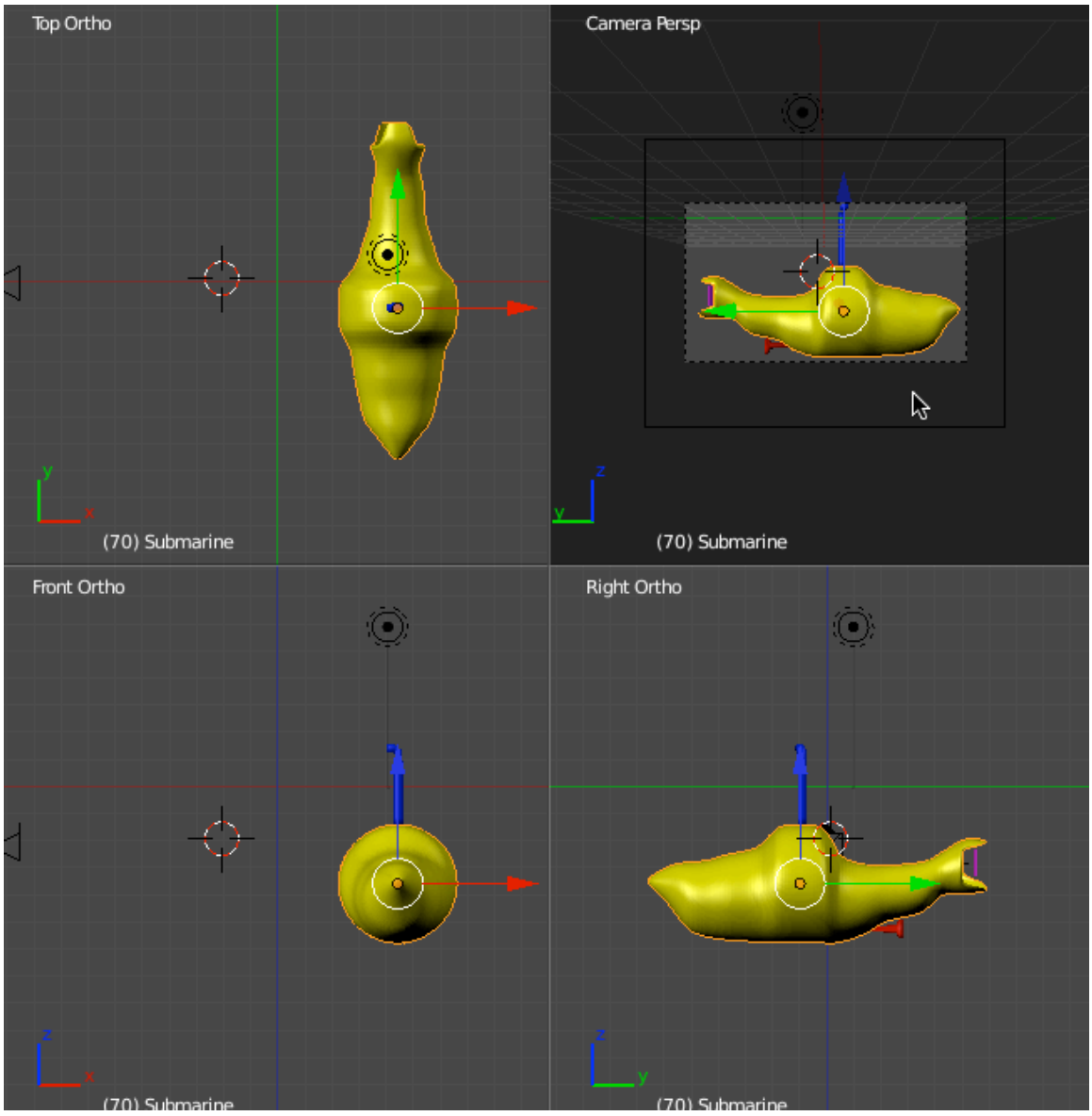

Press CTRL-UP ARROW. This will make your 3D viewport Editor full screen. (You can go back and forth to full screen by pressing CTRL-DOWN ARROW).

NOTE: ON SOME MACS THIS KEYBOARD COMMAND WILL NOT WORK. INSTEAD USE THE VIEW/TOGGLE FULLSCREEN FUNCTION

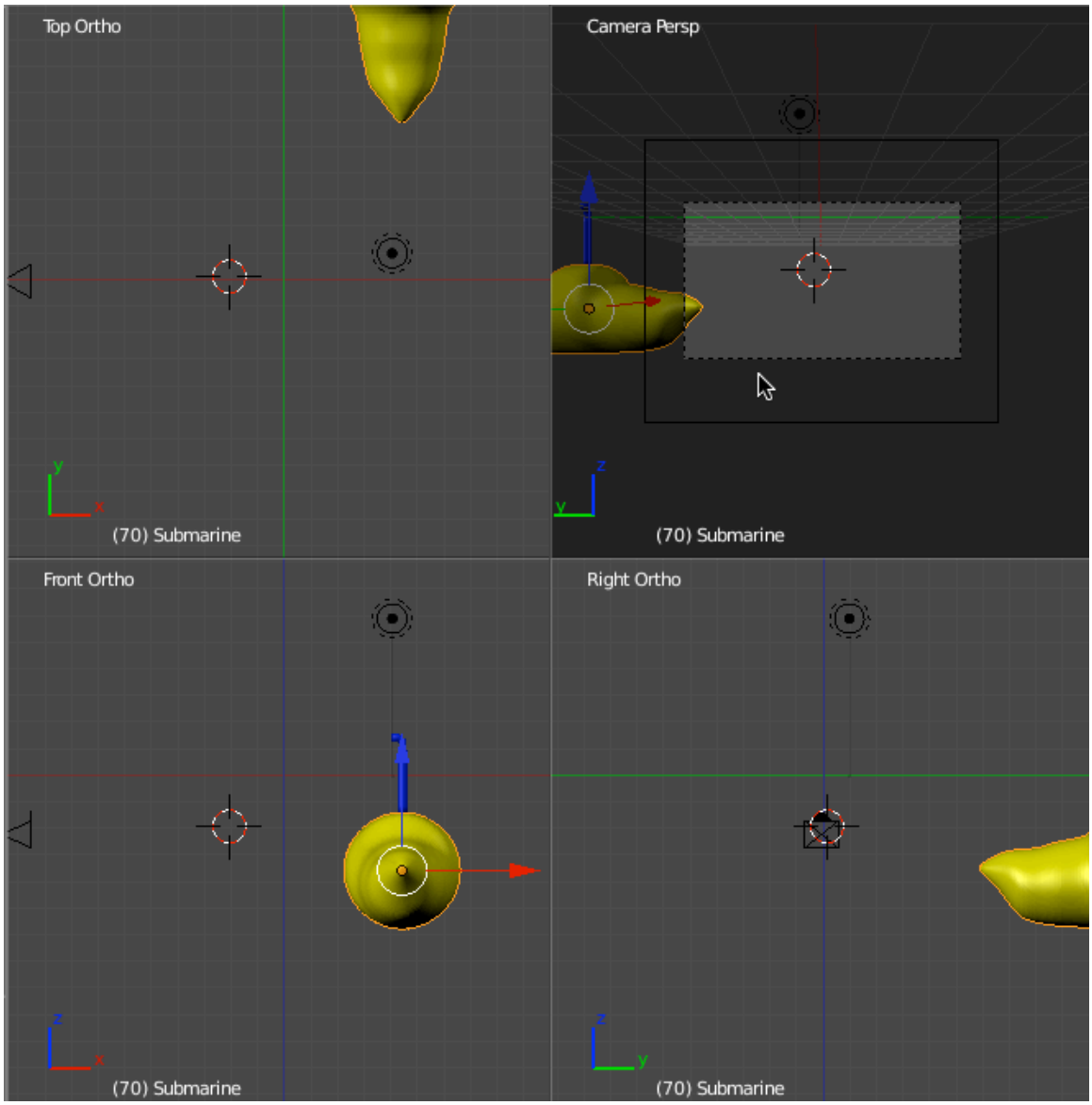



Select the submarine object. Make sure your 3D cursor is in the Front Viewport and press the GKEY (Grab) and move the submarine mode a bit to the right. Notice in camera view that the model is farther away from the camera and thus appears smaller. We want the model to fit in the dotted lines of the camera view. (You may have to zoom out a bit)

You may have to GKEY the submarine object in the right or top view to position it so that the submarine is fully within the dotted lines of the camera view.



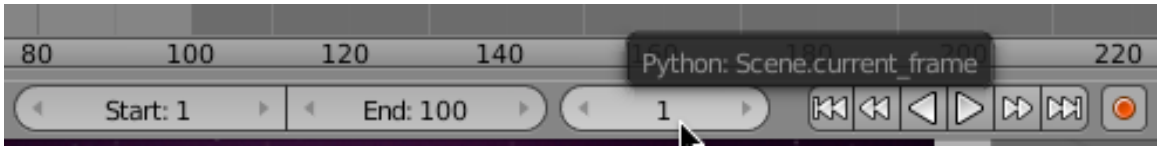

Once you have centered the submarine model in the dotted lines of the camera view, GKEY (Grab) the submarine in Right Side View and move it to the right so that we only see the nose of the submarine in the camera view.




This is the starting point for the submarine animation.

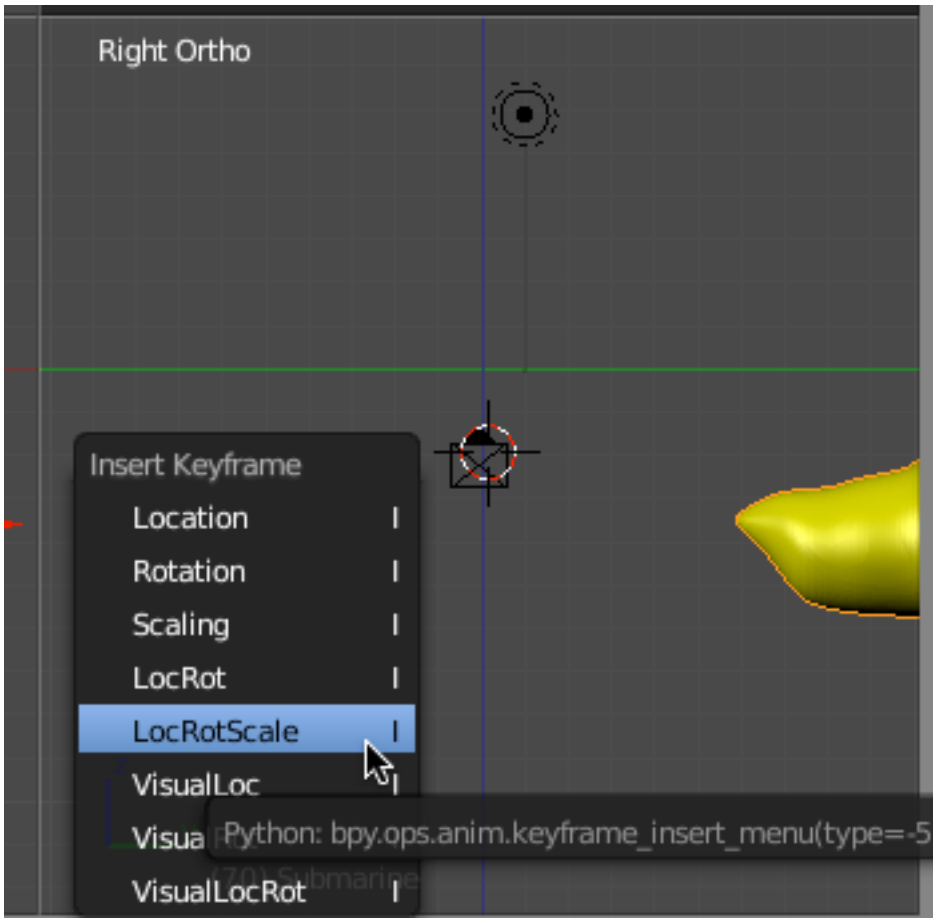
Return to regular screen by pressing CTRL-DOWN ARROW. (or View / Toggle Full Screen)

MAKE SURE YOU ARE IN FRAME 1.




With the submarine object selected (remember, you only have to animate the submarine object as it is a parent to the periscope, rudder and propeller objects), and your cursor in

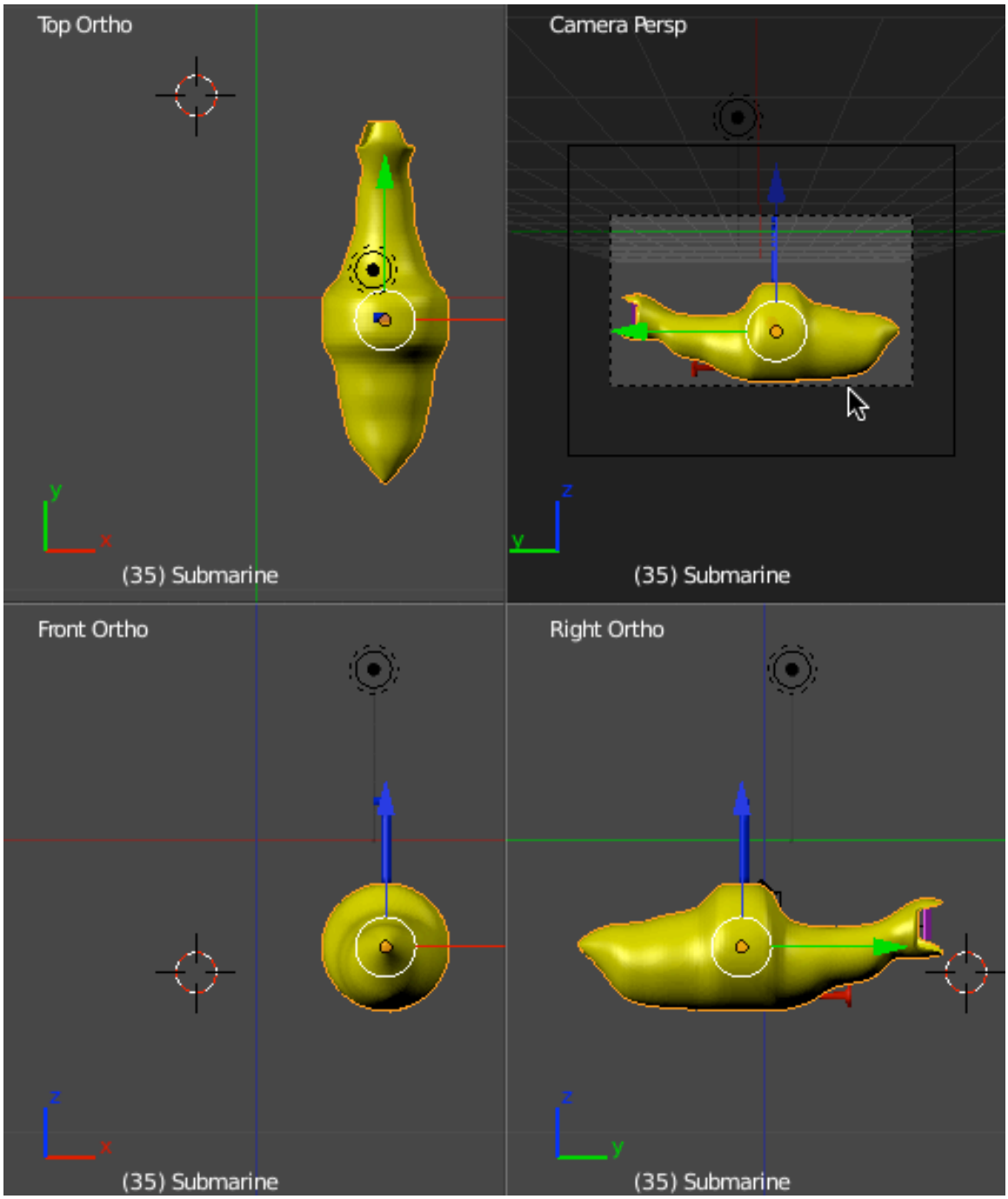
Right Side view, press the IKEY (Insert Keyframe) and add a **LocRotScale** keyframe for the submarine object for frame #1




A LocRotScale keyframe is 3 keyframes in one. It sets a Location keyframe, a Rotation keyframe and a Scale keyframe for the object all at the same time.

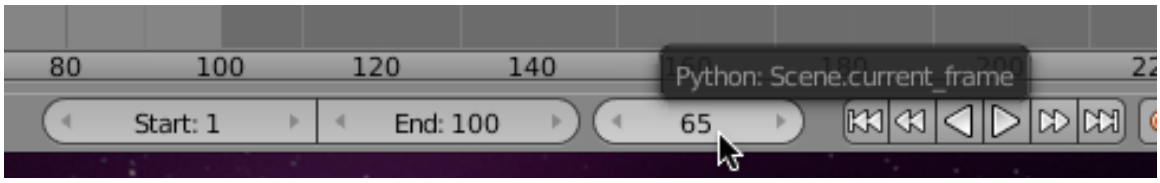
Go to Frame 35.


In Right Side View, GKEY (Grab) the submarine object and move it to the left so that it is totally within the dotted lines of the camera view.

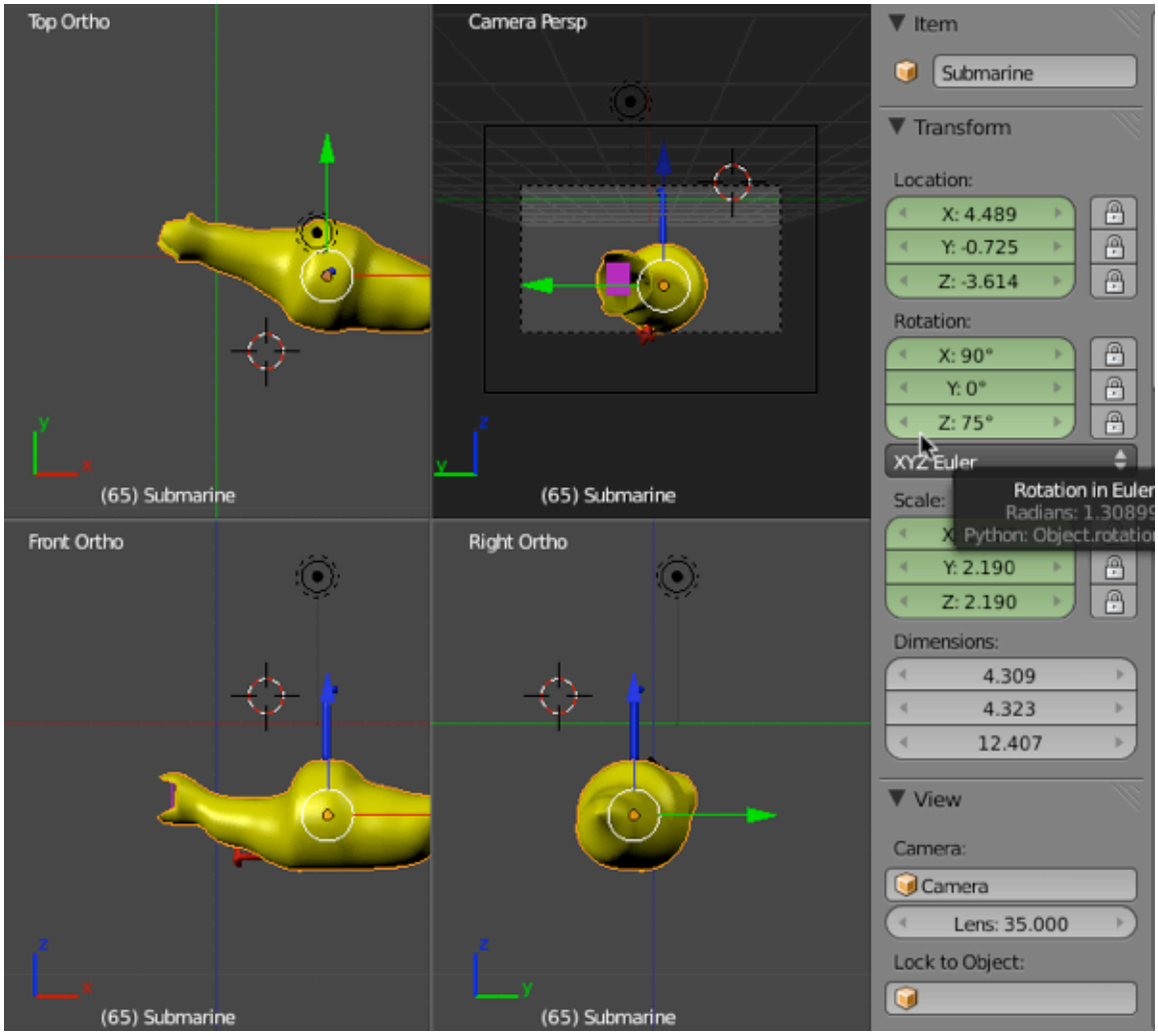



With the submarine object selected and your cursor in Right Side view, press the IKEY (Insert Keyframe) and add a **LocRotScale** keyframe for the submarine object for frame #35

Go to frame 65



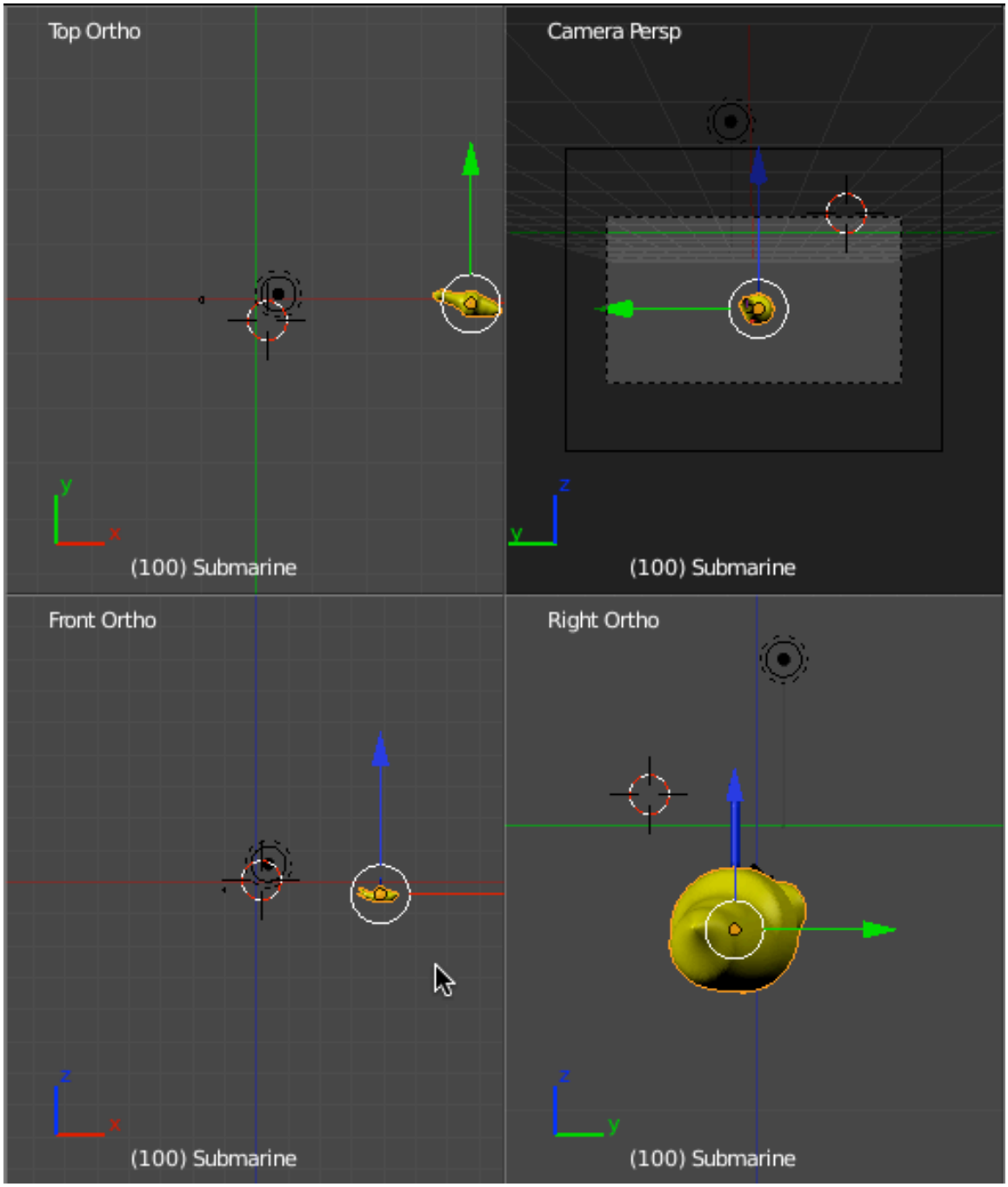

In the right 3D Editor Viewport properties panel set the Z rotation for the submarine object to 75 degrees. (Or whatever degrees it takes to make the submarine turn in camera view).




With the submarine object selected and your cursor in Right Side view, press the IKEY (Insert Keyframe) and add a **LocRotScale** keyframe for the submarine object for frame #65

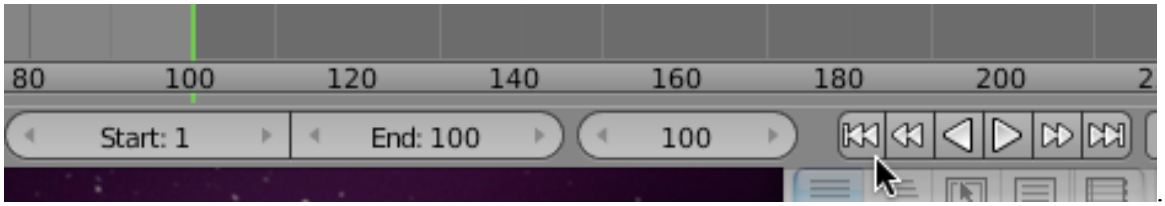
Go to Frame #100.


In the Front View viewport, zoom out a bit and GKEY (Grab) the submarine object and move it to the right so that it appears in the distance in the camera view.




With the submarine object selected and your cursor in Right Side view, press the IKEY (Insert Keyframe) and add a **LocRotScale** keyframe for the submarine object for frame #100.

Go to the beginning frame of the animation (1).



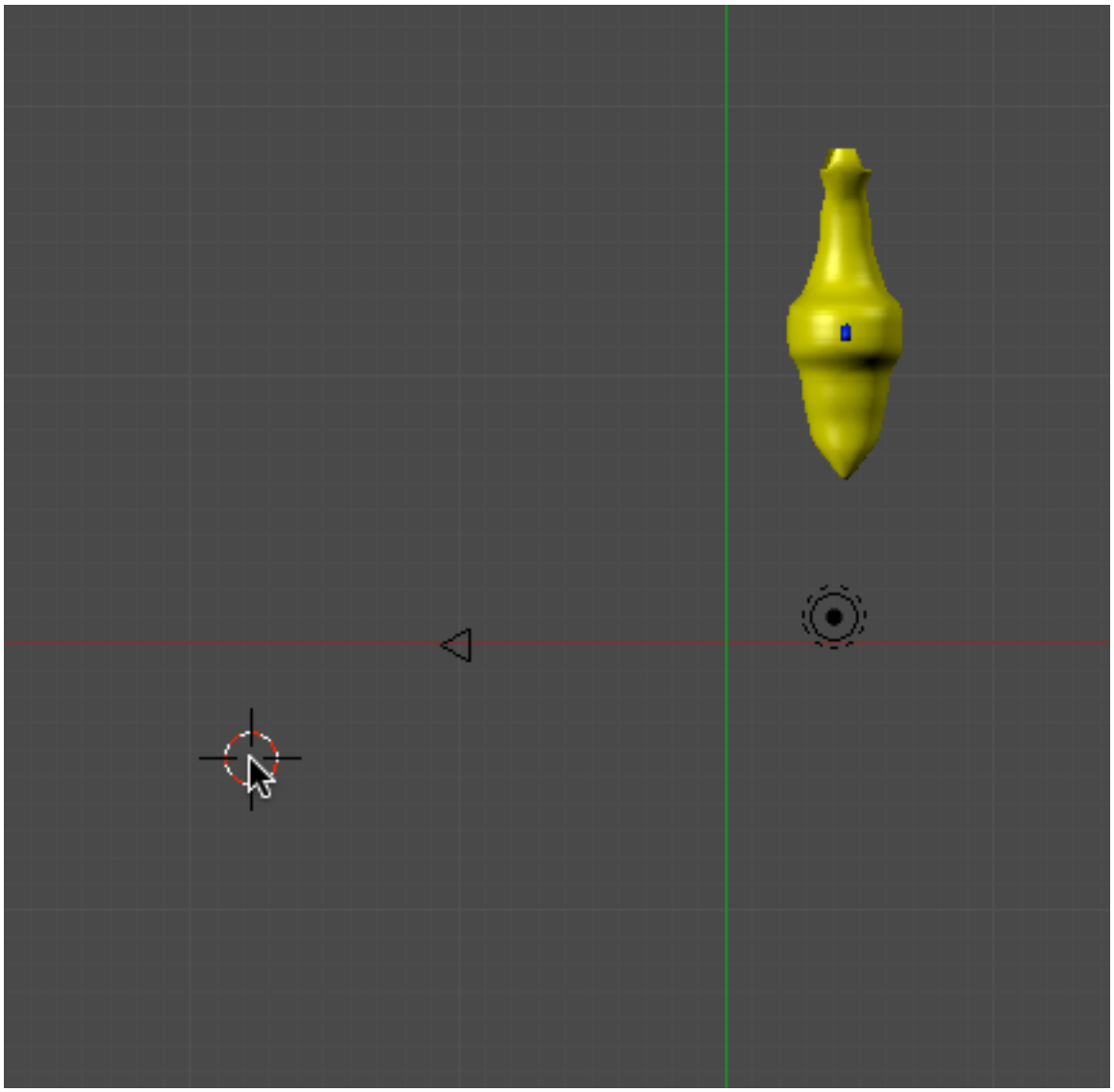

Click on the Play button in the animation control panel. Watch the animation in your camera view. The submarine moves into the camera from the left, turns and sails away.

Press ESCAPE or the stop button on the animation control panel to stop the animation.

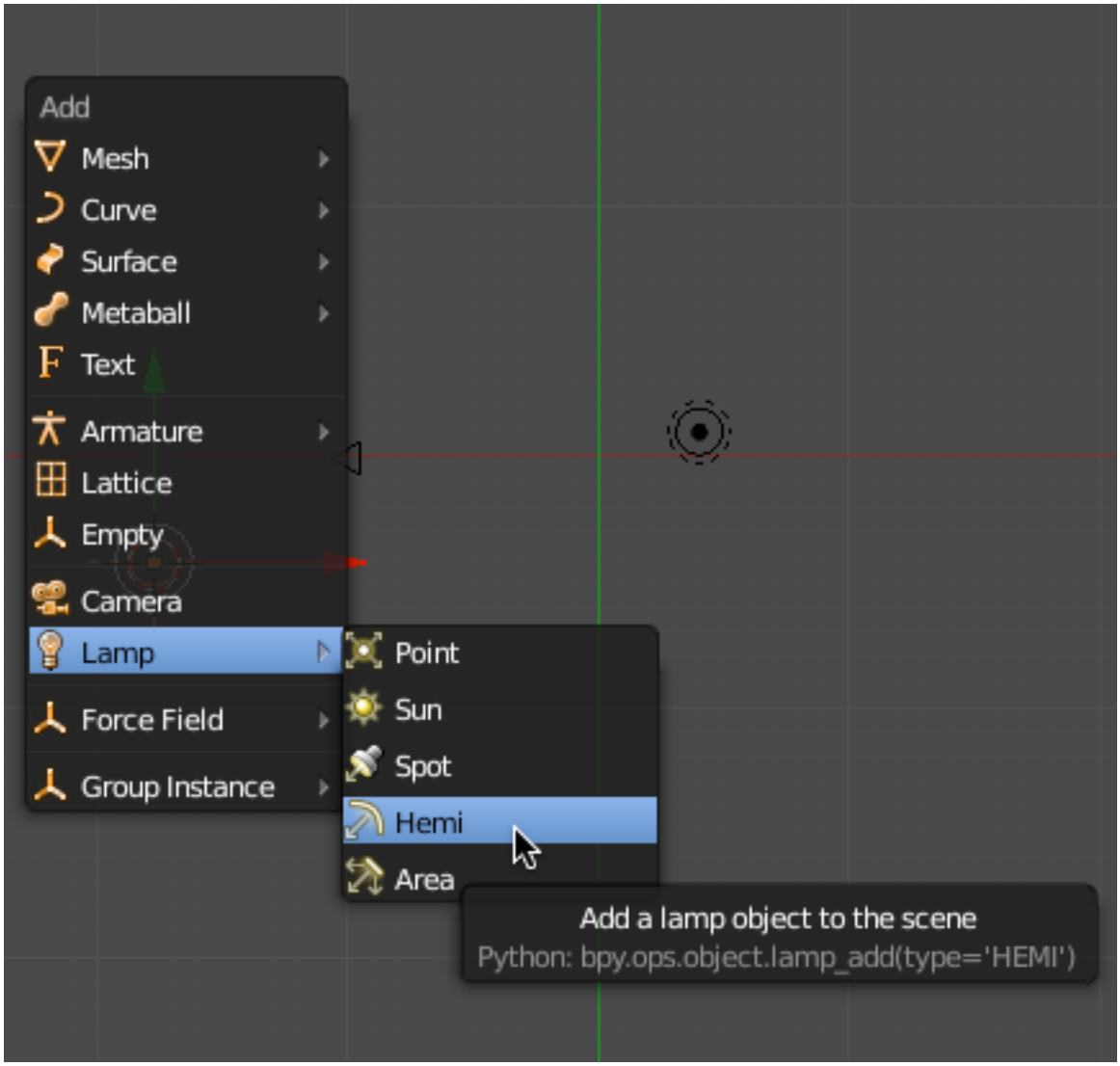
Save your Blender file (**COMMAND-S (MAC) or CTRL-S (PC)**).

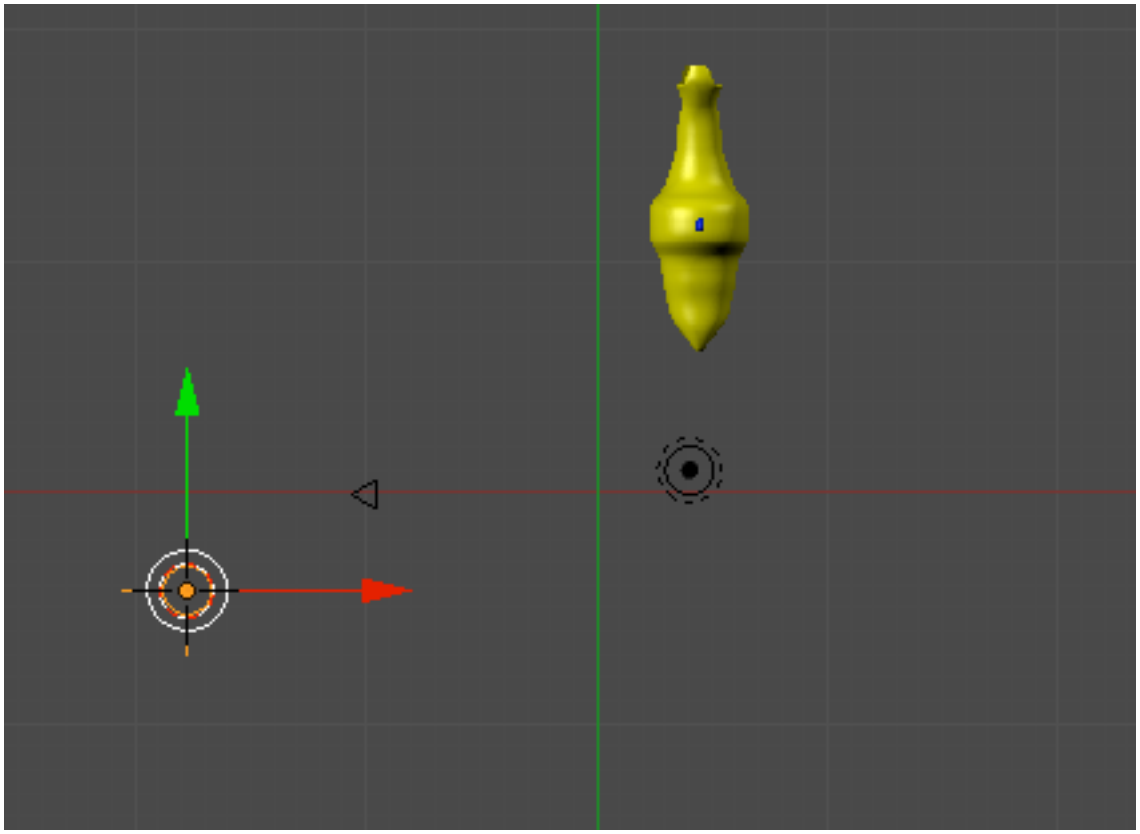
## LIGHTING:

We need to add some additional simple lighting to the scene. Press CTRL-ALT-Q to move back to a singe 3D viewport. Make sure you are in Frame #1. Go to Top View (NUMPAD-7). Place (click) your 3D cursor in the Front View as shown below.



Press SHIFT-A and Add a Hemi Lamp.

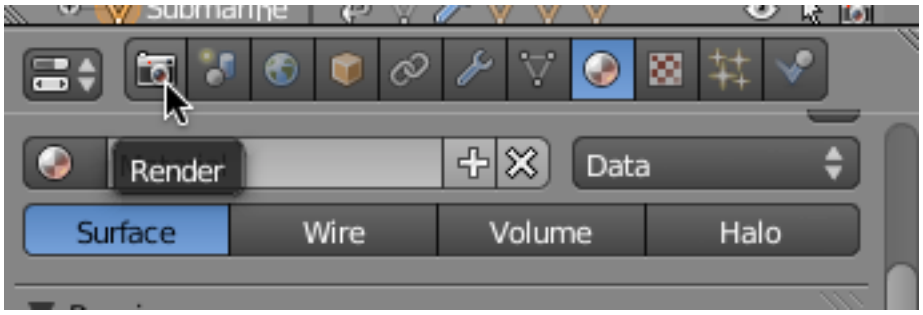

Add
Mesh
Curve
Surface
Metaball
Text
Armature
Lattice
Empty
Camera
Lamp
Force Field
Group Instance
Point
Sun
Spot
Hemi
Area
Add a lamp object to the scene
Python: bpy.ops.object.lamp_add(type='HEMI')



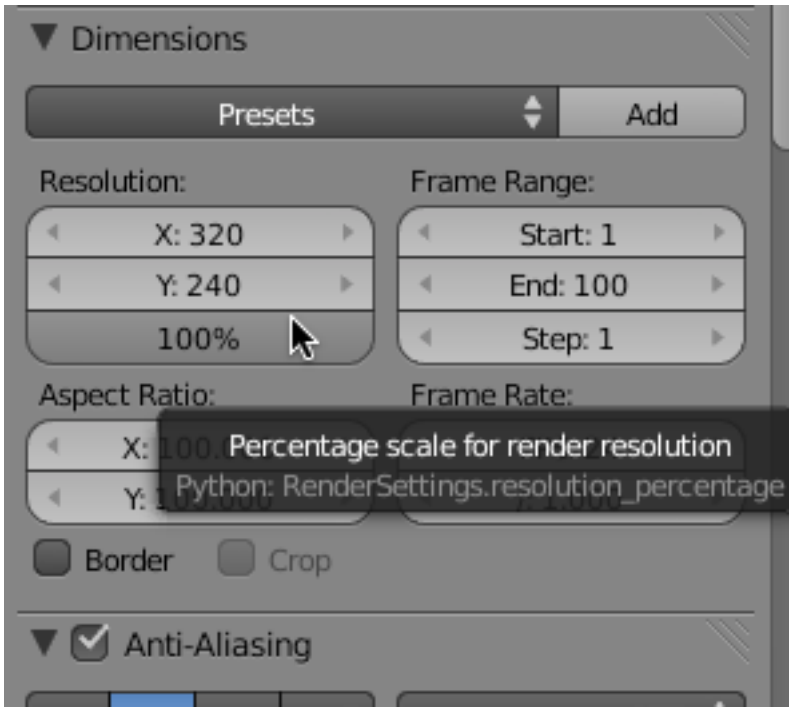
## Rendering:

We are now ready to render the animation. Press NUMPAD-0 to go into Camera View.

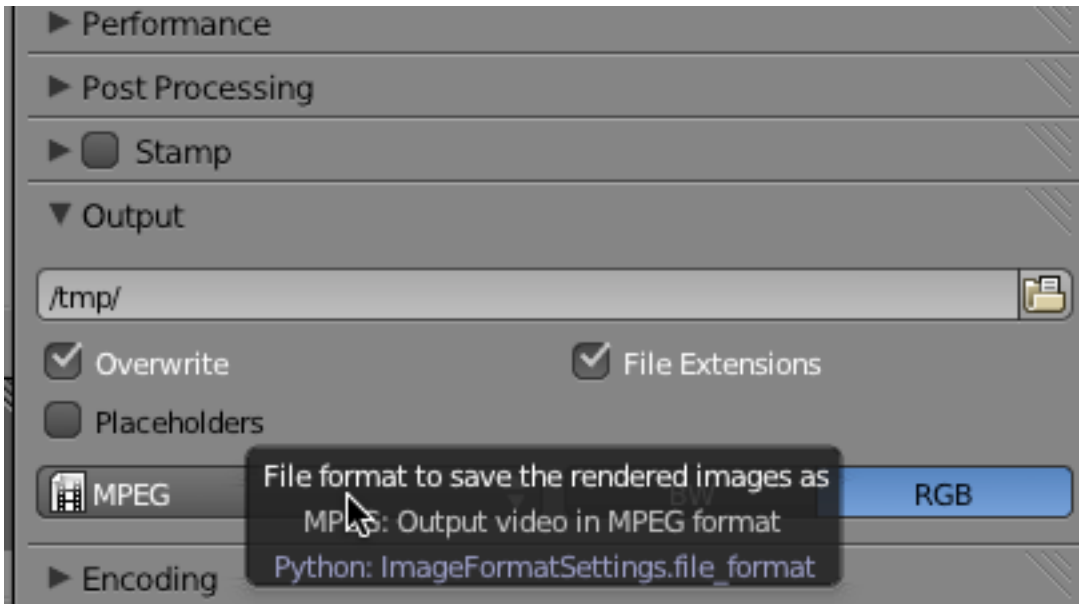
Press the Render context button in the Properties Editor.



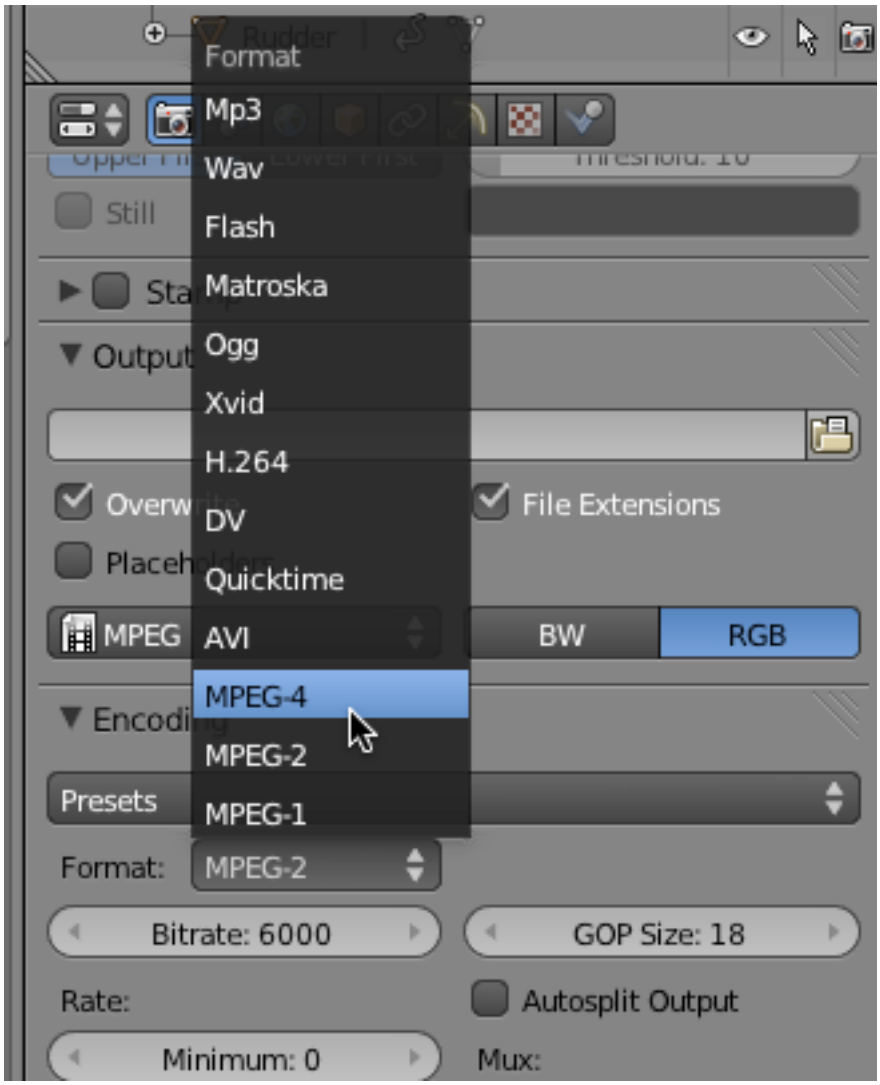

Under the Dimensions panel set the X dimension to 320 pixels and the Y dimension to 240 pixels. Set the Percentage control to 100 %.



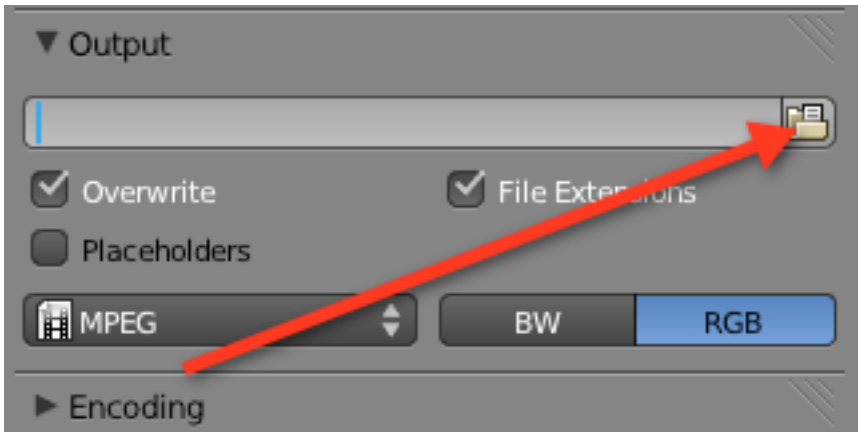

In the Output panel, set the output to MPG.



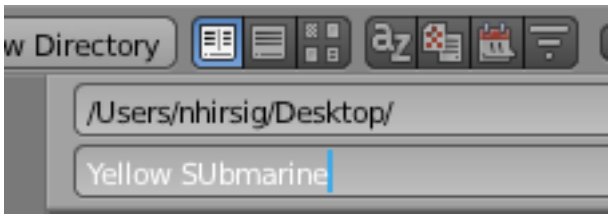

In the Encoding panel, set the format to MPEG-4



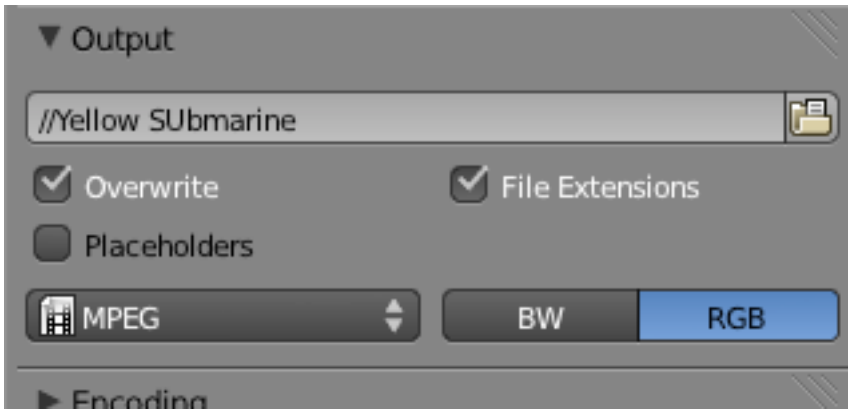

In the Output panel, click on the Output file icon.




This opens Blender's File Browser. Type in a file name for the video file, and then choose where you want the MPPG movie file to be saved. (I choose my desktop)

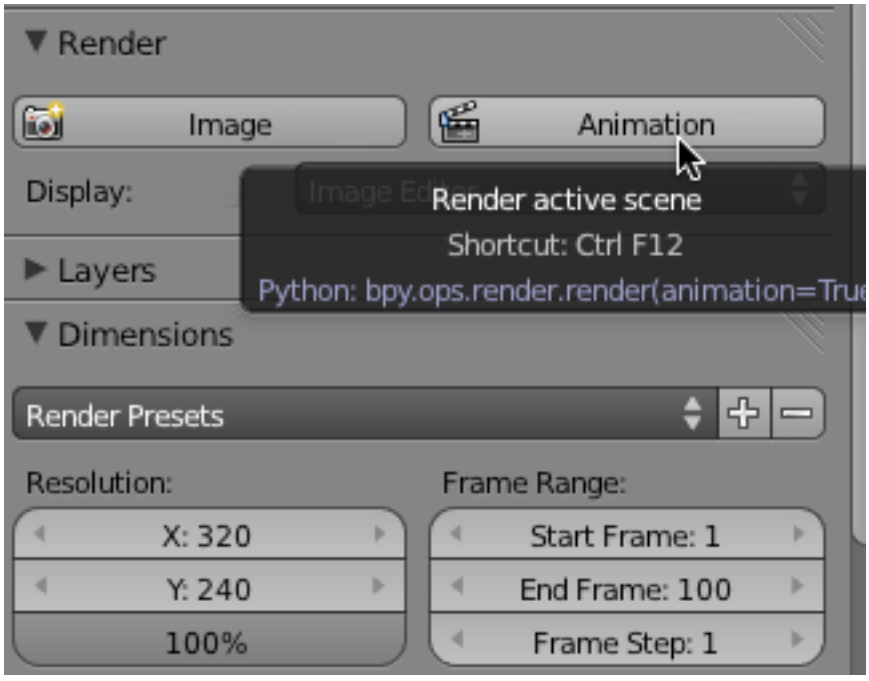



Press the Accept button.



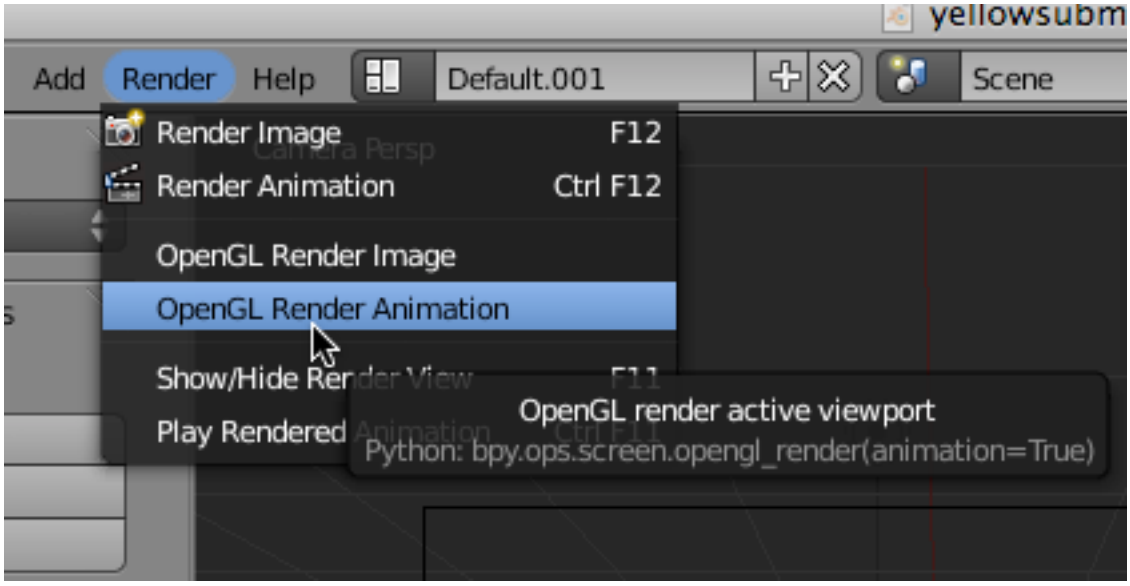

This will produce a MPEG-4 video, 320 x 240 pixels and save it on my desktop.

We can now render the animation. Click on the Animation button in the Render panel



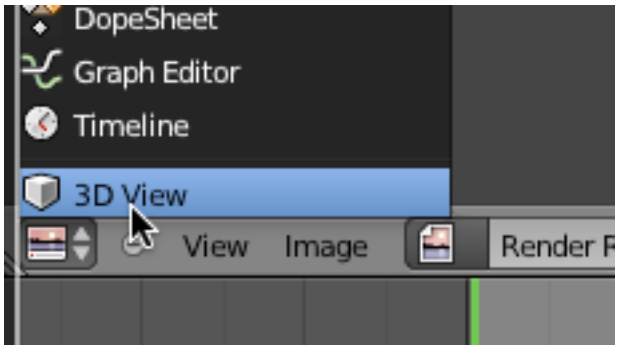

Blender's UV Image Editor Window will open and the animation will be rendered to a file. It will take a few minutes to render all 100 frames of the animation.

When it is finished rendering, you can play it back in Blender by pressing the Render button in the Information Editor Header and select Open GL Render Animation.




You can also locate the video file in the output directory and play it in your MPEG-4 movie player.


You can click on the window type button in the lower left corner of the display and return to the 3D viewport.




Save your Blender file CTRL-W.

A completed copy of this .blend file named YellowSubmarineComplete.blend can be downloaded HERE.