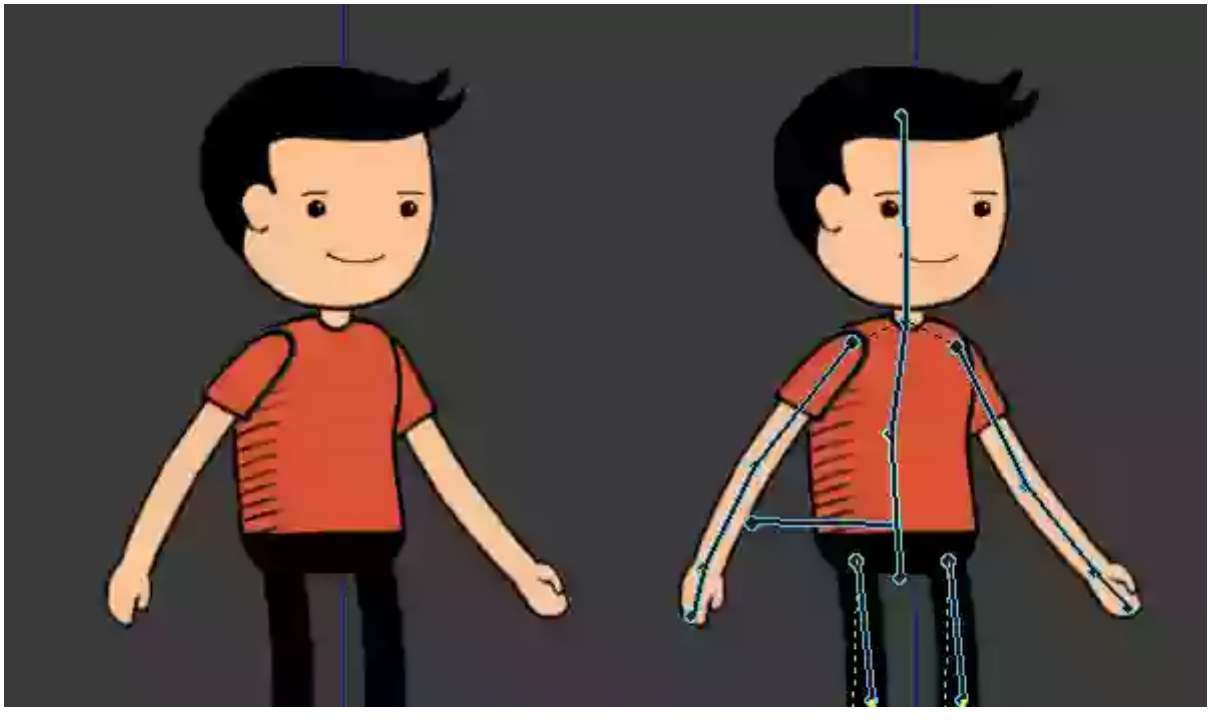
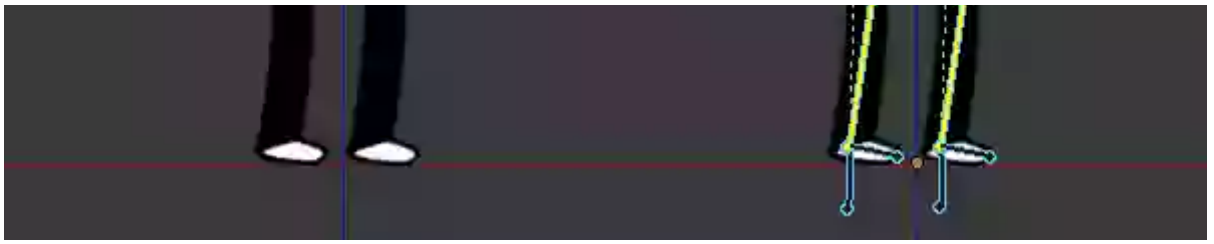
How to Rig a 2D Character in Blender for Cut-Out Animation or Explainer Videos: Part 1

by Karan Shah 12 Apr 2016

Difficulty: Intermediate Length: Long Languages: English

Blender Animation





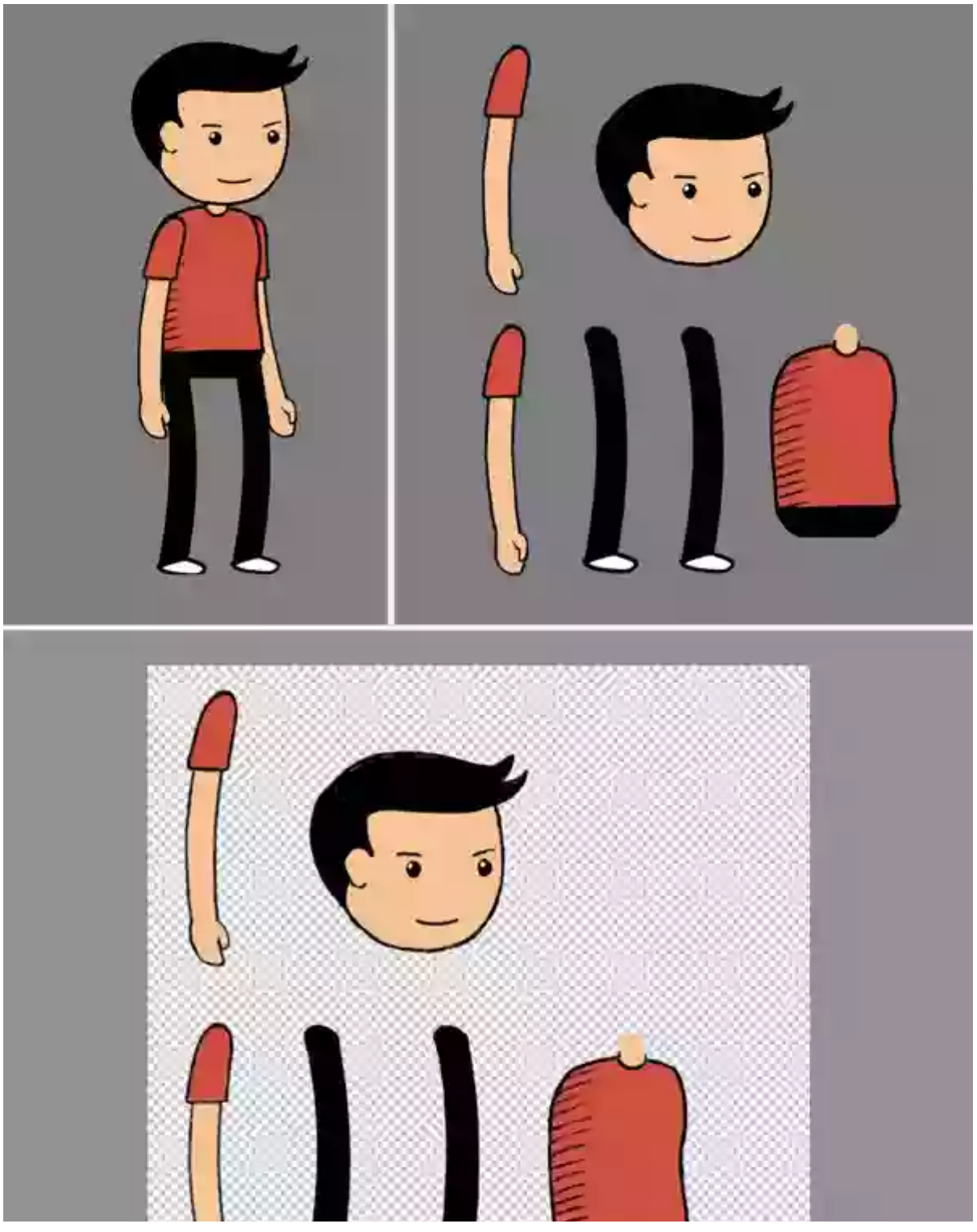
What You'll Be Creating

Building the Character

Step 1

In the paint program, construct the character such that all the movable items, such as limbs and head, are in separate layers.

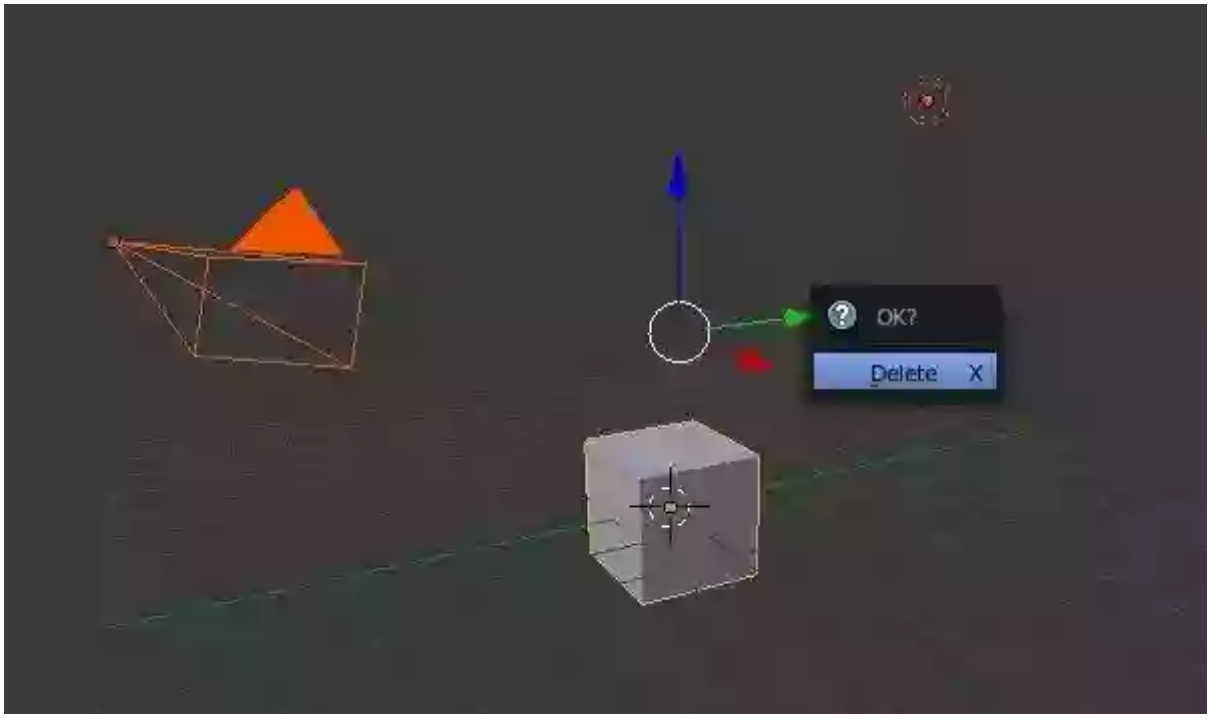
Move them apart so that there is ample space between them. Turn off the background layer and export it as transparent `.png` file.



Creating the character in 2D program

Step 2

Open Blender and in a new file, press **A** to select all default objects and press **Del** to delete them.



Delete default objects

Step 3

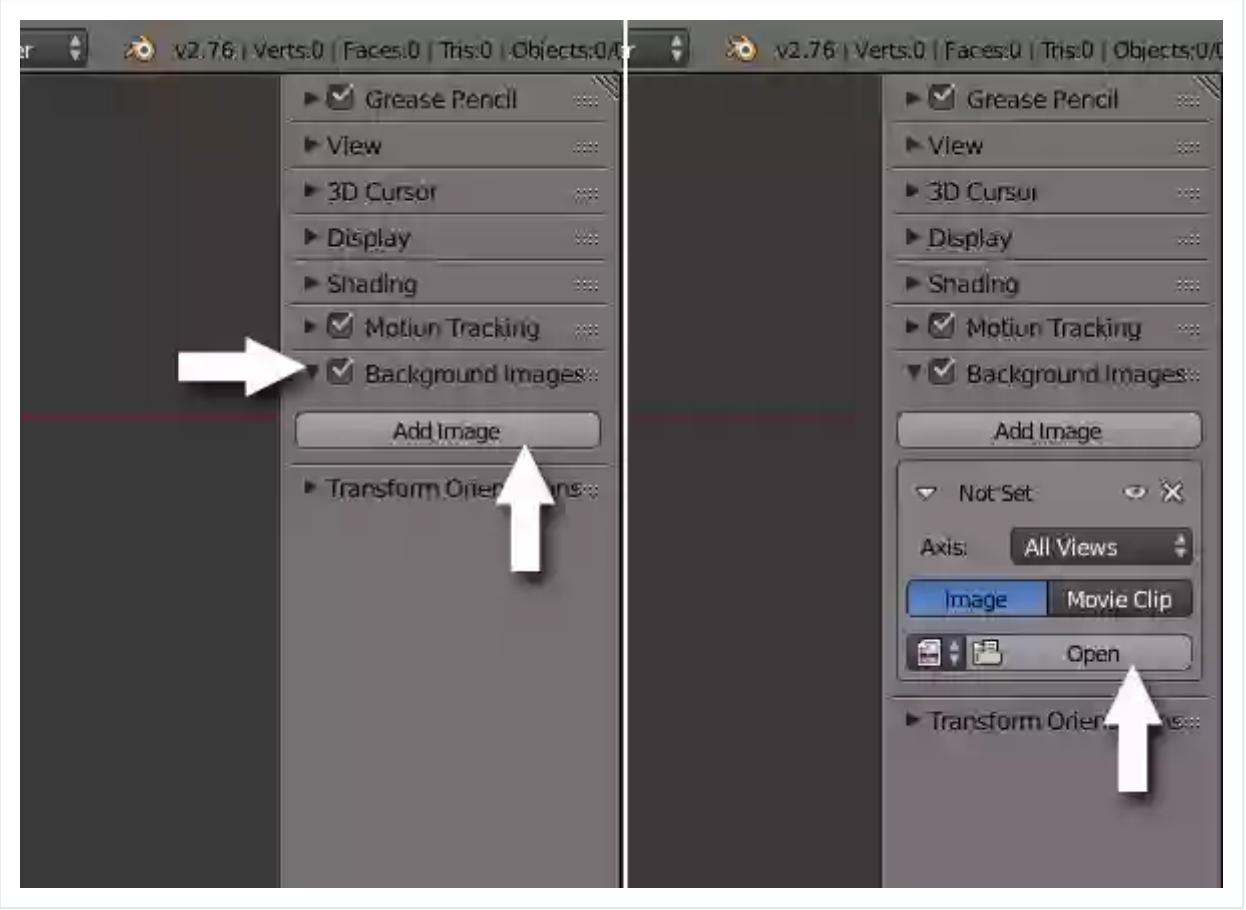
With the mouse in 3D viewport, press **1** in the number pad to get into front view.

Press **5** in the number pad to toggle off perspective view.

Press **N** to bring out the properties panel and tick the **Background Image** check box.

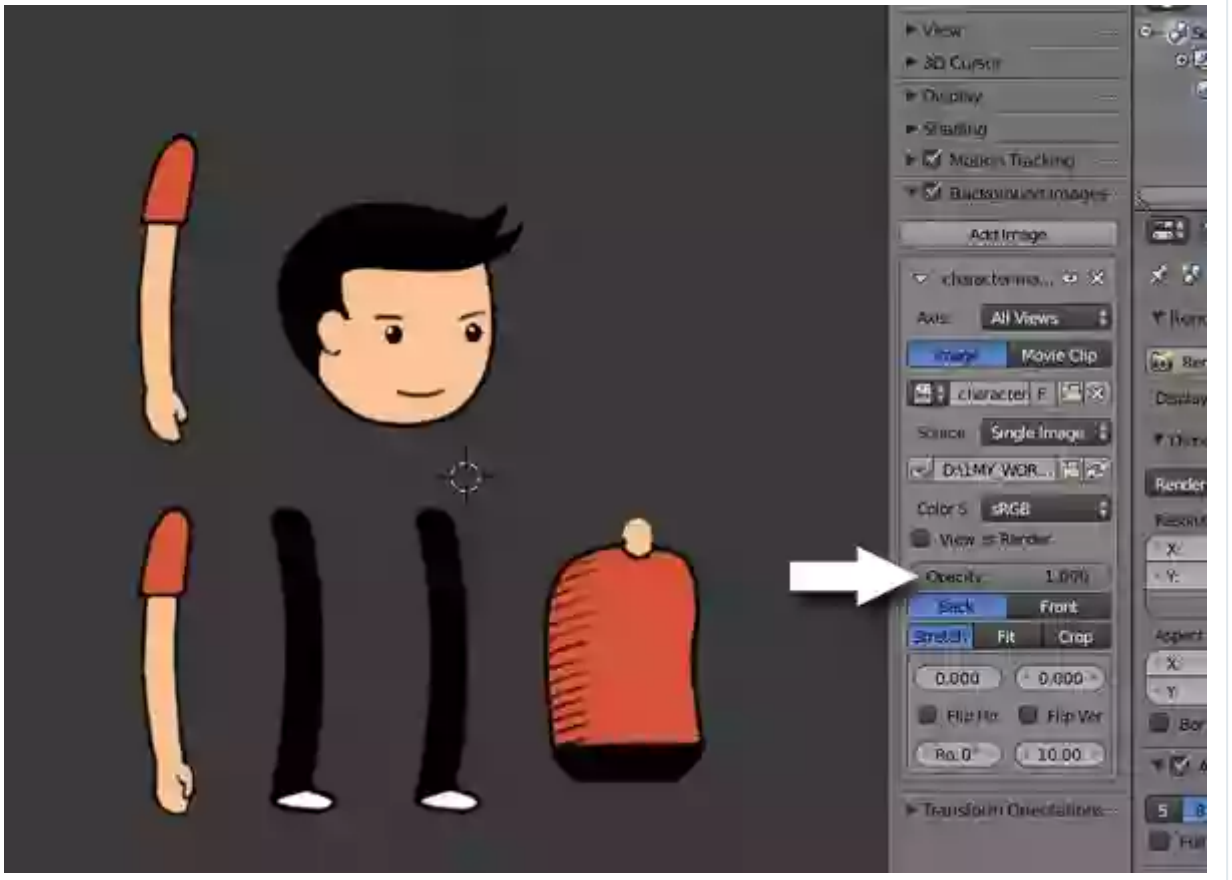
Click on the **Add Image button**.

Press the **Open** button and browse for the image.



Adding background image

Increase the **Opacity** to **1**.



Changing opacity of background image

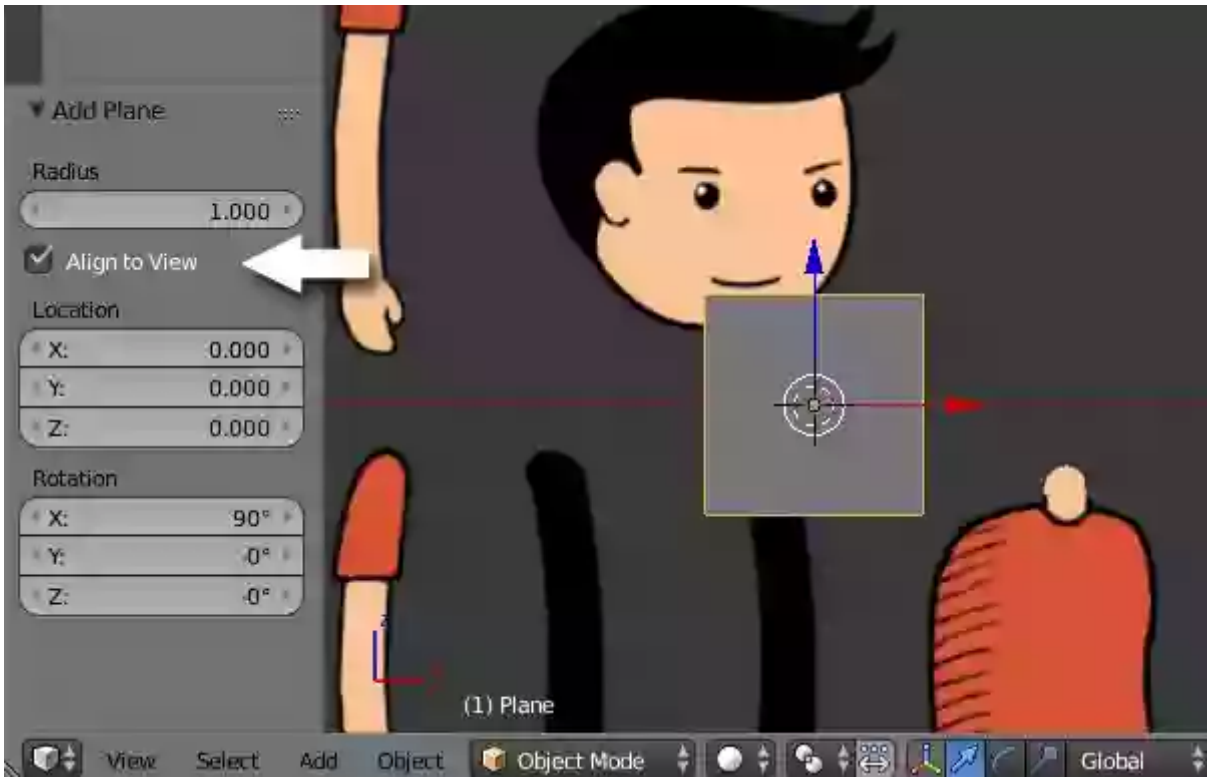
Step 4

Press **Shift-A** and add a **Plane**.

Adding a plane

In the **Tool Options** panel, which is located at the bottom of the tool shelf, tick the **Align to View** checkbox so that the circle is not facing upwards.

Press **T** to toggle on the **Tools Options** panel if it is not there.



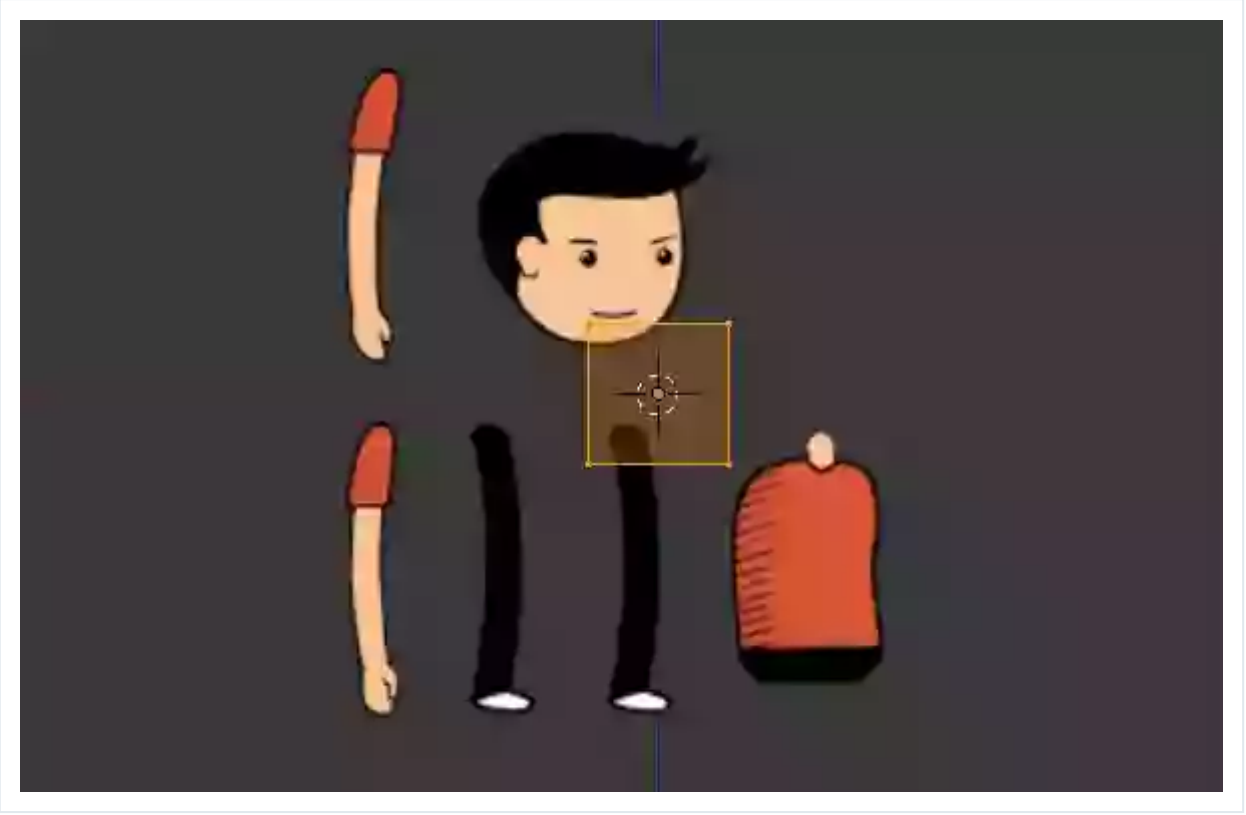
Aligning the plane to view

Step 5

Secondary-click the mouse on the plane to select it.

Press **Tab** on the keyboard to enter edit mode.

Press **Z** for wire-frame mode so that you can see through the mesh.



Editing the plane

Step 6

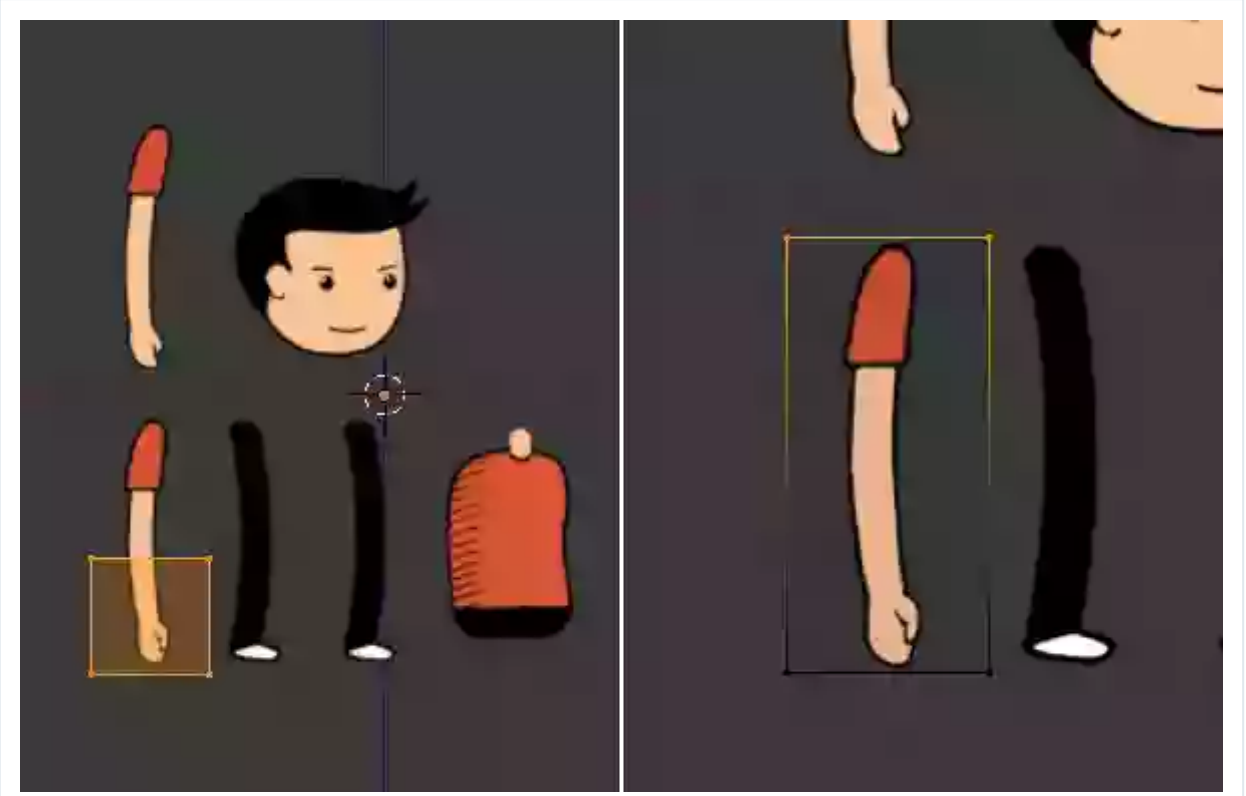
Press **A** to select all vertices of the mesh.

Press **G** to move the mesh and place it such that it covers the arm.

Select the top two vertices and move them just a little above the shoulder.

Secondary-click on the vertex to select it and hold **Shift** and then right click again on to select more than one.

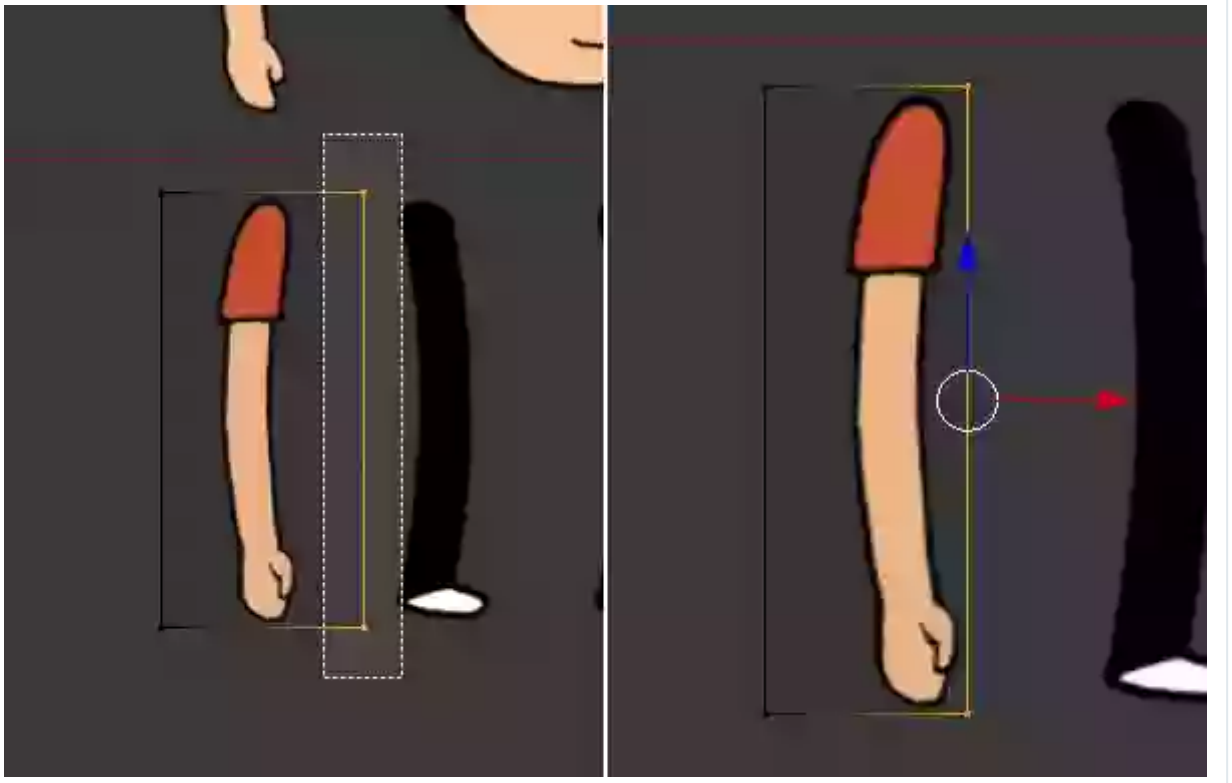
Press **G** key to move.



Editing the geometry

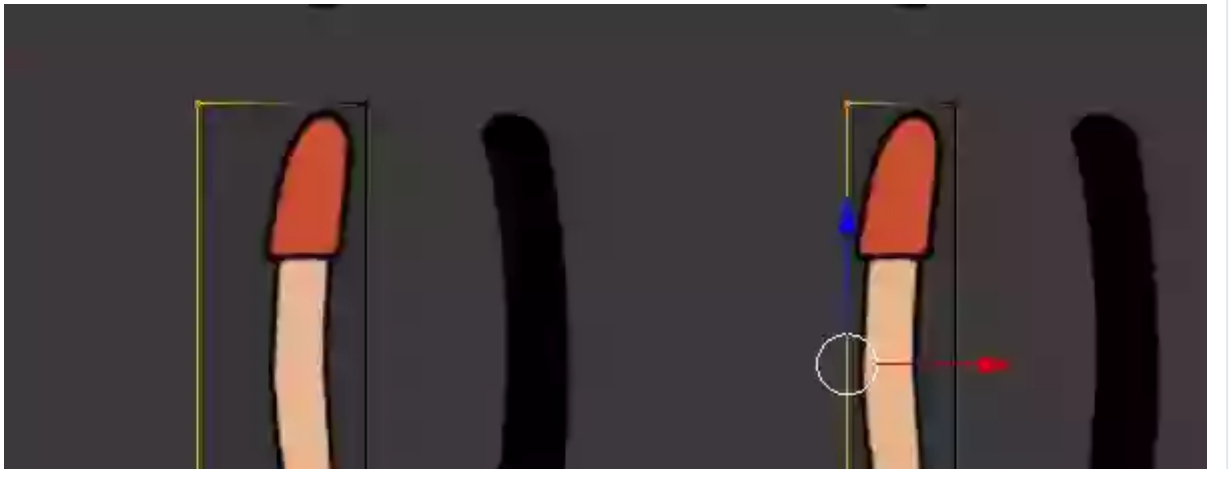
Step 7

Use the **B** key and drag select vertices. Select the vertices on the side. Move them closer to the arm.



Creating the arm

Similarly, move the other two vertices closer to the arm.



creating the arm

Step 8

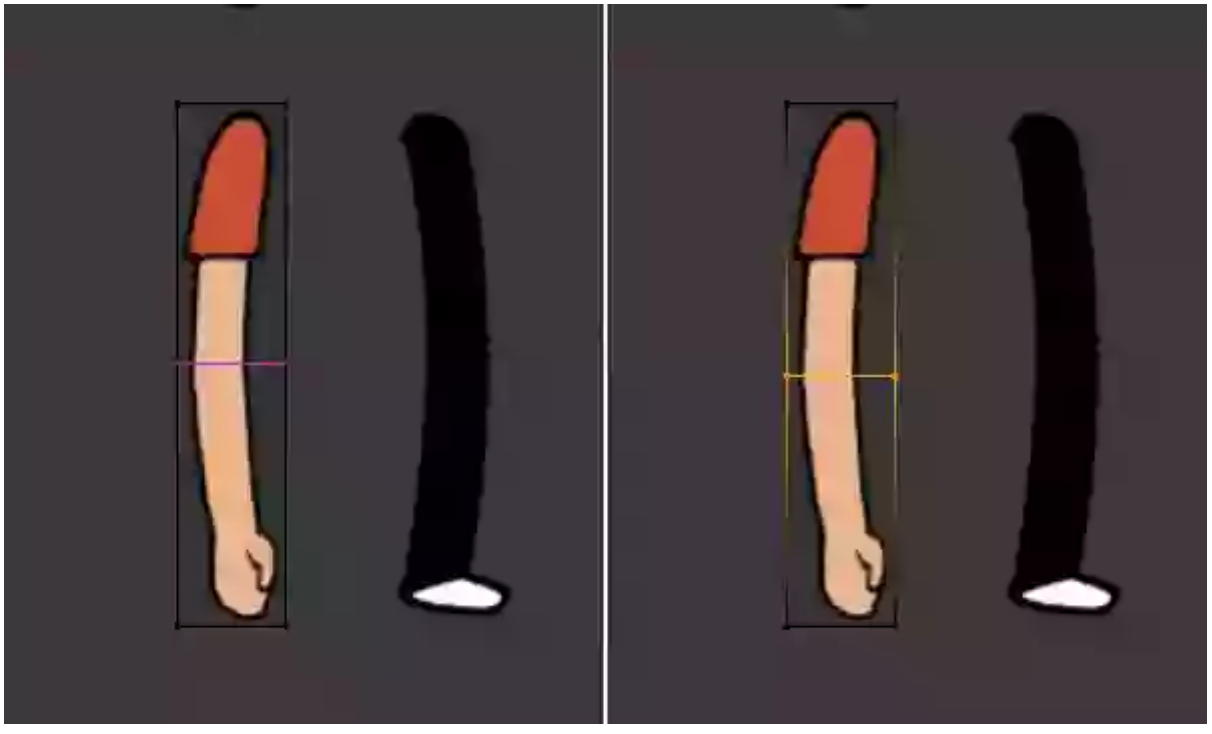
Move the mouse over the mesh.

Press **Ctrl-R** to insert an edge loop.

Primary-click to confirm.

Move the mouse up or down to place the loop cut at the elbow.

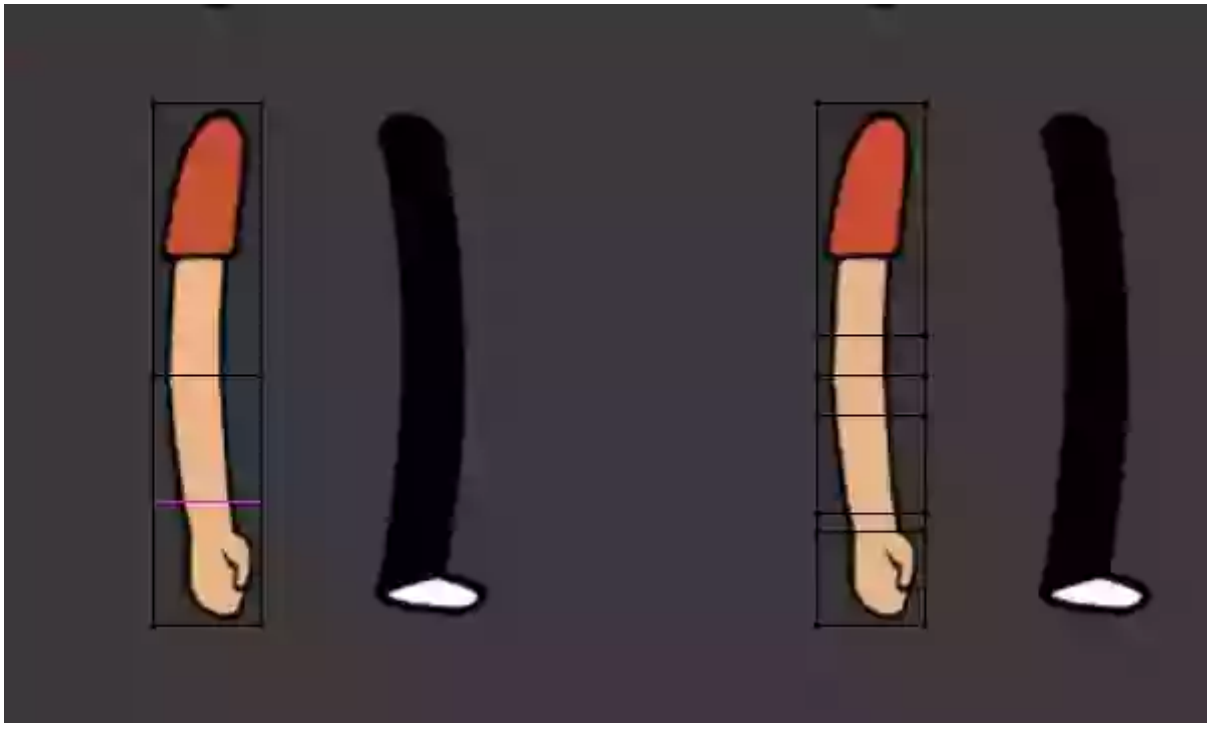
Primary-click again to confirm the position.



Adding more vertices

Step 9

Similarly add few more edge loops, total three for elbow and two for wrist. This will help deform the mesh according to the bone movement.

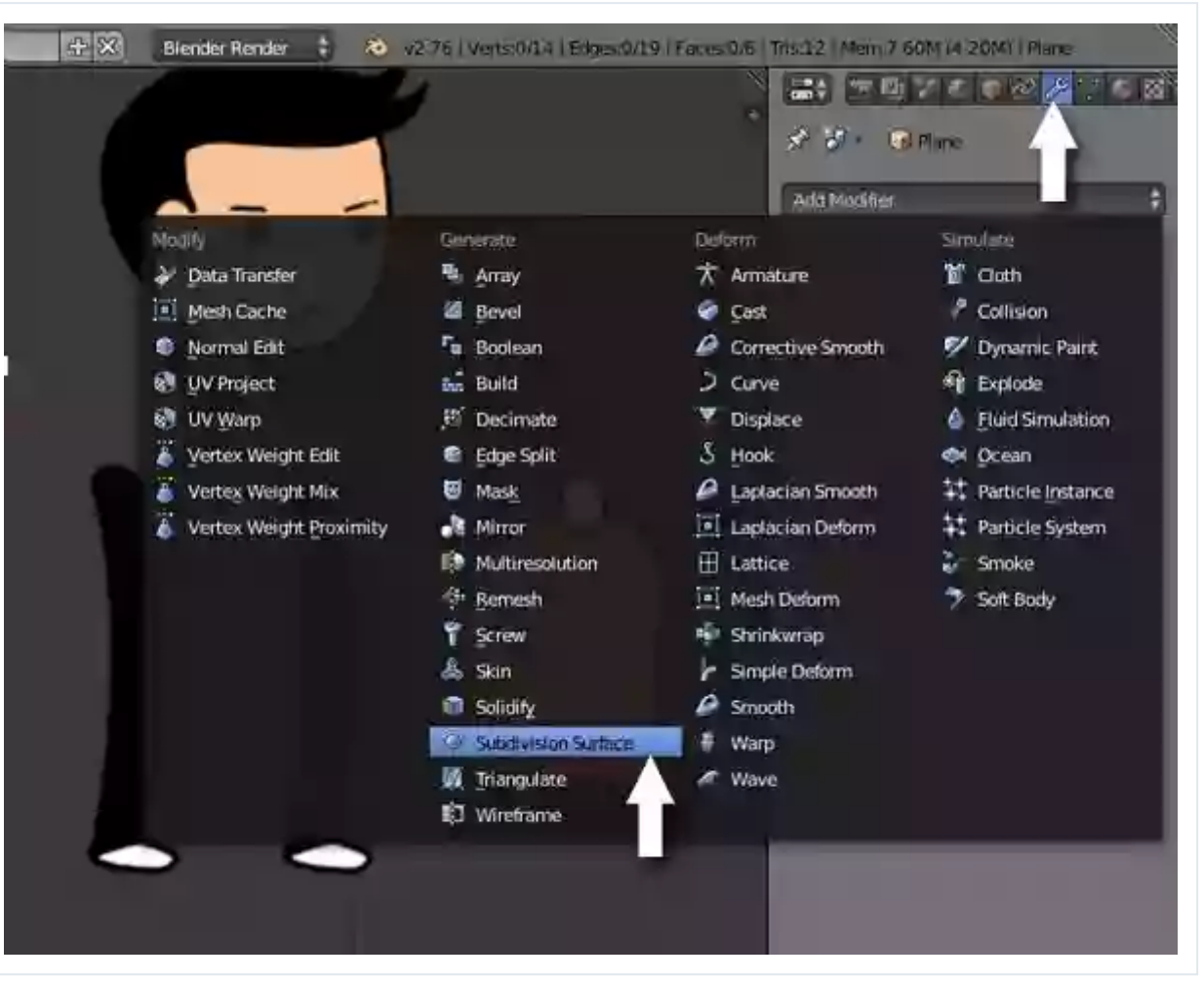


Creating joints

Step 10

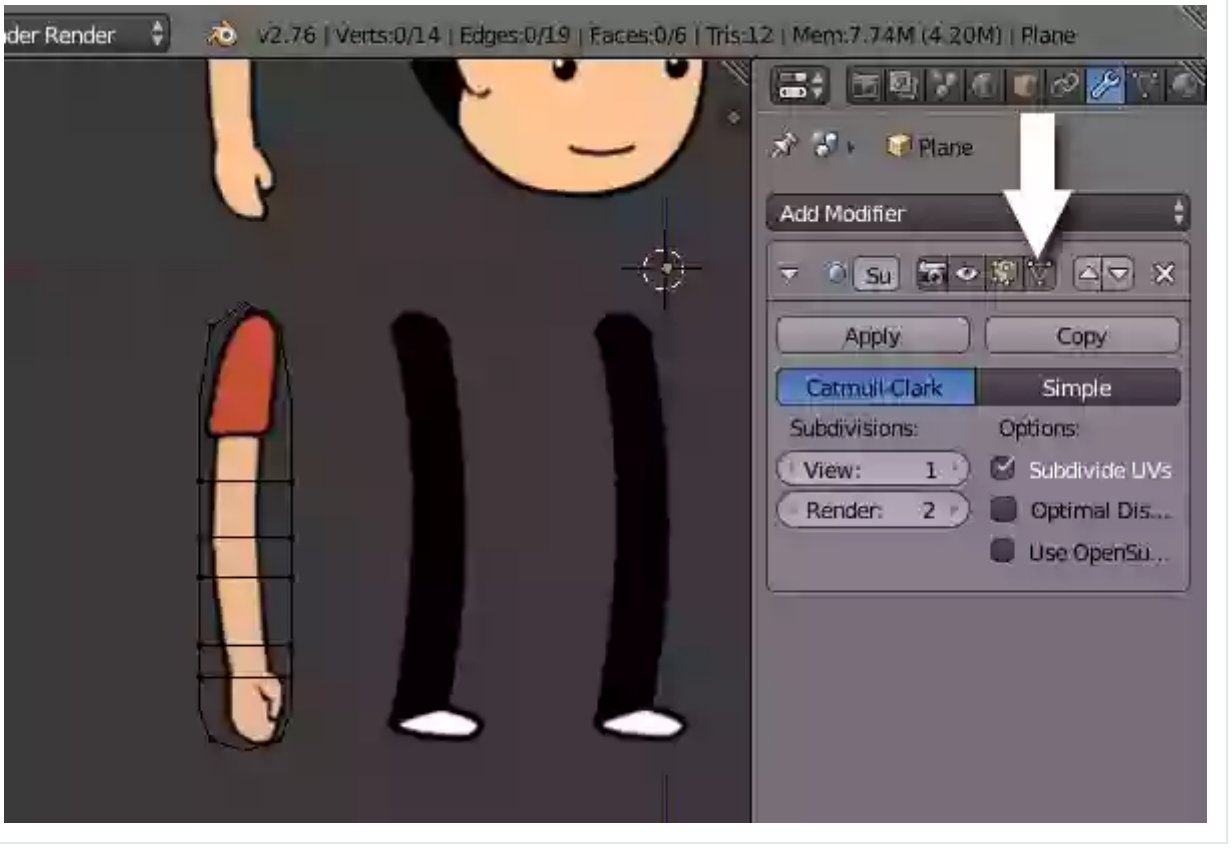
In the **properties** window, click the **modifiers** button.

Press the **Add Modifier** button and select **Subdivision surface**.
This will smooth out the mesh.



Adding Subdivision Surface modifier

Click on the cage button to preview the effect of the modifier while editing.



Modifier settings

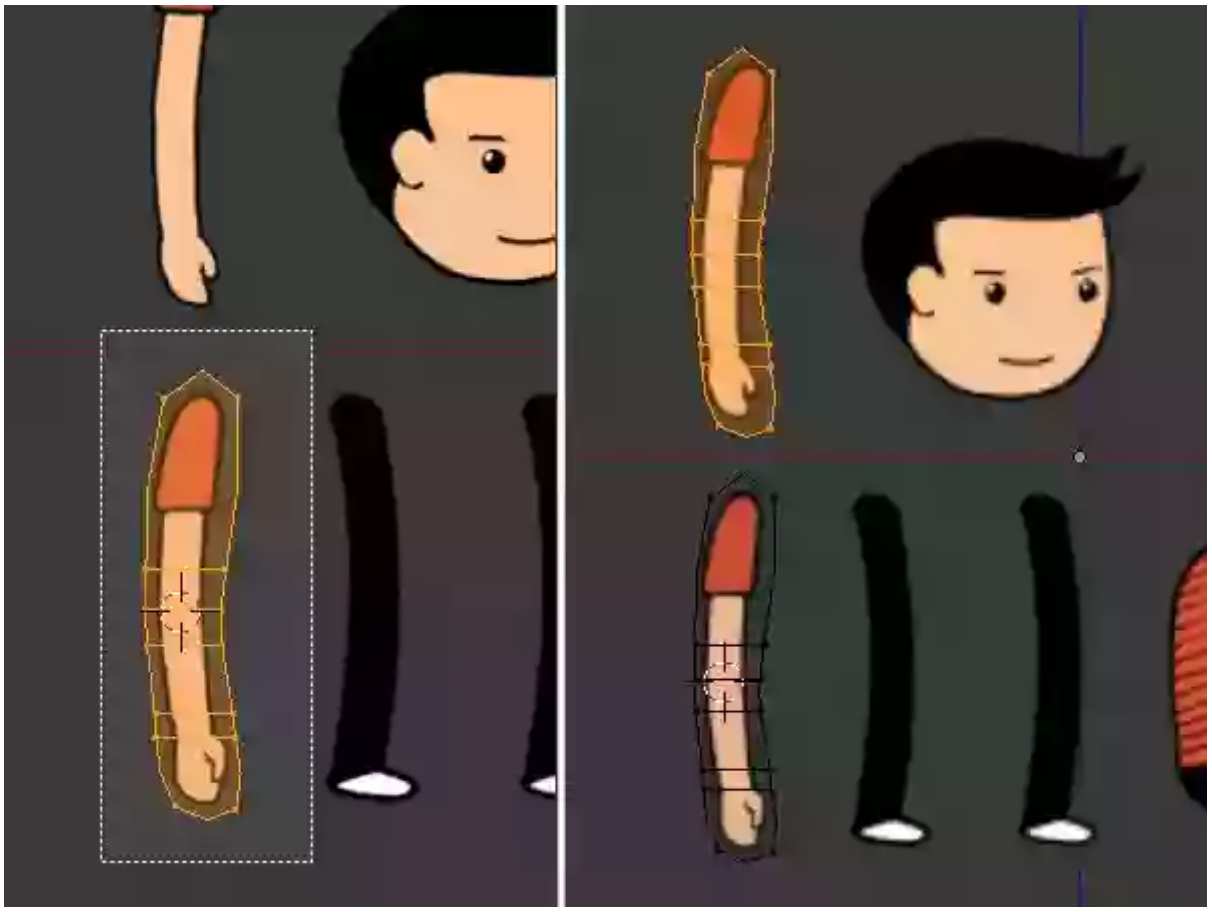
Step 11

Tweak the vertices around so that it covers the arm. Remember, secondary-click on any point to select it, then press **G** key on the keyboard to move.

Reshaping the mesh

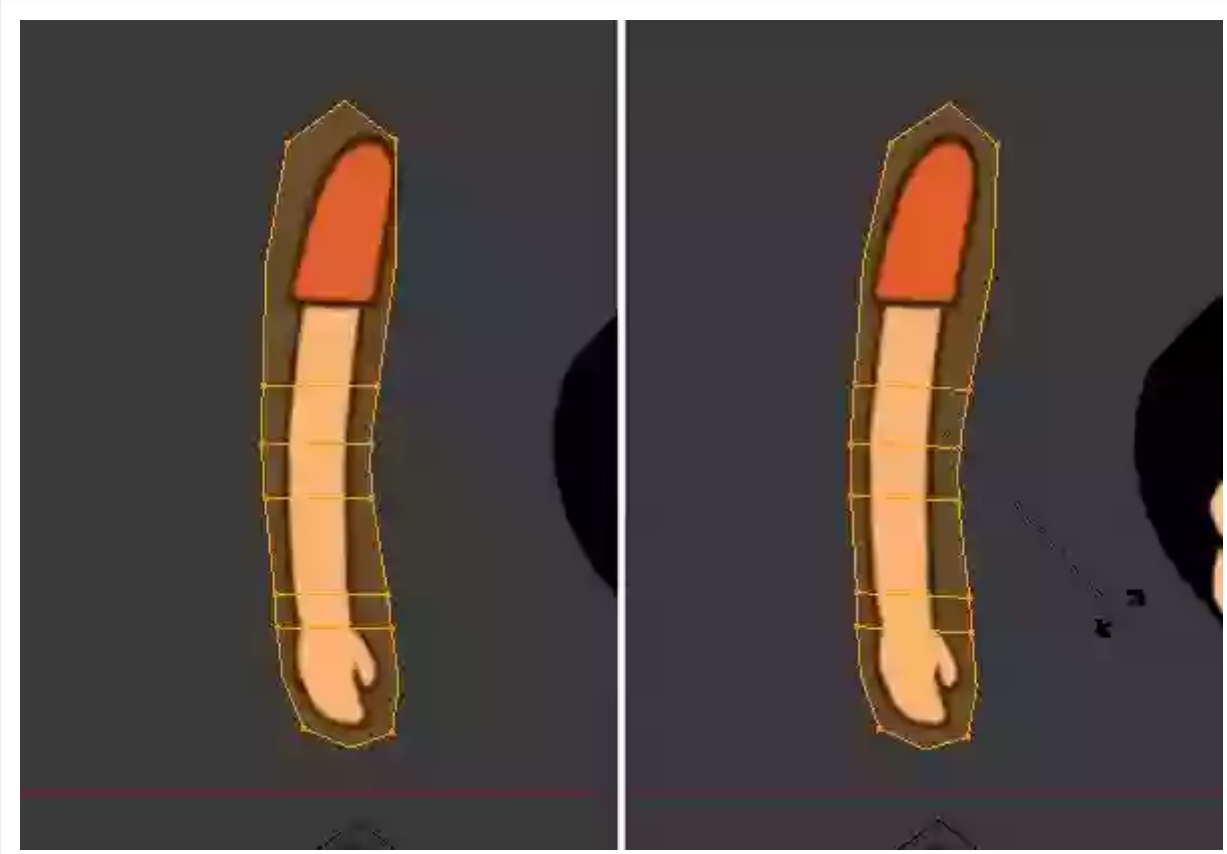
Step 12

Press the **B** key and drag select all vertices. Press **Shift-D** to duplicate the mesh. Move the mouse towards the second arm and primary-click to confirm the position.



Duplicating the arm

Tweak the new mesh so that it covers the second arm perfectly.



Tweaking the mesh

Step 13

For the legs, add another plane. Make sure you are still in the edit mode. Press **Shift-A** and click on **Plane**.

Adding another plane

In the toolshelf, check **Align to View** so that the plane is facing correctly towards the viewer.

You'll see that the plane is not a perfect square. This is because of the subsurface modifier which was already applied to the object in step 10.

Aligning the plane to view

Step 14

With the new plane select,

- press **G** key and move the new plane on top of the leg.
- Press **A** to deselect all vertices. Hold **Shift** and then secondary-click on the bottom two vertices to select them.
- Press **G** and move them down, just above the knee. Primary-click to confirm the position.
- Press **E** to extrude them. Move the mouse to move the new set of points downwards. Primary-click to confirm.
- Similarly extrude again few times to make the whole leg till tow.
- Press **S** to scale down the last two vertices.

Creating the leg

Step 15

Press **B** and drag select all vertices of the leg.

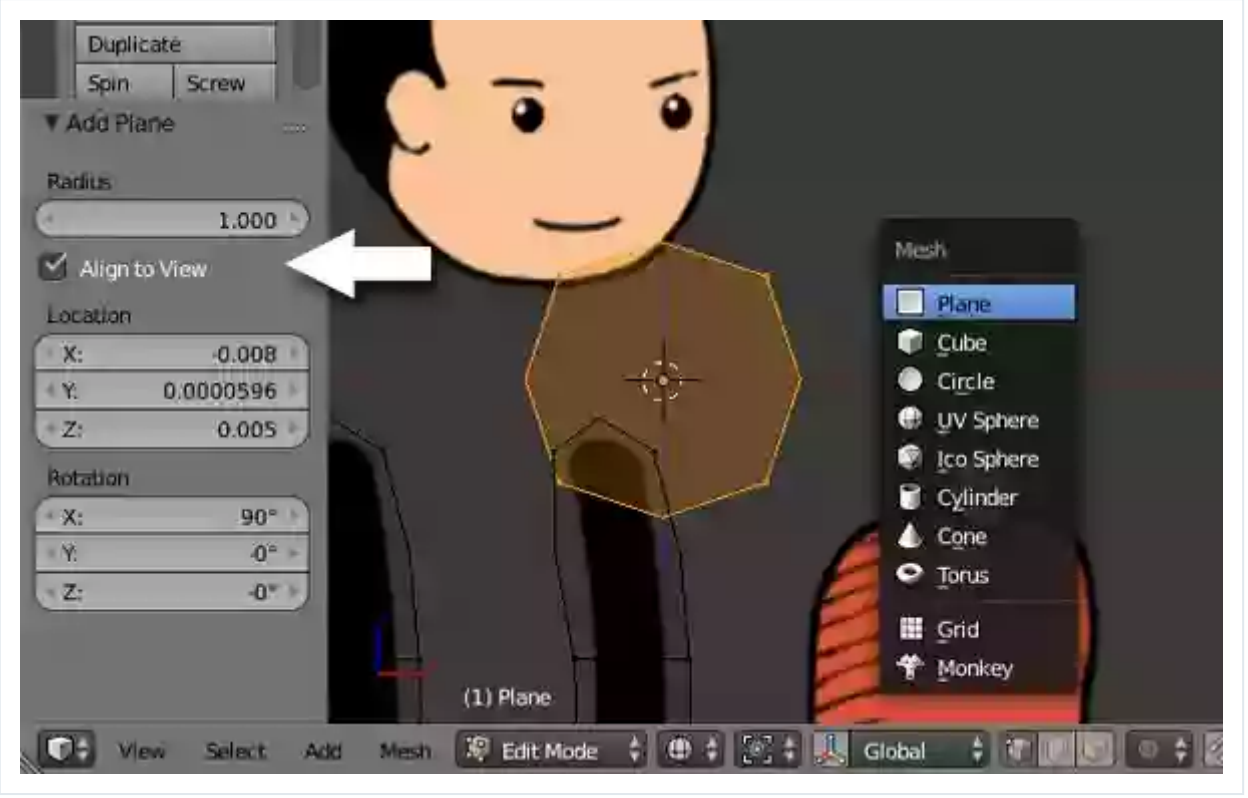
Press **Shift-D** to make a copy, move the mouse and place the duplicate over the second leg.

click to confirm the position.

Duplicating the leg

Step 16

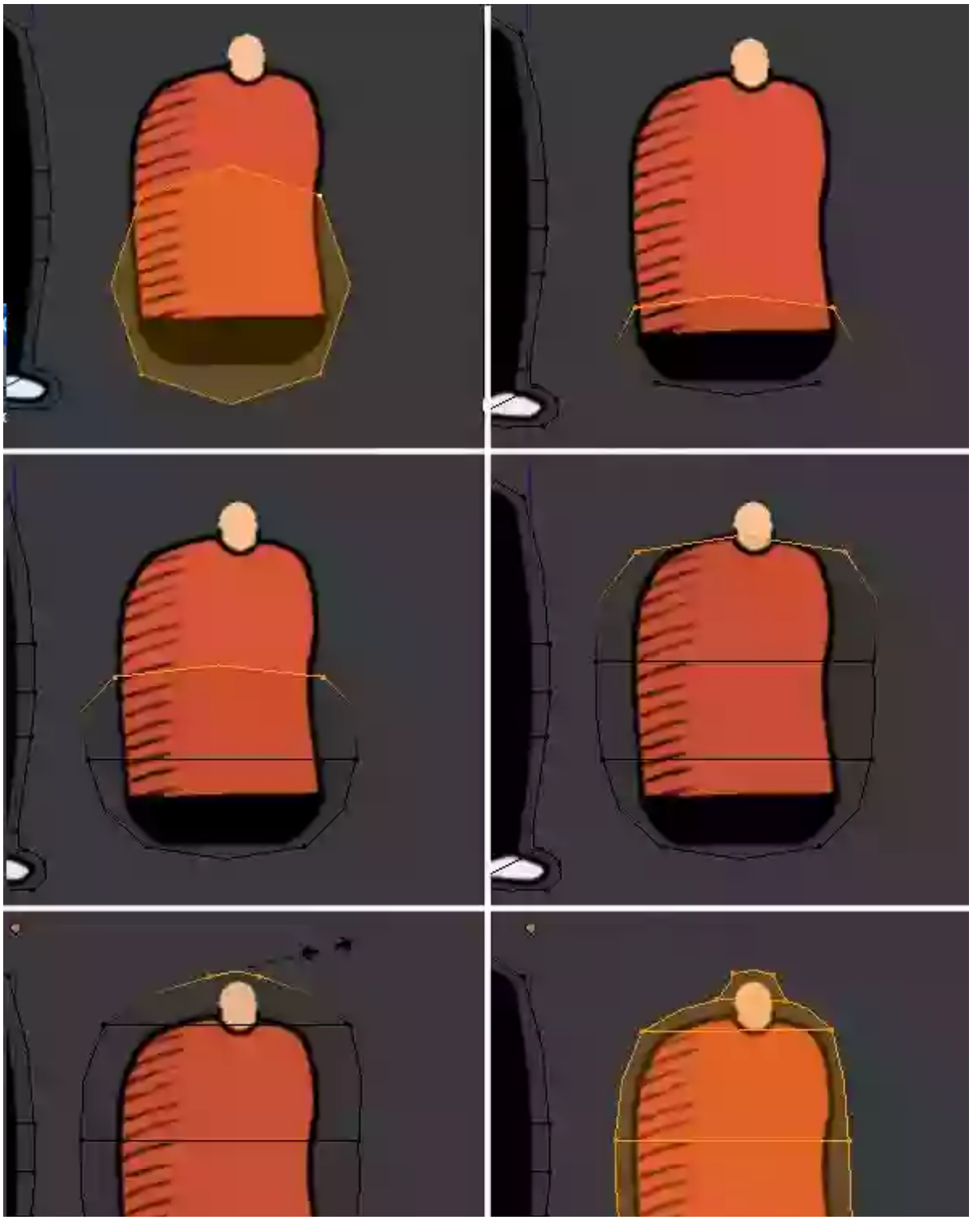
Press **Shift-A** and add a new plane. Tick the **Align to View** checkbox so that it faces the viewer.



Adding another plane

Step 17

Similarly, with the same method, extrude along and build the torso. Press **S** key to scale down the vertices for neck.



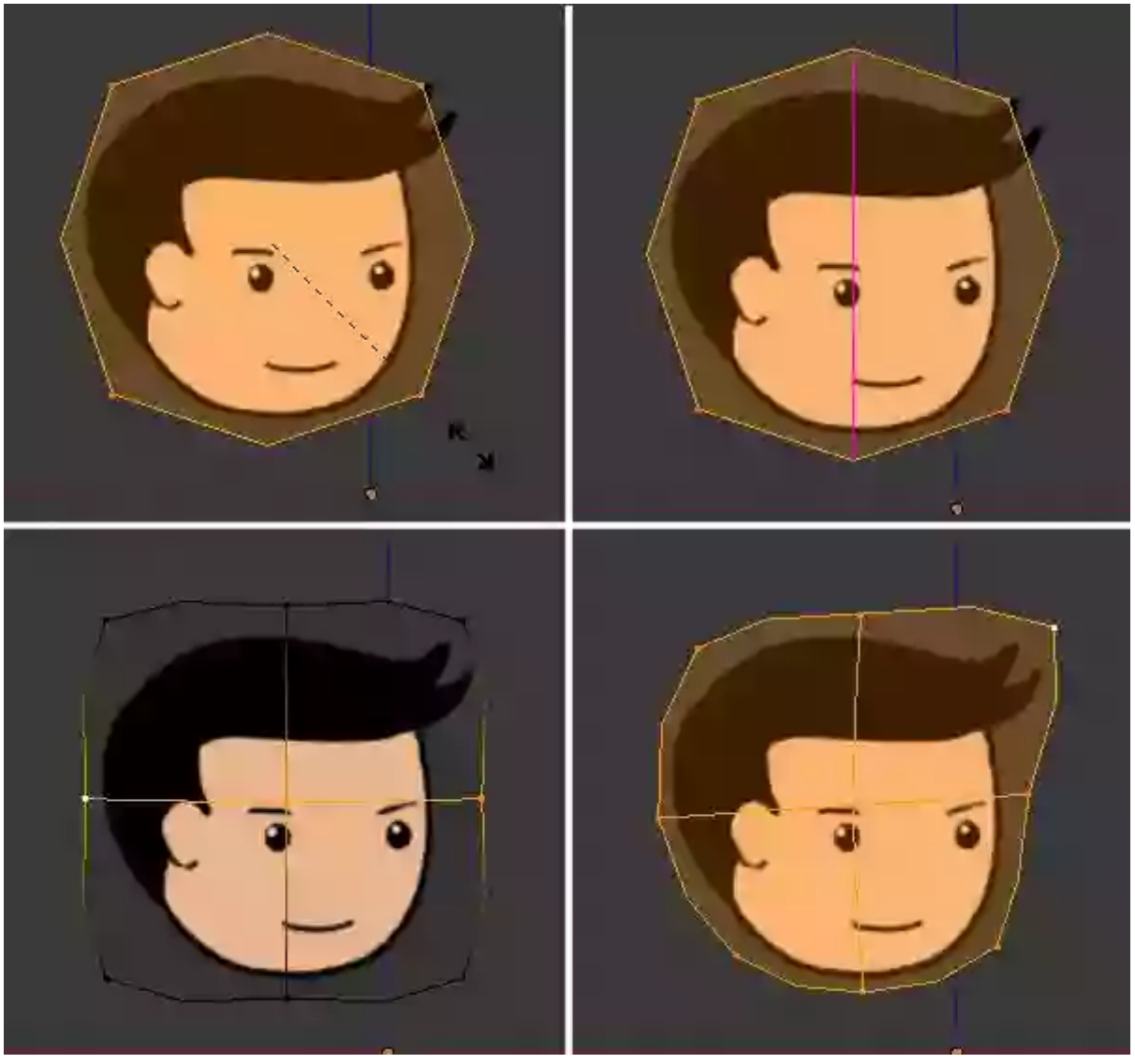
Creating the torso

Step 18

Press **Shift-A** to add another **plane** for head. Scale it to match the reference.

Press **Ctrl-T** to add edge loops.

Tweak the vertices.



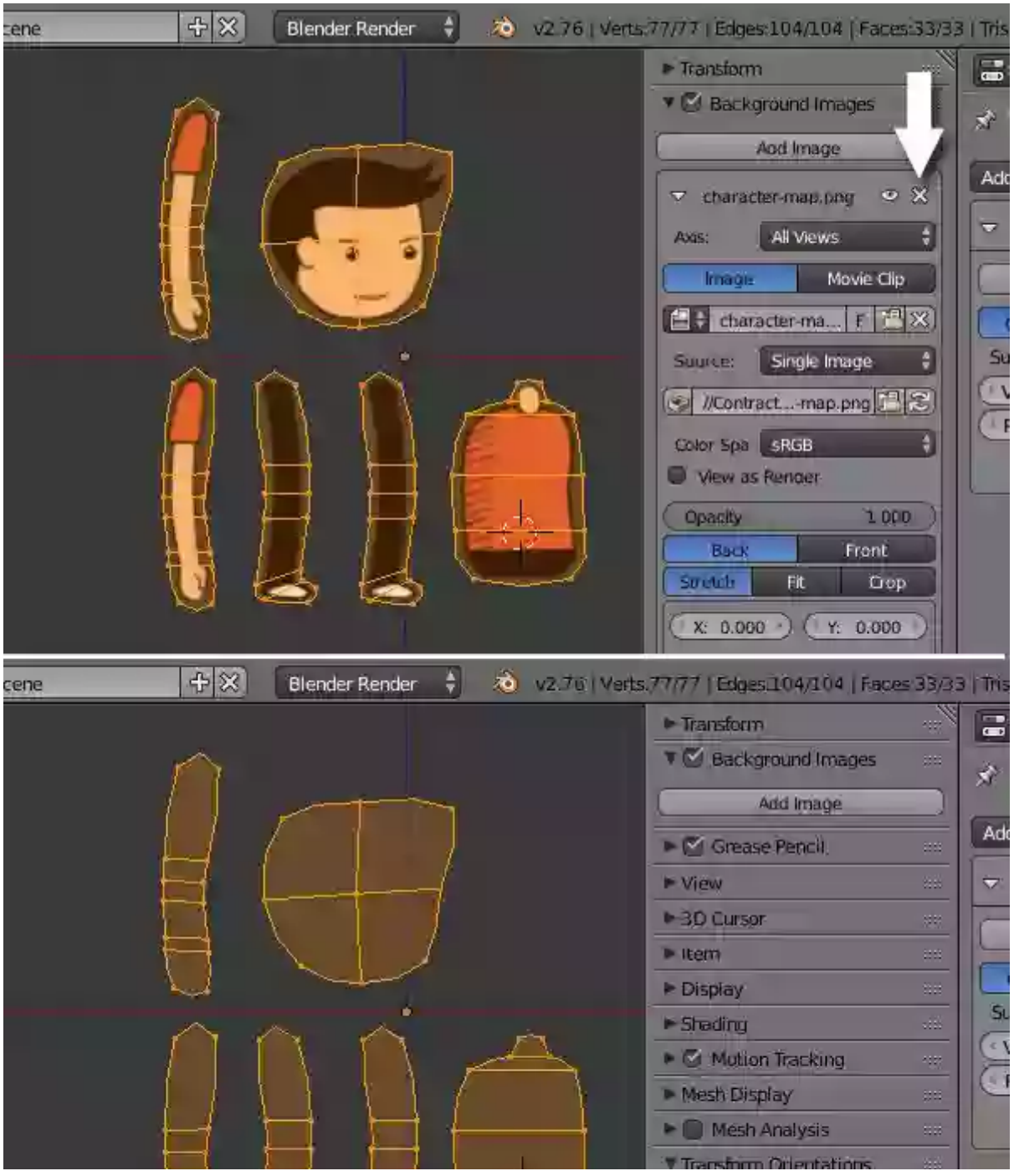
Creating the head

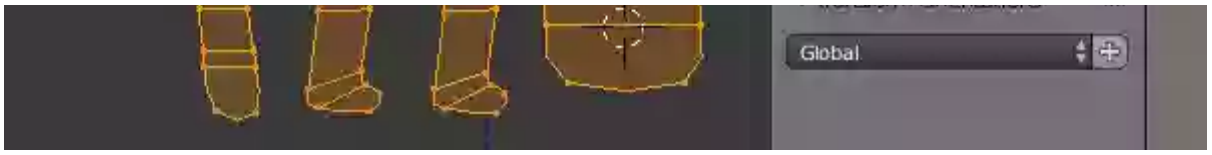
Step 19

Remove the background image.

Click on the cross button in the **Background Images** panel.

Press **N** to see or hide the **properties** panel.

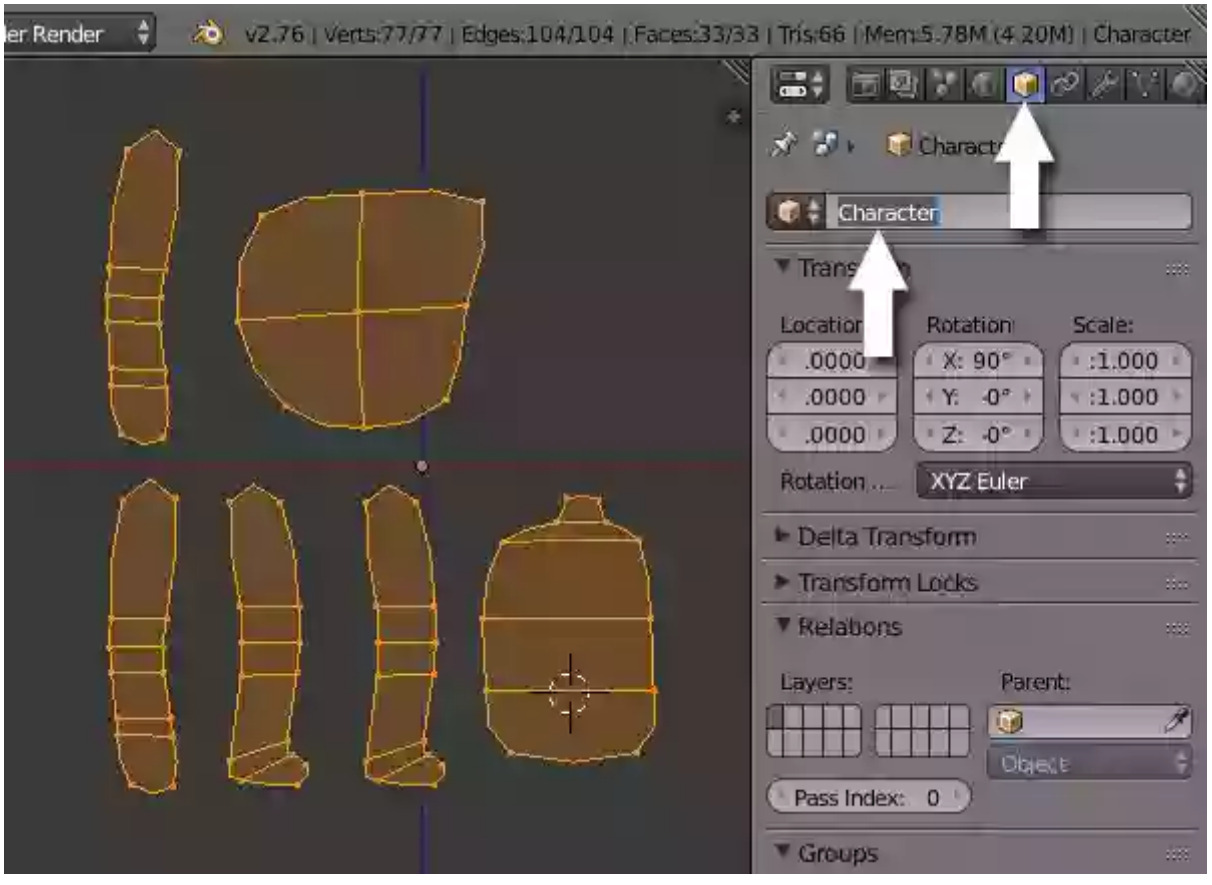




Removing the background image

Step 20

Click on the object button in the **properties** window. Rename the model to **Character** or another name of your choice.

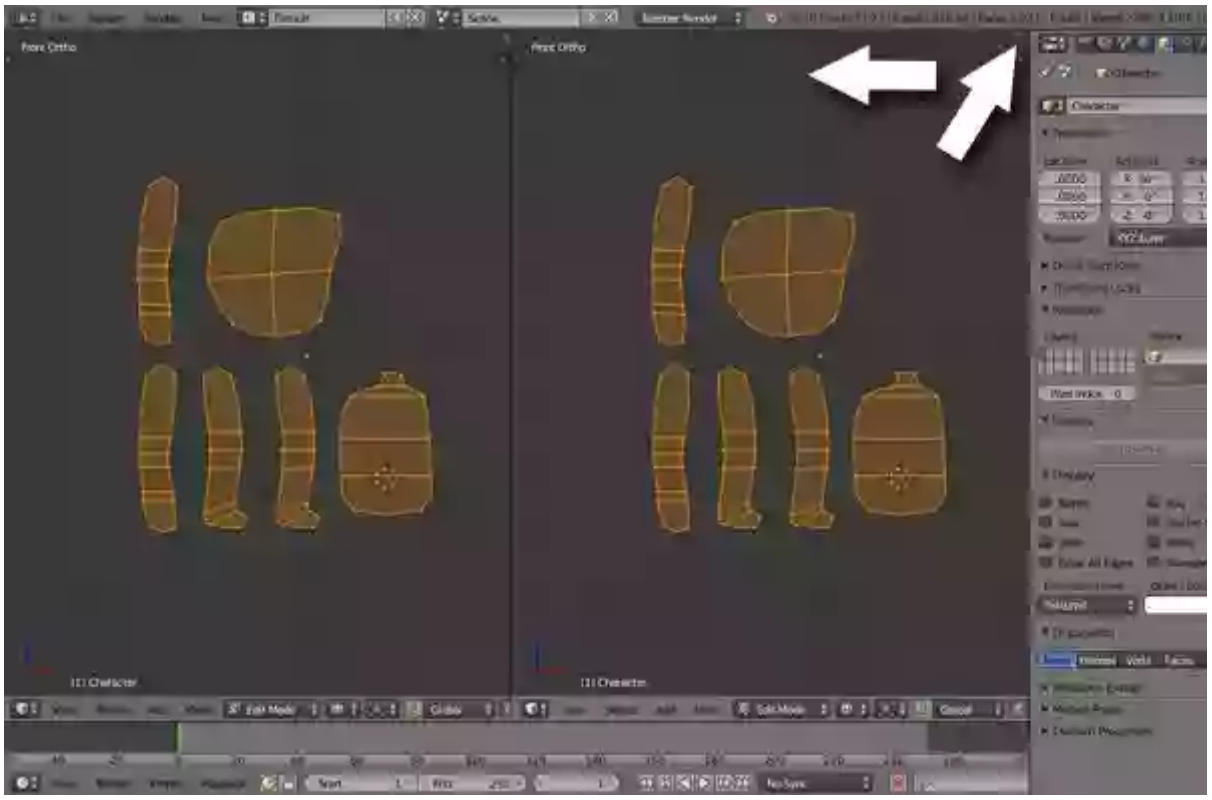


Renaming the object

Texturing the Character Object

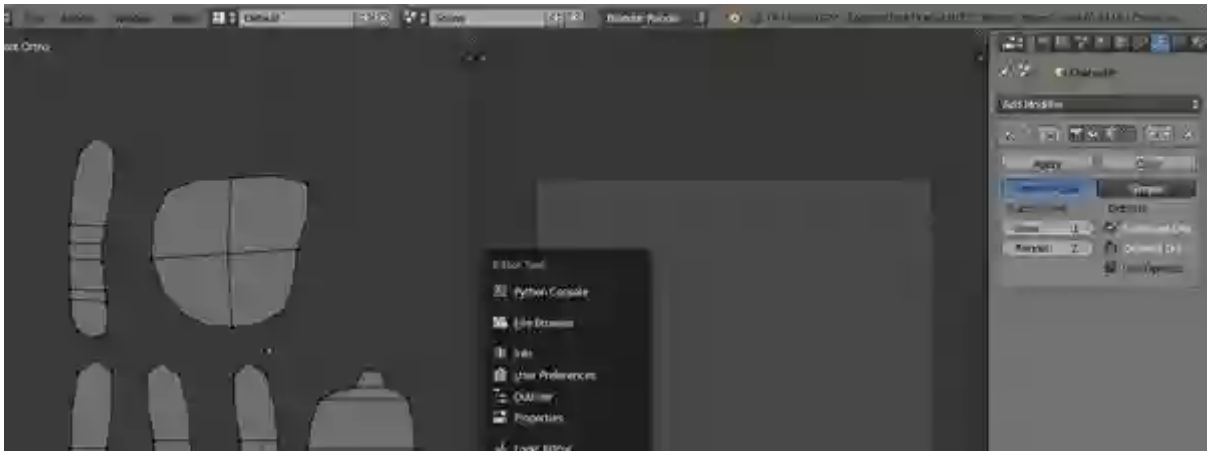
Step 1

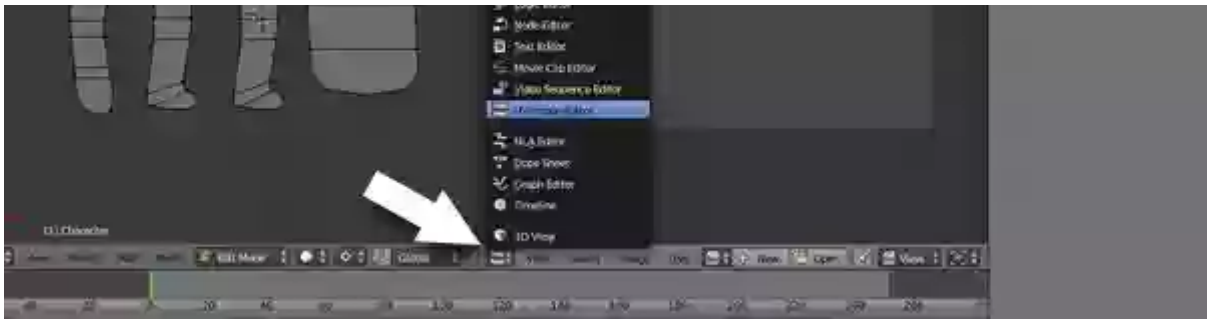
Split the 3D view by dragging the top corner with primary-mouse button.



Splitting the view into two

Click on the window type button and select **UV/Image Editor**.



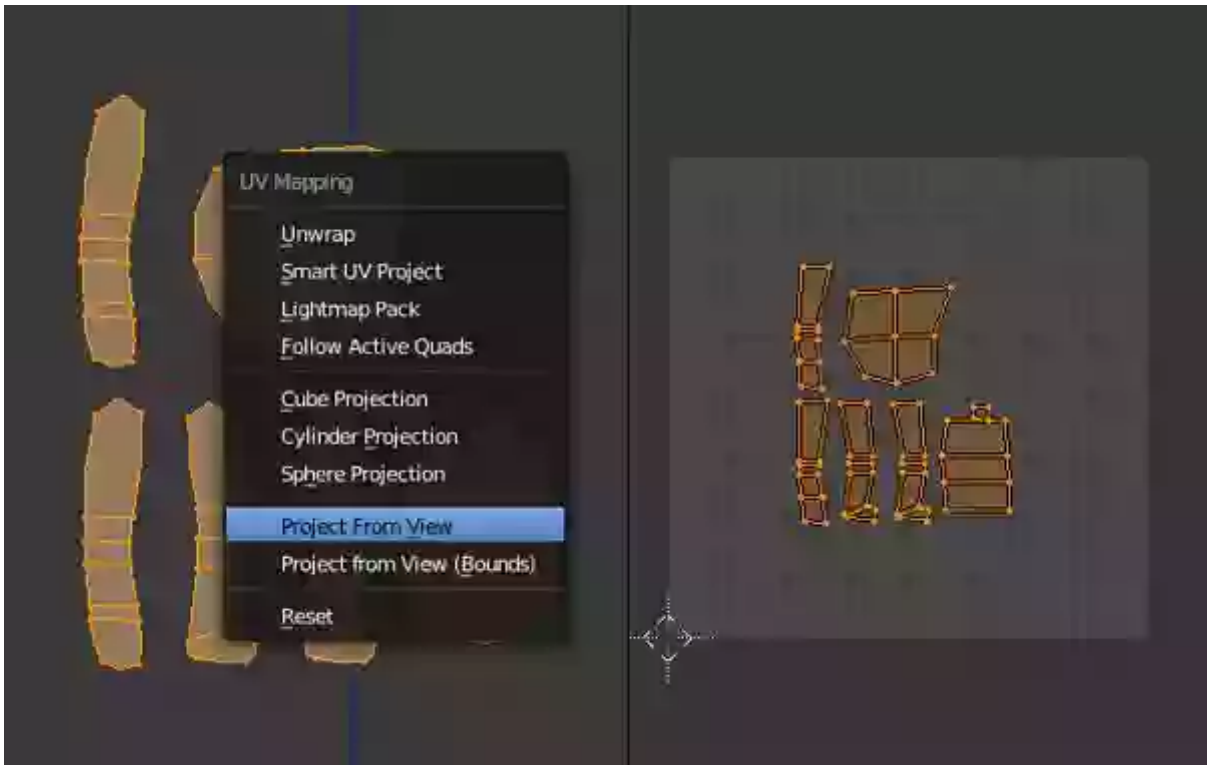


Opening the UV Editor

Step 2

In the 3D view, press **A** on the keyboard to select all vertices.

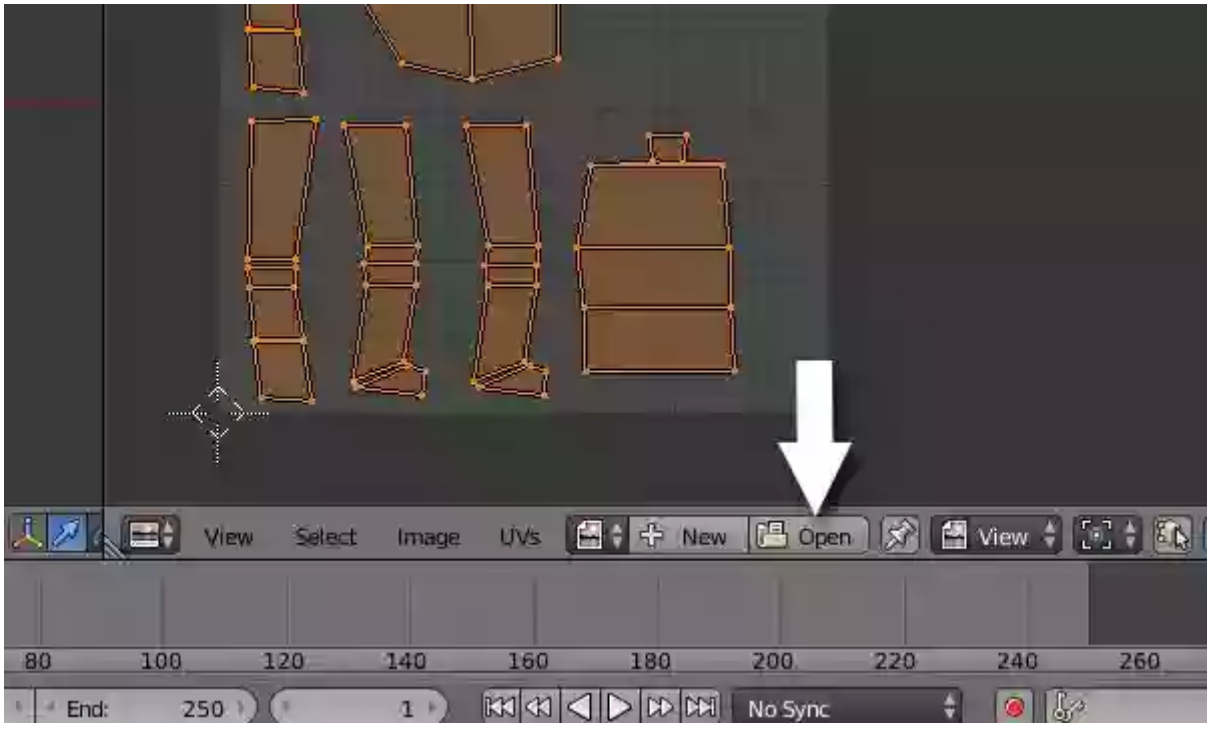
Press **U** to bring out the **UV Mapping** menu and select **Project From View**. This will unwrap the vertices onto the UV editor.



Unwraping the mesh

Step 3

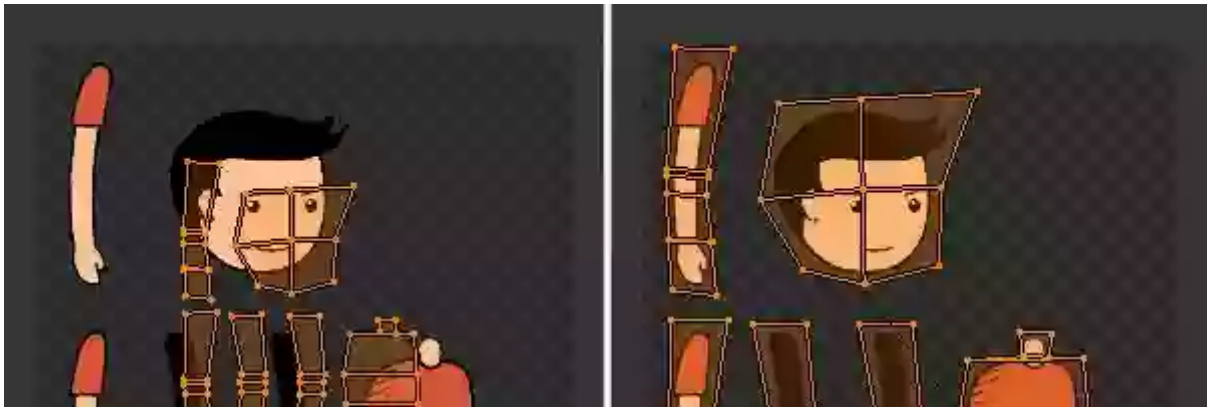
In the UV Editor, click on the **Open** button and browse for the character image.



Opening the character image

Step 4

In the UV editor, press **A** to select all vertices. Press **S** to scale them to match the image.



Rescaling the UVs

Step 5

In the 3D viewport, press **Alt-Z** to set the Viewport Shading to **Texture**. You can also select this by clicking on the Shading button in the 3D viewport's header, and selecting **Texture**.

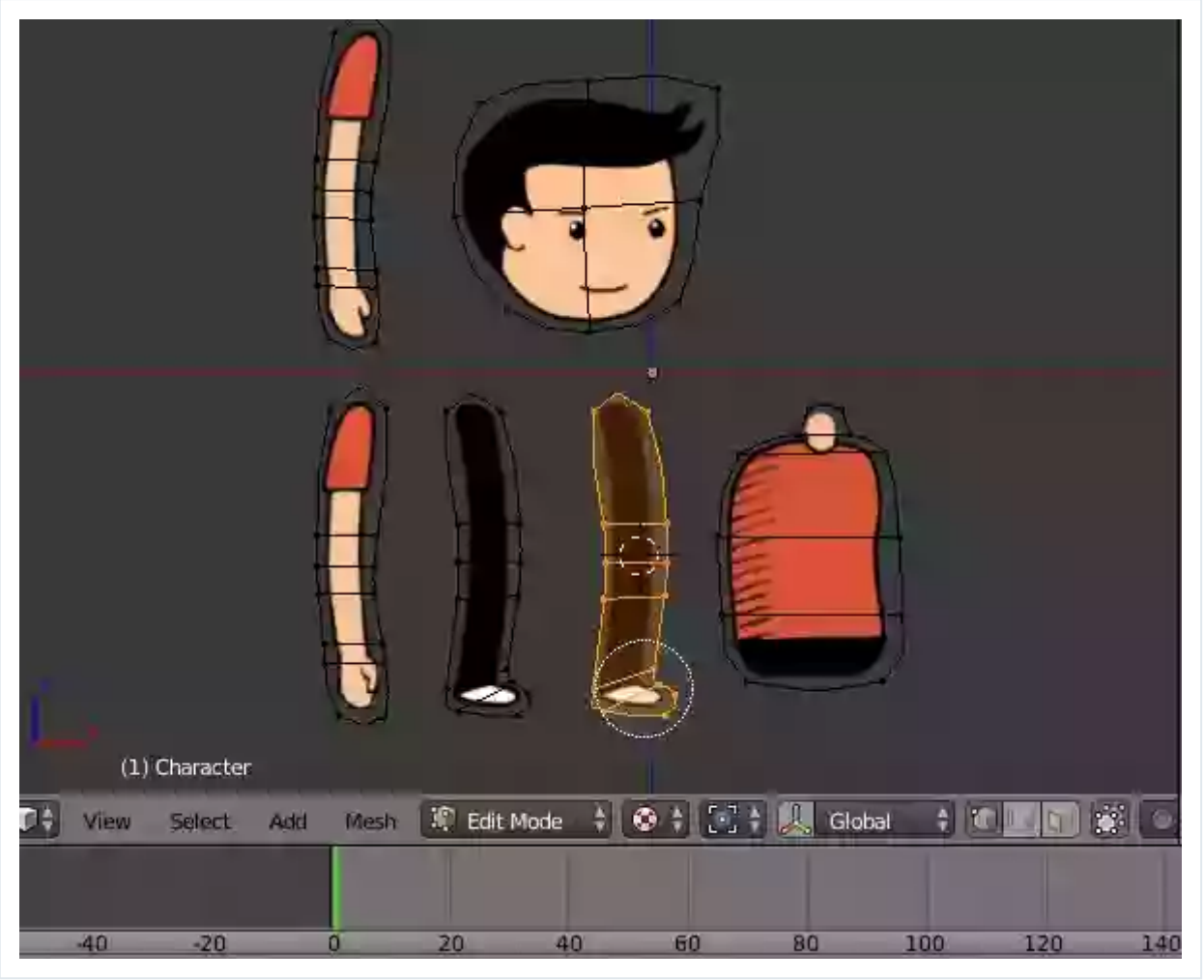
Enabling textured view in viewport

Re-arranging The Character Mesh

Step 1

In the 3D viewport, press **G** and brush select all vertices of any leg

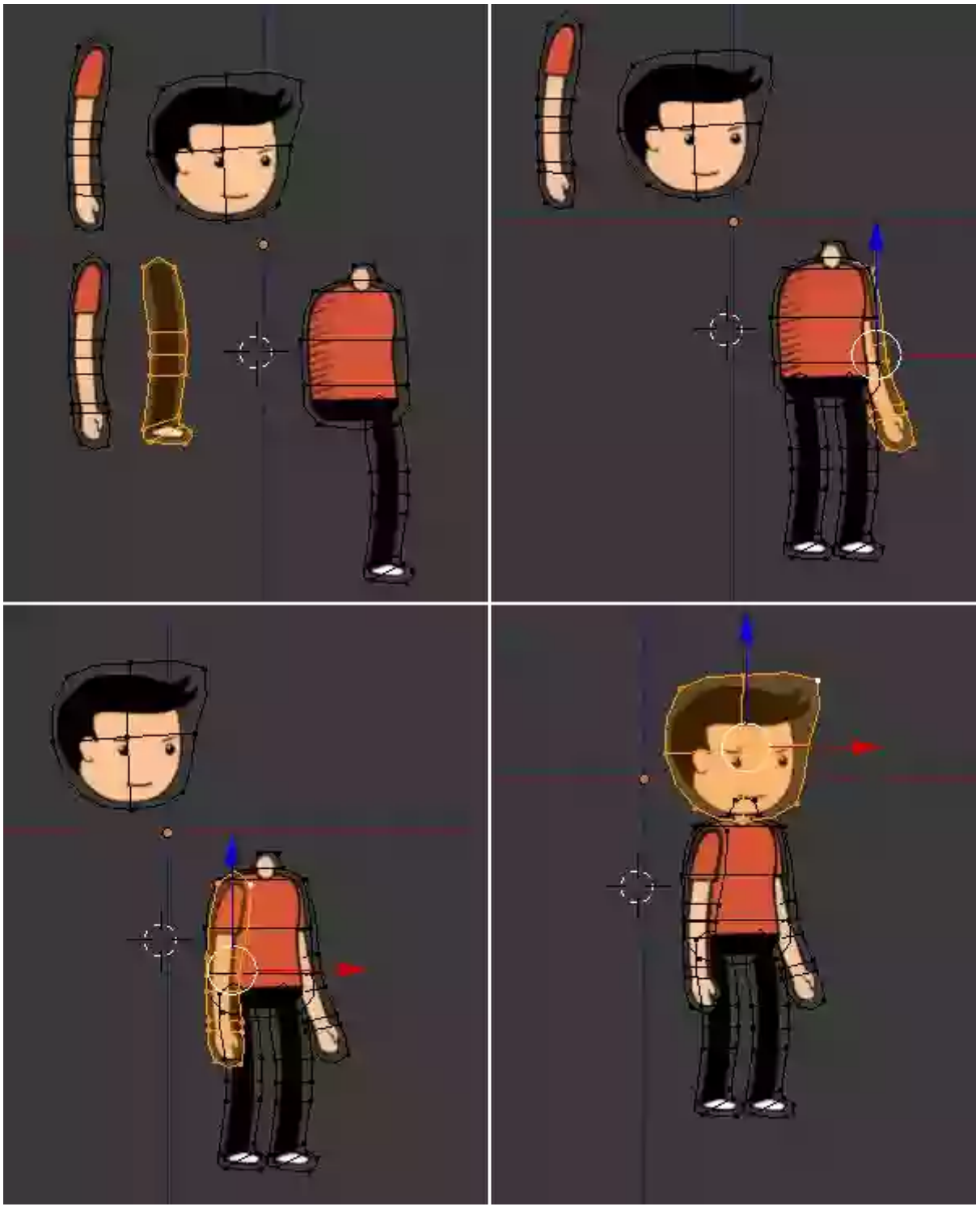
In the 3D viewport, press **C** and brush select all vertices of any leg.



Selecting the leg

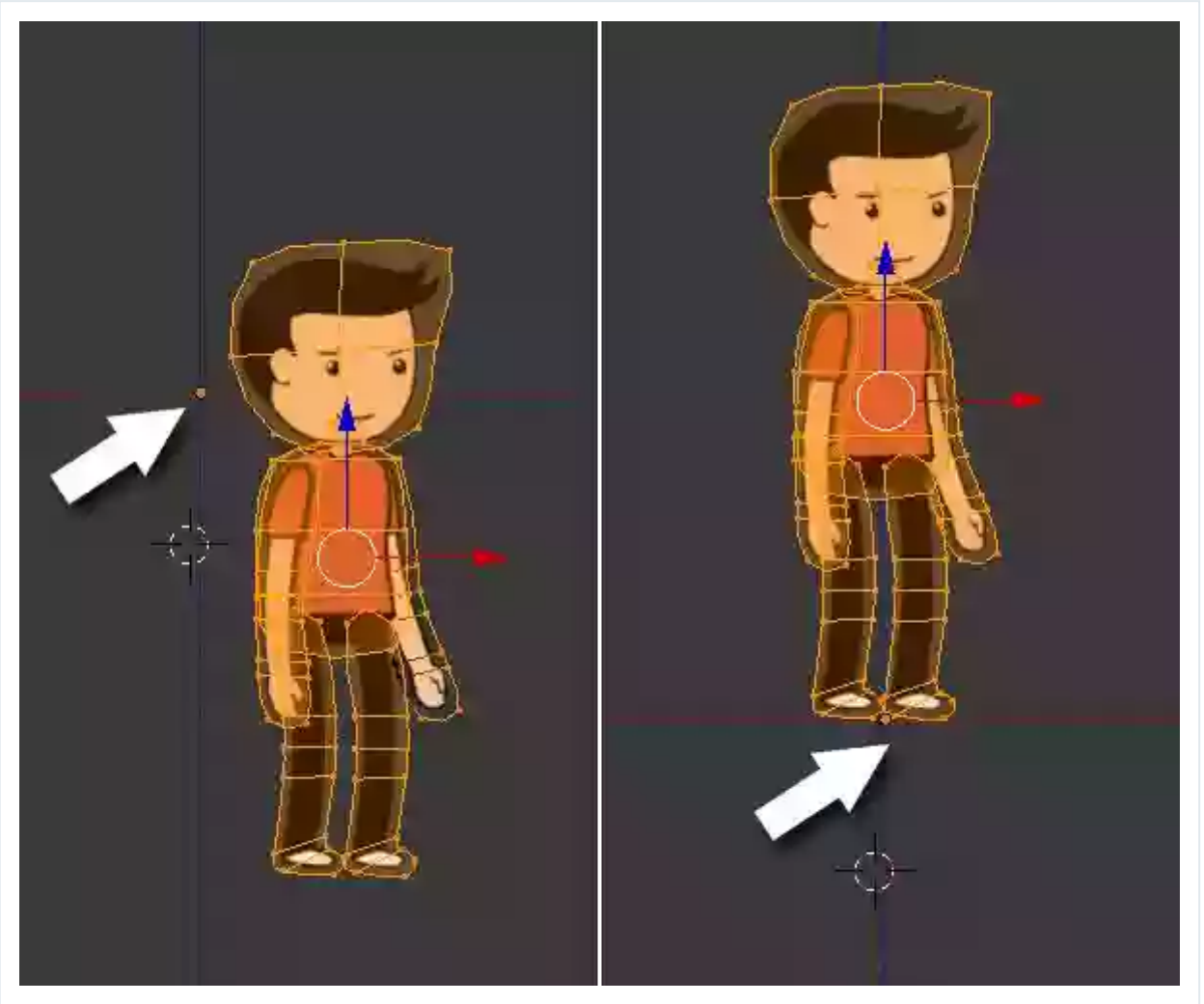
Step 2

Press **G** and place it below the torso. Similarly place all parts where they belong.



Rearranging the mesh to form the character

After placing all parts, press **A** to select the whole mesh. Press **G** and move it on top of the origin point of the object, which is the orange dot.

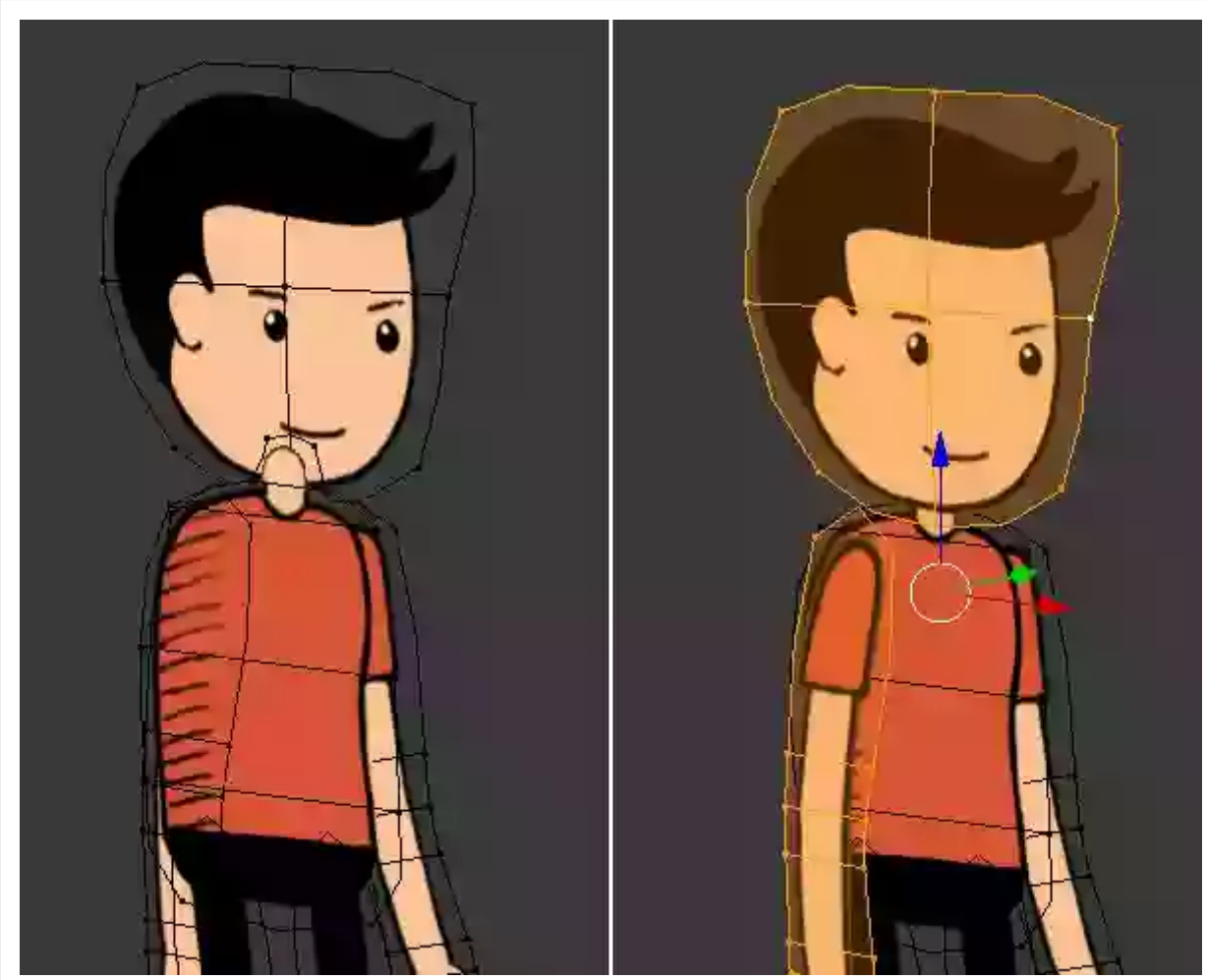


Positioning the mesh above the point of origin

Step 3

Select the parts which you want them to be in front. Rotate the 3d view by dragging the middle mouse button.

Select the mesh and move them forward with the help of the arrow manipulator. Similarly push back the mesh which are suppose to be behind.



Moving and placing the mesh front and back

Press **Tab** to exit the edit mode. The character is now ready to be rigged. Press **Ctrl-S** to save the file.

The character is ready

Armature Setup and Rigging

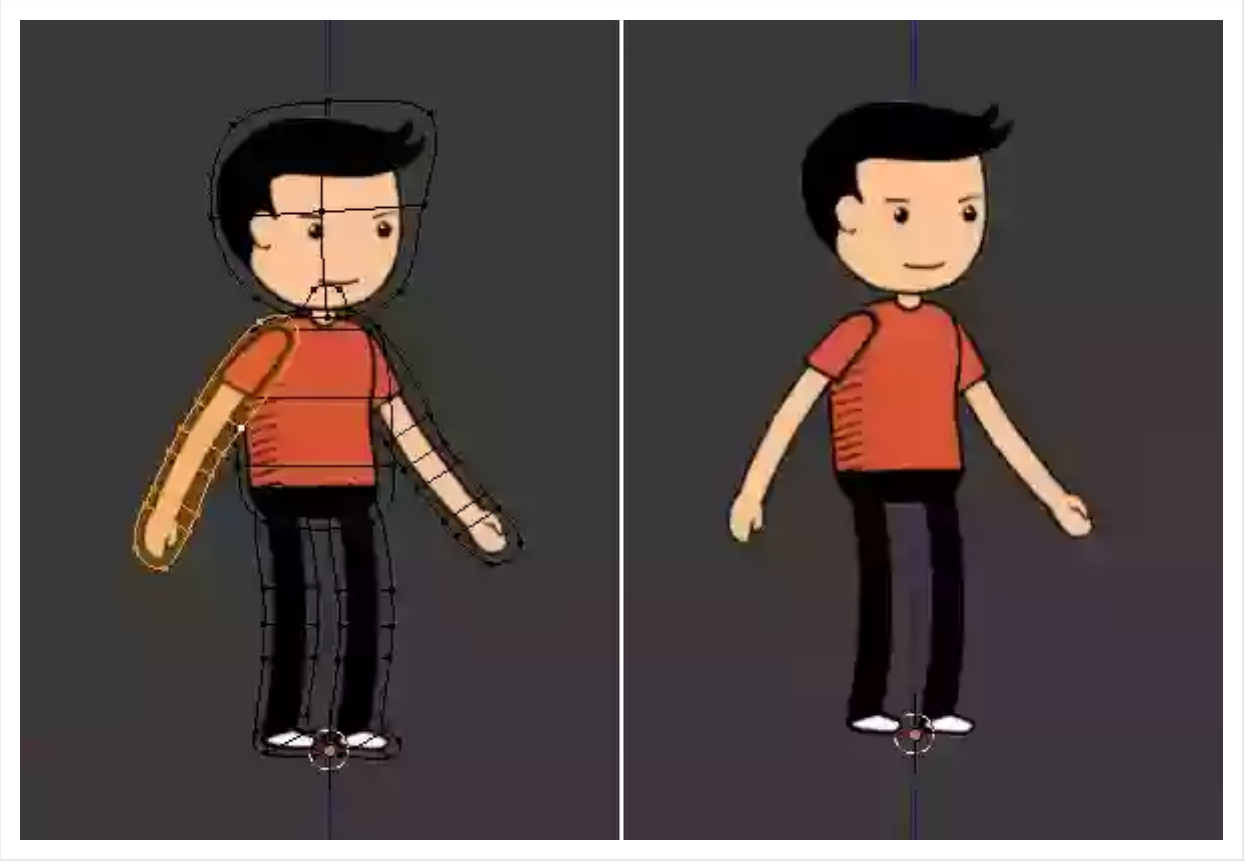
Step 1

Secondary-click on the Character object and press **Tab** to go back into edit mode.

Move the mouse over the arm and press **L** to select the connected vertices, i.e. the arm.

Press **R** key on the keyboard to rotate the arm so that they are spread out and little bit away from the body.

Do the same for the other arm. It will be easy to rig the object in this pose.



Rotate the arms

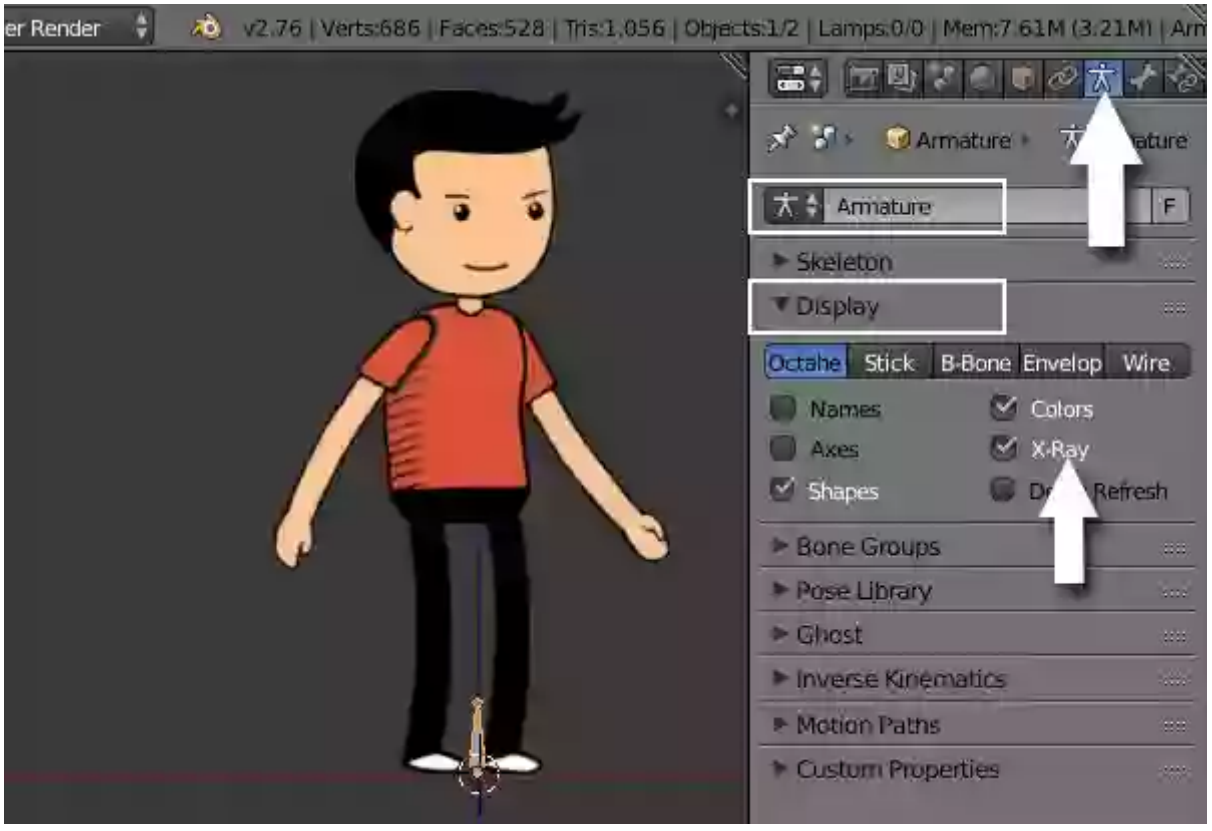
Step 2

Press **Tab** to exit edit mode. Press **Shift-A** and add an **Armature**.

Add Armature object

Click on the **Armature** button in the properties window. In the **Display** panel, tick the **X-Ray** checkbox.

This will help see the bone through the object.



Armature display settings

Step 3

With the **Armature** object selected, press **Tab** to enter edit mode. Select the bone with right click and press **G** to move behind the back. Press **R** to rotate it, as shown in the image.

Placing the base bone

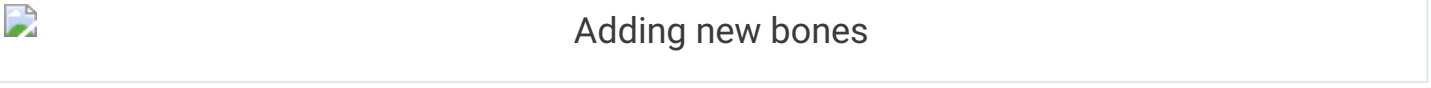
Step 4

Secondary-click the the tip of the bone to select it.

Press **E** to extrude out a bone for stomach.

Move the mouse upward and primary-click to confirm.

Similarly extrude out bones for chest and head.

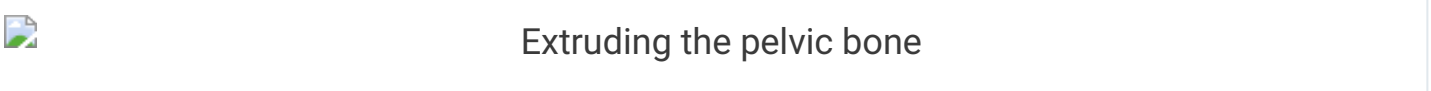


Adding new bones

Step 5

Secondary-click on the tip of the first bone again to select it.

Press **E** to extrude out another bone downwards for pelvic.
Primary-click to confirm.



Extruding the pelvic bone

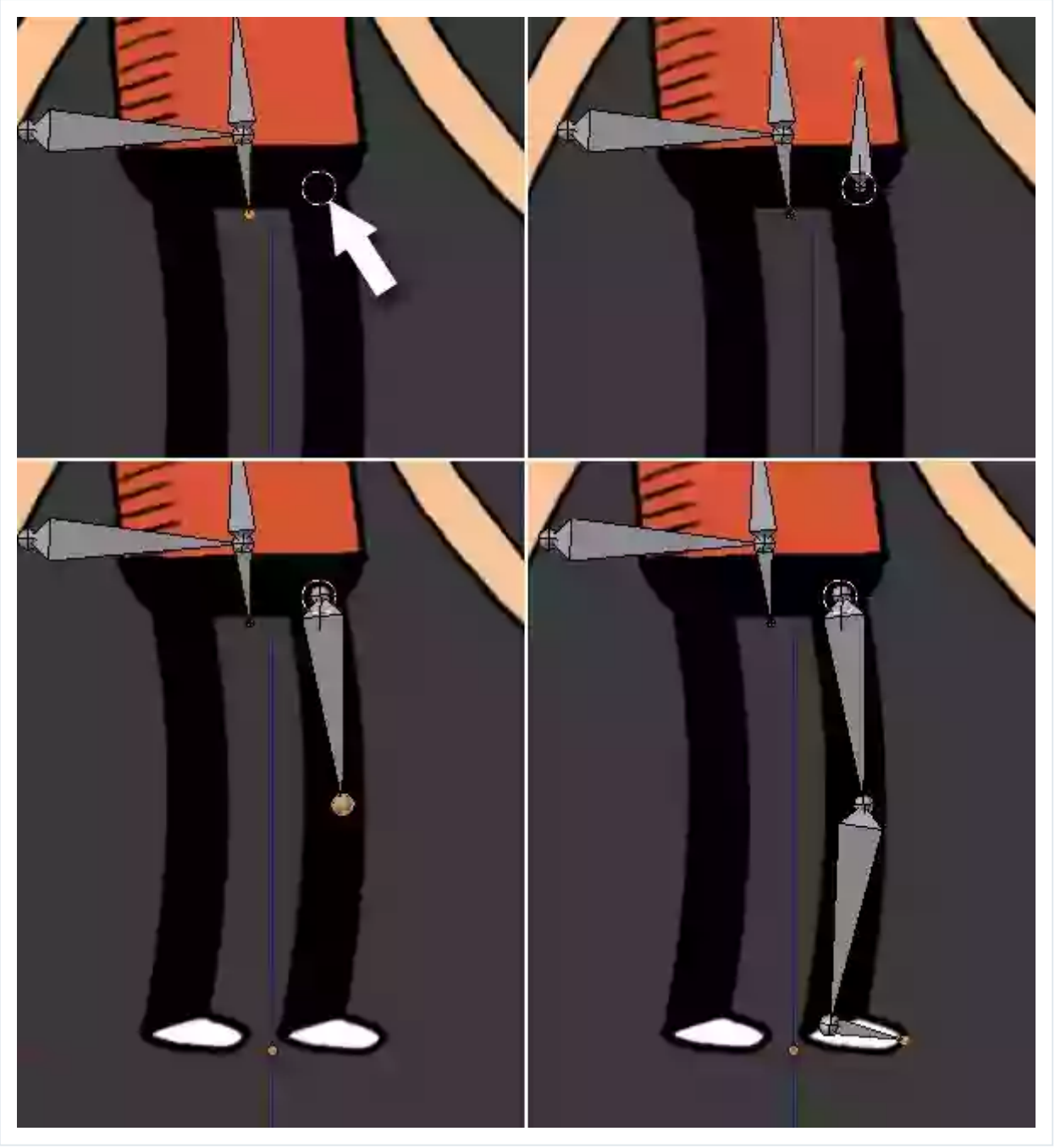
Step 6

Primary-click above the leg to place the 3D cursor there.

Press **Shift-A** to add a new bone.

Secondary-click on the tip and press **G** to move it down. Primary-click to release.

Press **E** to extrude a bone for shin and another for foot.



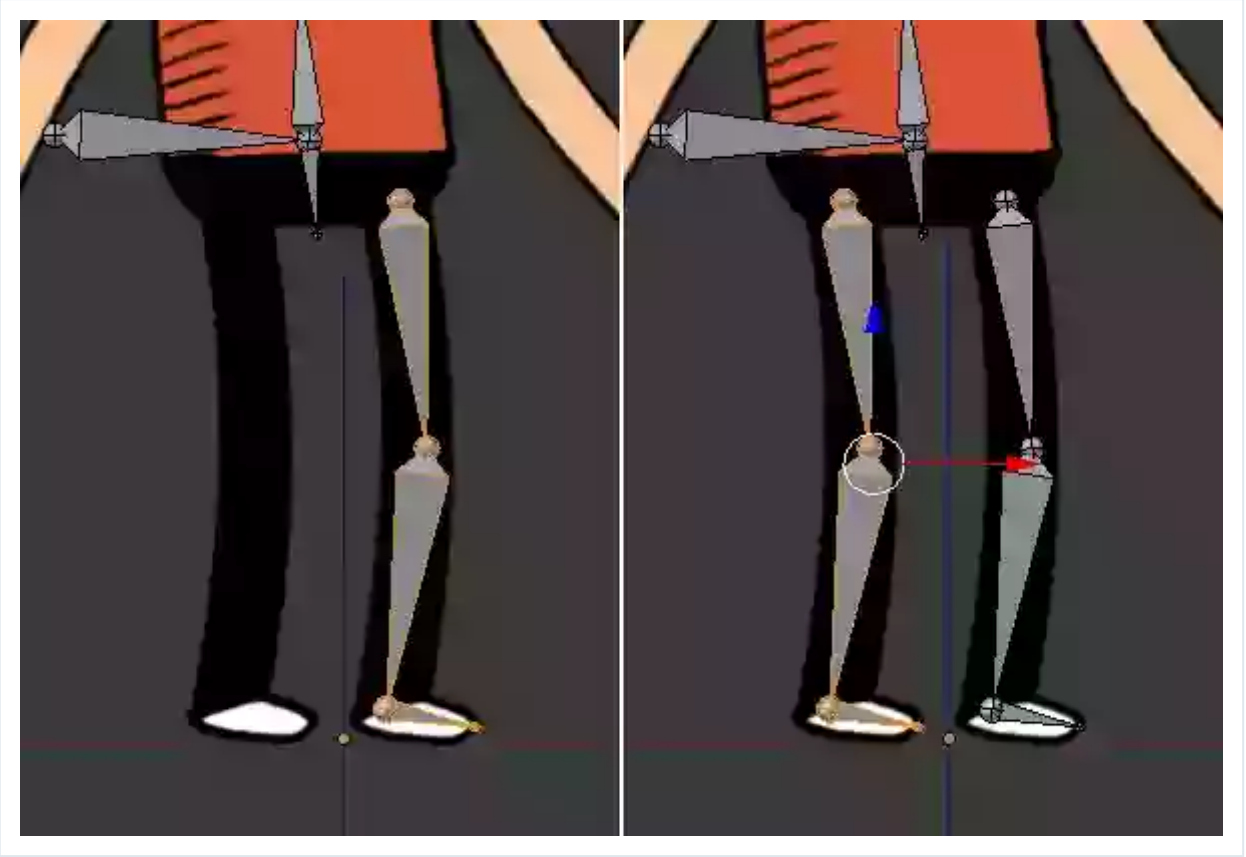
Adding leg bones

Step 7

Hold **Shift** and then secondary-click on all three bones of leg to select them.

Press **Shift-D** to duplicate them.

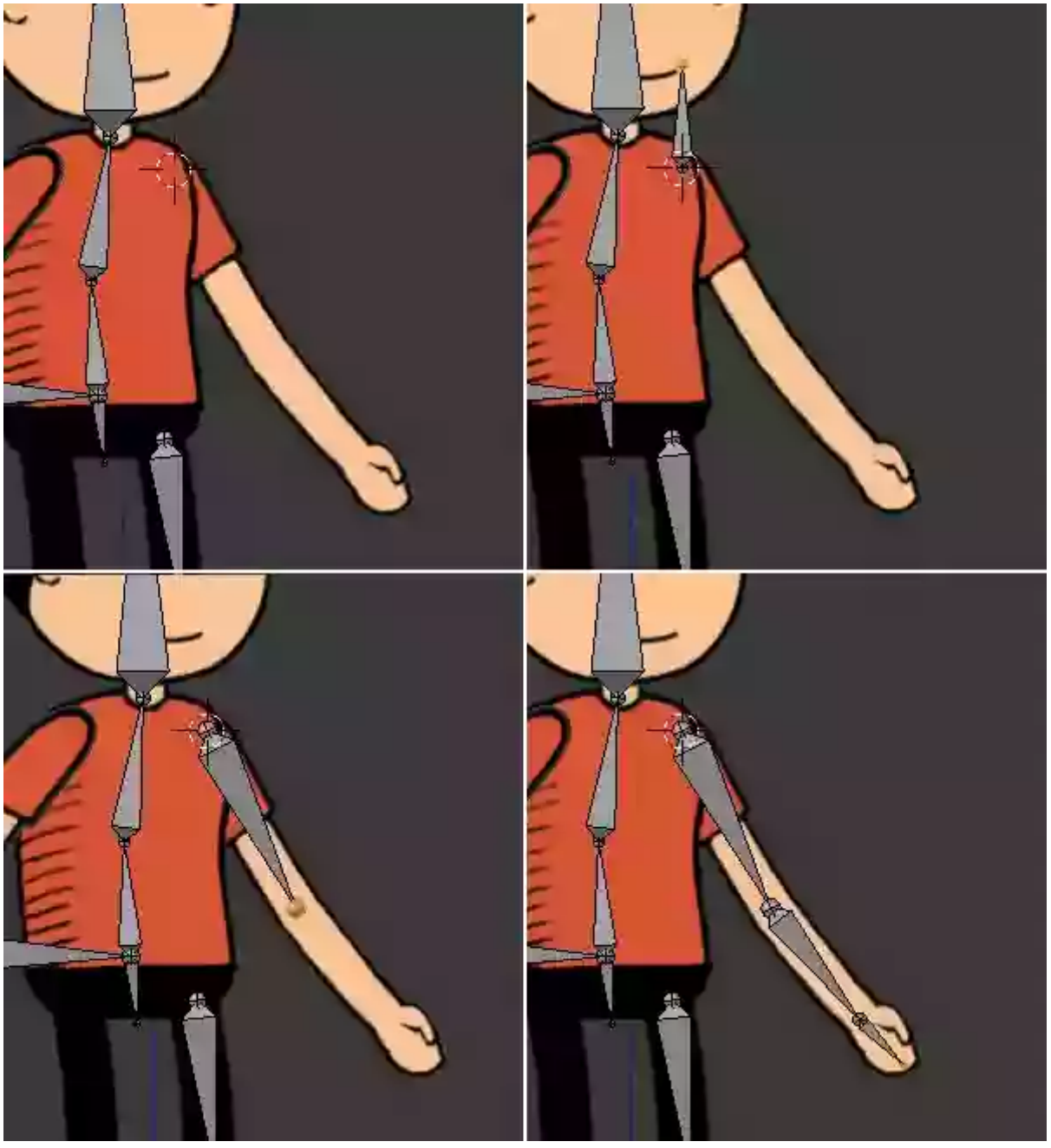
Move the new copy over the second leg and primary-click to confirm.



Duplicating the leg bones

Step 8

Similarly create bone set for the arm. Primary-click on the shoulder to place the 3D cursor. Press **Shift-A** to add new bone and then rotate it. Extrude out the new bones for arm and palm.



Adding arm bones

Step 9

Duplicate the arm set for the other arm, or create a new set.

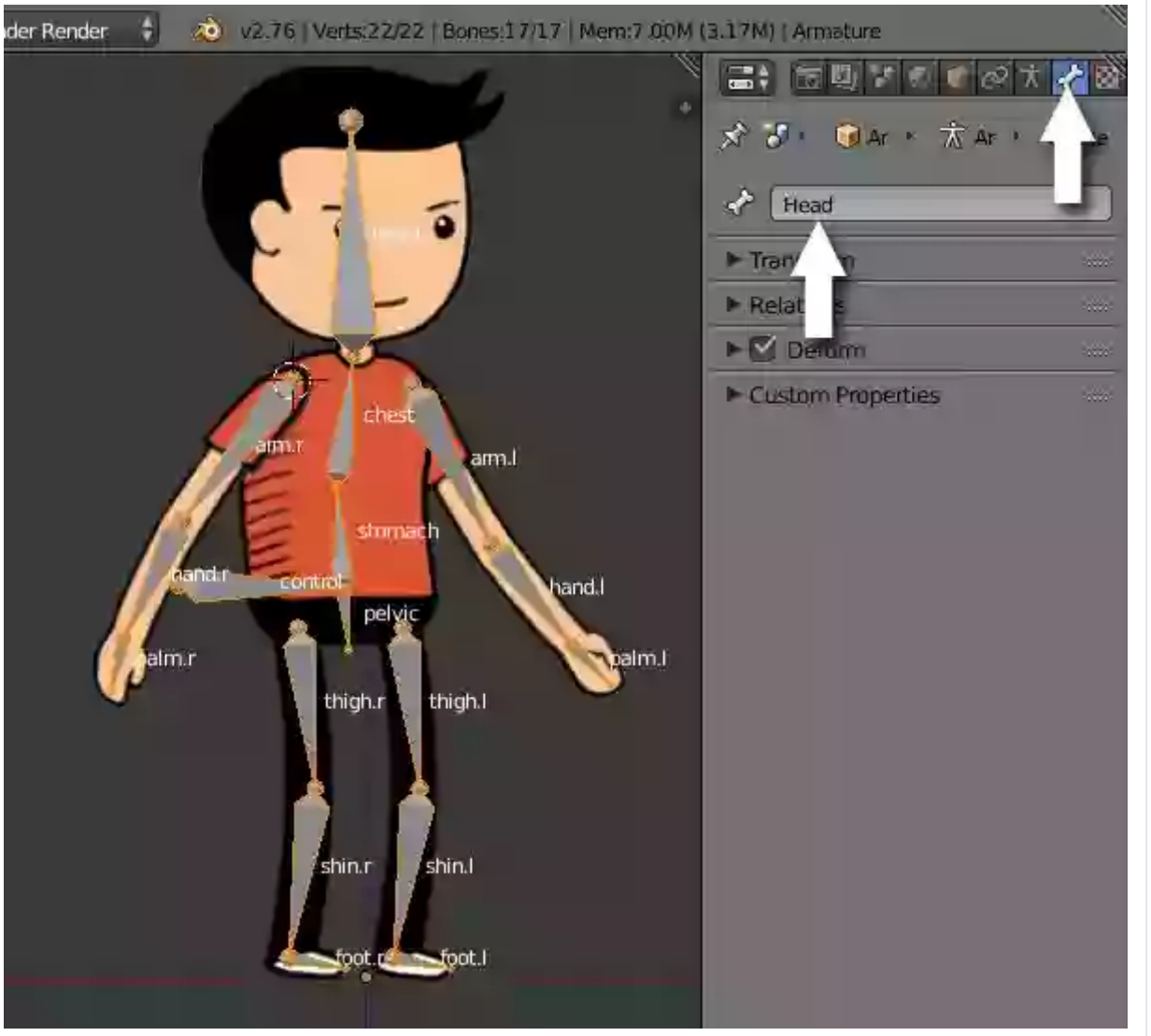
Duplicating the arm bones

Step 10

Secondary-click on the head bone to select it.

Click on bone button on the properties panel. Rename the bone **Head**.

Similarly rename all bones. Use extension **.l** and **.r** to distinguish between left and right bones. For example **arm.l** and **arm.r**.



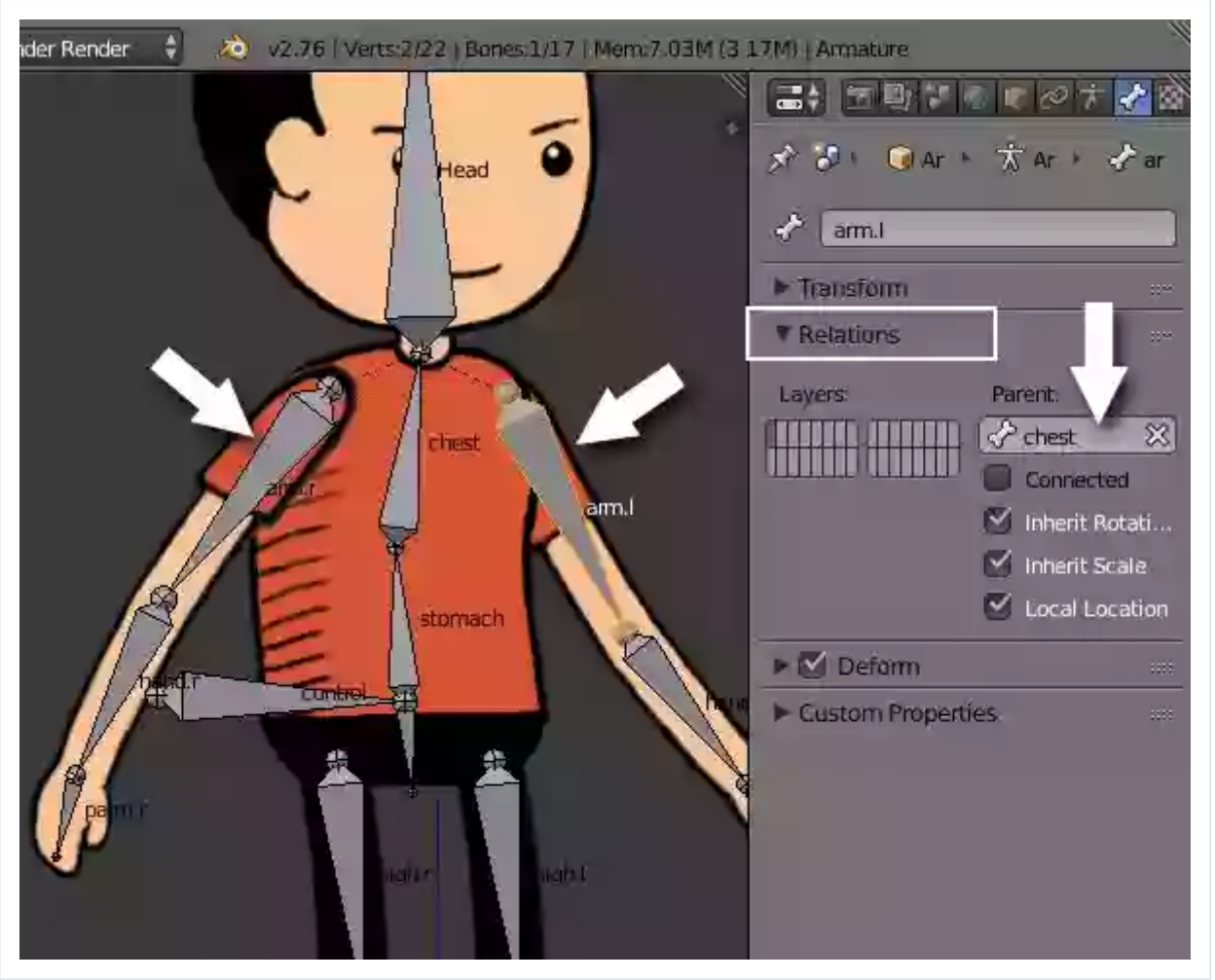
Renaming the bones

Step 11

Secondary-click on the **arm.l** bone.

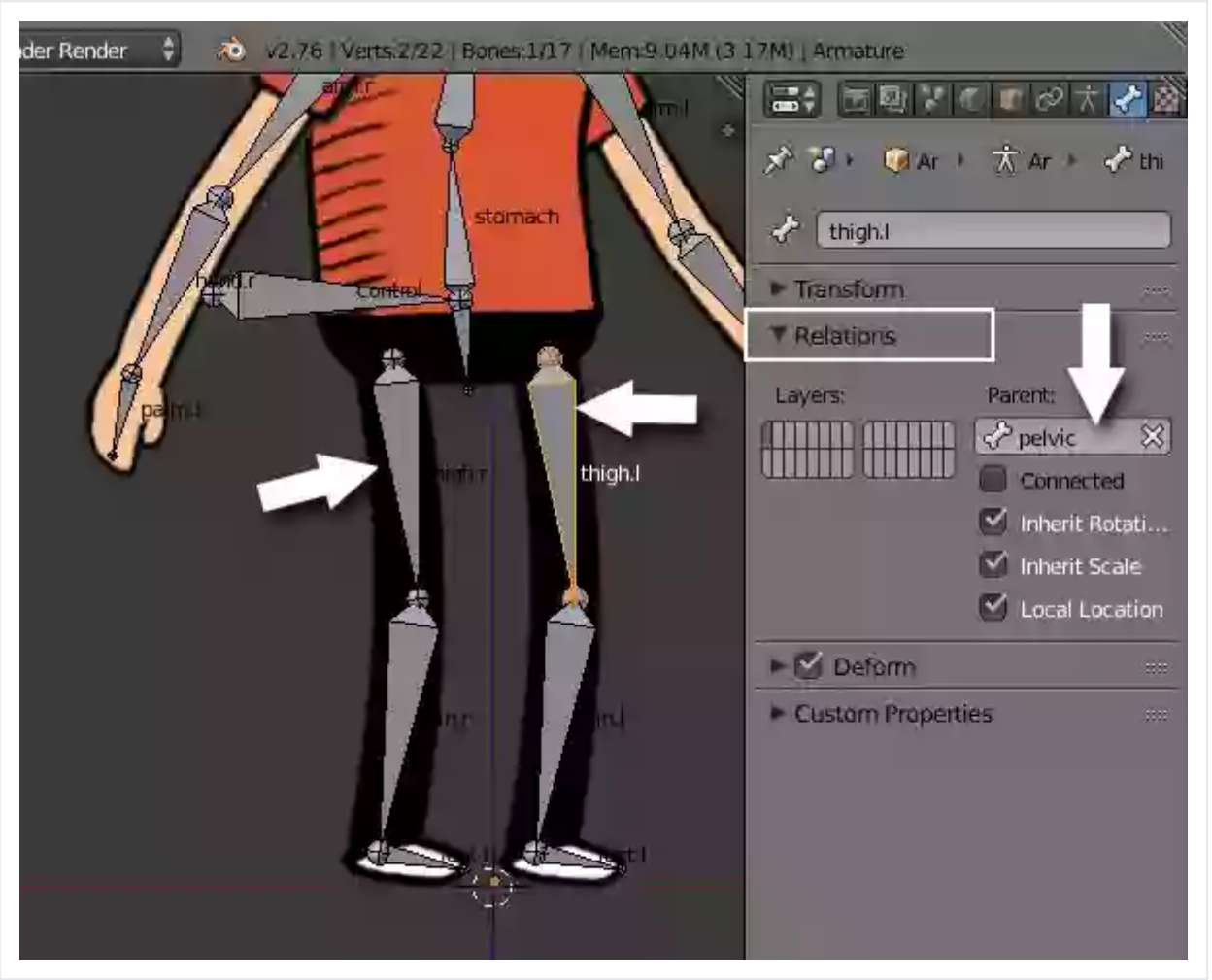
In the bone properties, under the **Relation** panel, set the **Parent** bone to **Chest**.

Do the same for the other arm. This will set the chest bone as parent bone, and the arm bones will follow its movement.



Linking the arm bones to chest

Similarly set the pelvic bone as parent for the thigh bones. Secondary-click to select the thigh bone, and in the **Relations** panel set **Parent** to **pelvic**.



Linking the thigh bones to pelvic

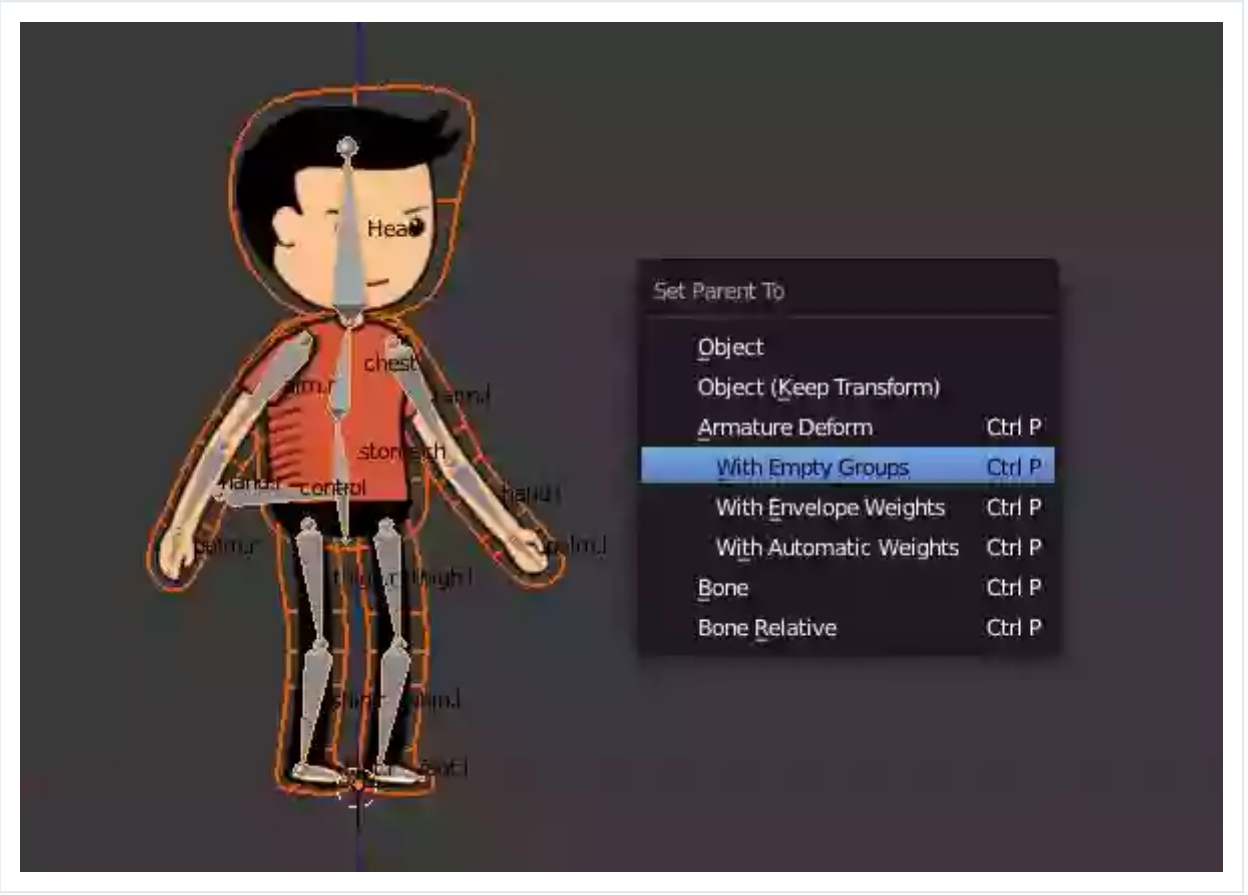
Step 12

Press **Tab** to exit the edit mode.

Hold **shift** and sceondary-click on the character object first and then on the **Armature**.

Press **Ctrl-P** to make the armature parent.

In the menu select **With Empty Groups**. This will create vertex groups with bone names but will not assign any vertex to any bone. You'll do that manually.



Linking the armature to character

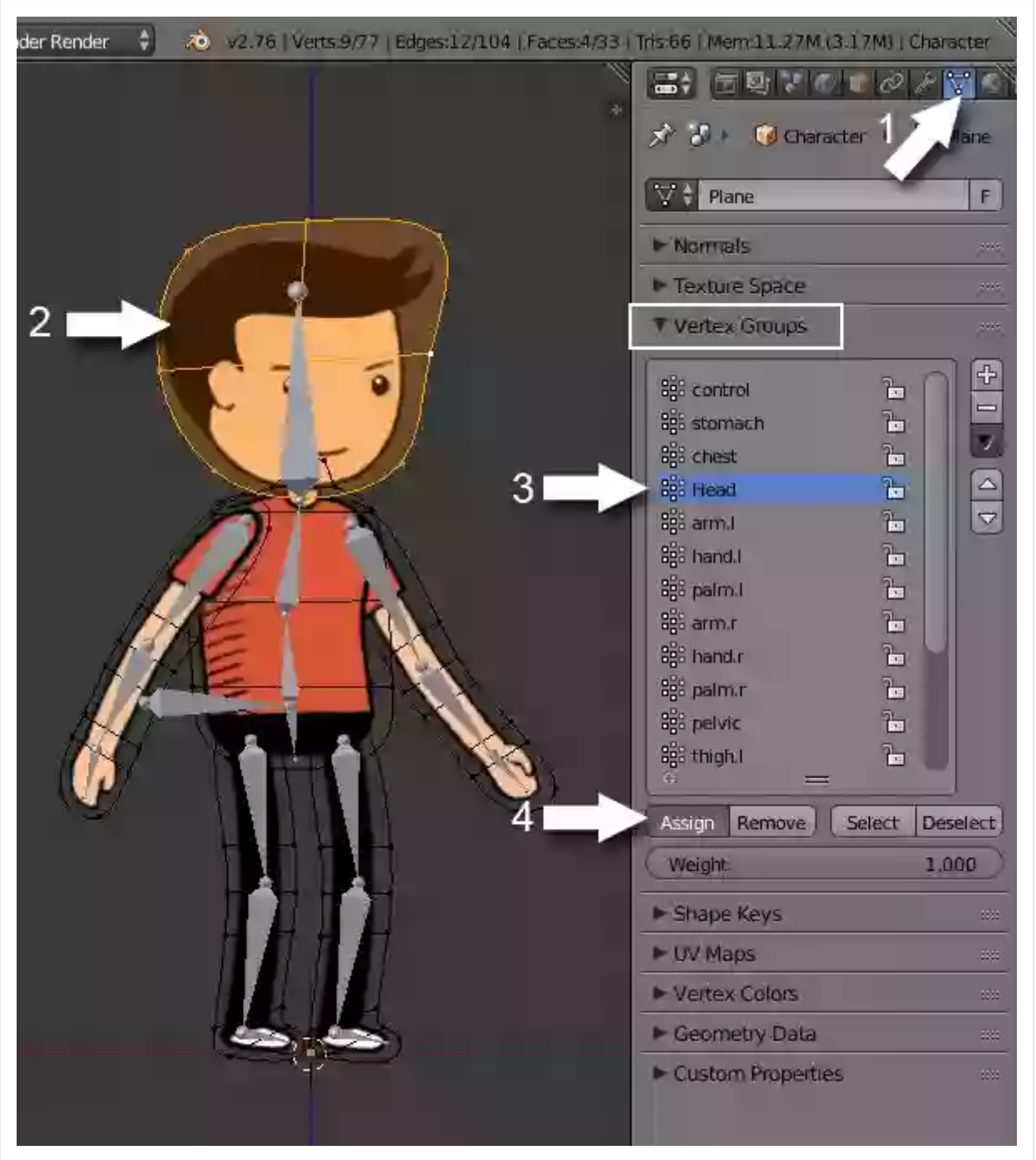
Step 13

Press **A** to deselect all objects. Secondary-click on the character to select it. Press **Tab** to enter edit mode.

- Click the **Object Data** button in the **properties** window.
- In the 3D view, select all the vertices of the head. Either hold **Shift** and then secondary-click each vertices or move the mouse over the head and press **L** to select connected vertices.
- Click **head** in the **Vertex Groups** panel.
- Click the **Assign** button.

- Click the **Assign** button.

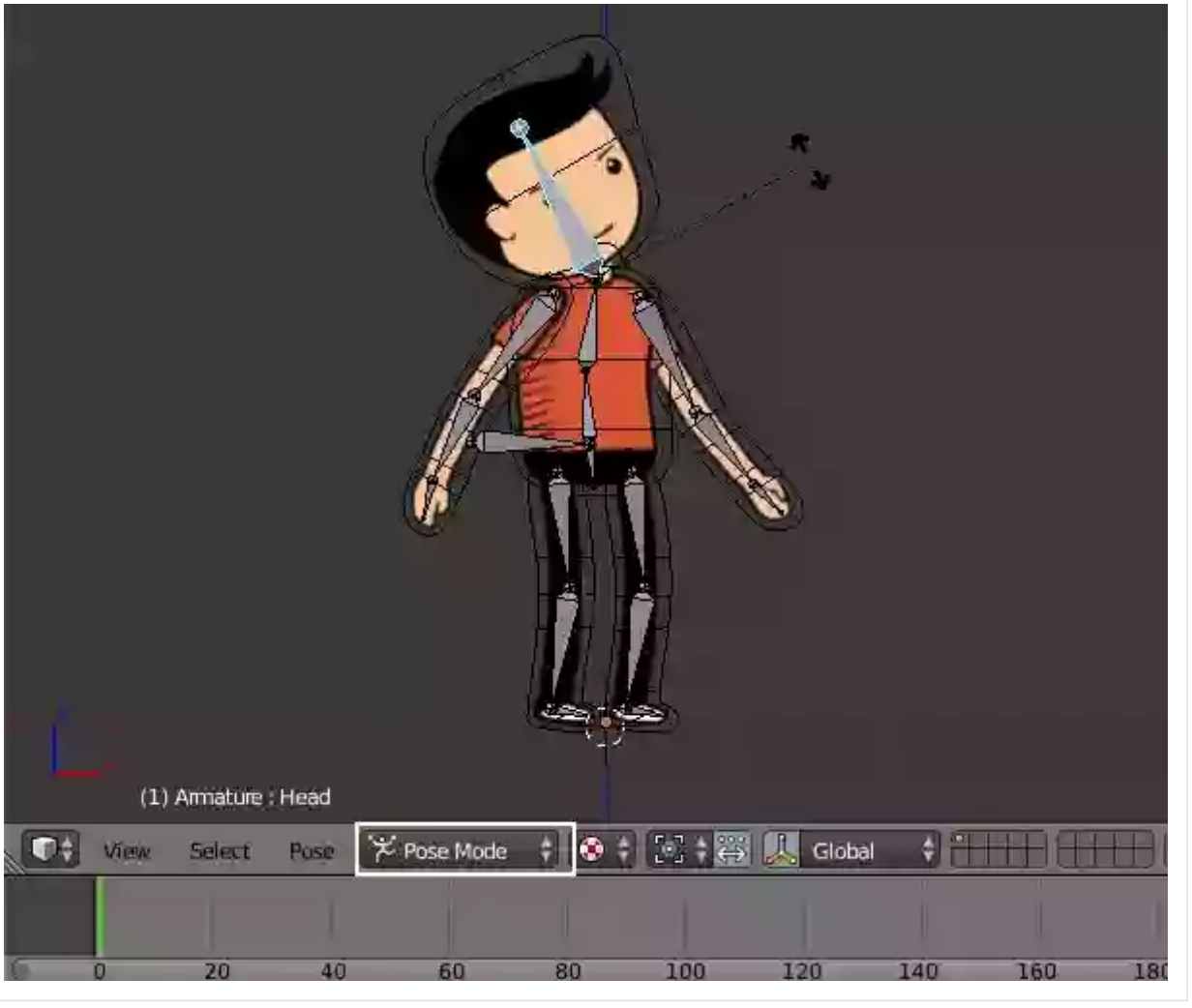
This will assign the selected vertices to the vertex group named **Head**, which is already assigned to the bone name **Head**.



Assigning the head vertices to the head bone

You can test by moving the bone in the pose mode. Press **Tab** to exit edit mode. Secondary-click on the armature.

Press **Ctrl-Tab** to enter pose mode. In pose mode, the bones will turn blue when selected. Secondary-click on the head bone and press **R** to rotate it. Press **A** to select all bone and press **Alt-R** to reset the rotation.



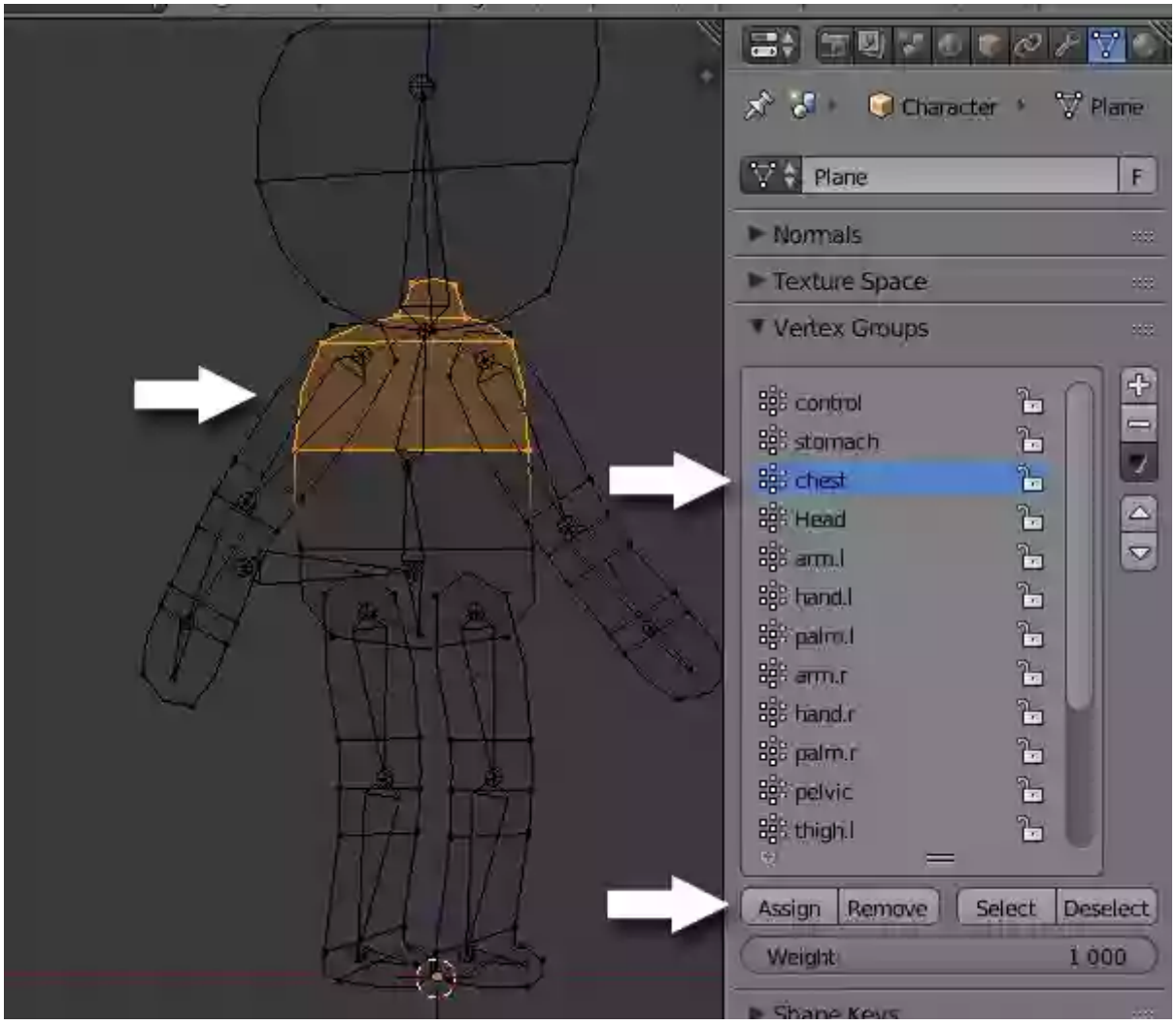
Testing the head bone

Step 14

Secondary-click on the character object, and press **Tab** to enter edit mode. Select only the vertices which you want to assign to chest.

Ensure you deselect any previously selected points. Click on the **Chest** in the **Vertex Groups** and click on **Assign** button.

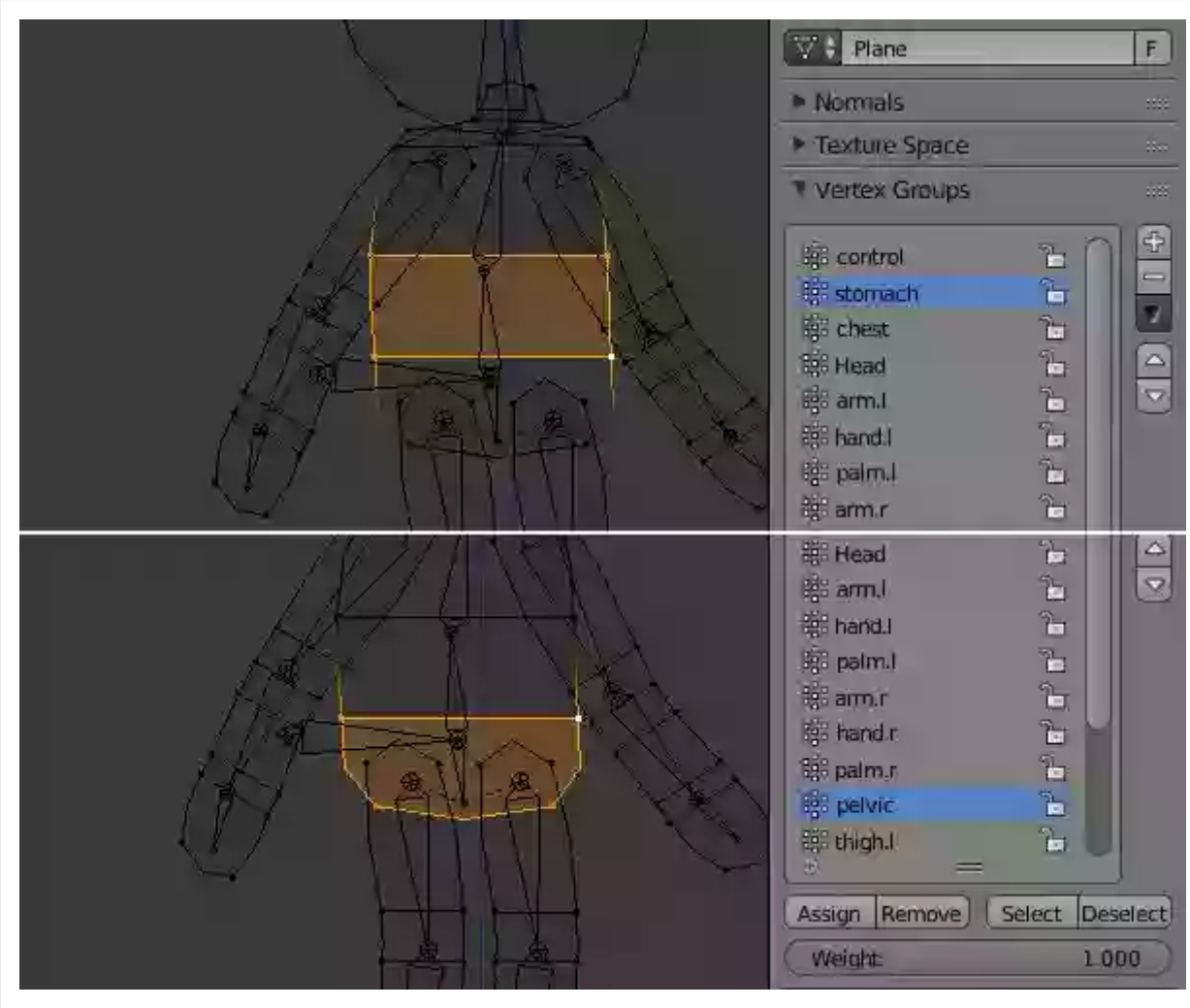
Chest in the **Vertex Groups** and click on **Assign** button.



Assigning the chest vertices to its vertex group and bone

Step 15

Similarly assign vertices for **stomach** and **pelvic**.



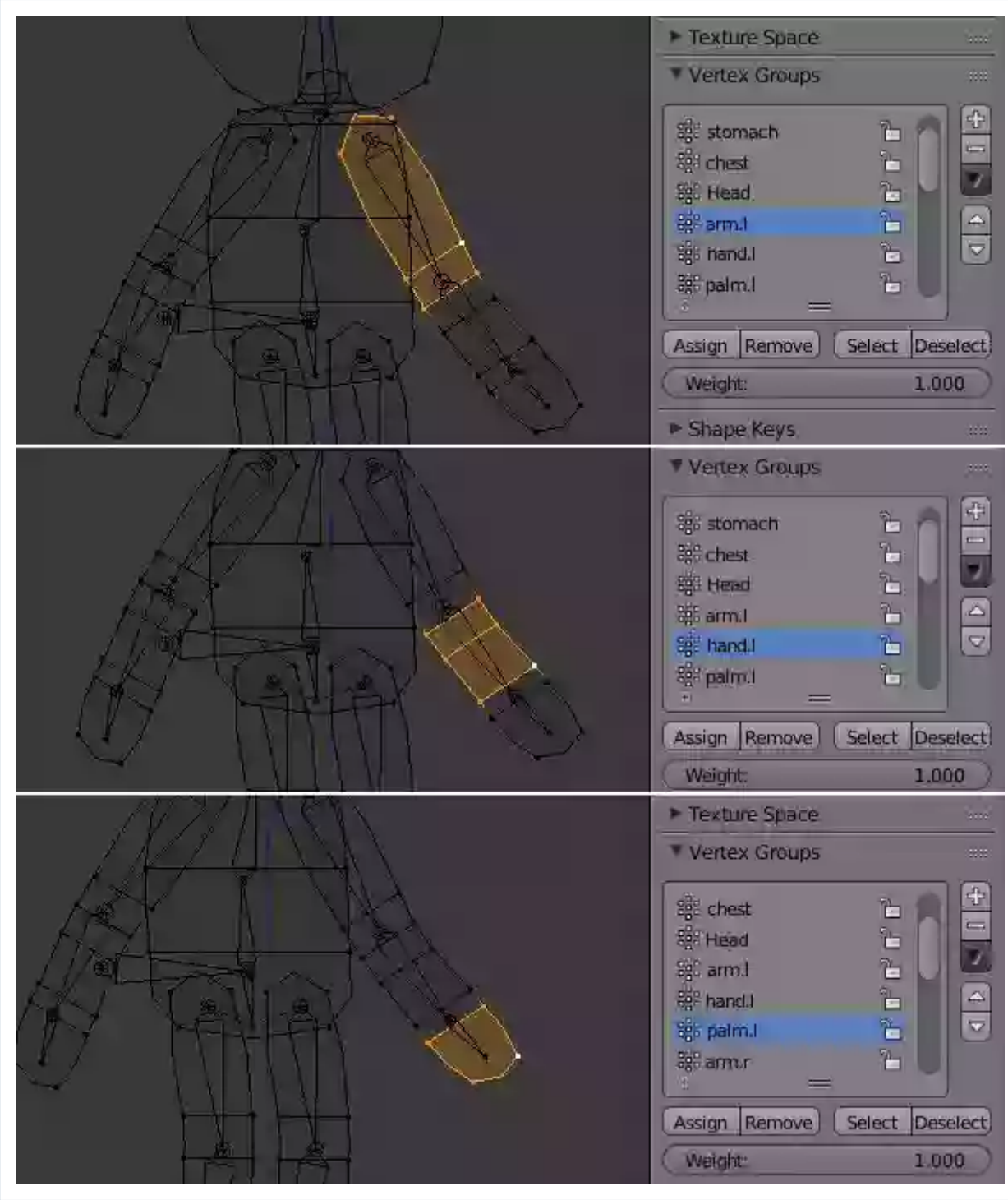
Assigning the vertices to their respective vertex groups and bones

Step 16

Move ahead to the arms. Select the upper part of the arm and assign it to **arm.l** vertex group.

Select the lower part and assign it to **hand.l**. There will be common vertices of the joint (elbow) on each group.

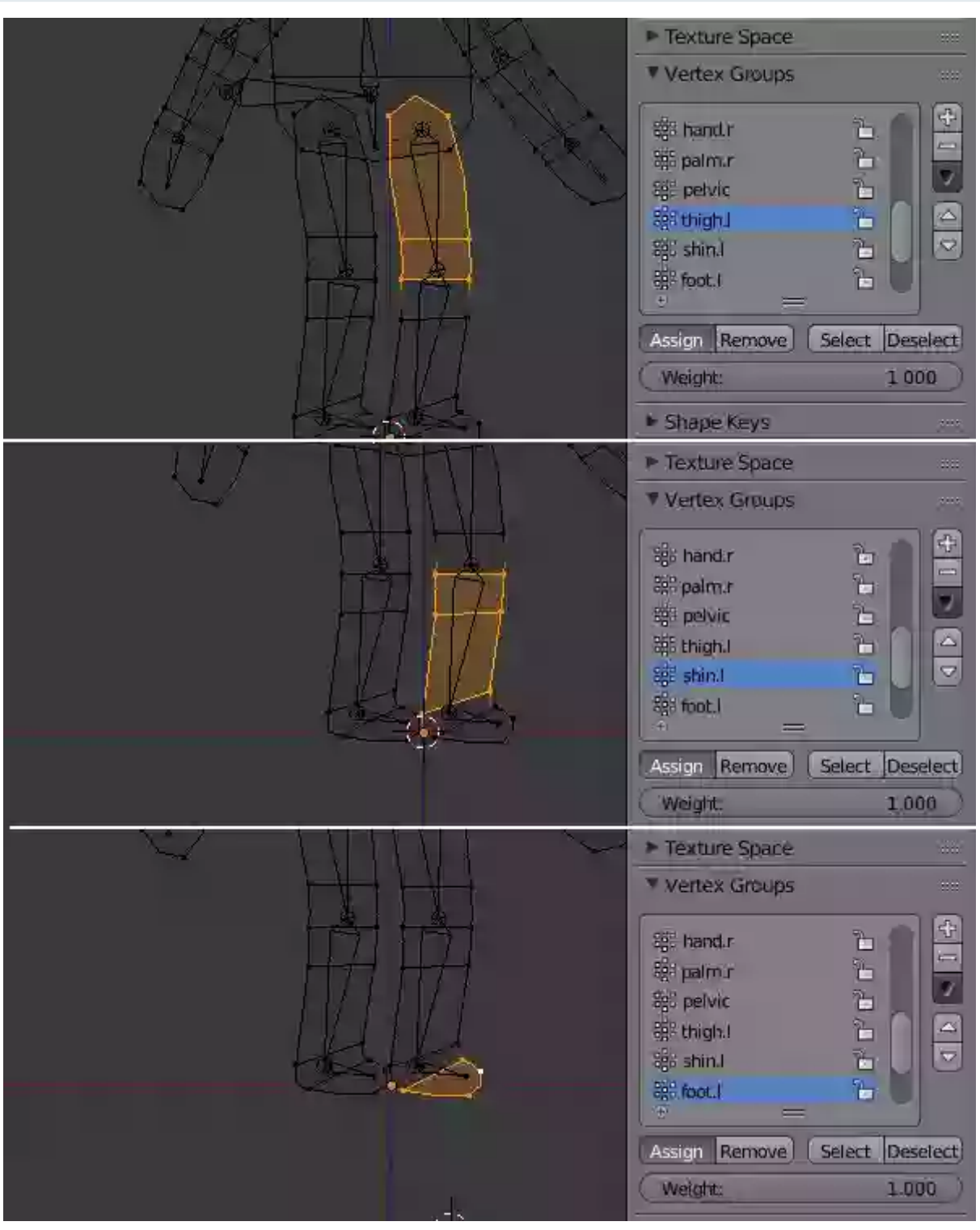
Similarly, the palm vertices to **palm.l**. Again the wrist vertices will be common in **hand.l** and **palm.l** vertex groups.



Assigning hand vertices to their vertex groups and bones

Step 17

Similarly do the same for both legs one at a time.

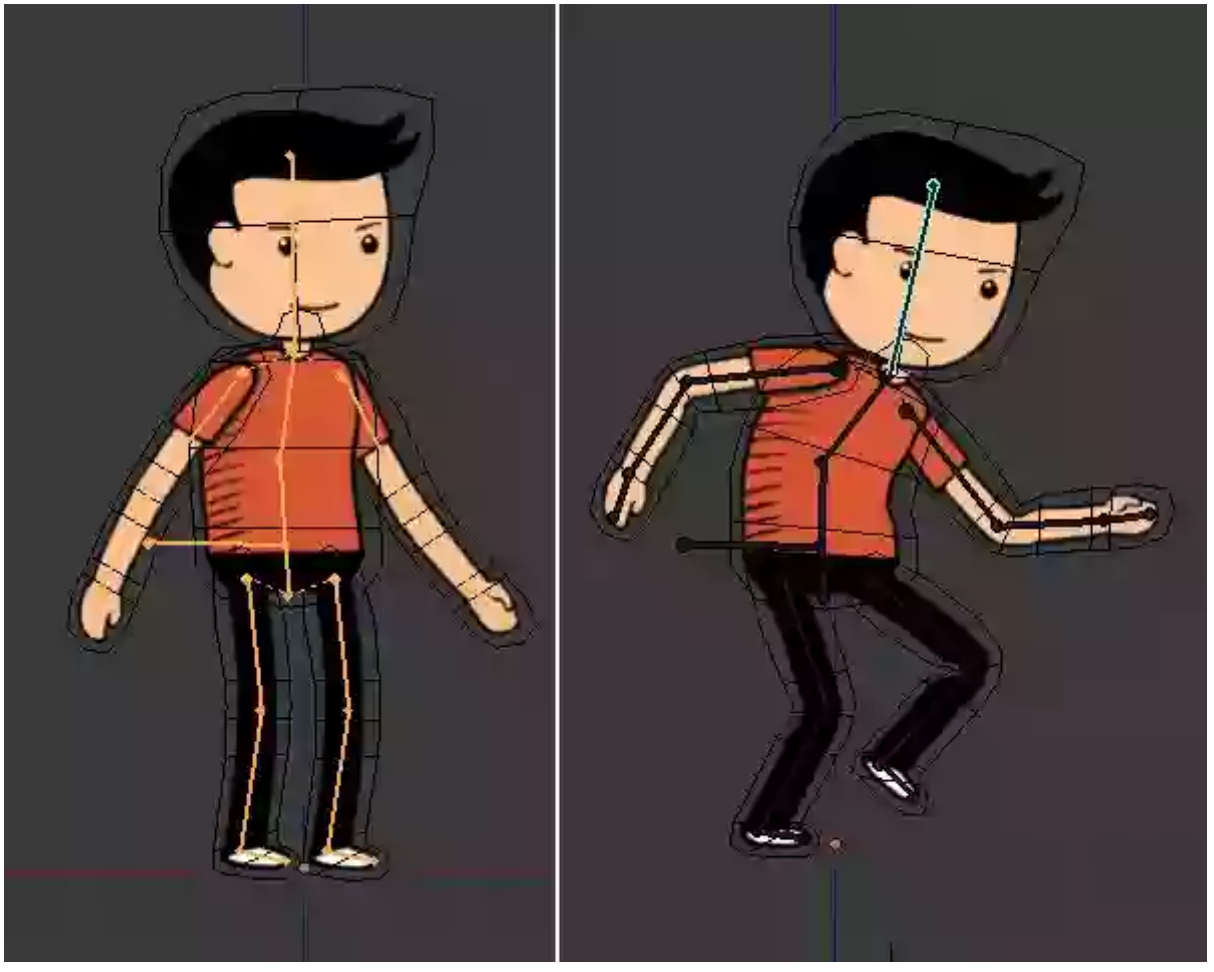


Assigning the leg vertices to their vertex groups and bones

Step 18

Press **Tab** to exit edit mode. Secondary-click on the armature object. If it is not in pose mode, press **Ctrl-Tab** to enter pose mode. Select any of the bone and press **R** to rotate and see the

effect. Press **A** to select all bones and press **Alt-R** to reset the rotation.

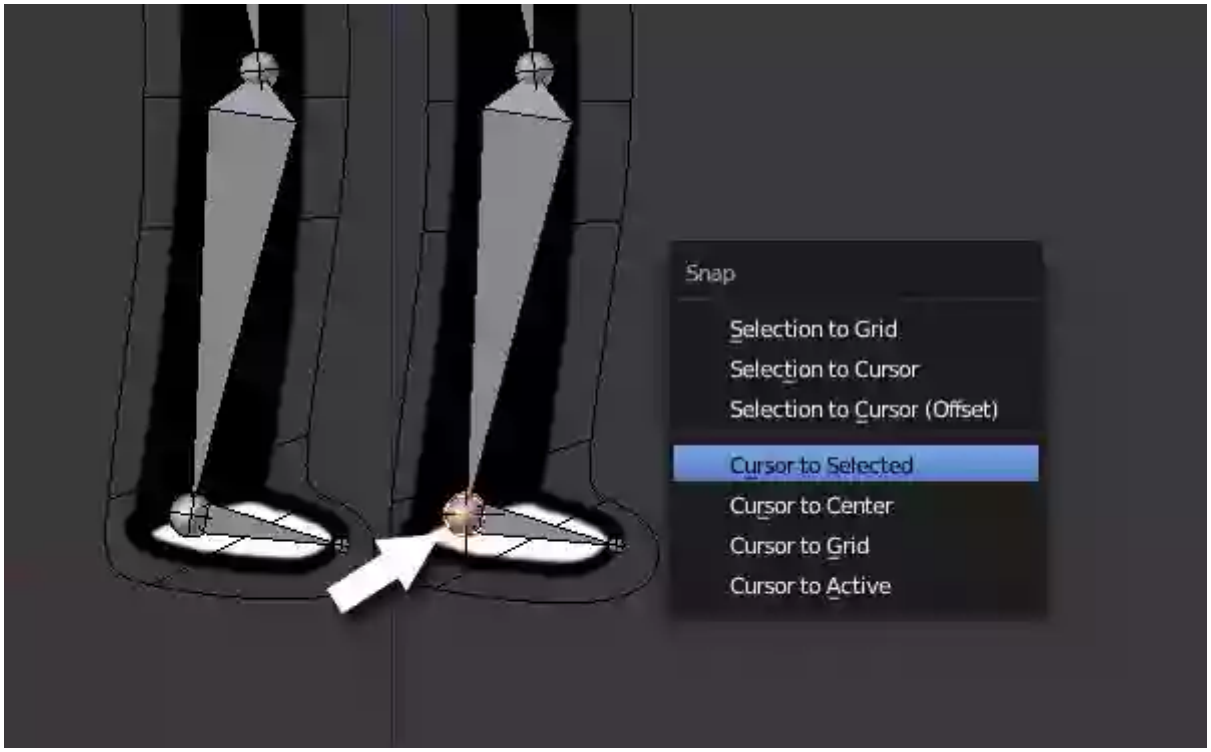


Testing the armature

Step 19

Next I will add the IK, or *Inverse Kinematics*, setup. This helps in posing and animation. Secondary-click on the tip of shin bone to select it. Press **Shift-S** and click on **Cursor to Selected**. This will

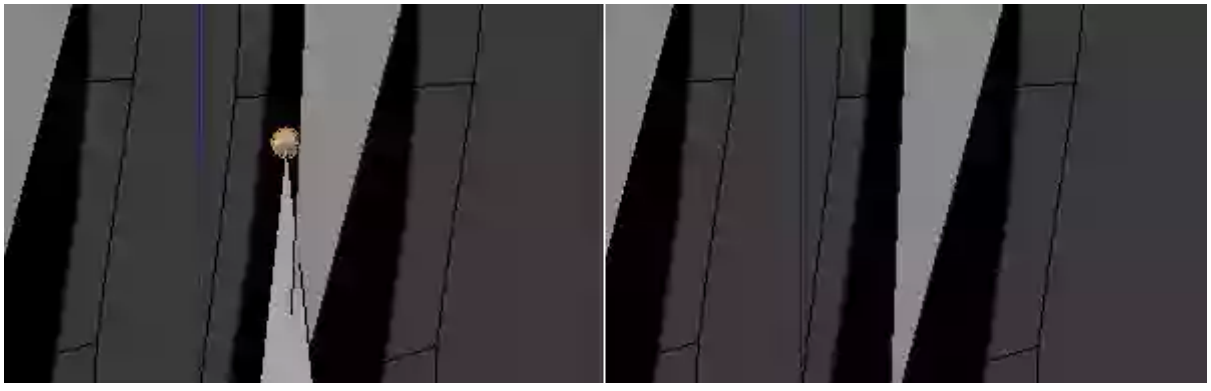
bring the 3D cursor to the selected bone tip.



Placing the cursor at the heel

Step 20

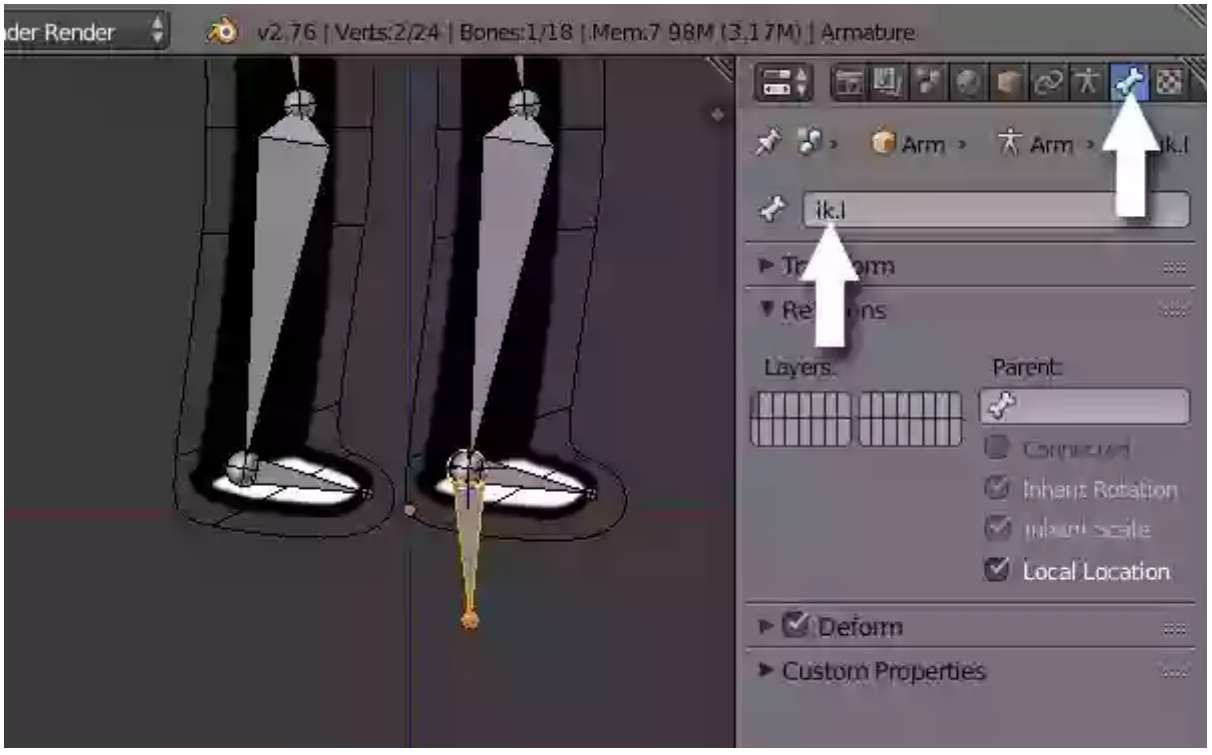
Press **Shift-A** to add a bone. Secondary-click on the tip of the new bone and press **G** to pull it down. Primary-click to confirm.



Adding a new bone

Step 21

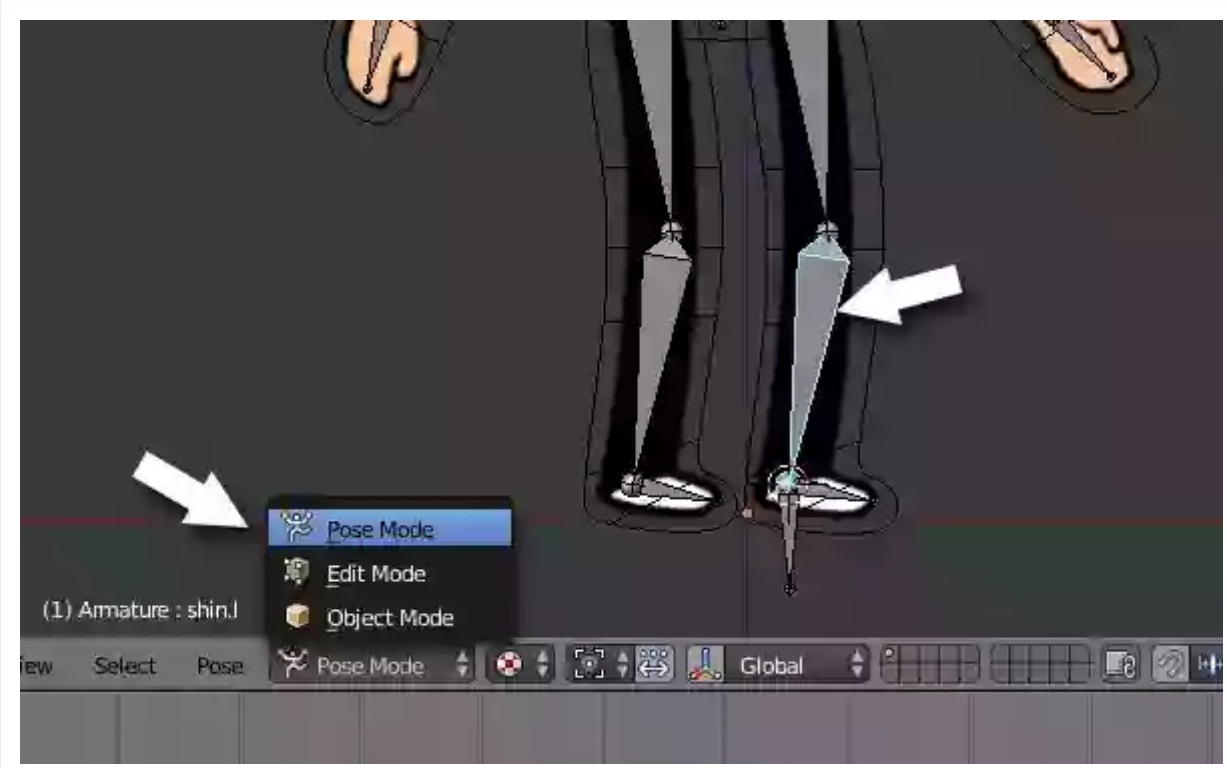
Secondary-click on the new bone to select it. Click on the bone button in the **Properties** window and rename the new bone **ik.l.**



Renaming the bone

Step 22

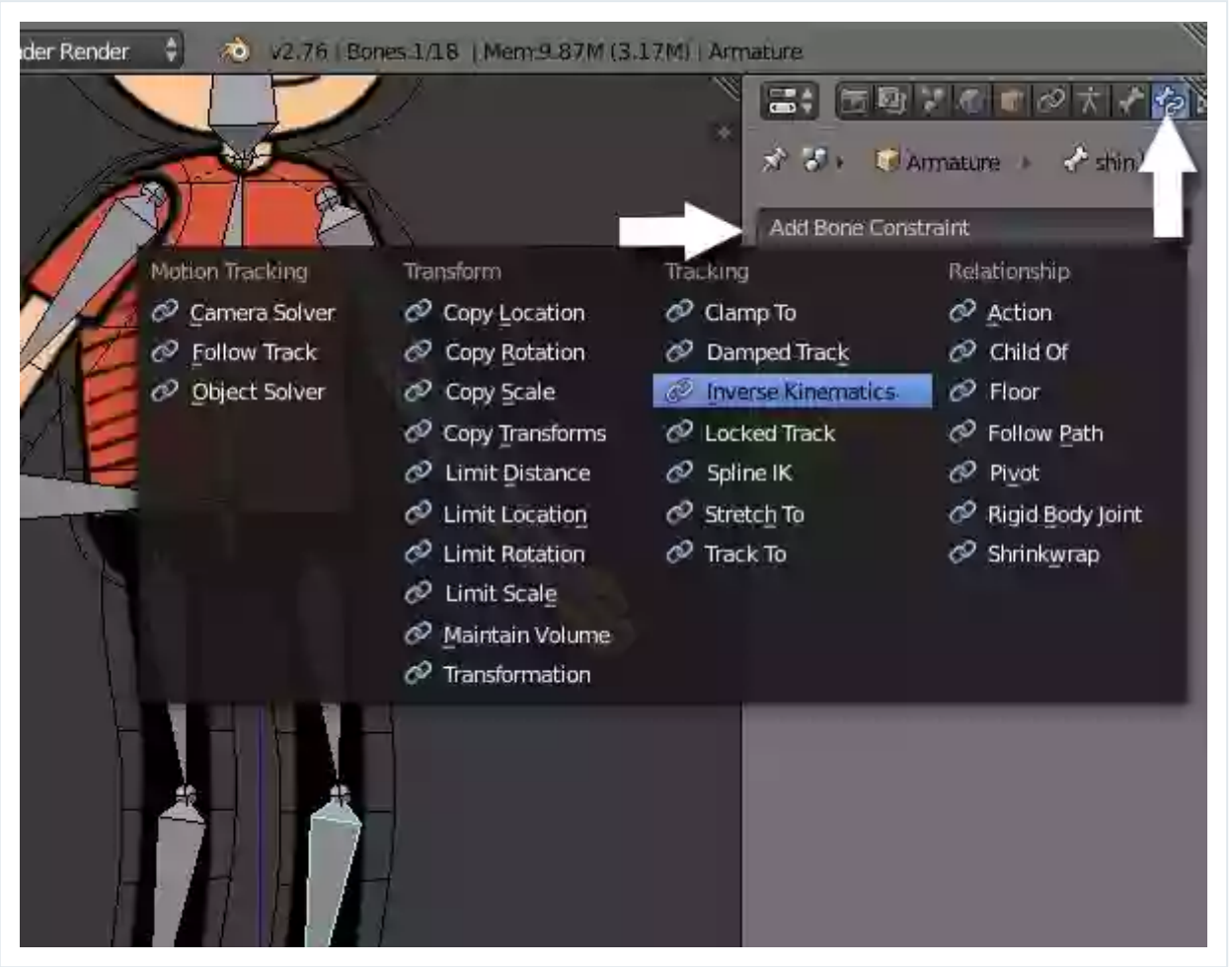
Press **Ctrl-tab** and switch to pose mode. You can also select **Pose Mode** from the header. Secondary-click on the shin bone to select it.



Switching to pose mode

Step 23

With the shin bone selected, click on the bone constraint button in the properties window. Press the **Add Bone Constraint** and select **Inverse Kinematics**.

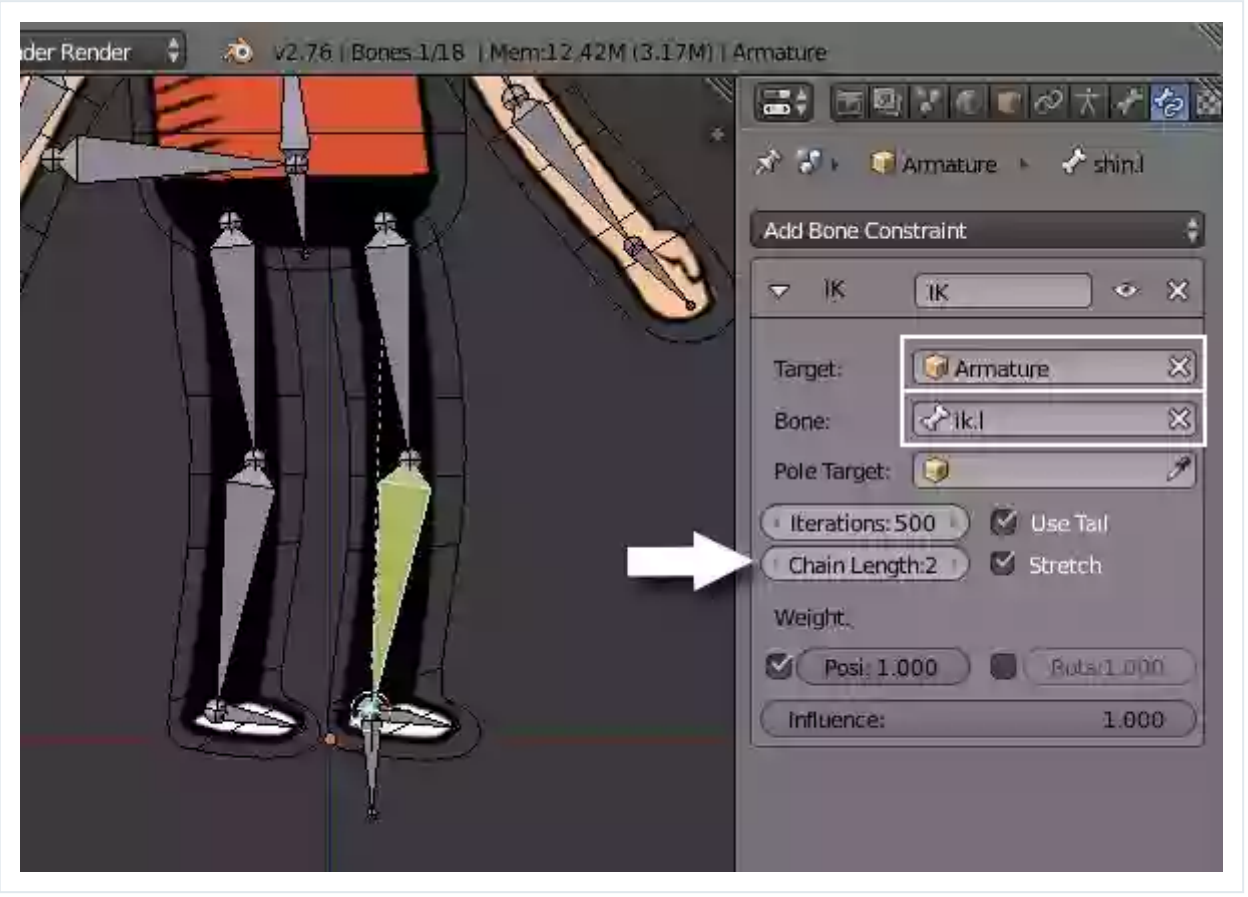


Adding bone constraint

Step 24

In the **IK panel**, set **Target** object to **Armature**. **Bone** to **ik.l**.

Increase the **Chain Length** to **2**.



Inverse Kinematics settings

Select the IK controller bone (ik.l) and press **G** and move it around to test it. To reset the position and rotation, select all bones with **A** key and press **Alt+G,** to reset location, and **Alt+R,** to reset rotation.

Testing the IK bone

Step 25

Select the other lower leg bone (**shin.r**) and add the **Inverse Kinematics Constraint** to it.

Use **Armature** as **target** and **ik.r** as **target bone**. Set **chain length** to **2**. Basic armature setup is now ready.

Play with some poses in the pose mode. To move the legs use the IK controllers.

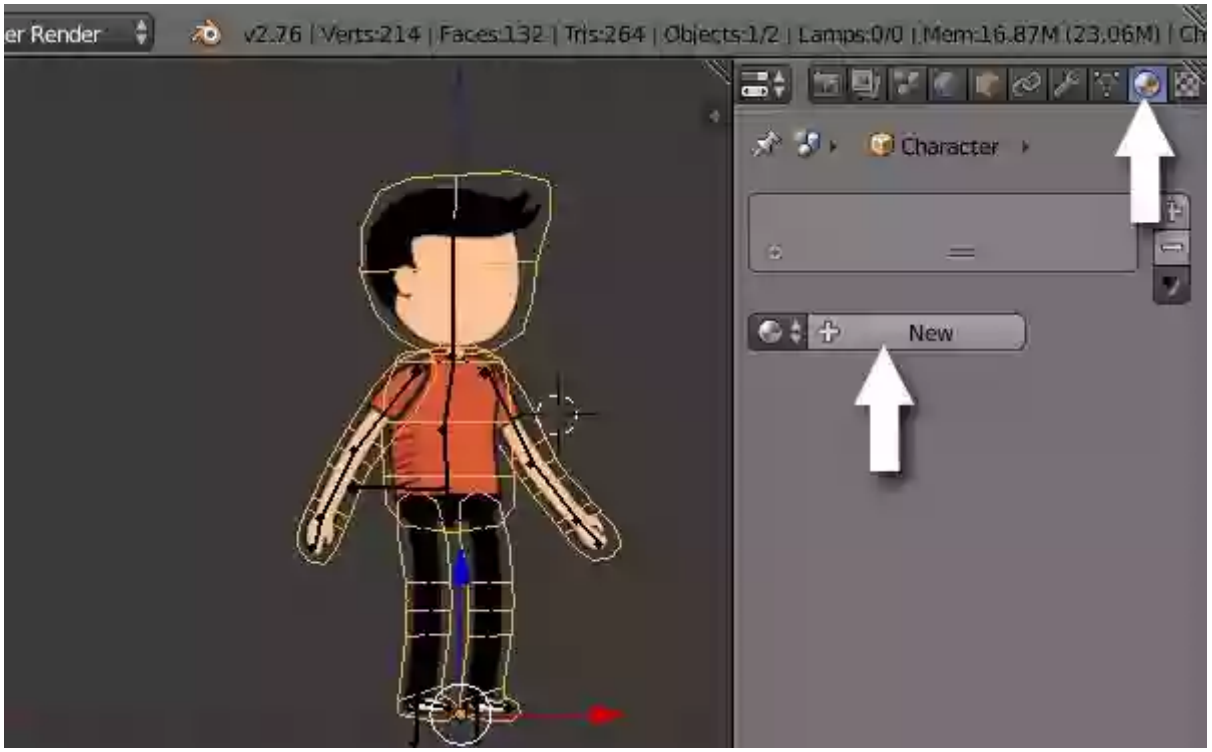
Adding IK Constraint to the other leg

Material Setup

Step 1

Secondary-click on the character object to select it.

Click on the **Materials** button in the **properties** window and press the **New** button to add new material.

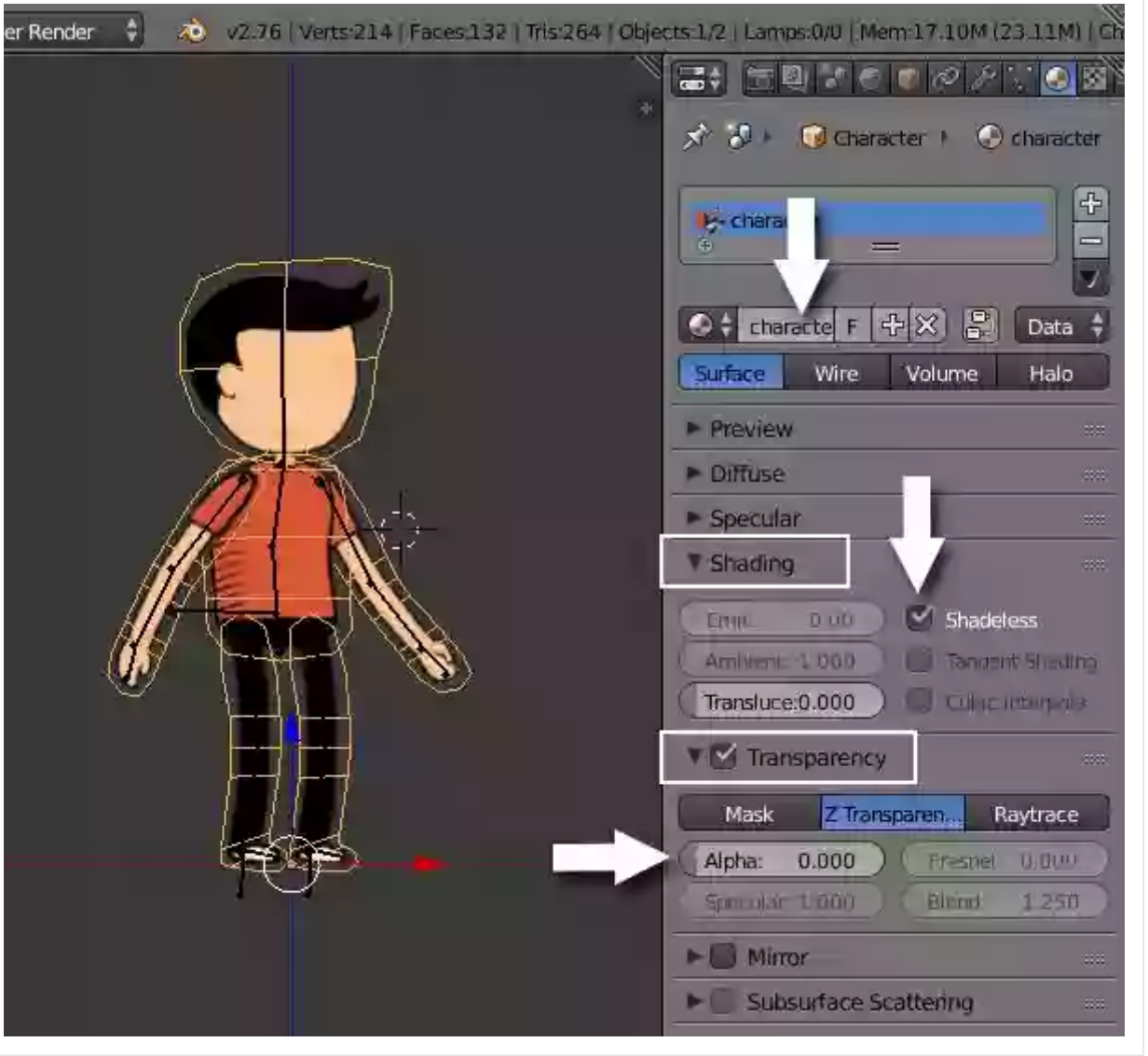


Adding new material

Step 2

Rename the material to **character** or anything you want. In the **Shading** panel, tick the **Shadeless** checkbox.

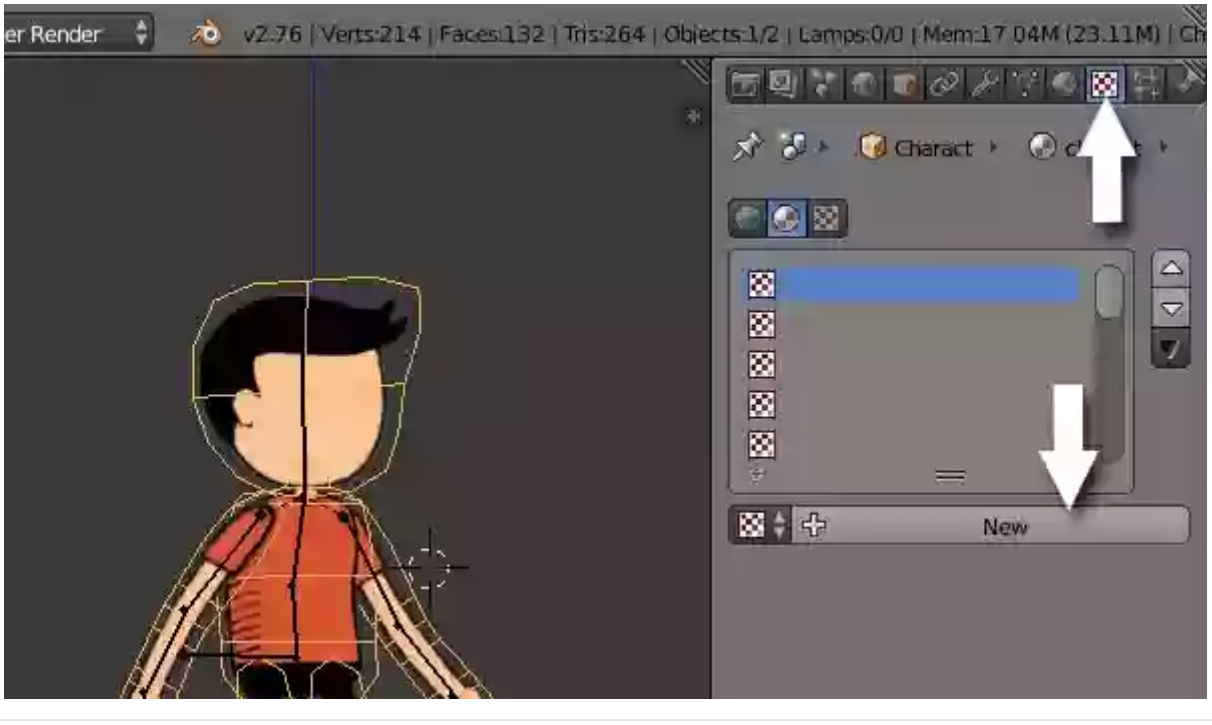
Tick the **Transparency** checkbox in reduce the **Alpha** to **0.00**.



Material settings

Step 3

With the object selected, click on the texture button in the **properties** window. Click the **New** button.

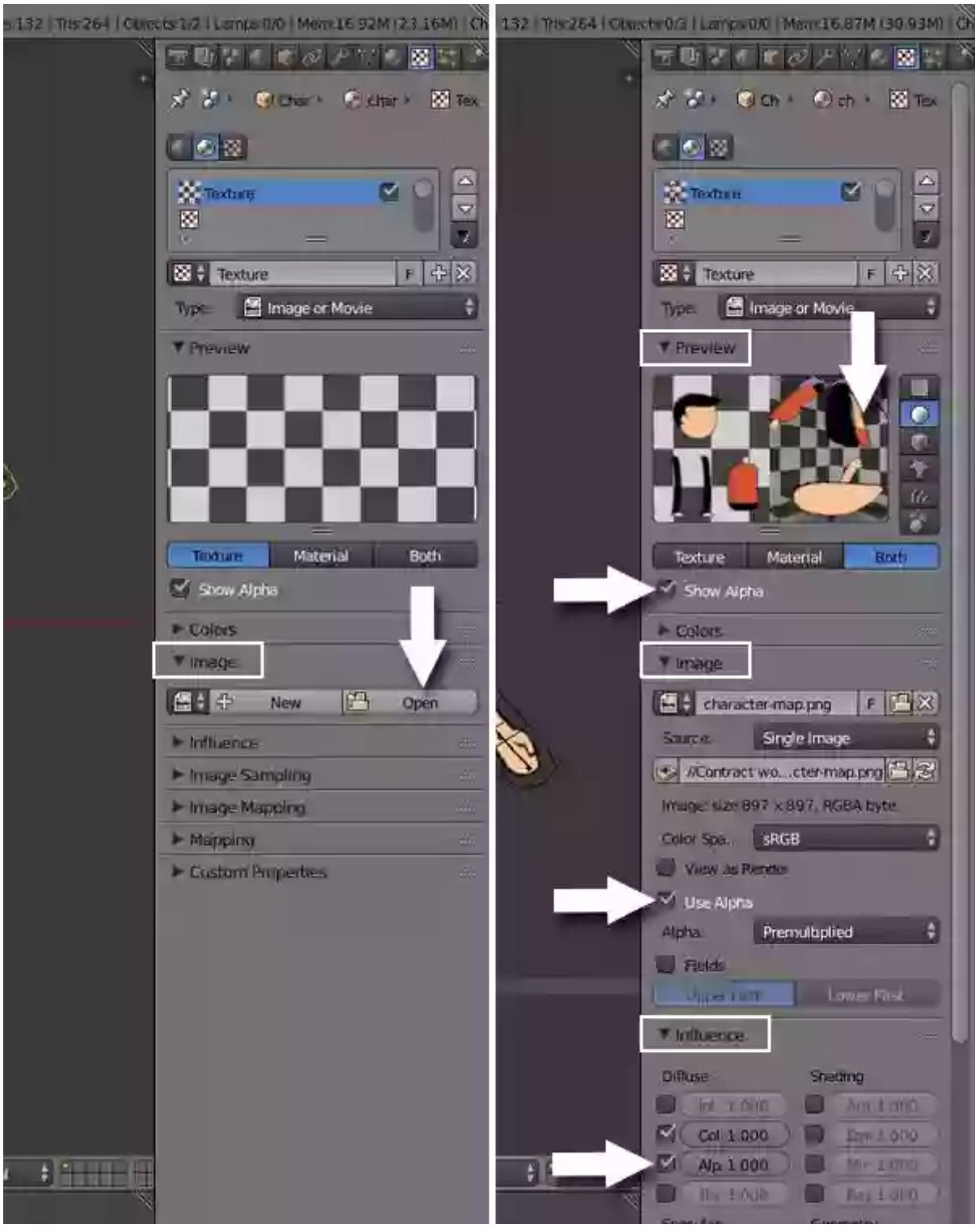


Adding new texture

Step 4

In the **Image** panel, click on **open** button and browse for the character texture image. Tick **Show Alpha** checkbox to preview the transparency.

In the **Image** panel, tick the **Use Alpha** checkbox. In the **Influence** panel, tick **Alpha**. The material and texture setup is now done.


Texture
Type: Image or Movie
Preview
Texture
Material
Both
Show Alpha
Colors
Image
New
Open
Influence
Image Sampling
Image Mapping
Mapping
Custom Properties
character-map.png
Source: Single Image
Color Spa.: sRGB
View as Render
Use Alpha
Alpha: Premultiplied
Fields
Influence
Diffuse
Shading
Col: 1.000
Alp: 1.000

Texture settings

In the next part I'll show you how to animate mouth and other expression using **UV Warp** modifier.

Karan Shah

Karan Shah is a 3D Artist and Animator from India. He is a BFA Graduate with specialization in sculpture. An inclination towards the digital medium made him a self taught computer artist. He is a currently freelancing..

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Name

Rafael Ghiraldelli
6 months ago

I didn't manage for textures to appear on Blender 2.8. Did some adaptations on the walkthrough, and managed to work fine until the UV mapping step. Even if 3D viewport (left) is in texture mode (LookDev), UV doesn't show up. Am I missing something here?

View – uploads.disquscdn.com

1 Reply

crayonium Rafael Ghiraldelli
6 months ago

2.8 is messing with me, too.
I did manage to get the texture to show up in the 3D viewport.
On the material tab, click the circle by the 'Base Colour' option under the shader. View – uploads.disquscdn.com
In the window that pops up, select 'Image Texture'. View – uploads.disquscdn.com
In the new space below that box there are now some new options. Click the image icon with the drop down arrow and choose the image that you used in the UV mapping step. That should apply the image to your material. View – uploads.disquscdn.com
I'm still struggling with getting Blender to use my texture's alpha in rendering, though, so if anyone has any further insights, I'd be very grateful. View – uploads.disquscdn.com

1 Reply

crayonium crayonium
6 months ago

Oops, I forgot to add that you will probably need to change your viewport shading to 'Solid Mode' and then set the 'Colour' value to 'Texture'. View – uploads.disquscdn.com

1 Reply

Rafael Ghiraldelli ➚ crayonium
6 months ago

Shows fine in 3D Viewport now! Thanks!
However, I don't know how to get rid of the shade/emission in render. Do you know how?
View – uploads.disquscdn.com

Reply

Rafael Ghiraldelli ➚ crayonium
6 months ago

Thanks for the insight. Now I'm trying to figure out how to make alpha works as well :/

Reply

crayonium ➚ Rafael Ghiraldelli
6 months ago

Unfortunately, I'm still having trouble with that, too.
I'll post back if / when I figure it out.
If someone else knows, tips would be greatly appreciated!

1 Reply

Dejo . ➚ crayonium
2 months ago

Here you go, I created a shader that works fine in eeve, but not in cycles.
View – uploads.disquscdn.com View – uploads.disquscdn.com

Reply

Russett ➚ Rafael Ghiraldelli
6 months ago edited

This method for creating a puppet animation was the best that could be done in 2.79, but is outdated now. It's much better to draw the parts directly in the 2D workspace with the new grease pencil capabilities in 2.80. Animation is more accurate when you're not dealing with gross shapes of the old method.

Here's one of my experiments:
Blender 2.80 (beta) grease pencil animation experiment – disq.us

1 Reply

crayonium ➚ Russett
6 months ago

The new 2D functions in 2.8 are definitely cool, but the method described in this tutorial is still useful for creators who want to create 2D art in another program and then animate it in Blender.

1 Reply

Russett ➚ crayonium
6 months ago

That's true. Hopefully, Blender will continue to improve the drawing tools so that we can eventually do more of what we can do in other paint programs.

2 Reply

adarsha

a year ago

at end how they removed face expression

Reply

FRUITY FACTS
2 years ago

Thank you so much. This is really good.

Reply

King. V android studio
2 years ago

Hello,I had a litte bit problem.At final step"Texturing the Character Object"part,my background image doesn't appear after click the texture button.How the image could appear after we delete it on step 19 "Building the Character"????

Reply

> **Juuuu** ➚ King. V android studio
> 2 years ago
>
> if you open the file again in the UV mesh, as explained in step 3 of the section "Texturing the Character Object", it should appear when you switch to texture
>
> Reply

HD Video Editors
2 years ago

Great !! and learn lots ... thanks TUTSPLUS

Reply

Russett
2 years ago edited

Thanks so much! A lot of work went into this. Very clearly presented.

Reply

Eva
3 years ago

Works perfect.

Reply

Friend
3 years ago

I have a little problem. I am using a png textrure with an alpha chanel. There is white backgroind in my 3D ViewPort. I managed to make it work only in render mode by using a mix of two shaders in node manadger. But still can't make it work in 3D ViewPort.

View – disq.us

View – disq.us

Reply

> **Eva** ➚ Friend
> 3 years ago

Maybe you should've stayed in blender render instead of cycles

Reply

Ach Hadda
4 years ago

can't wait for part 2 :D

Reply

Load more comments