

CH18- Armatures

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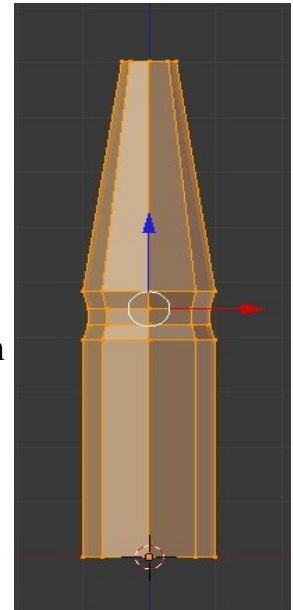
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Armatures

My dictionary defines 'Armature' as being a protective covering but in Blender the term appears to have a different meaning altogether. In Blender, 'Armature' refers to an Object type which is used to deform a mesh. Think of your finger and the skin covering it and the bones inside. The skin would be the mesh and the bones are the 'Armature'. When the bone moves the skin moves with it. Obviously the analogy is not quite correct but it gives you the idea.

To demonstrate the 'Armature' principal in Blender we will make something akin to a finger and make it deform with an 'Armature'.

Start with the default Blender Scene and delete the Cube. Add a Mesh Circle. In the Tool Shelf (Panel at LHS of 3d Window) reduce the number of vertices from 32 to 8. Extrude the Circle on the Z axis to create a simple mesh as shown in the diagram. The finger will only have two parts with a joint in the middle. The vertices close together in the middle of the mesh are where the joint will be. They act like a part of a concertina hose on a vacuum cleaner allowing the mesh to bend.



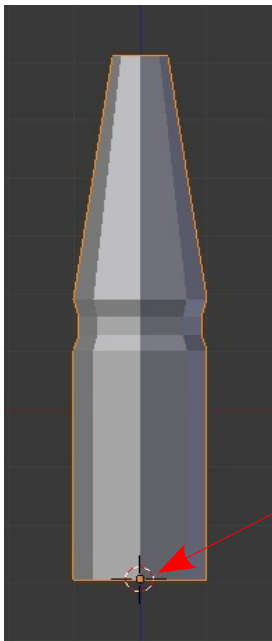
Edit Mode

Note: When creating a mesh for use with Armatures use as few vertices as possible. Too many vertices will slow down the computer considerably. This is the reason for reducing the number of vertices in the Circle.

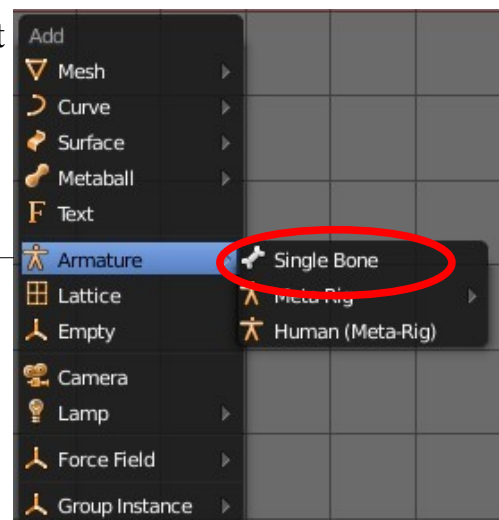
Select the mesh and go into Object mode

Place the 3D Cursor as shown

Add 'Armature' – Single Bone.



Object Mode



Go to the Properties Window – Object button – display tab and tick X Ray (Obj) this makes the Armature visible in Object mode -Solid display. It actually makes the Armature display on top of the Mesh.

With the Armature selected – Tab to Edit mode.

Select the top end of the Bone and drag it up to the middle of the bend point.
Press the E Key and extrude the bone (Creates a second bone) up to the top of the mesh.

In the Properties window – **Object data** – Display tab – tick 'Names' to show the names of the bones in the 3D Window. The names will be 'Bone' and 'Bone.001'.

Press A Key to deselect the bones – Remain in Object mode.

We will now set up a Child Parent relationship between the Mesh and the Bones.

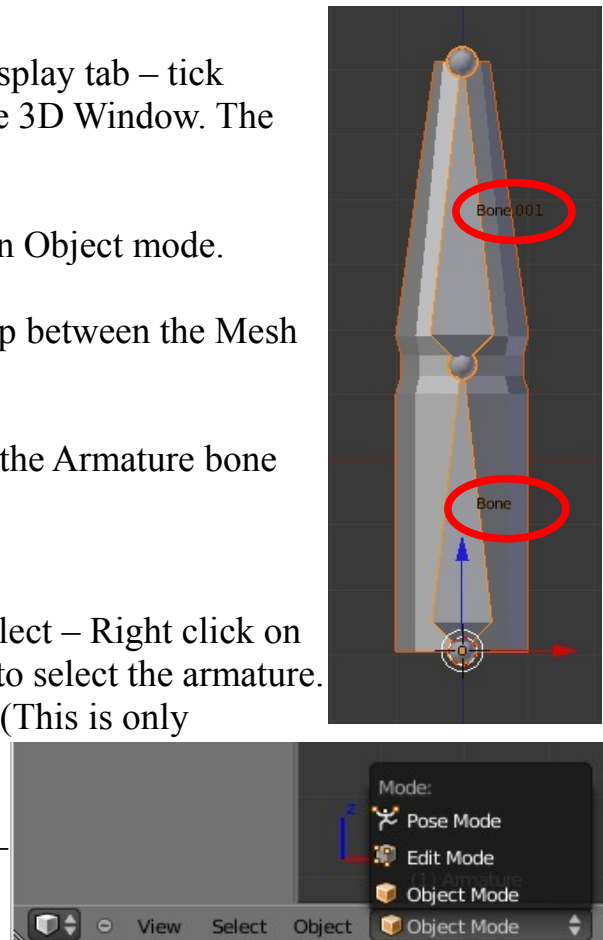
Shift select the Mesh object (Child) and then the Armature bone (Parent).

Press Ctrl + P and select 'Armature Deform'.

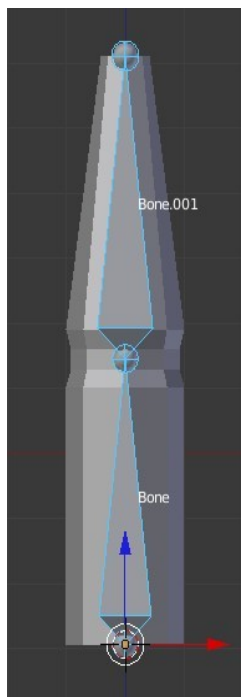
To prove the relationship press A Key to deselect – Right click on the Armature (Mesh selects) – R Click again to select the armature.
In the 3D Window header select 'Pose Mode' (This is only available when the Armature is selected).

R Click (Select) Bone.001 – R Key (Rotate) – Rotate the bone.

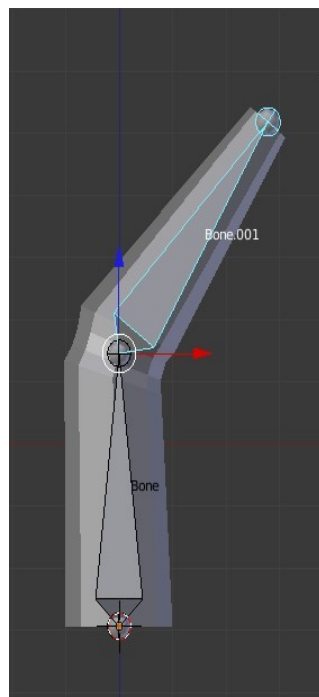
The Mesh deforms as the Bone is rotated.



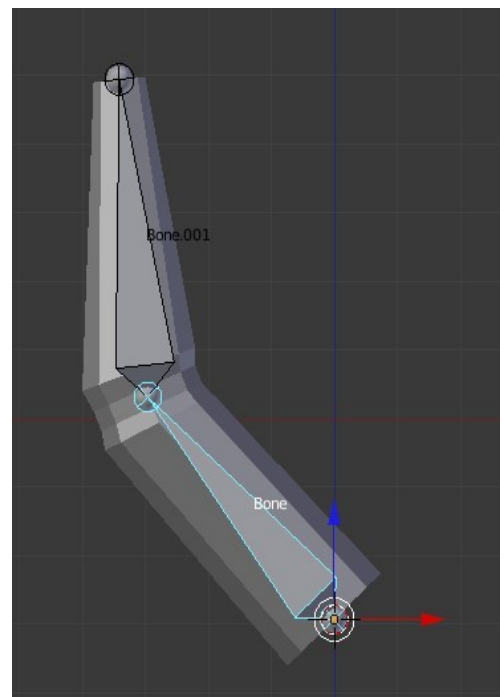
Blender has automatically assigned vertices to each bone.



Pose Mode



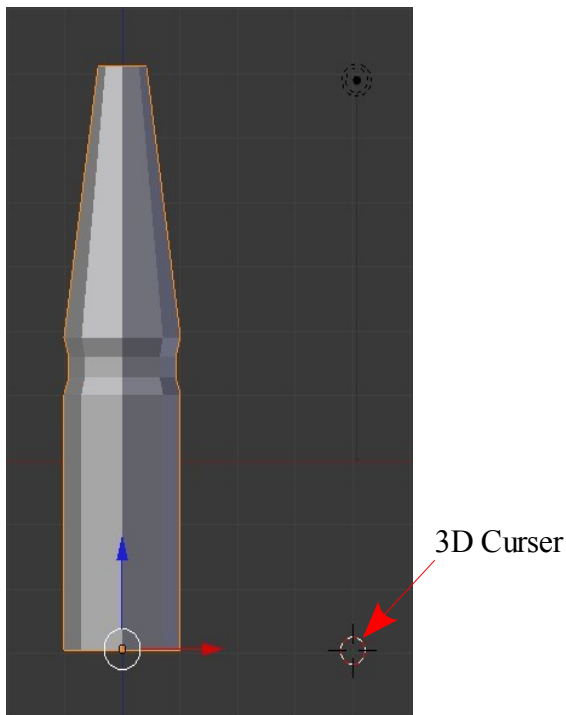
Bone.001 Rotated



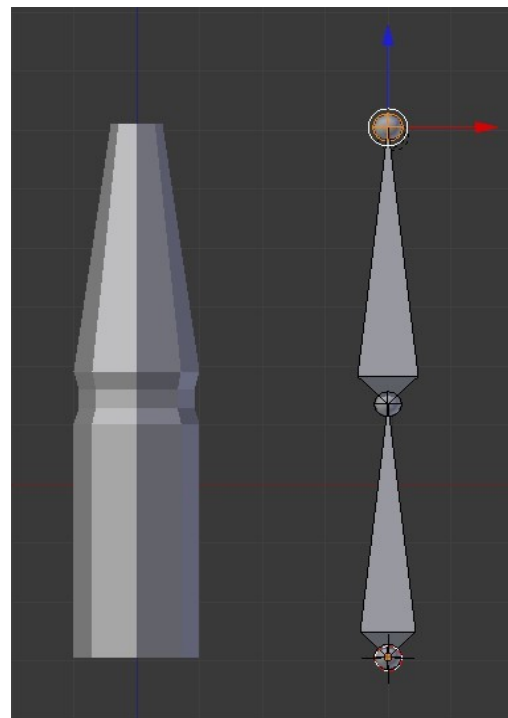
Bone Rotated

Manually Assign Vertices.

Create the mesh as before – Leave in Object mode.
Place the 3D Cursor off to one side.



Mesh in Object Mode



Armature Added and Extruded

Add – Armature (Shift + A – Armature – Single Bone).

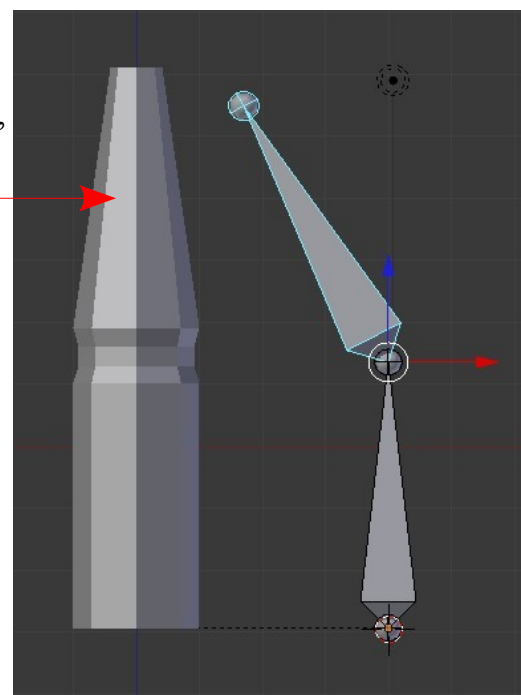
As before Tab to Edit mode select the top point of the bone and extrude it up.

Tab to Object mode – A Key (Deselect).

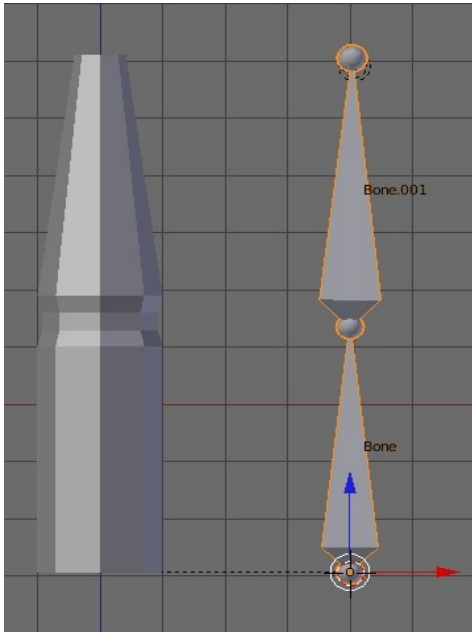
Create a Child Parent relationship as before.

To prove the relationship deselect all (A Key)
select the Armature – Pose mode – Select top bone,
R Key (Rotate) – THE MESH DOES NOT
DEFORM – **No vertices have been assigned**

Top Bone Rotated



How to Assign Vertices



Put the armature in Object mode.

In the Properties Window – **Object data** – Display tab – tick 'Names'. (See: Bone and Bone.001)

A Key (Deselect) Armature – R Click Mesh object to select.

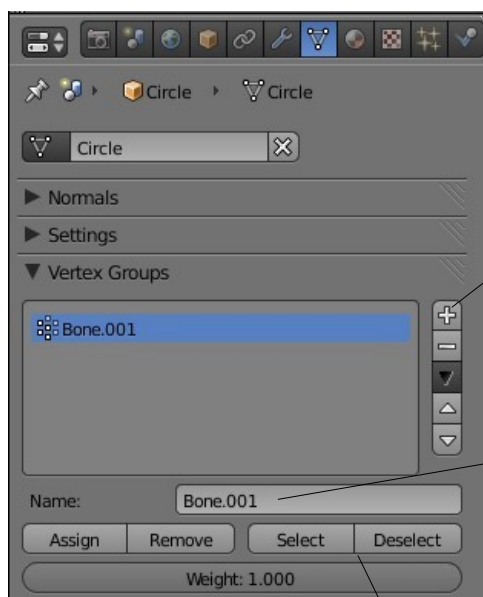
Assign Vertices to a Vertex Group

With the mesh selected Tab to Edit modeling the Properties Window – Object data button - - Vertex group tab – Click + to add Vertex Group.

In the Name panel – delete 'Group' and retype 'Bone.001'.

In the 3D Window select the vertices you wish to assign to the Group.

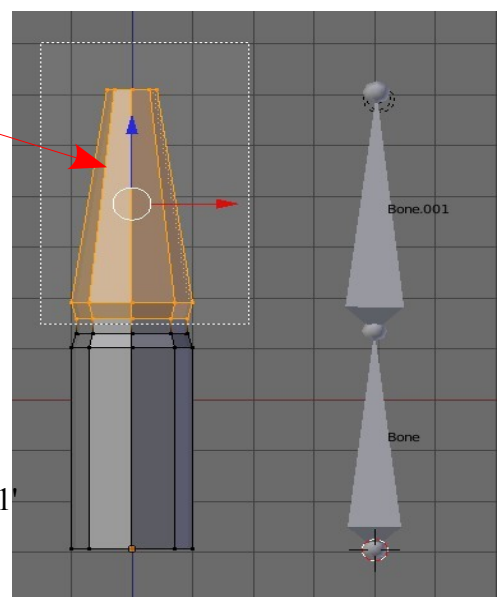
In the Properties window – Object data – Vertex group tab – click 'Assign' (By clicking on Deselect and Select you will see the vertices in the 3D Window selected and deselected).



Select Vertices

Click to Add Vertex Group

Delete 'Group' Retype 'Bone.001'



3D Window

Click Select and Deselect to Show and Hide Vertex Group in the 3D Window

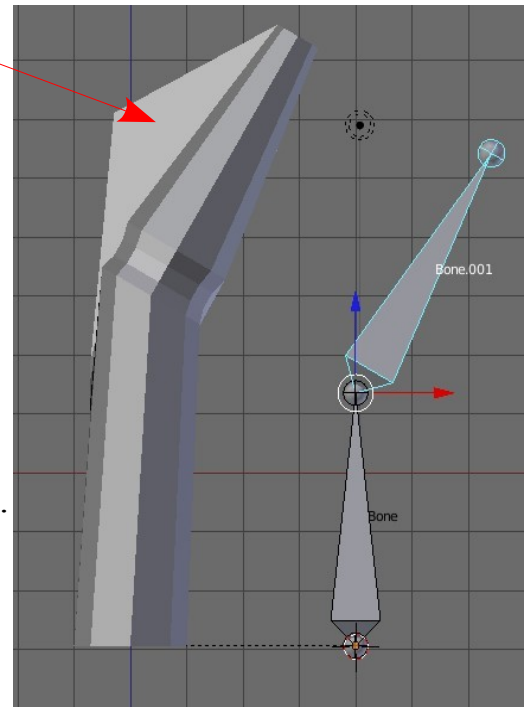
Note: Incorrect Deformation

Tab to Object mode – A key to deselect all.
R Click the armature (Select)

In the 3D Window header – Click Pose mode.

With Bone.001 selected – R Key (Rotate) the bone.
The mesh deforms as the bone is rotated.

The incorrect deformation noted above has occurred since the 'Limit Selection to Visible' button was in the wrong mode. Not all vertices were selected



Armature in Pose Mode

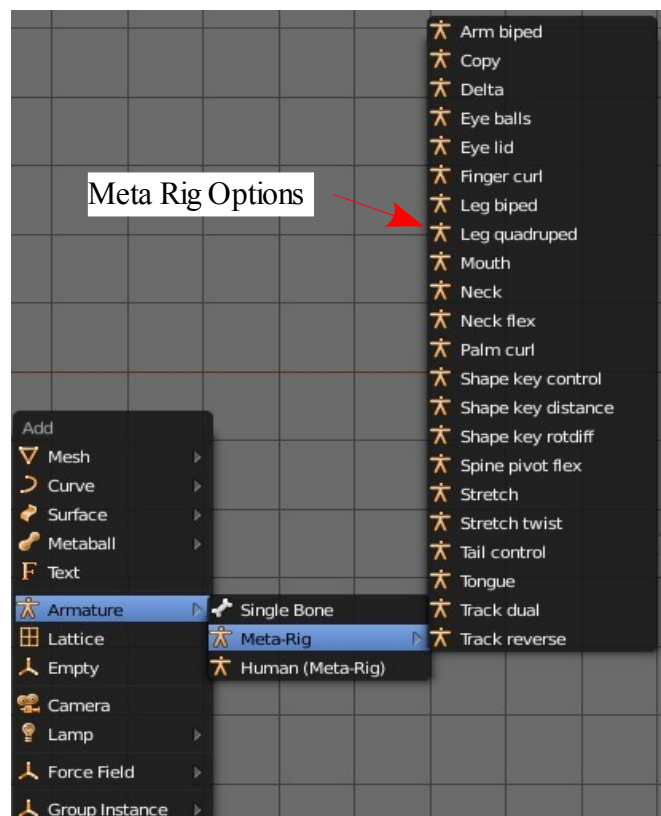


3D Window Header

Limit selection to Visible

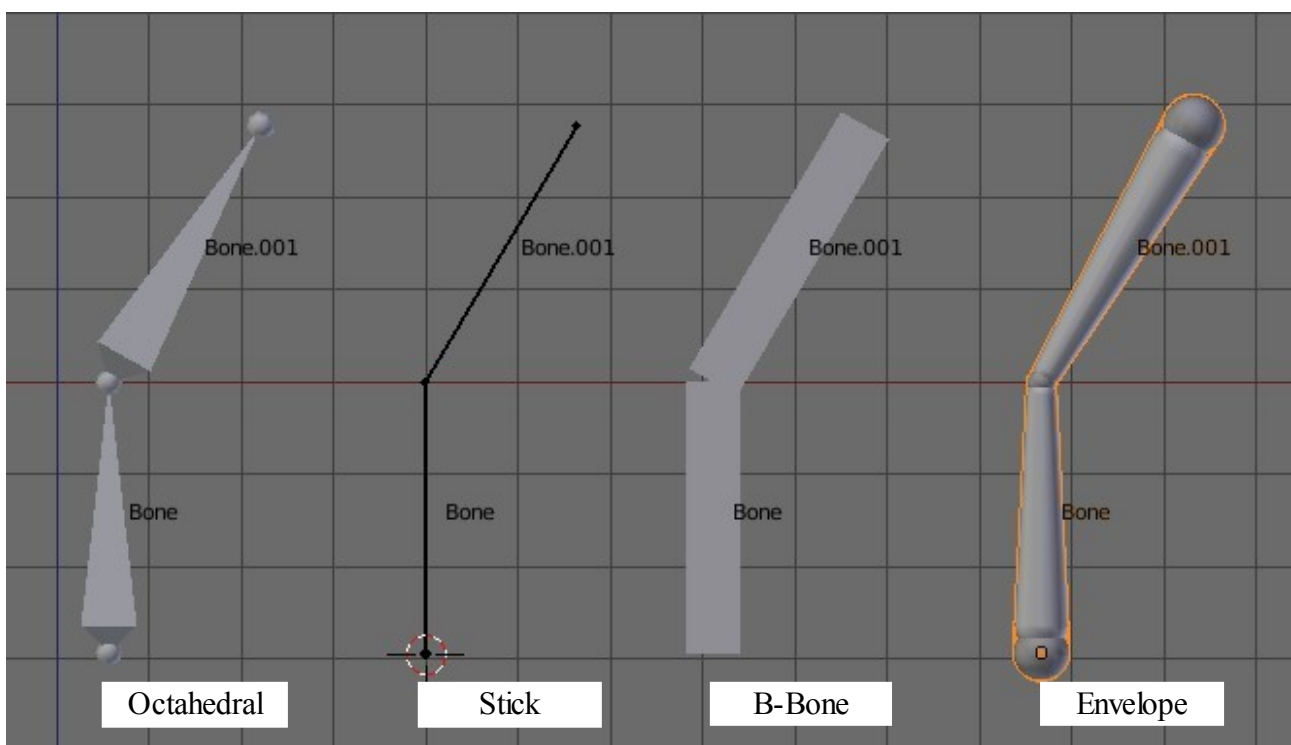
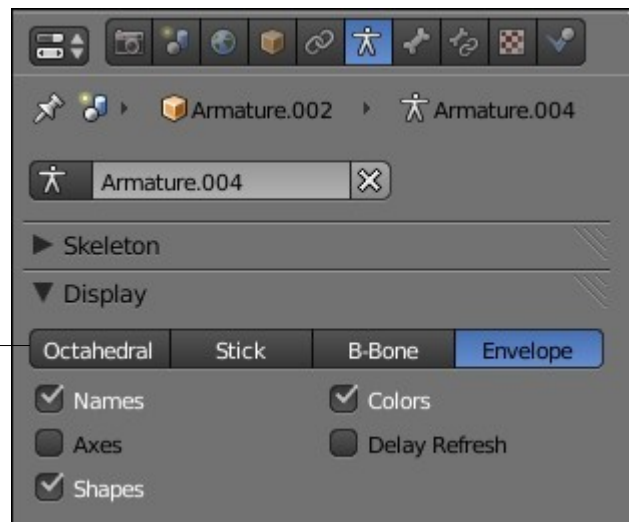
Adding Armatures.

To add an Armature press Shift + A key –
Armature.

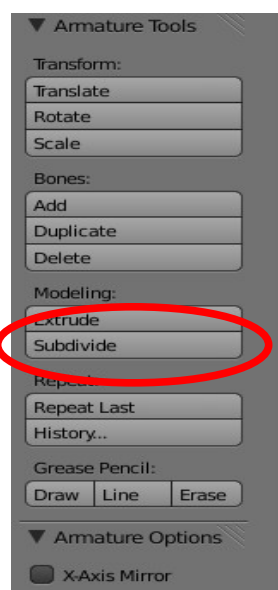


Armature Display

In the Properties Window – object data button - Display tab – the choices for different displays are. _____

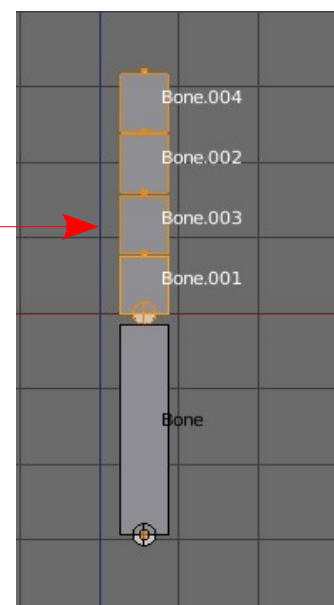


Editing Bones



Click on 'Subdivide' in the Tool Shelf at the LH Side of the 3D Window to create more Bones

B-Bone Armature in Edit Mode

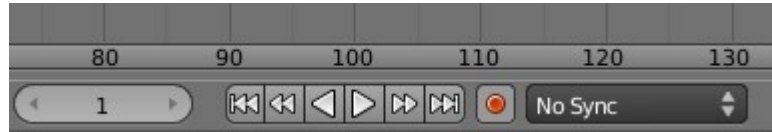


Automatic Keyframing

Automatic Keyframing allows you to quickly animate the movement of complex Armature arrangements,

With the Armature selected in Pose mode – Select the bone.

Click on the red button in the timeline Window – Move frame + move bone.
Keyframe is automatically applied.



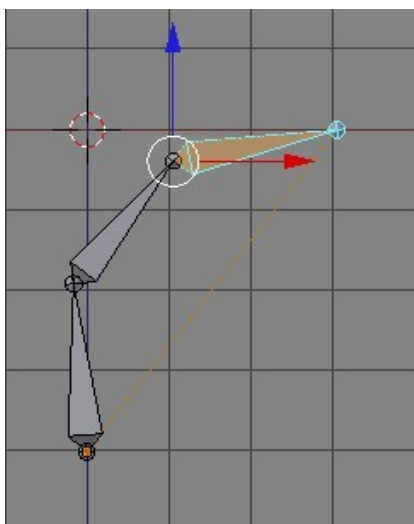
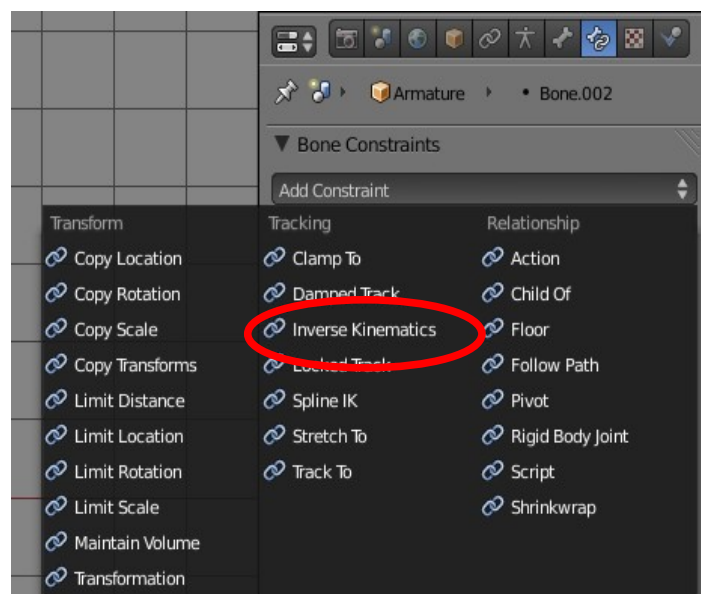
Inverse Kinematics

Inverse Kinematics is used when you want to manipulate an Armature by simply grabbing (G Key) the end Bone of a chain and moving it with all the connected bones following.



Armature Bone Chain with top Bone selected in Pose Mode

In the Properties Window – Bone Constraints button – Click 'Add Constraint' – Select 'Inverse Kinematics'



Drag the Bone to see the chain follow