BLENDER MODELLING

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WITH BLENDER V2.83

BLENDER BASICS

WHAT AND WHY

Free and Open Source, easy to use

Many possibilities:

- Modeling
- Texturing
- Video editing
- Rendering
- …

https://docs.blender.org/manual/en/latest/index.html

VIEWPORT NAVIGATION

Exploring 3D view:

- Zoom with mouse **wheel**
- Orbit view with **holding middle mouse button**
- Pan with **[shift] + hold middle mouse button**
- Align view with an axis with:
  - side (x aligned) with **numpad 3**
  - front (y aligned) with **numpad 1**
  - top down (z aligned) with **numpad 7**

ADD – DUPLICATE – DELETE - HIDE

DELETE with:

- **[X]** and then confirm
- **[canc]**
- Click on **Object > Delete**

ADD an object with:

- **[shift]+[A]**
- Click on **Add** (in the top left)

DUPLICATE objects with:

- **[shift]+[D]**
- Click on **Object > Duplicate Objects**

HIDE object temporally from the view with

- **[H]**

And unhide it with

- **[alt]+[H]**

SELECT

You can select:

- One object with the **left mouse button**

- More objects with **[shift] + left mouse button**

- All the objects in the scene with **[A]**

- All the objects defining a box area with **[B]** and dragging the box

- All the objects within a circular area with **[C]**

  - Use the mouse wheel to change the diameter of the circle

  - Press the mouse wheel to deselect object

  - Press right mouse button or exit to confirm the selection

GRAB – SCALE - ROTATE

- GRAB (move) object: **[G]**

- ROTATE object: **[R]**

- SCALE object with **[S]**

- You can move/rotate/scale an object along an axis with: **[G]/[R]/[S] + [X]/[Y]/[Z]**

- When executing an action press **left click** to CONFIRM, **right click** or **esc** to CANCEL
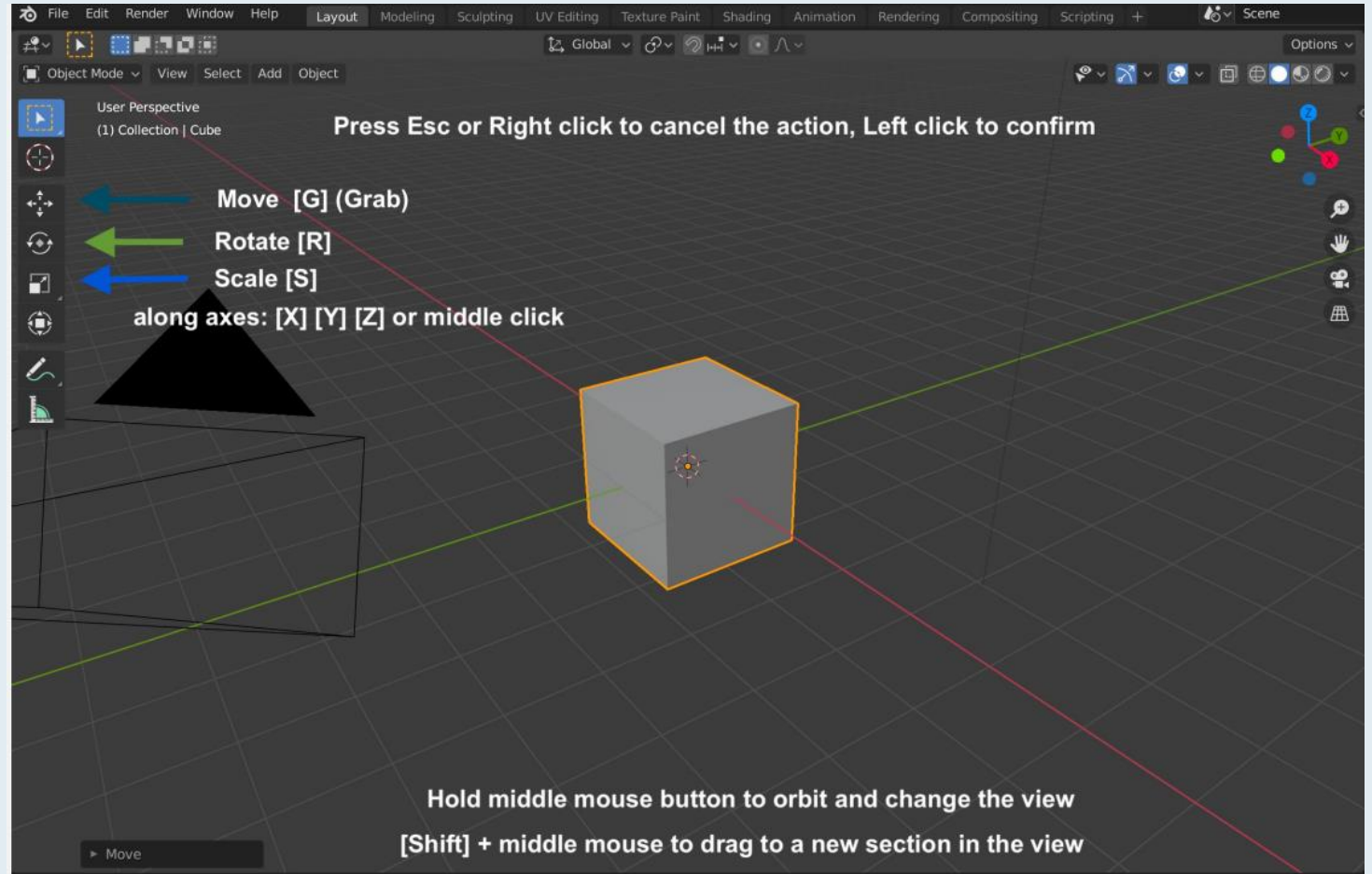
OBJECT & EDIT MODES

In the top left corner, you can see the Obect Modes dropdown menu, you can switch between Modes (otherwise press **[ctrl] + [tab]**

- The **Object Mode** is used to edit objects transformations (position, rotation, and size)

- The **Edit Mode** is used to edit objects' "shape" (vertices, edges, faces...)

https://docs.blender.org/manual/en/latest/editors/3dview/modes.html
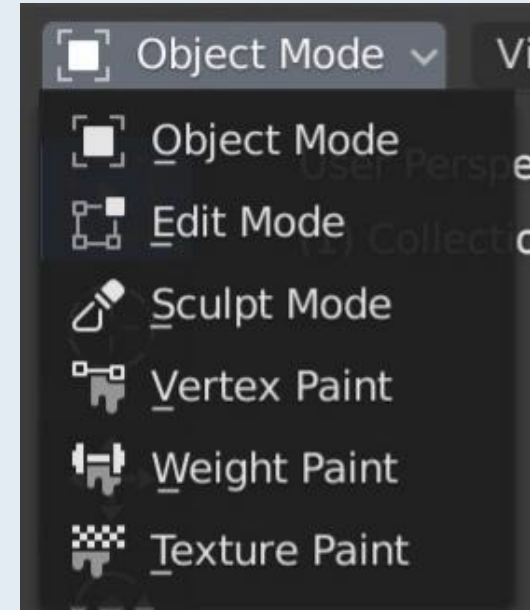
EDIT MODE

In Edit Mode you can modify your mesh

- On the left, you can switch betwen **Vertex, Edge or Face selection**

- You can see your object in different ways using **[Z]:**

  - Wireframe – object only with edges

  - Rendered – full render

  - Solid - default

  - Material – object with material

- You can select all the vertices/edges/faces of an object with **[A]** or deselect all with **[alt]+[A]**
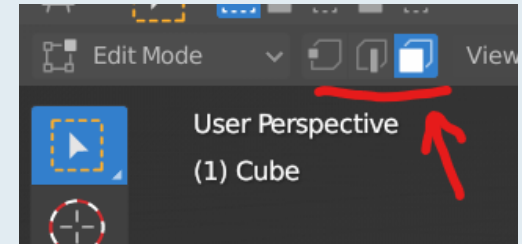
EDIT MODE: SOME TOOLS 1/2

- **EXTRUDE:** you can select multiple vertices (or edges/faces) and create a new face with **[E]**

- **LOOP CUT:** you can split the surface inserting a new edge loop with **[ctrl][R]**
 - You can perform multiple cuts by rolling the middle mouse button
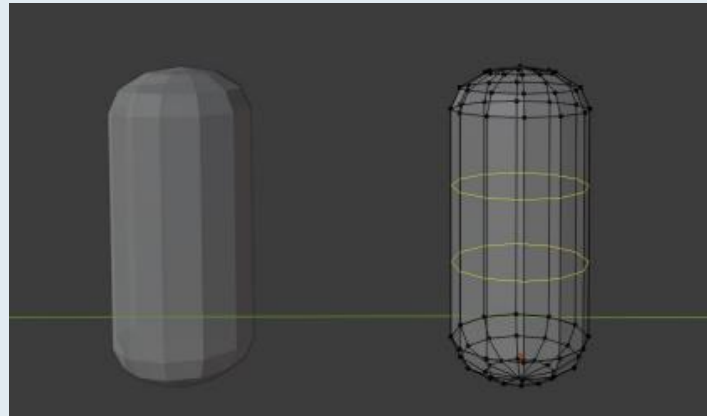
EDIT MODE: SOME TOOLS 2/2

- **INVERT:** you can invert the selection with

  - **[ctrl] + [I]**

  - **Select > Invert**

- **SELECT** all connected vertices/edges/faces with **[L]**

- **SPLIT MESH** creating a new object with **[P]**

- **JOIN MESH** using two objects with **[ctrl] + [J]**

SCULPT MODE

As Edit Mode, **Sculpt Mode** is used to alter the shape of a model, but instead of dealing with individual elements, an area of the model is altered using a brush
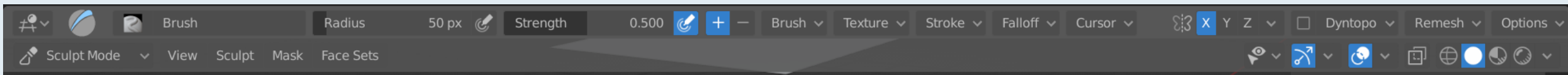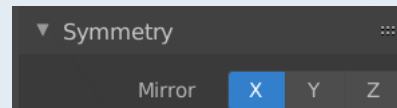

Choose a brush on the left, you can increase/decrease brush dimension with:

- **[F]** and confirm with left click

- change the **radius' value** in the Tool Settings

You can also change the **strength** of the effect of the brush

In the Tool Settings, on the left, you can enable the **Mirroring** of the brush affect across an axis:
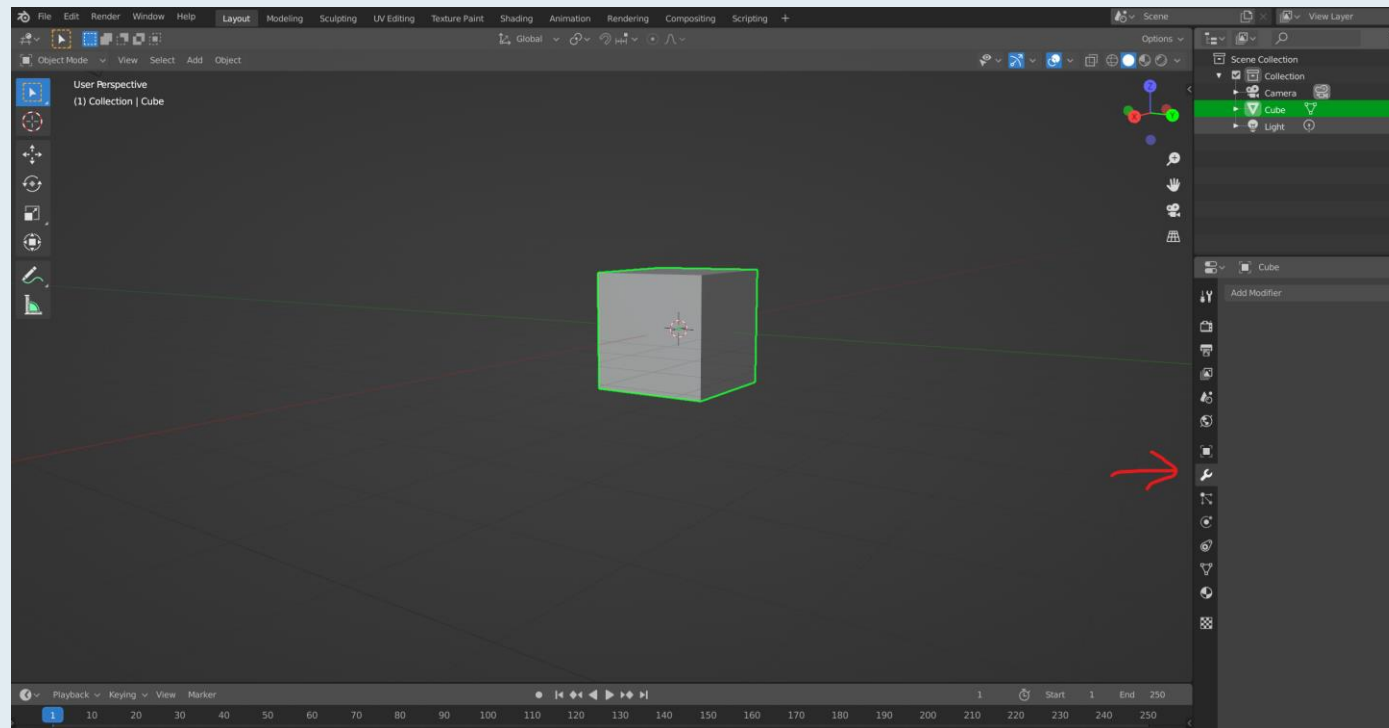

https://docs.blender.org/manual/en/latest/sculpt_paint/sculpting/index.html

MODIFIERS 1/3

Modifiers affect the shape of the object, without affecting the base geometry of your object

You can add modifiers to an object in the **Modifiers Panel**

MODIFIERS 2/3

List of all modifiers:

https://docs.blender.org/manual/en/latest/modeling/modifiers/index.html

Some useful modifiers are:

- **Array:** creates copies of the object with offset
- **Subdivision surface:** split faces into smaller faces giving a smoother appearance
- **Mirror:** applies changes in a mirrored way on the mesh, along object's local x, y, and z

MODIFIERS 3/3

Modifiers are ordered in the **Modifier Stack**

The modifiers are applied to an object in order from top to bottom, you can always change modifiers' order in the panel

APPLY:

When you push the button Apply the modifier becomes real. Apply is a <u>not reversible</u> action and the order in which you apply modifiers matters

N.B. if you apply each modifier manually in a different order from the one in the Modifier Stack, the order in which you apply the modifiers becomes the final one
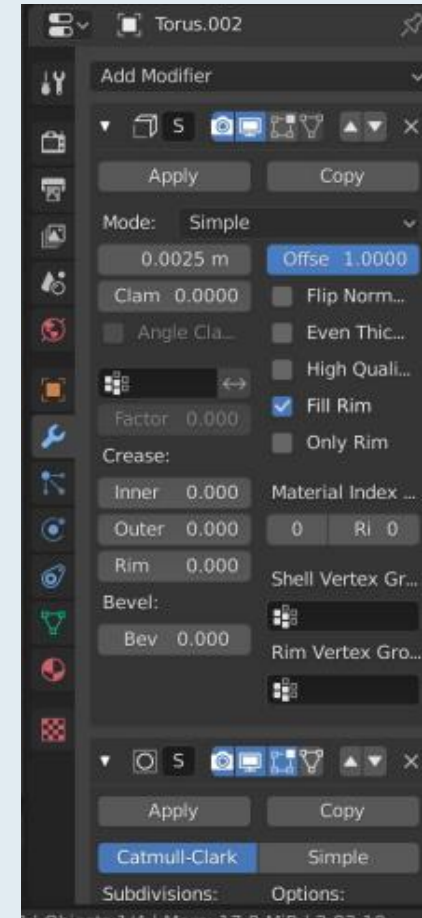
MATERIALS

MATERIAL 1/2

The Material indicates the surface qualities of an object as color, shininess, transparency

You can add a Material in the Material Panel

There you can change the material properties of the object's surface

In Edit Mode, you can add different materials, each one related to a different part of the mesh:
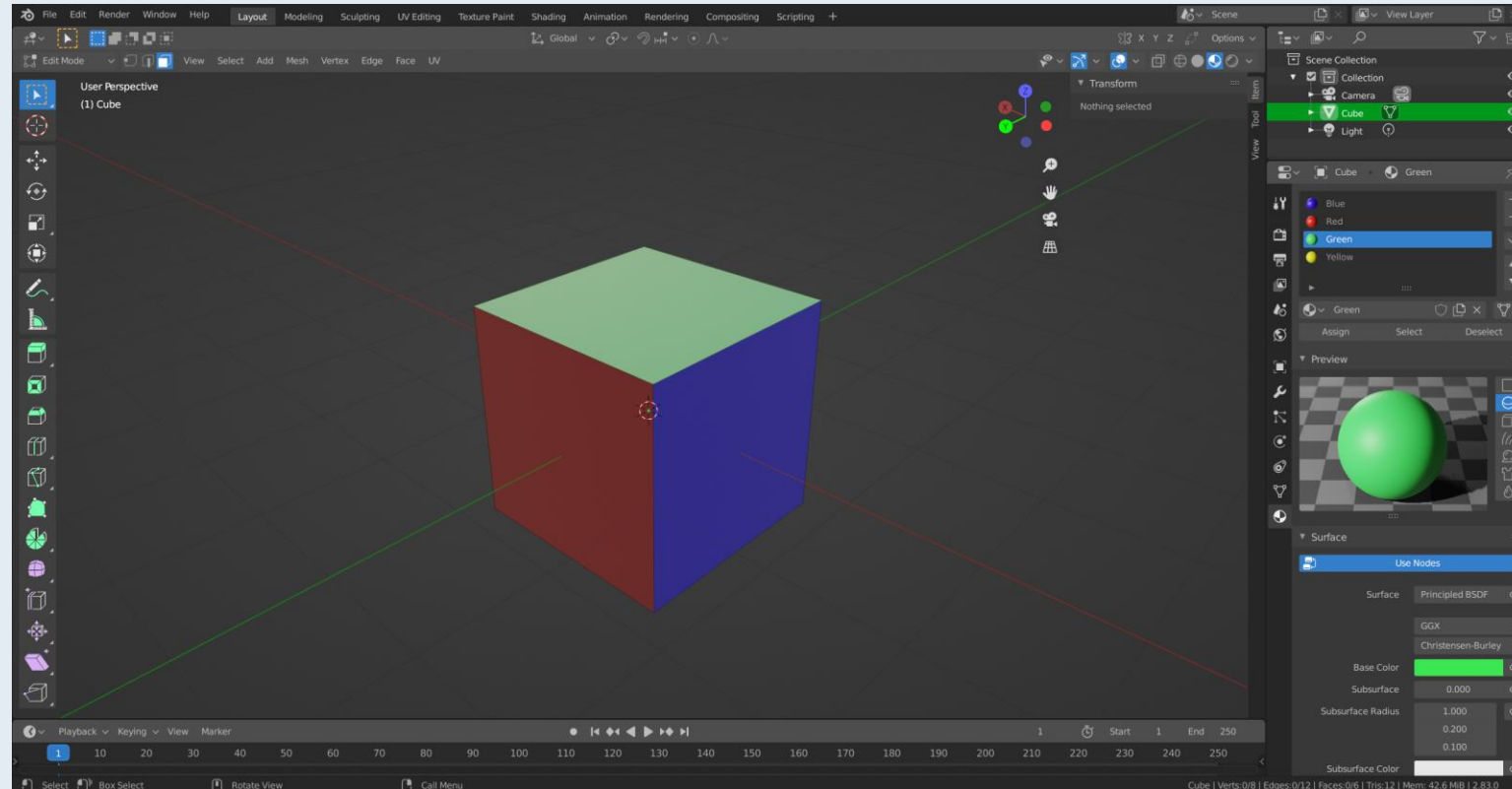
1. Select a part of the mesh (the object) you want the Material to assign to

2. Click on Material Panel and then click on **+** to create a slot for a new Material, and click on **+ New** to create the Material

3. Click on **Assign**

4. Repeat for each material you want to assign to each part of the mesh

https://docs.blender.org/manual/en/latest/render/materials/index.html

MATERIAL 2/2

Multi-material cube:

https://docs.blender.org/manual/en/latest/render/materials/index.html

TEXTURE

UV TEXTURE 1/2

You can apply texture using a flat image, the UV texture

It can be used to color the surface of a mesh and then it can be rendered as a flat image that wraps the object's surface.

You are actually painting a 2D image wrapped on a 3D mesh

The UV texture painted in Blender should be saved as a separate file: it is not automatically saved when saving the whole project
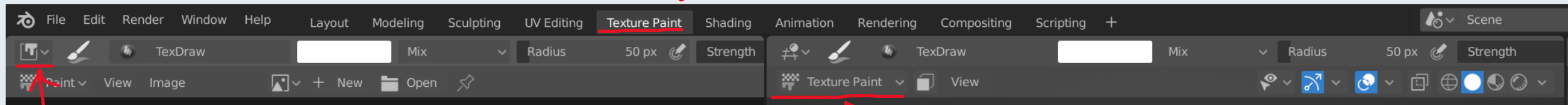
https://docs.blender.org/manual/en/latest/sculpt_paint/texture_paint/index.html

UV TEXTURE 2/2

In Blender you can directly perform texture paint, painting a 2D image in the Texture Paint window (1), that shows you the 2D Image Editor window on the left (2) and the Texture Paint Mode window on the right (3).
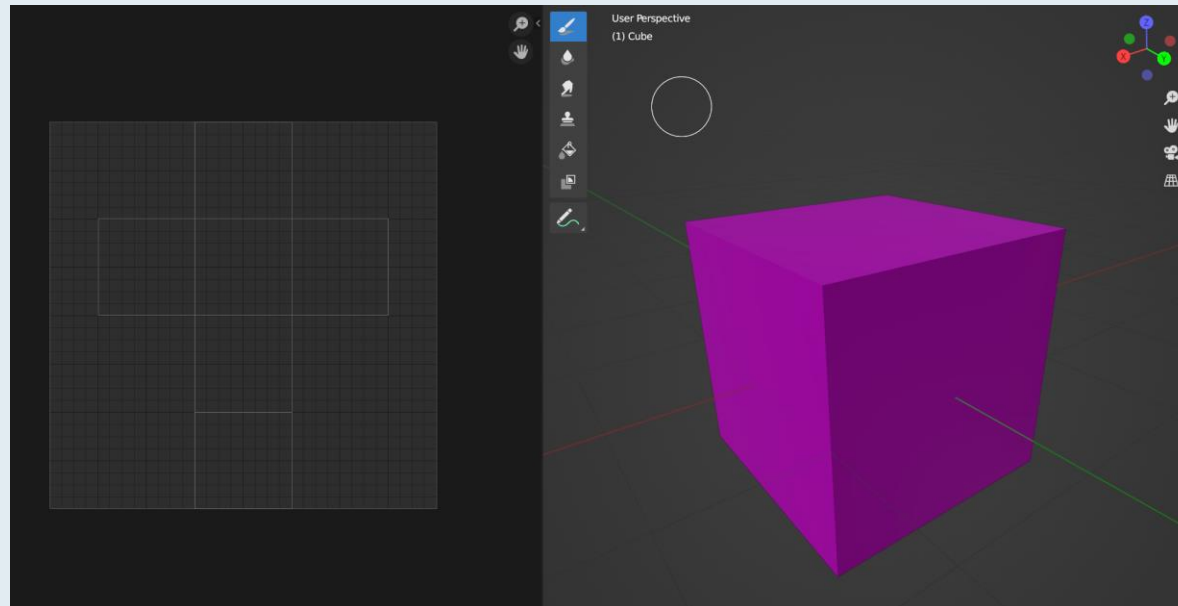
You can also import here external images (from Photoshop, GIMP, ...)

UNWRAPPING

You need to Unwrap your object to project it from 3D to 2D

- In Edit Mode, select the object with **[A]** and use **[U]**

- Select **Unwrap** to flatten the object's surface on 2D plane

SEAMS

For complex meshes, you may want to define a seam to guide the unwrapping process

The mesh will be unwrapped at the seams

To add an edge to a seam:

- Select the edge and **[ctrl]+[E] > Mark Seam**

to take an edge out of a seam:
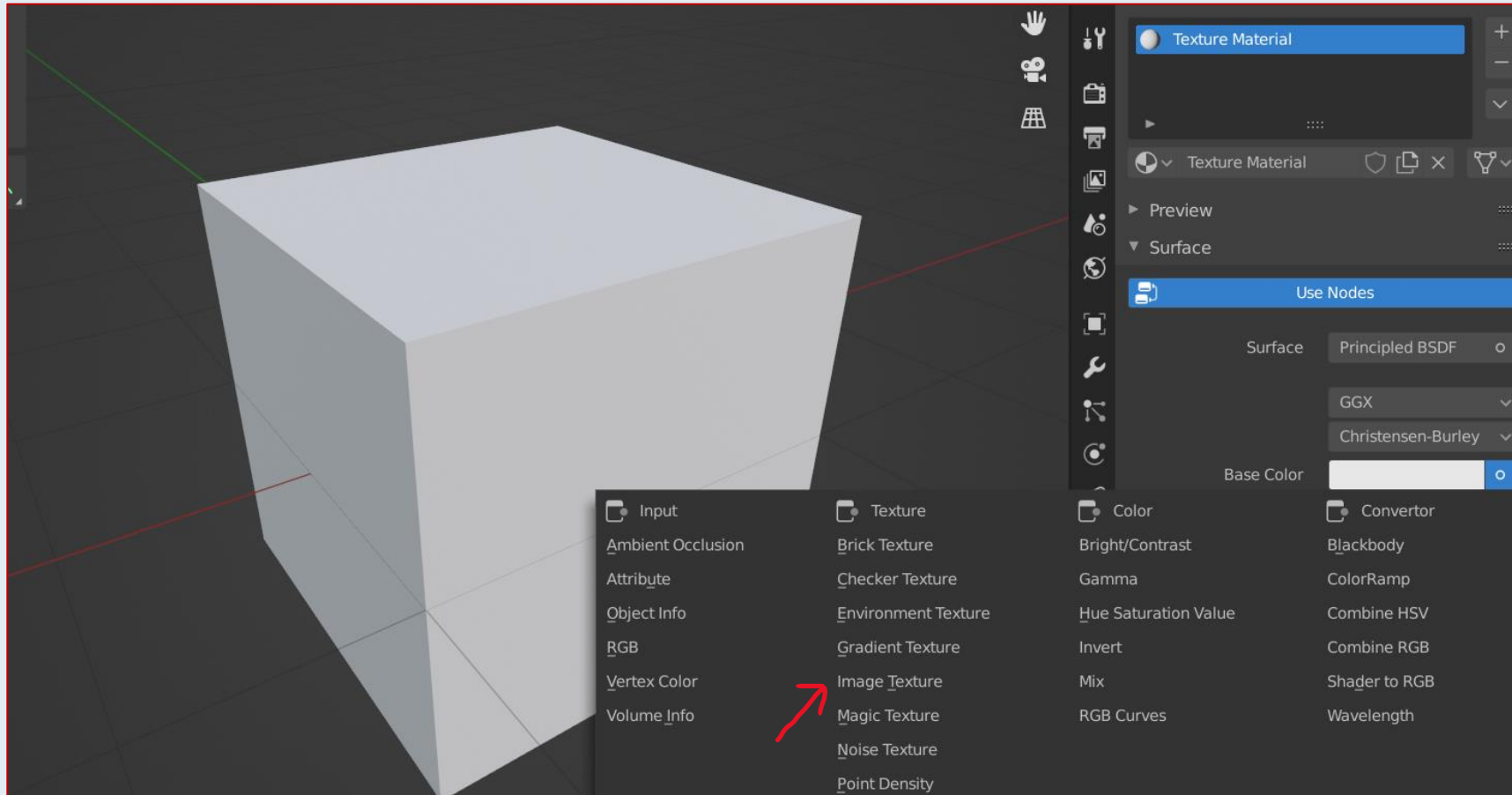
- Select the edge and **[ctrl]+[E] > Clear Seam**

Tips:

- You should avoid visible cuts when marking seams
- When unwrapping something mirrored, seam it along the mirror axis

https://docs.blender.org/manual/en/2.79/editors/uv_image/uv/editing/unwrapping/seams.html

TEXTURING 1/2

Before texturing, you need to create a new material and set as Base Color an Image Texture:

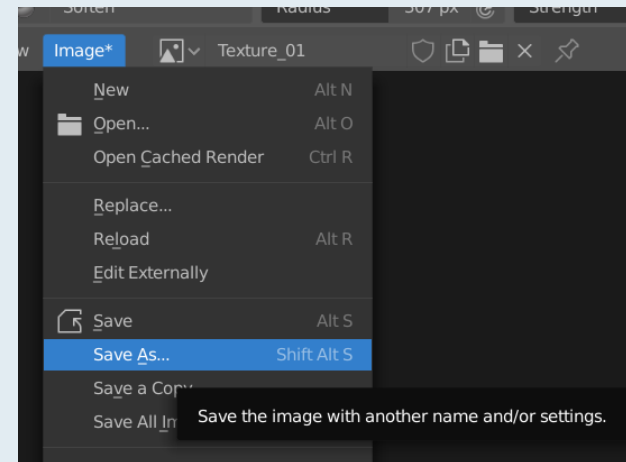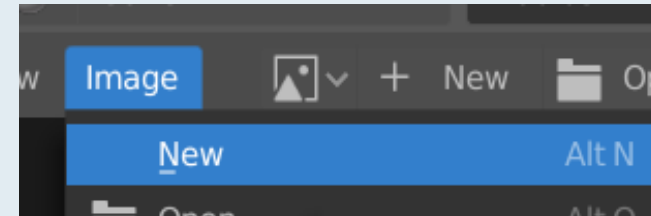# CREATE AND SAVE TEXTURE

In the Image Editor window:

You can create a new Texture image with:

- **Image > New**
- or clicking on **+ New**

You can save a Texture image with:

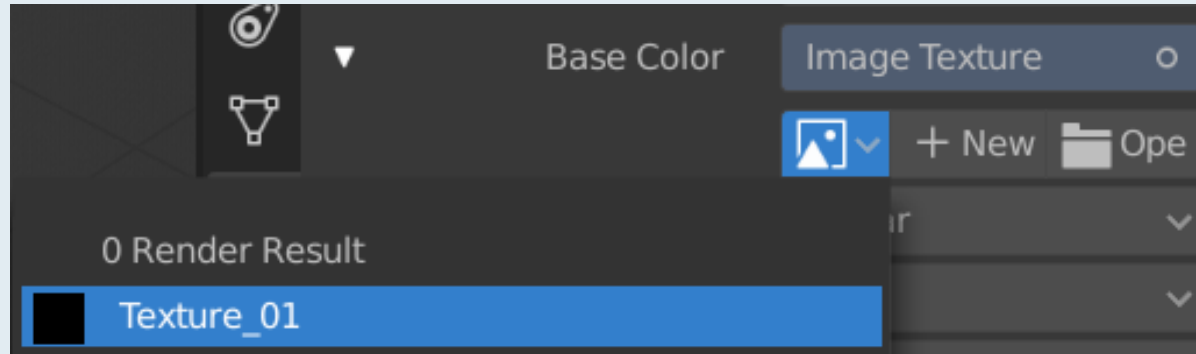- Click on **Image* > Save As**

https://docs.blender.org/manual/en/latest/sculpt_paint/texture_paint/index.html
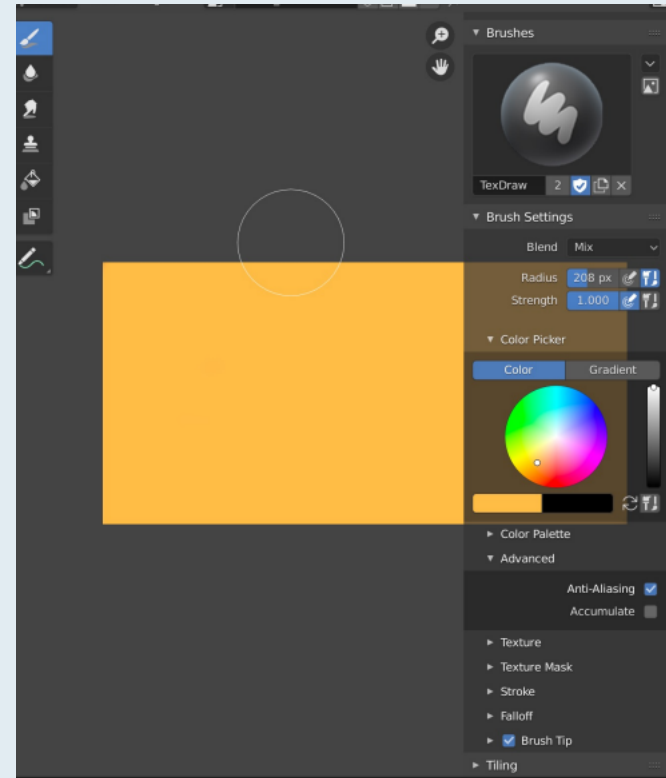
TEXTURING 2/2

In the created Material, select the image created previously (ore create a new one with **+ New** and save it):

PAINT TEXTURE TOOL PANEL

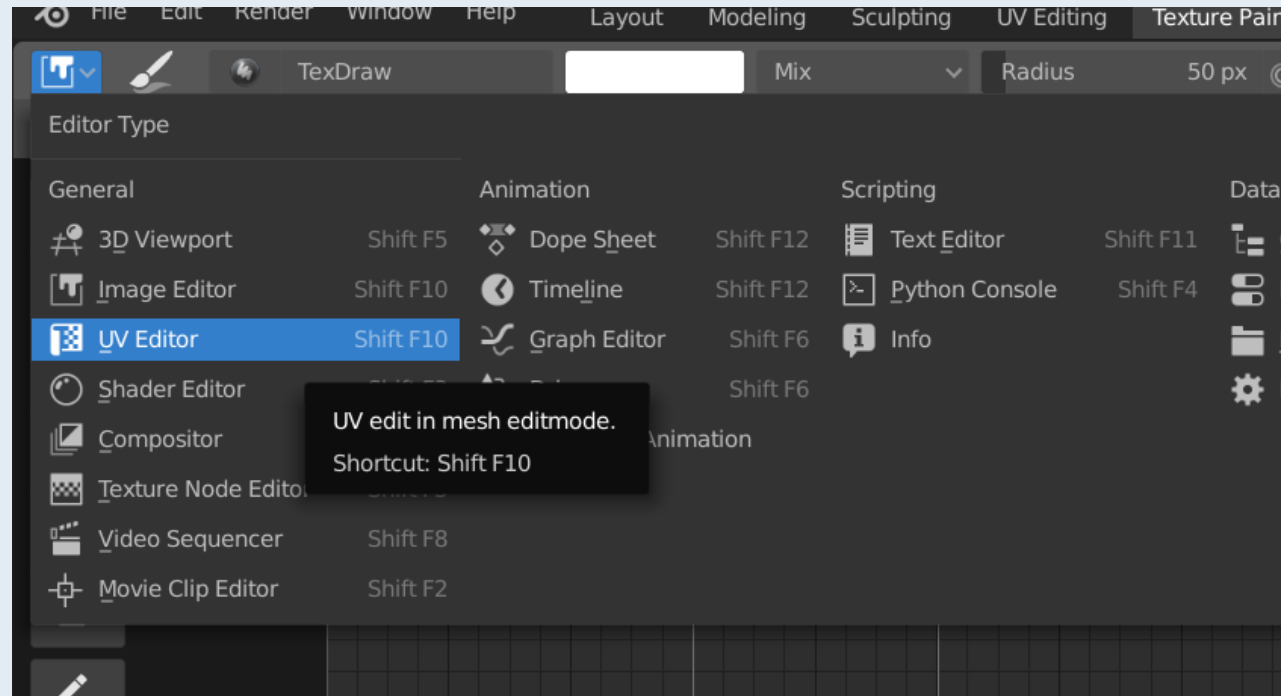Press **[N]** in the Image Editor window to make Tool right panel appear:

- You can select the brush color

- You can set brush radius in the Radius property

- You can select the brush strength in the Strength property

UV EDITOR

You can apply transformation on the vertices, edges, and faces of unwrapped mesh with **[G], [S], [R]**, as you can do in Edit Mode

On the left corner, select **UV Editor:**

PARTICLES

PARTICLES

Particles are items generated or emitted from mesh, and they are typically numerous. Each particle can be a point or a mesh and it can be joined/static or dynamic

1. Select the object on which you want to generate particles
2. Go to Particle System Panel
3. Click on + to add a Particle System Slot
4. In the Particle Setting you can choose between two types:

   - *Emitter:* animated particle system, generating particles (es. bubbles animation); you can also see the preview clicking on spacebar

   - *Hair:* static particle system, as hair or no animated objects

https://docs.blender.org/manual/en/latest/physics/particles/index.html

EMISSION OPTION

In the Emission you can set Particle's system options as:

- The *Number*: number of particles
- The *Seed*: the seed of random distribution of particles generation position
- Properties for Hair particles
- *Hair Length*
- *Segments:* the number of hair segments
- Properties for Emitter particles
- *Frame Start*
- *Frame End*
- *Lifetime:* the particles' lifespan in frames
- *Lifetime Random Variation:* gives to the particle's life a random variation
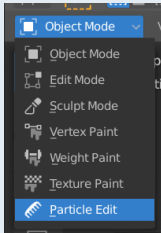
RENDER OPTION

In the Render section you can change how particles appear when rendered

In this section you can decide to Render as Object, with this option you can select another object in the scene that will be the particle:
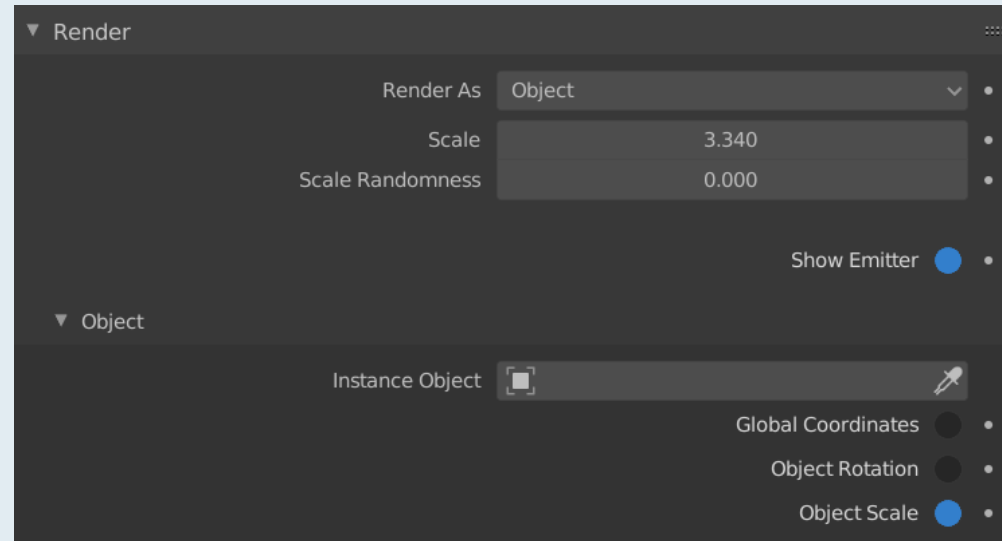
PARTICLE EDIT

Switch to Particle Edit Mode to edit and style hair particle

On the left, you can select the type of Brush you want to use:

➢ *Comb:* move the keypoints

➢ *Smooth:* parallels visually adjacent segments

➢ *Add:* add new particles

➢ *Length:* scales the semgents to make hair longer or shorter

➢ *Puff:* rotates the hair around its root

➢ *Cut:* scales the segments until the last keypoint reaches the brush

➢ *Weight:* useful for soft body animations

https://docs.blender.org/manual/en/latest/physics/particles/mode.html

ANIMATIONS

KEYFRAMES

A Keyframe is a marker in time, which stores the value of a property. The purpose is to allow for interpolated animation.
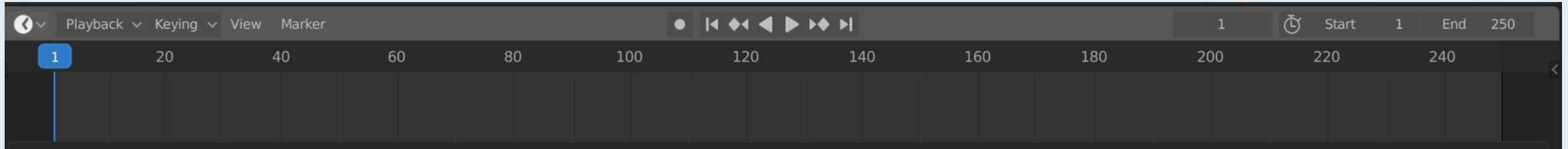
You can add a Keyframe in your timeline with **[I]**

- To add a Keyframe in a specific moment, select the frame in the timeline and then **[I]**
- There are different type of Keyframes:
  - Location
  - Scale
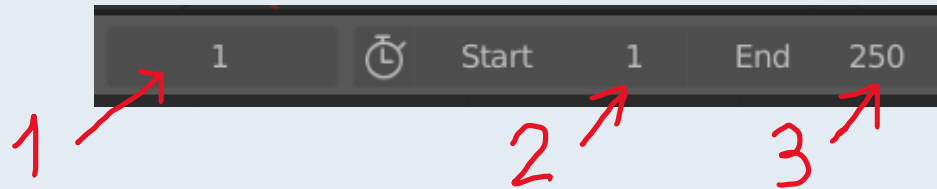 - Rotation
  - LocRot
  - …

TIMELINE

At the bottom of Blender's window you can find the Timeline panel, which shows the timeline where you can set the animation keyframes

- You can setup the **Current (1)**, the **Start (2),** and the **End (3)** frame of your animation on the right

1   2   3

- You can **Play** the animation with **[spacebar]**

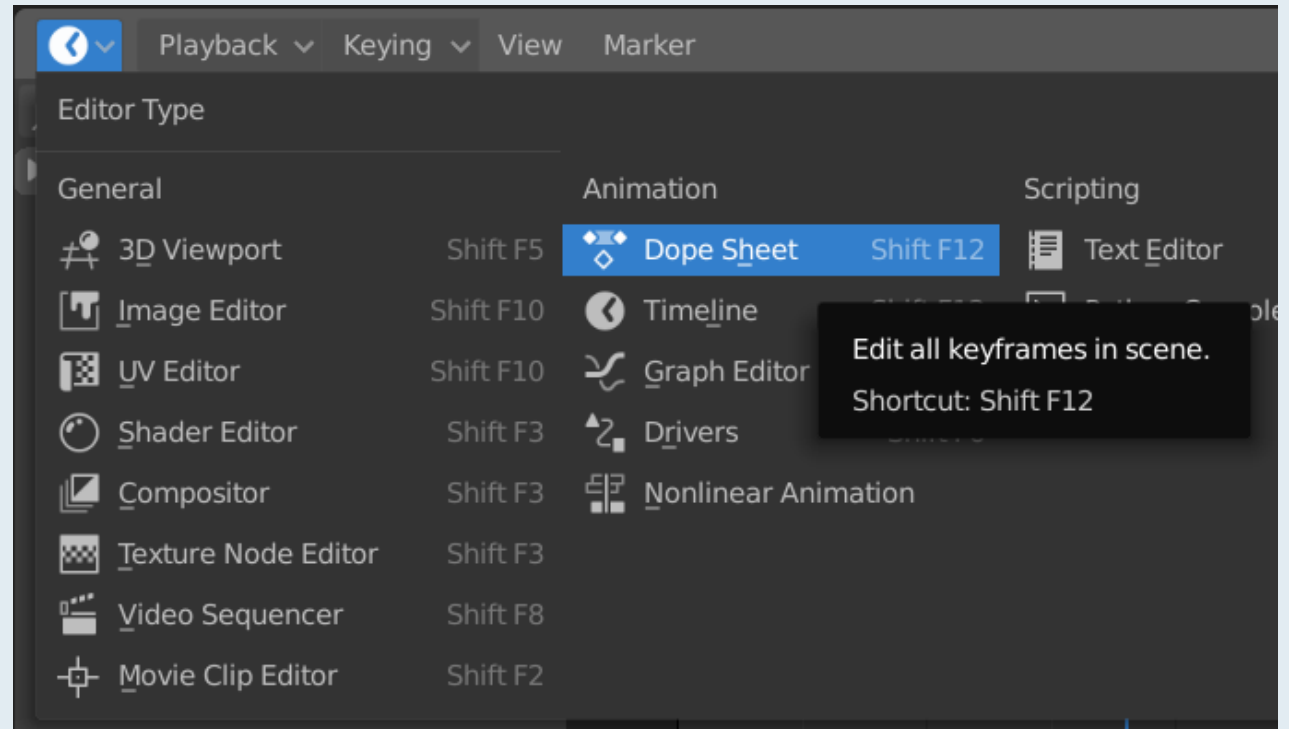https://docs.blender.org/manual/en/latest/editors/timeline.html
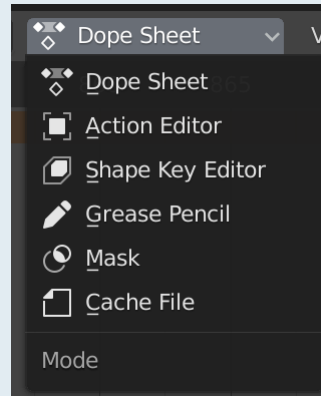
ANIMATIONS

You can manage Animations in the Animation Window:

- **Dope Sheet** can be used to edit keyframes

- **Timeline** can be used to playback and manage keyframes

- **Graph Editor** can be used to display the animation as curves, and to manage them
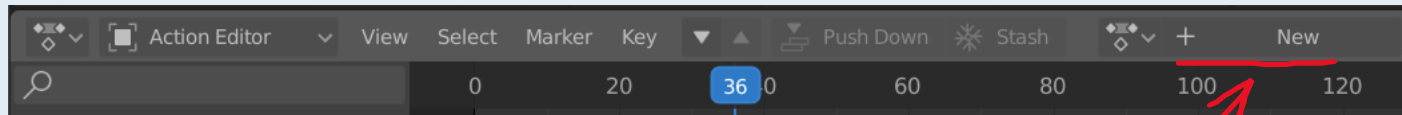
DOPE SHEET

Dope Sheet has different modes:

In particular, the **Action Editor** is where you can define and control <u>actions</u> (each different animation)

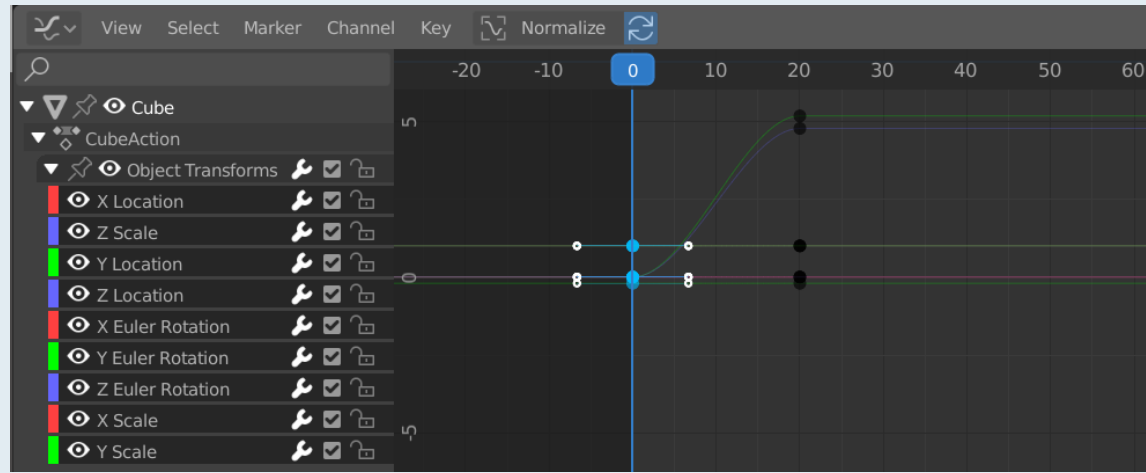Select Action Editor mode and click on **+ New** to create a new action

<u>https://docs.blender.org/manual/en/latest/editors/dope_sheet/index.html</u>

GRAPH EDITOR

The Graph Editor allows you to adjust animation curves over time for each property:

From Blender doc: *When using Bézier-interpolated curves it is possible to control the slope of the curve at the control points. This is done via the curve point handles; [...] Each curve point can have a different handle type, even within the same curve."*

https://docs.blender.org/manual/en/latest/editors/graph_editor/index.html

IMPORT/EXPORT

IMPORT-EXPORT

You can import or export your work with a different 3D file extension, the supported extensions include:

- **FBX**

- OBJ

- …

The import/export option is in

- File > Import > (extension name)

- File > Import > (extension name)