

# Maya 2015 Animation

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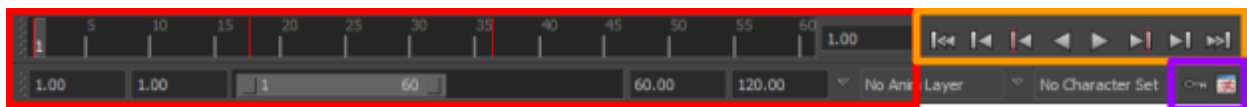
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## Timeline

The timeline tool allows you to set keyframes on certain properties of your object (e.g. translation or scale). Once you have those keyframes set, the object will transition between keyframe values as you move between the keyframes.

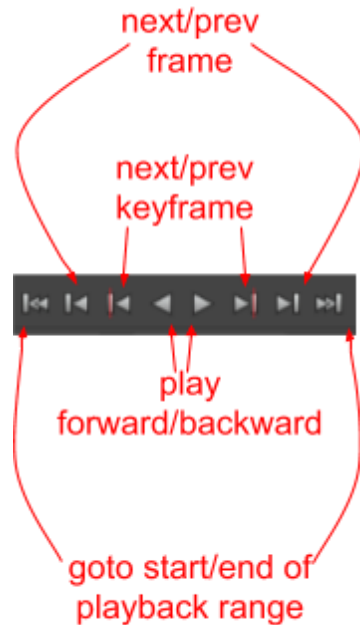
You don't need to open up the tool, it's visible by default on the lower portion of Maya. This is the first place you'd go to for roughing out an animation of your model.



### Timeline

The timeline allows you to scrub through your animation, set animation length / playback length, and see where keyframes are set on your selected object (where the red lines are in the timeline).





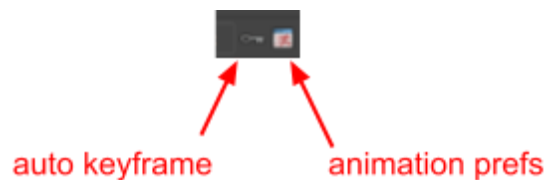
You can play the animation forward/backward, step through the animation by frame/keyframe, and easily jump to the start/end of your playback range.

One thing to remember is that your controls are limited to your playback range. If you have an animation of 200 frames but your playback range is only set to the first 60 frames, these controls will only take into account the first 60 (e.g. playing the animation will only play the first 60 frames).

## Help Buttons

The first button enabled the “auto keyframe” option. This is described further in sections below.

The second button opens the animation preferences option. Many of these options are available by right-clicking the timeline, but some are not.



## Adding Keyframes

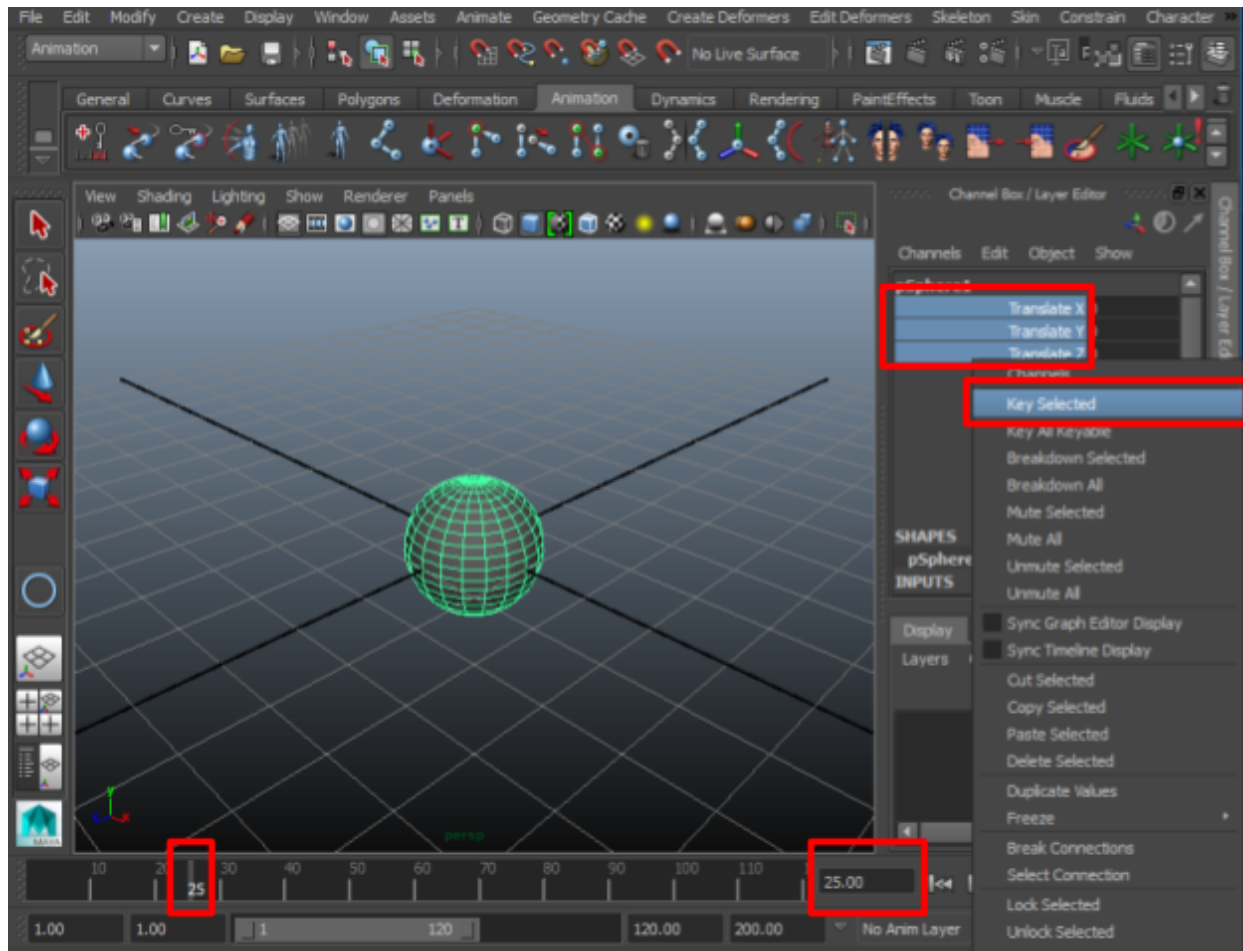
**NOTE:** Keep in mind that the timeline only shows you the keyframes for the selected object. If you select away from the object, you won't see where your keyframes are anymore. The dope sheet will help with this (described later on).

**NOTE:** Make sure to delete history and freeze transforms on your object before doing any animation. History and existing transforms may cause instability with your animation. It'll definitely make things more confusing if you ever end up using the graph editor (graph editor described in a later section).

You add keyframes on select channels of an object (channels are the properties that show up in the channel box). For example, you can add keyframes for translation, or translation+rotation, or translation+scale, or some other combination of channels.

To add a keyframe...

1. Select your object
2. Select the frame you want to keyframe in the timeline
3. Select the channels you want to keyframe, right-click and select Key Selected

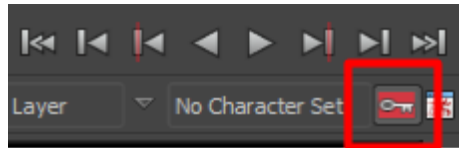


Once you do this, the channels you key'd will go red in the channel box + a red line will show in the timeline to indicate that a keyframe is there.

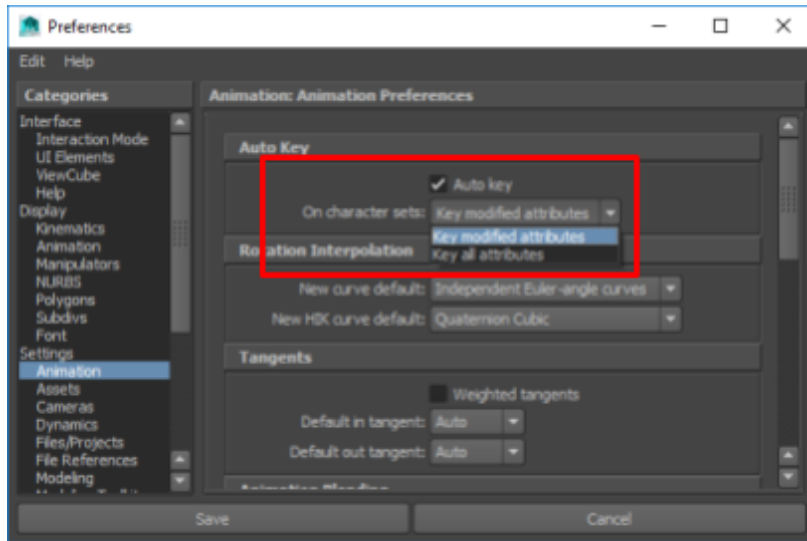


You can now navigate to another frame and repeat the exact same process to set another keyframe for the same object. When you go to a new frame and set the new channel value, you still have to right-click on the channel and select Key Selectable.

You may be tempted to think that you can just change the channel value and it'll automatically add a keyframe -- that won't happen unless you have the auto keyframe option toggled on.



**NOTE:** If you're having trouble with the auto keyframe option keying up EVERY channel instead of the specific channels you're animating on, go into the animation preferences and check the Auto key drop down.



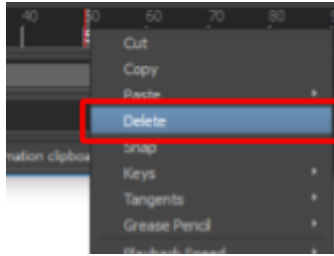
**NOTE:** The option underneath Key Selected is Key All Selectable. Rarely ever is this what you want. It will literally key every channel in the channel box, even boolean values like visibility. You should only key up on channels that you know you're going to be changing. You can always come back and add more channels if you need to.

If you ever do need it, the hotkey for Key All Selectable is S.

## Deleting Keyframes

**NOTE:** Keep in mind that the timeline only shows you the keyframes for the selected object.

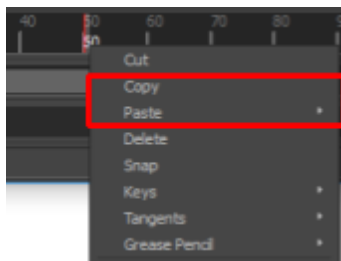
You can delete a keyframe by navigating to it in the timeline, right-clicking on it, and choosing Delete.



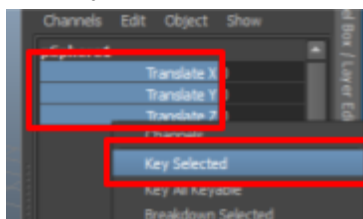
## Copying/Pasting Keyframes

**NOTE:** Keep in mind that the timeline only shows you the keyframes for the selected object.

You can copy a keyframe by navigating to it in the timeline, right-clicking on it, and choosing Copy. Then, navigate to the frame you want to paste to and right-click and choose Paste.



Another way to copy over a frame to a keyframe is to go into the timeline and MMB click-and-drag the frame to copy to the frame to paste to. Once done, go into the channel box and key the selected frames just as you would do if you're adding a keyframe.



**NOTE:** If you use the MMB click-and-drag approach and have auto keyframe enabled, it still won't automatically pick up. For this specific case, you'll still need to go to the channel box to "key select" the relevant channels.

You can also copy and paste by ranges. See how to select ranges in the subsection on moving/scaling below.

## Moving/Scaling Keyframes

**NOTE:** Keep in mind that the timeline only shows you the keyframes for the selected object.

You can move and scale keyframes in the timeline by Holding Shift + LMB click-dragging the area what you want to move/scale. The area you select will be highlighted red.

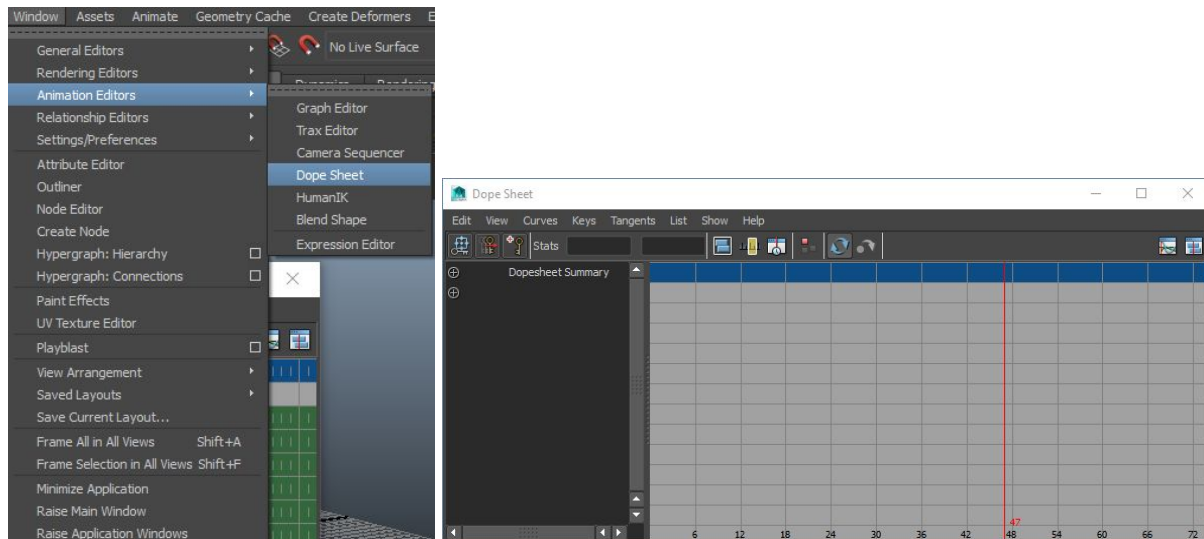
The outer arrows will allow you to scale, while the inner arrows will allow you to move.



## Dope Sheet

Part of the problem with using the timeline is that you can't really view/modify the animations for multiple objects individually. The dope sheet fixes this by giving us a stacked view of the timelines for each of the objects we select.

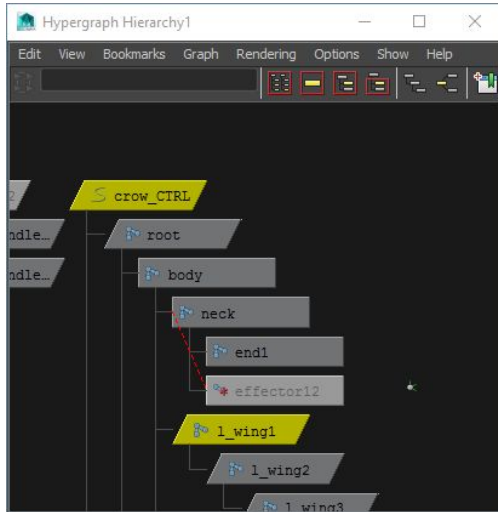
You can open the dope sheet by going to Window -> Animation Editors -> Dope Sheet.



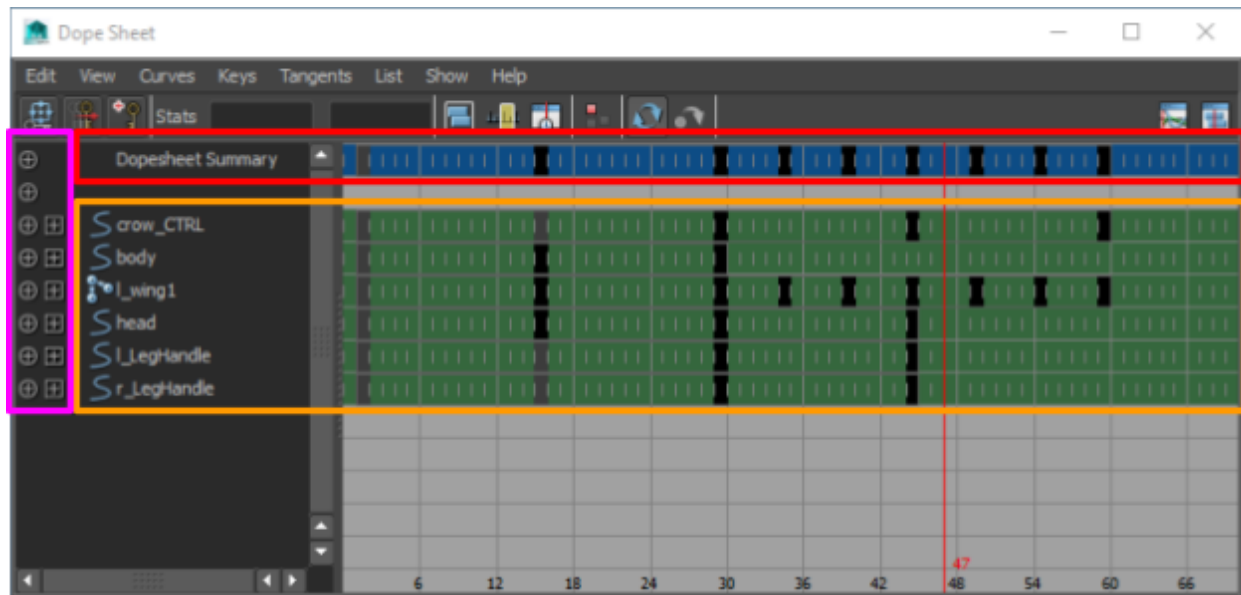


Before the dope sheet shows anything useful, you need to multi-select the various objects you've applied animation to. These could be: individual joints, rig controls, etc..

You can do this by directly selecting in the viewport, or you can go into the hypergraph and select the nodes which are slanted (slanted nodes = animated nodes).



As you select the nodes, they should show up in the dope sheet...



**NOTE:** Note the red line. It corresponds to where you are in the timeline. There doesn't seem to be a way to move this in the dopesheet, but if you move it in the timeline it'll sync to the dopesheet.

### Selected

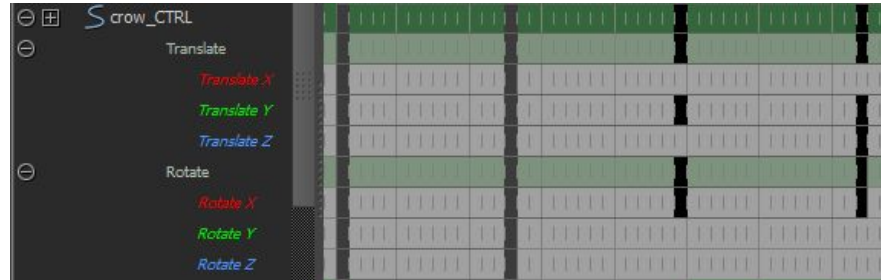
These are the items we've selected. The dopesheet shows frames they have keyframes on.

## Summary

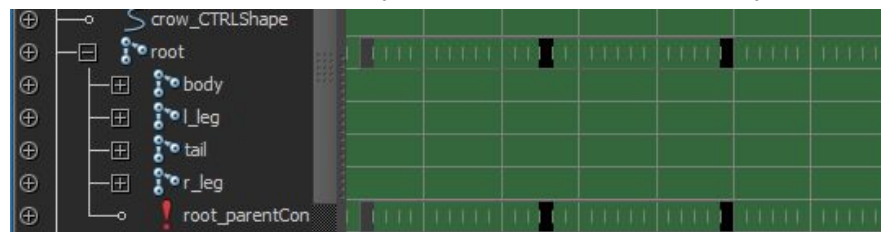
Summary is an aggregated view of all of our keyframes. As long as one of the objects we've selected has a keyframe on at some position, it'll show up on the summary as well (in that same position).

## Expanders

The circular expander shows you which properties of the object are keyframed on.



The square expander allows you to drill down the hierarchy of the object.



**NOTE:** Standard viewport camera mechanics apply to the dopesheet....

- Alt+MMB to pan
- Alt+RMB (or scrollwheel) to zoom
- LMB click+drag to multi-select marquee (Shift/Ctrl modifiers apply here)

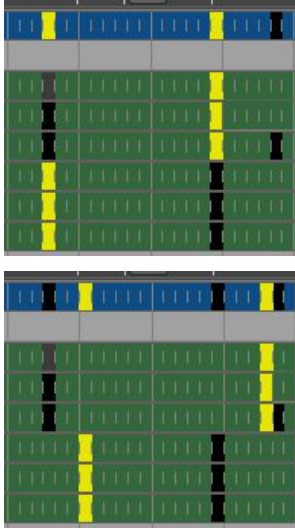
## Moving Keyframes

You can select multiple keyframes and move them by first hitting W (same as viewport translate hotkey) and then MMB click+drag.

**NOTE:** Standard viewport selection mechanics apply here...

- LMB click+drag marquee selects a bunch of keyframes
- Shift + LMB click+drag adds to an existing selection
- Ctrl + LMB click+drag remove from an existing selection

In the following example, the highlighted keyframes were moved 3 frames...



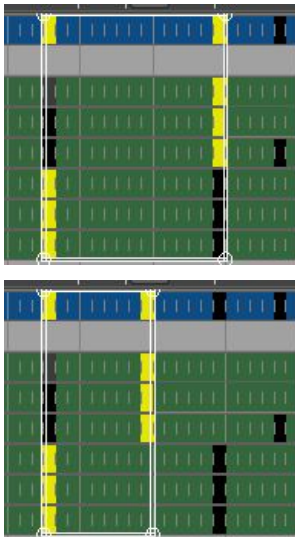
## Scaling Keyframes

You can select multiple keyframes and scale them by hitting the R key (same as viewport scaling hotkey). Once you're done scaling, you can hit W.

**NOTE:** Standard viewport selection mechanics apply here...

- LMB click+drag marquee selects a bunch of keyframes
- Shift + LMB click+drag adds to an existing selection
- Ctrl + LMB click+drag remove from an existing selection

In the following example, the highlighted keyframes were scaled down. Notice how the highlighted items have been framed up. You can scale by dragging one of the corners...

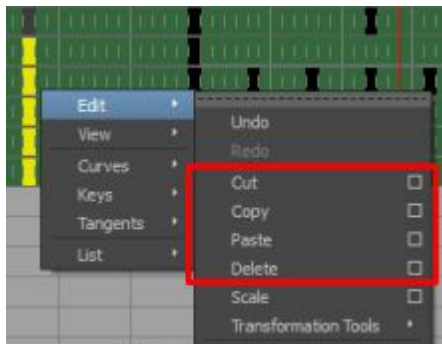


## Cut/Copy/Paste/Delete Keyframes

You can select multiple keyframes and copy/paste/delete them by right-clicking and going to the Edit menu.

**NOTE:** Standard viewport selection mechanics apply here...

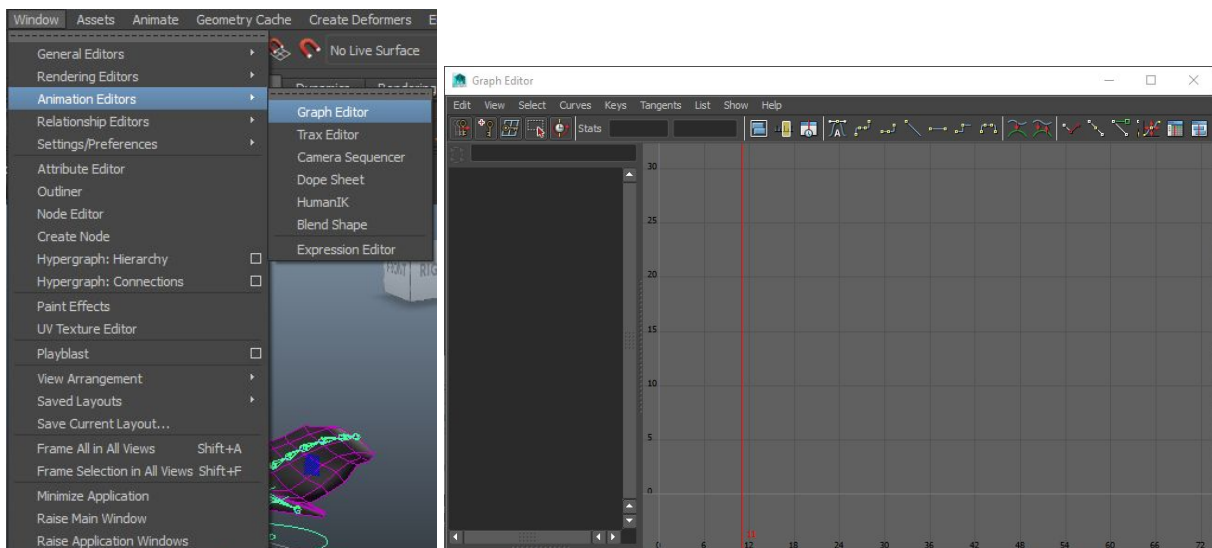
- LMB click+drag marquee selects a bunch of keyframes
- Shift + LMB click+drag adds to an existing selection
- Ctrl + LMB click+drag remove from an existing selection



## Graph Editor

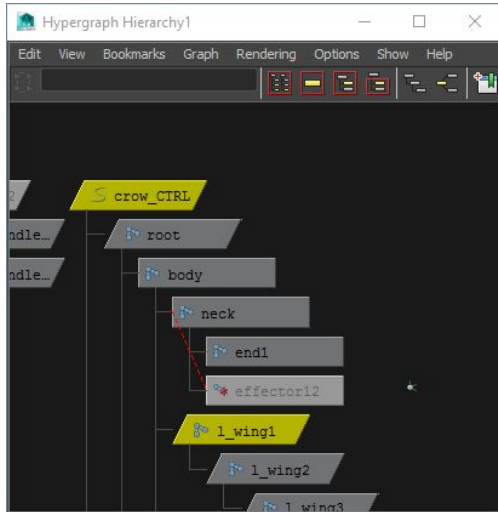
The graph editor is like the dope sheet, but instead of just showing you where the keyframes are, you get the ability to change how keyframes interpolate between each other.

You can open the dope sheet by going to Window -> Animation Editors -> Graph Editor.

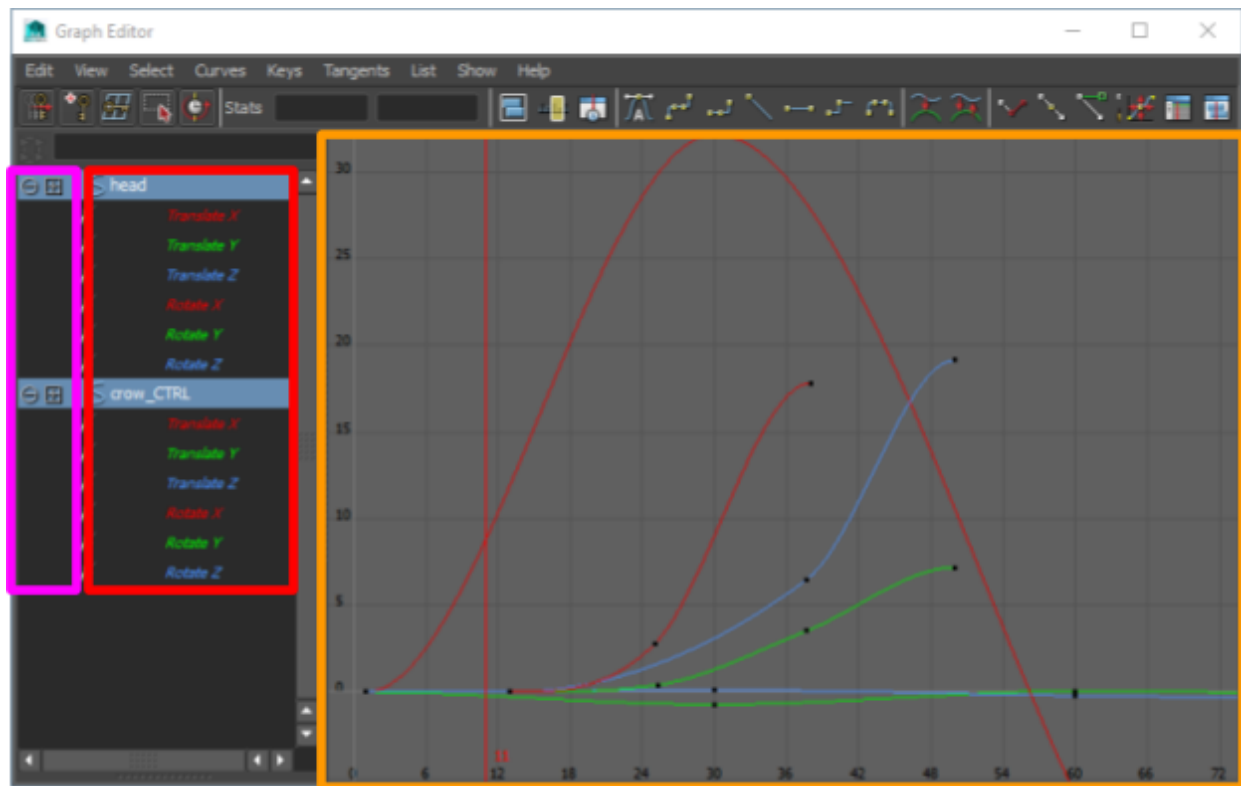


Before the graph editor shows anything useful, you need to select one or more objects that you've applied animation to. These could be: individual joints, rig controls, etc..

You can do this by directly selecting in the viewport, or you can go into the hypergraph and select the nodes which are slanted (slanted nodes = animated nodes).



As you select the nodes, they should show up in the dope sheet. However, unlike the dope sheet, you probably don't want to load up too many objects in the graph editor.



**NOTE:** Note the red line. It corresponds to where you are in the timeline. There doesn't seem to be a way to move this in the graph editor, but if you move it in the timeline it'll sync to the dopesheet.

## Selected

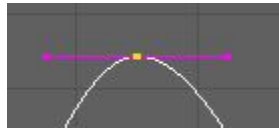
These are the items we've selected. You can select multiple or select individual ones. The plots will show for what you have selected here.

## Graph

Contains the plots for the stuff you have selected.

- \* Black dots on the plots represent keyframes
- \* X-axis is the frame number
- \* Y-axis is the value of whatever channel it is that's being plotted

You can select one or more keyframes at the same time. When you do, the dot will turn from black to yellow and the plot will change color to white (these indicate selection).



As you can see above, when keyframes are selected, handles show up that let you manipulate the curve via the tangent (the handles represent the tangent). You can select these tangents just as you would anything else.



In the example above, the right-side tangent was selected.

More on tangents later.

## Expanders

This is exactly like the dopesheet...

The circular expander shows you which properties of the object are keyframed on.

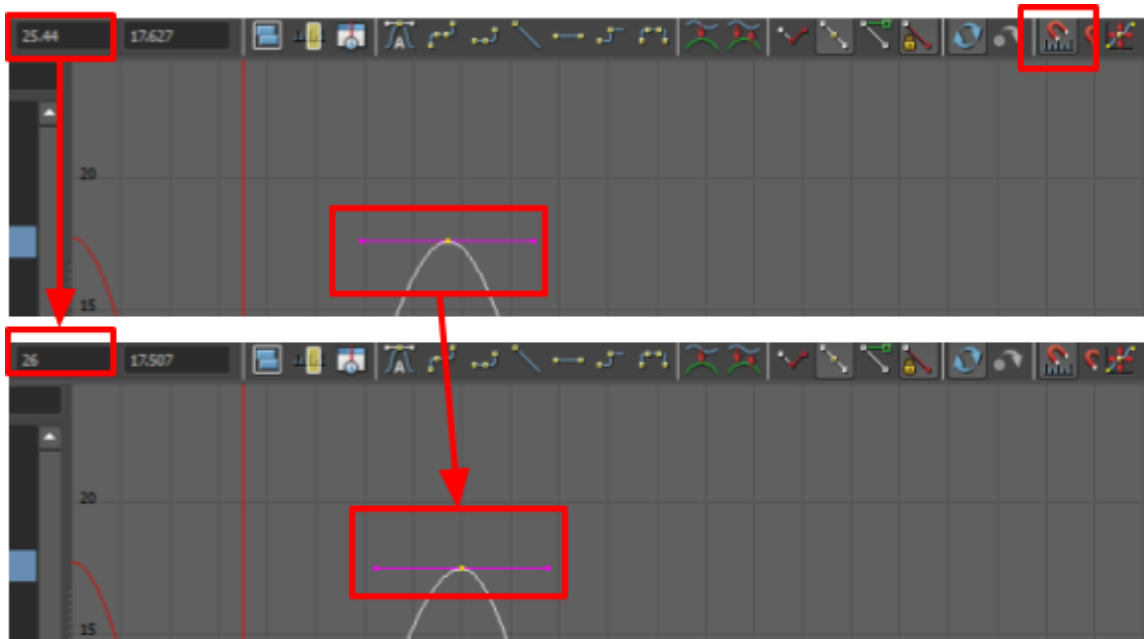
The square expander allows you to drill down the hierarchy of the object.

**NOTE:** Standard viewport camera mechanics apply to the graph editor....

- Alt+MMB to pan
- Alt+RMB (or scrollwheel) to zoom

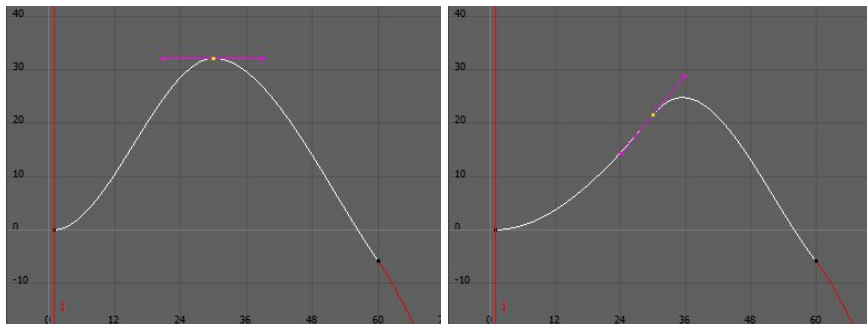
- LMB click+drag to multi-select marquee (Shift/Ctrl modifiers apply here)

**NOTE:** One bizarre thing you'll notice in the editor is that, initially, your keyframes show up at non-whole numbers (e.g. a keyframe on frame 26 may show up at 25.44). There's no explanation as to why this happens. But, if you want you can use the snap to grid feature in the toolbar to move them to the correct spot (how to move described further in subsections below).



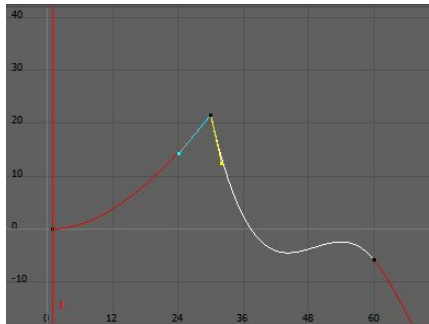
## Changing Keyframe Curves

You can change how keyframes interpolate between one another by changing the curvature between them (e.g. transition slower/faster into a keyframe). You can do this by either moving the keyframe up or down, or modifying the tangent handles...



By default, tangent handles are unified. That means that if you move one handle, the other handle will move along with it. You can break this to have more control over how your curve transitions.

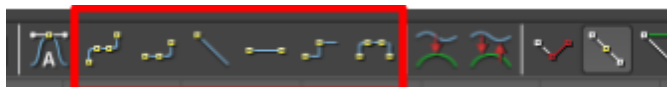
To do this, first select your keyframe, then go to the toolbar and click the break tangent button. Once you do this, you'll be able to move the handles independent of each other...



To get back, just click the button to the left of the break tangent button (called unify tangent). If you want you can also select both of your handles and click the auto-tangent button to get your 2 handles back to a straight line...



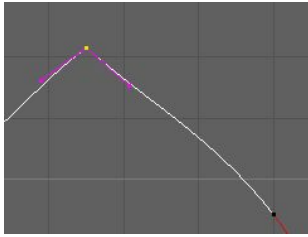
In addition to the auto-tangent button, there are several other buttons that will change the tangent to some pre-defined shape.



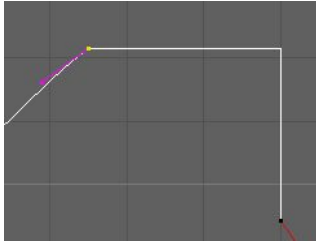
Of particular interest in the highlighted list above is the 3rd one and 5th one...



- 3rd = linear tangent -- breaks the tangent and makes the curve sharp



- 5th = step tangent -- breaks the tangent and turns the curve into a step



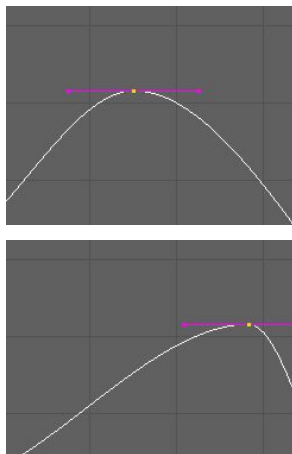
## Moving Keyframes

You can select multiple keyframes and move them by first hitting W (same as viewport translate hotkey) and then MMB click+drag.

**NOTE:** Standard viewport selection mechanics apply here...

- LMB click+drag marquee selects a bunch of keyframes
- Shift + LMB click+drag adds to an existing selection
- Ctrl + LMB click+drag remove from an existing selection

In the following example, the highlighted keyframes were moved 3 frames...



**NOTE:** You can drag past neighbouring keyframes. If you do, it'll just switch positions.

## Scaling Keyframes

You can select multiple keyframes and scale them by hitting the R key (same as viewport scaling hotkey) and then MMB click + drag.

**NOTE:** Standard viewport selection mechanics apply here...

- LMB click+drag marquee selects a bunch of keyframes
- Shift + LMB click+drag adds to an existing selection
- Ctrl + LMB click+drag remove from an existing selection

Some important things to remember with this...

1. WHERE YOU CHOOSE TO DRAG FROM IS WHERE YOU'LL BE SCALING FROM. A crosshair will show up when you start scaling that shows you where you're scaling from.

Keyframes before this point will go left/down.

Keyframes after this point will go right/up.

In the example below, the crosshair is at the second keyframe. That means the keyframe before it will go left and the one after it will go right.



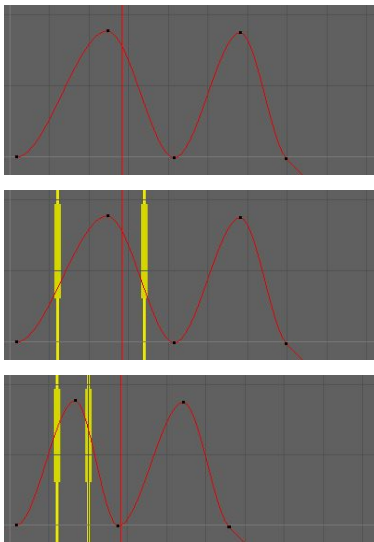
2. Once MMB is down, you can scale horizontally or vertically, not both. How you move the mouse after holding MMB defines which one happens.

Once determined, the mouse cursor will change to indicate which axis you're scaling about.

**NOTE:** If you want to scale just a portion of the plot without affecting the rest of it. Use the retime tool..



The retime tool lets you isolate a specific region (should have atleast 1 keyframe there) and just scale that region, without affecting anything on the outside of it. In the example below, note how we're isolating the first hump and shrinking it only. Everything before/after stays in the same place.



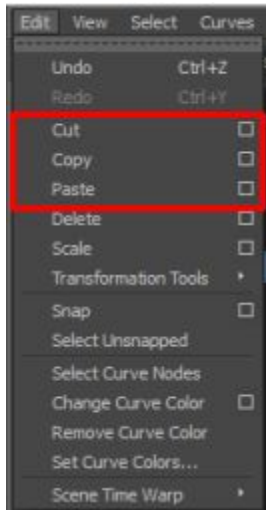
The tool will prompt you on what to do when you select it. If you need more information, search online.

## Cut/Copy/Paste Keyframes

You can select multiple keyframes and cut/copy/paste them by going to the Edit menu. Note that when you paste, it'll PASTE WHERE THE TIMELINE CURRENTLY IS. Adjust the timeline to where you want to paste before pasting.

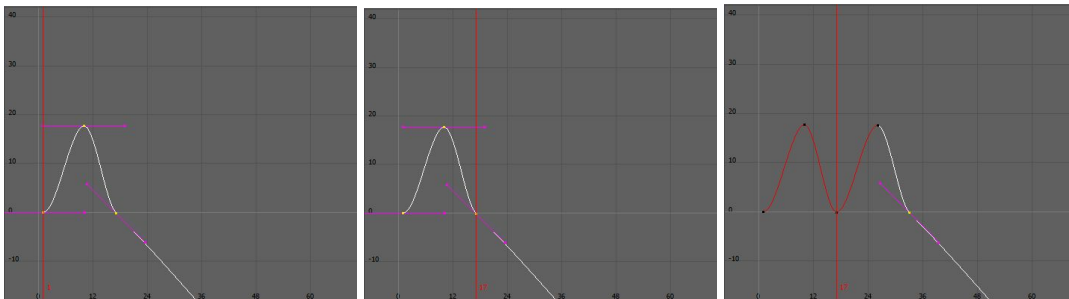
**NOTE:** Standard viewport selection mechanics apply here...

- LMB click+drag marquee selects a bunch of keyframes
- Shift + LMB click+drag adds to an existing selection
- Ctrl + LMB click+drag remove from an existing selection



**NOTE:** Unlike the dope sheet, this isn't exposed in the context menu. You have to go to the main menu for this.

In the following example... I copy my keyframes, then move the timeline to where I want to paste, then paste.

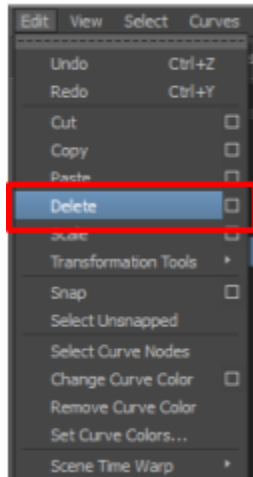


## Delete Keyframes

You can select multiple keyframes and delete them by going to the Edit menu.

**NOTE:** Standard viewport selection mechanics apply here...

- LMB click+drag marquee selects a bunch of keyframes
- Shift + LMB click+drag adds to an existing selection
- Ctrl + LMB click+drag remove from an existing selection



**NOTE:** Unlike the dope sheet, this isn't exposed in the context menu. You have to go to the main menu for this.



