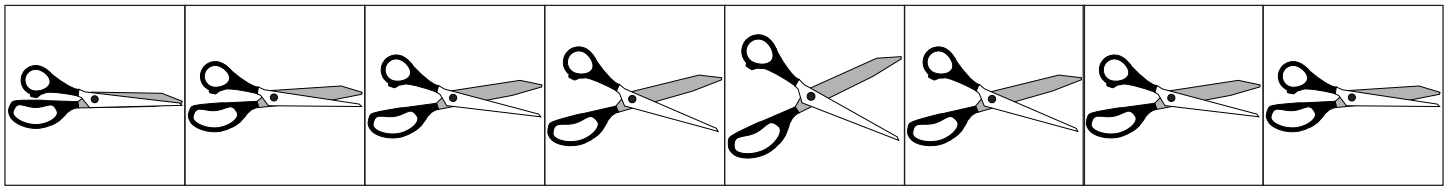
Motion Graphics Reference

Animation: A series of images that create the illusion of movement or change over time when viewed in sequence

Video: A time-based recording of visual images

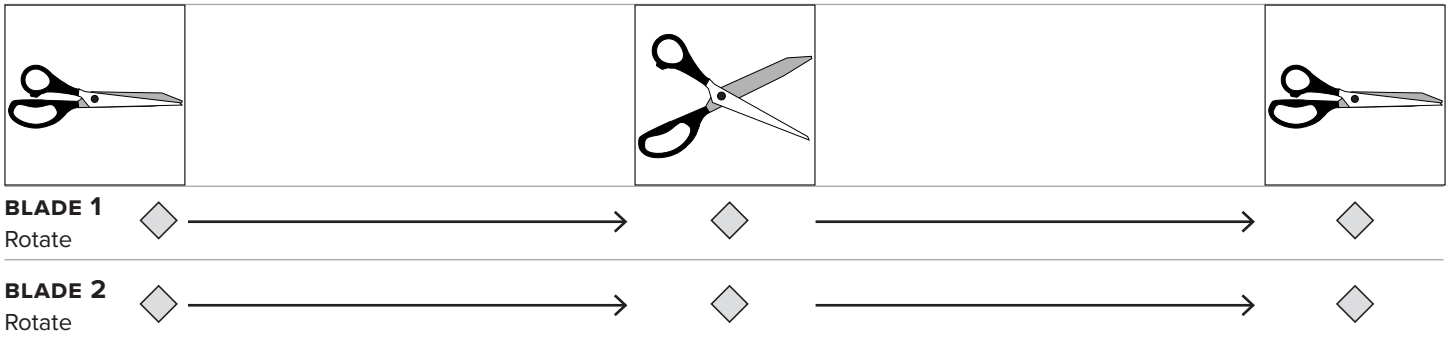
Frame By Frame Animation

A series of images shown in sequence, where artwork is prepared for each frame



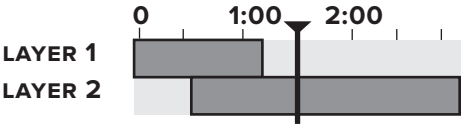
Keyframe Animation

Artwork is prepared only for the most important frames at the start/end of a change, and the in-between frames are generated.



Timeline

A visual representation of the passage of time, used in software and technology that allows time-based editing.



Frame

An individual still image within a video or animation. If you pause a video while it's playing, what you see is one frame.

Keyframe

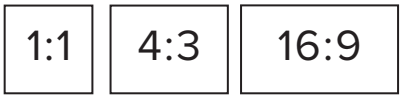
A frame that marks the start or end of an animated change or transition.

Composition

A container for working on a video. A composition has a timeline and a duration, and can have multiple layers with images, video or audio clips, and effects. A finished video can consist of 1 composition, or many.

Aspect Ratio

The width:height proportion of an image, video, or screen. Standard widescreen is 16:9, and standard non-wide screen is 4:3



Frame Size

The actual pixel dimensions of a video.

Some common sizes:

640 × 480	Standard Definition (SD) 4:3
640 × 360	Standard Definition (SD) 16:9
1280 × 720	720p HD 16:9
1920 × 1080	1080p HD 16:9
2560 × 1440	2K 16:9

Duration

The length of a time-based piece of media

00:00:00:00

hours **minutes** **seconds** **frames**

(Many apps/devices show fewer digits for time & the smallest is seconds or minutes)

Frame Rate

The number of frames per second. Higher frame rates look smoother.

16–20	Old silent movies	**25**	Standard European TV / video (PAL)
23.97	Better for film-to-video transfer than 24	**29.97**	Standard American TV / video (NTSC)
24	Standard for film/movies	**50+**	High Frame Rate (HFR)

Drawn animation: It's common for the number of drawings per second to actually be only half of the frame rate it's played at, or less.

Transition

A change from one state to another.
In film, this refers to how the change from one shot or scene to the next is handled, or an animated change happening between two keyframes.

Tweening

The process of generating in-between frames in an animation, based on 2 or more keyframes. Software like After Effects or Photoshop can do tweening for you, but in traditional drawn animation, “inbetweener” can be a separate job for animators handling the in-between frames.

Parenting

Linking one layer to another, so that it follows the same animation. Useful for not having to create or copy/paste the same keyframes over and over.

Easing

Making the start or end of an animation speed up/slow down, for more natural-looking motion.
Ease In: Slower going into keyframe
Ease Out: Slower coming out of keyframe
Easy Ease: Both directions

12 Basic Principles of Animation

If you’re interested in making animated motion and action look more convincing, you might want to look up the “12 Basic Principles of Animation”, created by a group of influential Disney animators. They are:

1. Squash and Stretch
2. Anticipation
3. Staging
4. Straight Ahead Action and Pose-to-Pose
5. Follow Through and Overlapping Action
6. Ease In, Ease Out
7. Arcs
8. Secondary Action
9. Timing
10. Exaggeration
11. Solid Drawing
12. Appeal

There are a lot of great explanations and examples of these online.

Properties

A property is anything about an object / layer that can be animated with keyframes.

AFTER EFFECTS PROPERTIES

In After Effects, every property that can be animated has a stopwatch icon next to it:



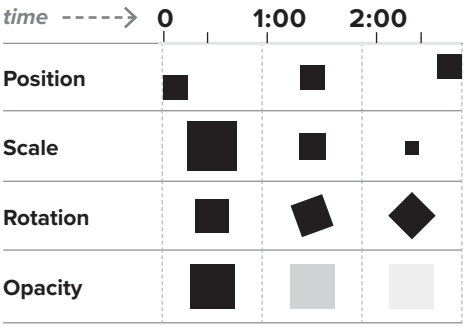
Off: any changes made to this property will not be animated.



On (blue): Clicking the stopwatch icon for the first time makes a new keyframe for that property at the current time marker. Changing the value of that property at any other point in the timeline will create new keyframes, and generate the animation between them.

Partial List of After Effects Properties

ALMOST EVERY LAYER



Anchor Point	The reference point for transformations (for example, the center of a rotate or scale)

TEXT LAYERS

- Characters
- Line Spacing
- Tracking
- Path
- Colour

SHAPE LAYERS

- Fill/stroke colour
- Vector points and paths

AUDIO LAYERS

- Volume

EFFECTS

- Colour changes
- Masks, mattes, and keying
- Lighting and shadows
- Generating special video effects
- Effects similar to Photoshop filters
- Draw a line along a path

CAMERA

- 2D or 3D camera movement
- Zoom, lens, etc

PHOTOSHOP PROPERTIES

Photoshop’s video timeline (but not frame animation) allows keyframes for position, opacity, and layer effects. If the layer is a smart object, it’s also possible to animate scale, rotate, flip horizontal/vertical, skew, distort, and perspective transforms.

Rendering

The process of generating a flat, finished, self-contained video file (.mov, .mp4, or other) from a layered working file like a After Effects .aep or Photoshop .psd

You can send After Effects compositions to render either in the After Effects Render Queue, or in Adobe Media Encoder, which has a larger set of options and possible formats.

ADOBE MEDIA ENCODER FORMATS

Media Encoder is a separate application that can be used either to render videos directly from After Effects, or to convert one video or audio file format to another.

Common Video Formats		
H.264	.mp4	Standard for digital video
H.264 Blu Ray	.m4v	Similar to mp4, but can include DRM copyright protection
MPEG-2	.mpg	Not as efficient as mp4, but still used
Quicktime	.mov	Bigger file size than mp4 (with default settings)
Audio		
AIFF **MP3** **Waveform Audio**	.aif .mp3 .wav	Audio only
Images		
JPEG **PNG** **TIFF**	.jpg .png .tif	Still images only
Other		
Animated GIF	.gif	

Photoshop’s File > Export > Render Video also contains a version of some of the Media Encoder settings, but with fewer options. Photoshop animated GIFs aren’t considered a video format, and are instead saved with File > Export > Save For Web.

Working In After Effects

Your working file (.aep) is a **Project**

A project contains at least one **Composition**

A composition can contain (each as its own layer):

- Imported audio or video files
- Imported flat image files
- Imported layered PSD or AI files
- Text and vector shapes made in After Effects
- Other compositions (“nested comps”)

...and the motion, animation, special effects, and timing that you set up for any of these layers.

Your project can also contain extra files and comps you’re not using.

Rendering

VIDEO FILES

.mp4 **.mov**

The .aep project file is a working file, and it’s not a self-contained video that you can play outside of After Effects.

To generate video files from your After Effects project, you need to render them from a composition.

Composition Settings

Preset: Contains the settings for matching some common formats

Width and height: The size in pixels

Lock Aspect Ratio: Keeps the proportions between width + height consistent when you change the pixel size. For example: 16:9 is the shape of a standard widescreen video.

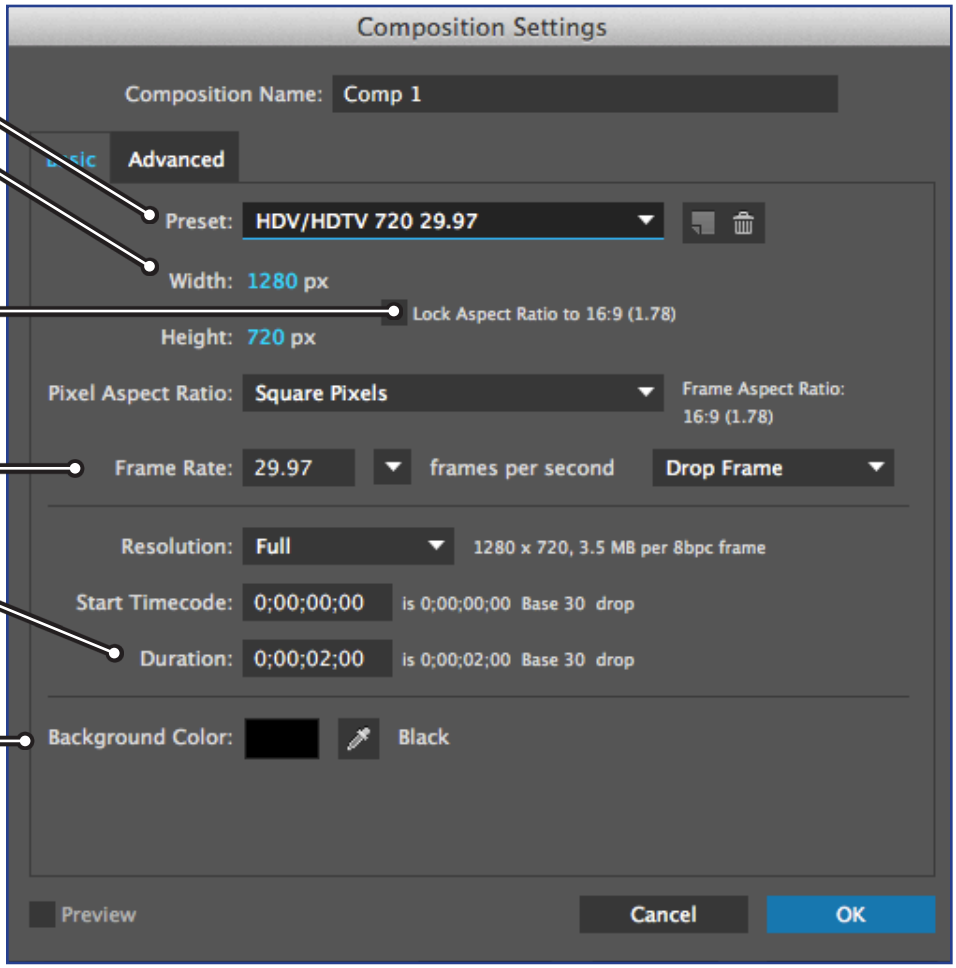
Frame rate: The number of frames per second. Higher frame rates look smoother, and 29.97 is the standard for American TV and video.

Duration: time length of the comp.

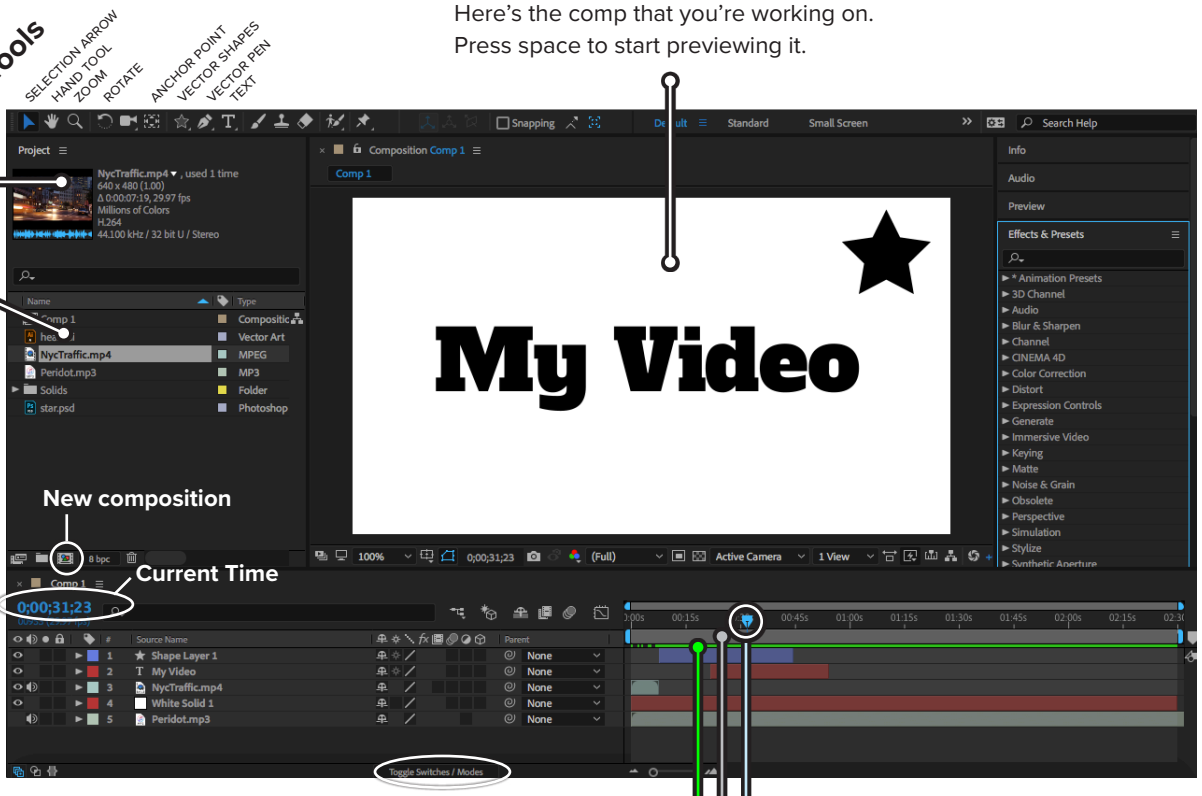
00:00:00:00

hours **minutes** **seconds** **frames**

Background Color: This is for working in After Effects, NOT your final video! If you want a background colour other than black in your video, you need to include it as a layer.



Basic After Effects Workspace



After Effects: Time + Previewing

Time

You can adjust how time works for an entire layer by selecting it and going to **Layer > Time** in the menu:

Time-Reverse Layer	This makes the whole layer play backwards. **Note:** there is a separate way to make a series of individual keyframes play backwards, and it's called Time-Reverse Keyframes. You can find it either by going to Animation > Keyframe Assistant in the menu, or control/right-clicking on the selected keyframes in the timeline.
Time Stretch...	This lets you speed up or slow down the layer based on either a percentage, or a duration. For example: • A 10 second long layer that is changed to 50% becomes 5 seconds long, playing twice as fast • A 10 second long layer that is changed to a duration of 20 seconds will play twice as slowly (200%)
Freeze Frame	This freezes the entire layer on a single still frame, which you can choose with the timeline marker.
Freeze on Last Frame	This freezes the layer on its last frame. It will play normally, and then just look like its last frame for the rest of its timeline bar.
Enable Time Remapping	This is the starting point if you want to customize other types of time changes within a layer. It doesn't work on all types of layers, but you can get around that by putting them in their own comp, and applying time remapping to that. You can do this quickly by right-clicking the layer and choosing "Pre-compose"

Preview Rendering and Real Time Playback

"Rendering" is also the word for generating a finished video file from a layered working file... but After Effects is also doing some rendering while you work, so that you can watch previews of the composition. It needs to do this each time you preview, when something has been added or changed since the last preview.

The coloured bar above the timeline layer blocks and below the time numbers & work area bar represents how much of the comp is rendered and ready to preview, and any gaps are parts that aren't rendered yet. Playback can be slow and choppy while it's filling in the gaps, and you can open Window > Info to check whether it's playing in real time.

Green bar: preview is stored in RAM (fastest) / **Blue bar:** preview is stored in disk cache
After Effects will try to preview in green whenever possible, but if that doesn't have enough space, it's blue instead. Gray gaps that won't fill = not enough space in either.

Troubleshooting Previews

If it's still not playing in real time after letting the preview run a few times, or if it's stopped rendering or previewing entirely, here are a few things to try:

Preview at lower resolution, or zoomed out farther so that it looks smaller. In the default workspace, these options are above the timeline and underneath the visual preview. The resolution options are Full, Half, Third, Quarter, Auto, and Custom.

Clear out the old previews.
Under Edit > Purge in the menu, there are options to clear memory (RAM), and disk cache. Doing this will also clear the current preview, but there will be more space and memory available now that older previews aren't being stored.

Give After Effects more storage space.
If you go to After Effects > Preferences in the menu, there are options under "Media & Disk Cache", including the total number of GB (gigabytes) it's allowed to use. Cleaning up the computer and deleting old files to free up more hard drive space can help here. You can also choose to use an external plug-in drive for the disk cache instead (but this will only be an improvement if it's a fast drive with lots of space free.)

Let After Effects use more memory.
If you go to After Effects > Preferences in the menu, there are options under "Memory" – and here you can see your computer's total memory available, and how much of that is reserved for other applications. Lowering the amount reserved for others means more for After Effects. Not having other applications open and running at the same time also helps.

Identify troublemaking layers.
Certain types of layers can slow down the rendering, including some effects & blending modes, masks, 3D, and large high resolution placed images. If you're working on other parts of the project where it's not necessary to see these layers, it might help to not include them in the preview.

This is also why some video files take a long time to render in Render Queue or Media Encoder: the longer the duration is, and the more complex the layers are, the longer the render time and the demand on your computer's resources.

Try moving the project to a school computer. The biggest factor in all of this is how much memory and space your computer actually has available.

On a Mac, you can check this by clicking the apple in the top left corner of the screen, then About This Mac. The school iMacs have 32GB of RAM, so if your laptop has 4, 8, or 16, switching to the school machine will probably make your work easier with After Effects rendering faster.

We have 2 iMacs available in the COMD studio, and you can also work in the Mac labs when there are no classes in them. (B4115, B1110, and B1122.)

After Effects: More Tips + Tricks

Adjustment Layers

Using adjustment layers to apply effects is usually a more convenient and flexible way to work than adding effects directly to individual layers.

To create an adjustment layer:

Layer > New > Adjustment Layer

The adjustment layer will be empty at first, and effects can be added through the **Effects** menu (for example: Effects > Color Correction > Tint.) Most effects also have properties that can be animated, which will add keyframes to the adjustment layer.

Adjustment layers affect all layers that are below them in the layer order.

Presets

After Effects comes with a library of presets that can be added to layers (which is quicker and easier for certain tasks than setting it up yourself), and they can be found in the **Effects & Presets** panel (Window > Effects & Presets.) For example: the preset for animating a text layer so that it looks like it's being typed in letter by letter is:
Effects & Presets > *Animation Presets > Text > Animate In > Typewriter

To apply a preset: select the layer, move the time marker to the place in the timeline where you want it to start happening, and double-click the preset.

Adjusting a preset: Selecting any layer and pressing **u** on the keyboard will open up only the properties that have keyframes. That means, if the layer has a preset applied, you can use this to see which properties and effects the preset is actually using, adjust their numbers/settings, and add/edit/move keyframes.

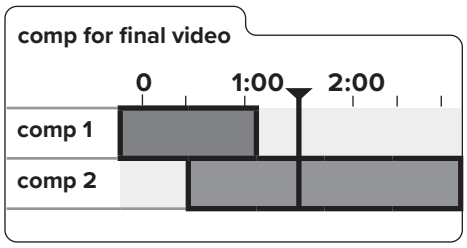
Adding more presets: There are many more presets that people have created and made available to download (some are free, and some cost money.) On a Mac, the place to put these downloaded files so that they show up in After Effects is **Applications > Adobe After Effects > Presets**

Besides presets, you can also download **plugins**, which can add extra functions and features to the After Effects software.

Comps Within Comps, Layers In Sequence

To work with a series of different videos or compositions together and arrange them in sequence, you need to create another composition to act as a container, with a duration long enough for all of them. Each will have its own layer in this composition.

Layers will be hidden underneath the layers above them whenever their timeline bars overlap, unless the upper layer has transparent areas, blending modes, or opacity set lower than 100%

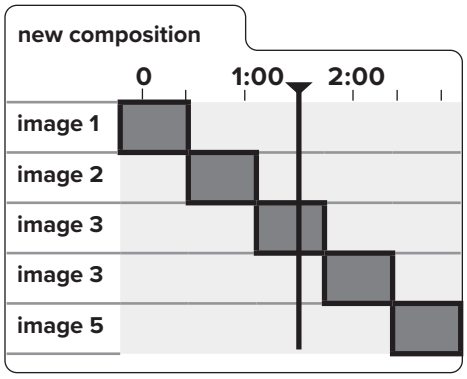


Example: *There are two compositions inside this container composition. Comp 1 has a shorter duration than Comp 2, and there is some overlap between them.*

Frame By Frame Image Sequence

Here's a way to set up a series of images to play as a frame-by-frame animation in After Effects, in a format where you can easily edit the timing and each frame:

- Select all the image files (not a whole folder containing them), and place or drag them into the AE project. It's a good idea to have the files numbered in order.
- Select that same list of image files in the AE Project panel, right-click (or control-click) them, and choose **New Comp From Selection**
- In the window that comes up, make sure Sequence Layers is checked. The duration here is the length of time for each frame.
- The new comp will have the series of images organized into layers, in a pattern that looks like stairs. The bars are arranged so that it plays in order.



Example: *This frame-by-frame sequence has five different images, which all have the same duration. They will play in the order 1,2,3,4,5*

- Once this is set up, it's easy to place this entire frame-by-frame comp into another comp, to use as part of a larger project.

Motion Along A Path

Animating a layer with Position keyframes creates a motion path – and this path is a vector line that can be edited by dragging its points + handles, and with AE's vector pen tools.

DRAWING A CUSTOM MOTION PATH

- First, create a placeholder layer for the path. This layer isn't meant to be visible, and "Solid" or "Null Object" are good New Layer choices. Now, with that layer selected, either draw the path with AE's pen or shape tools, or paste a copied vector path (even paths copied from Illustrator!)
- With that layer selected, press **M**, or open it until you see the property **Mask Path**. Click the words Mask Path to select the property, and then copy.
- Now, go to the layer that you want to move, select the **Position** property, and paste. Keyframes for the path should appear, and you no longer need that first layer with the mask path.

ORIENT ALONG PATH

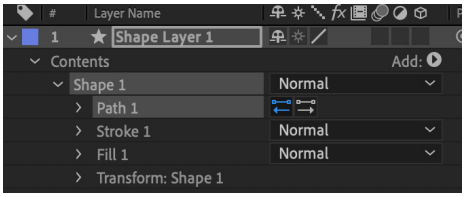
- To make the object automatically rotate to face forward as it moves along the path: select the layer, and go to:
Layer > Transform > Auto-Orient > Orient Along Path.

After Effects: Vector Shapes + Paths

Drawing Shapes

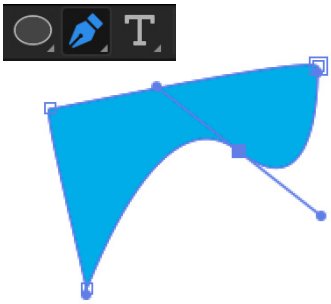


You can draw vector shapes with the shape and pen tools in After Effects. Vector shapes will appear in the timeline as **shape layers**. They can be animated with the regular set of Transform properties (Anchor Point, Position, Scale, Rotate, Opacity), plus a few other properties like fill and stroke colour, and animating changes to the vector points and path.



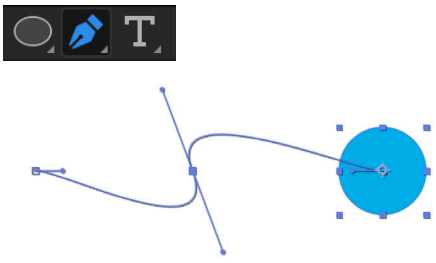
If you want to draw a new shape, make sure no other layers are selected. If something is selected, the vector tools will draw a mask for that layer, instead of a new shape layer.

Shapes drawn with the pen tool can also have their points and curve handles edited with the pen tool



Motion paths are vectors

If you have a layer that's animated with Position keyframes, the motion path can actually be edited with the pen tool! You can move the vector points, and bend the handles to make curves

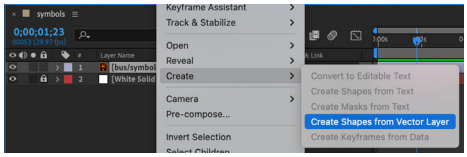


Imported Illustrator Files

When you import an Illustrator .ai file as a composition, the layers don't behave like vector shapes. If your layer has an orange AI icon, that's a pixel version of the Illustrator artwork, and if you make the size any bigger in After Effects, it will start to look blurry.

Fortunately, we can convert AI layers to AE vector shape layers. Either right-click on the layer, or go to the Layer menu, and choose

Create > Create Shapes from Vector Layer



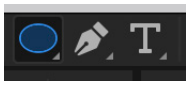
It will make a new copy of the layer, and you can delete the original.

Vector Masks

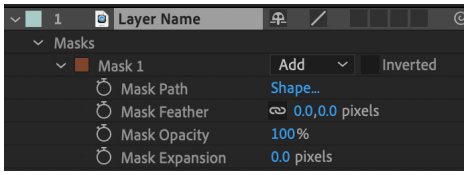
If you draw with the After Effects vector pen or shape tools with another layer selected, it will make a mask shape for that layer.

Properties for the mask are added to the layer, and can be animated (for example, animating "Mask Path" can make the mask shape change over time.)







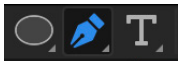


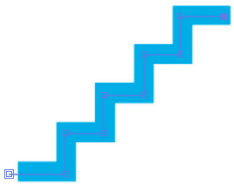
Animating a Stroke

Making a line look like it's drawing itself in is a popular effect. Here's one method:

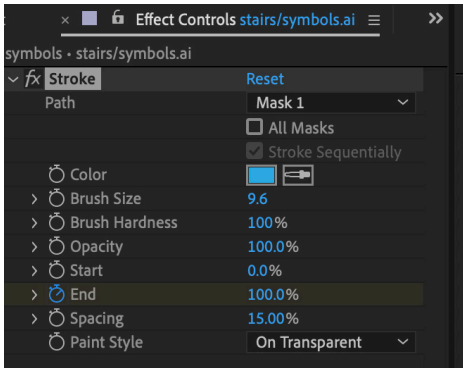
We'll need to start with a placeholder layer, and draw or paste a path on top. In this sample, I traced over the staircase shape image with the AE vector pen.

You can also copy and paste a vector path from Illustrator, with your After Effects layer selected.





Now, go to **Effect > Generate > Stroke.**



You can style the look of the line with properties like colour and size. The property to animate with keyframes to make it "draw" is **End**, from 0 to 100%.

I chose **On Transparent** to hide the original layer, and just show the new line. There are also options to keep the layer visible, or have the path "reveal" the original layer as it draws.

The vector paths that you're using for Generate Stroke are "masks" on the layer in After Effects. If you're using more than one path to draw multiple lines, choose **All Masks.** Stroke Sequentially means that they will appear in the same order that you originally drew them.

