Adobe Illustrator Crash Course

Moderate: Complex Shape Editing

Overview

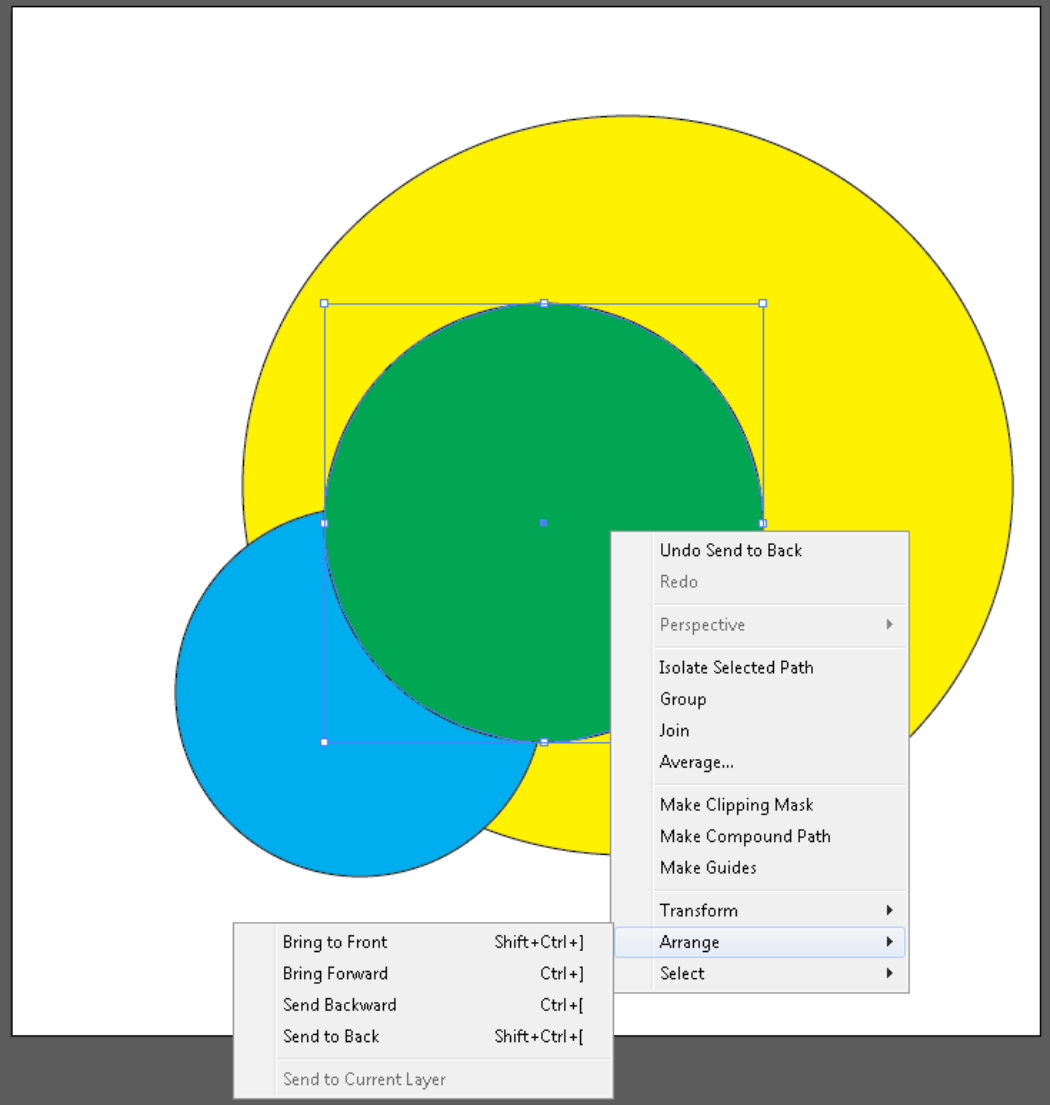
- You should have read the Superbasics & Basics tutorials and can navigate Illustrator, use basic terminology, and create/edit simple shapes
- We will now study how to manipulate these shapes in a more advanced way to create more complicated parts

Moderate Techniques

- Order
- Grouping
- Editing Paths
- Image Trace
- Outlines
- Non-Centered Rotation

Order

Order allows you to sort which shapes go on top of one another. Although it's most easily demonstrated with colors/for graphics purposes, Illustrator defaults to selecting the shape that is the closest to the "front," which you may need to change.



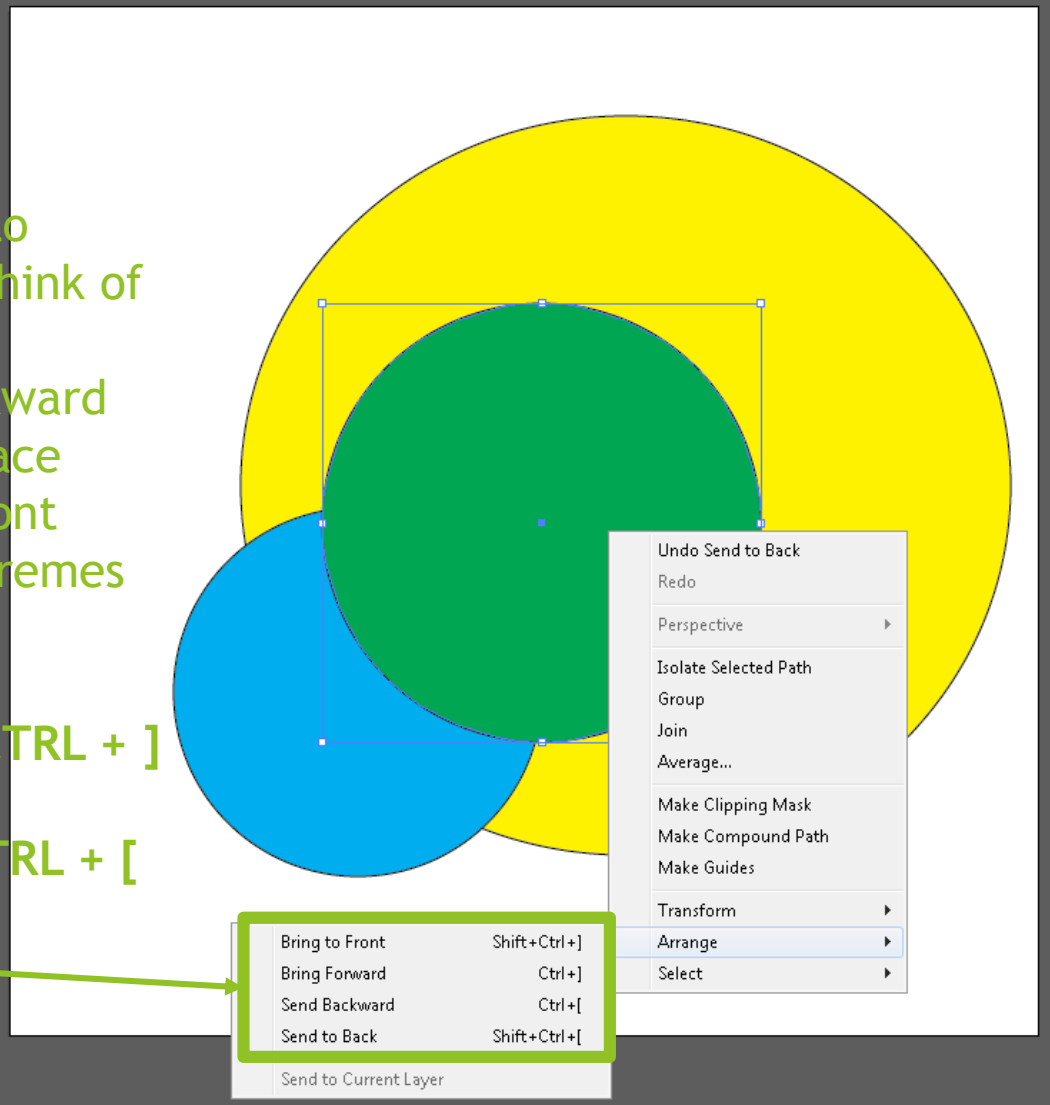
Order

Select the object you wish to arrange and right-click it. Think of your objects in a stack:

- Bring Forward/Send Backward moves the object one space
- Send to Back/Bring to Front moves objects to the extremes

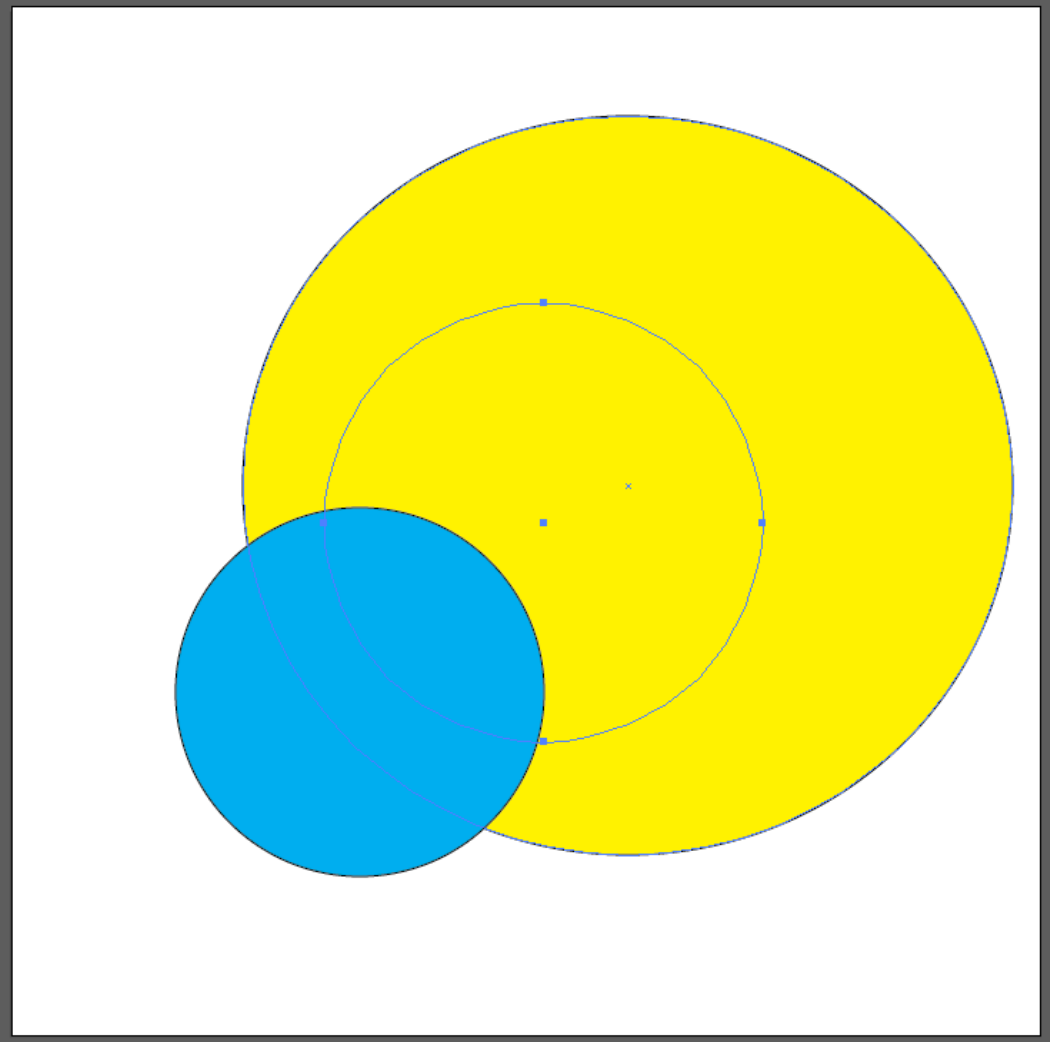
Hotkeys:

- Bring to Front: **SHIFT + CTRL +]**
- Bring Forward: **CTRL +]**
- Send to Back: **SHIFT + CTRL + [**
- Send Backward: **CTRL + [**



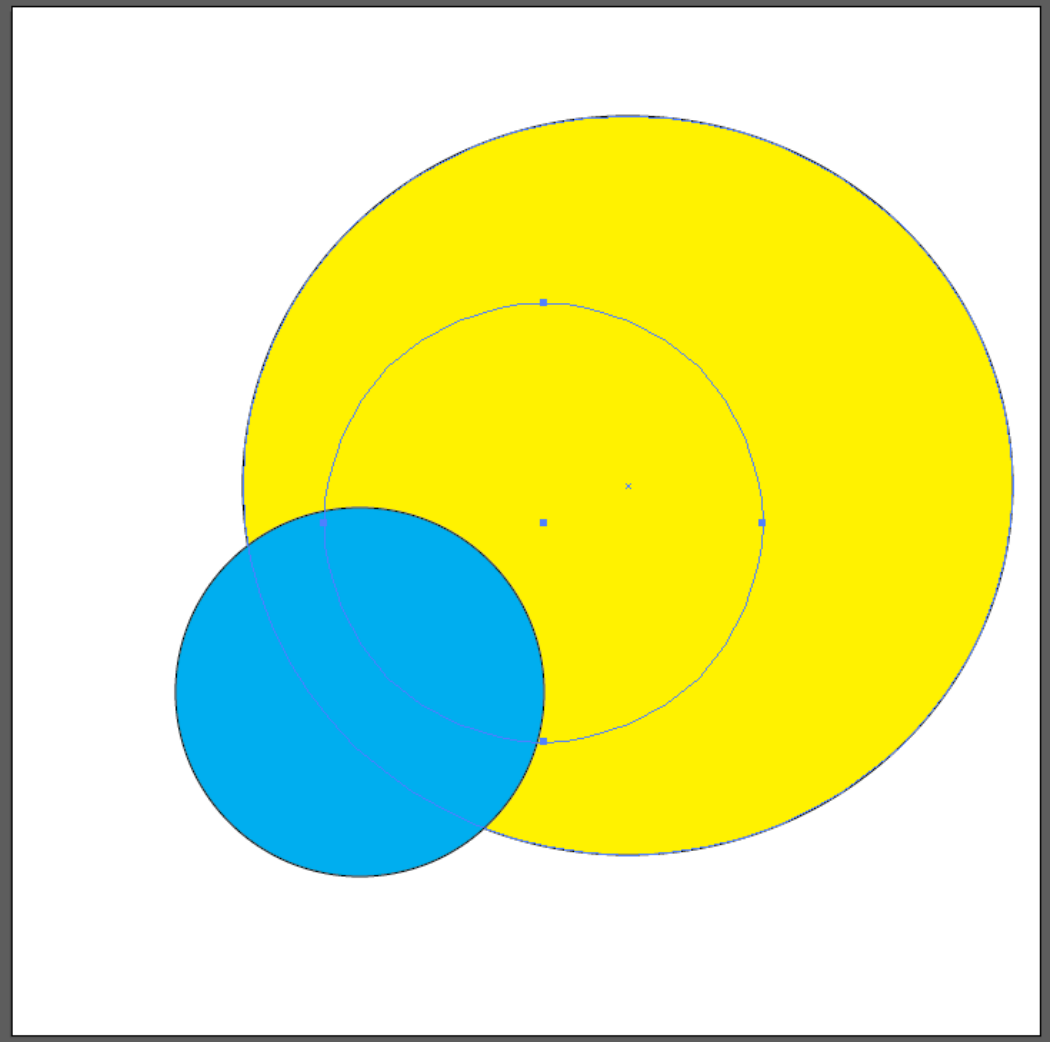
Order

Send to Back/Bring to Front sends the object to the back/front of the stack.



Grouping

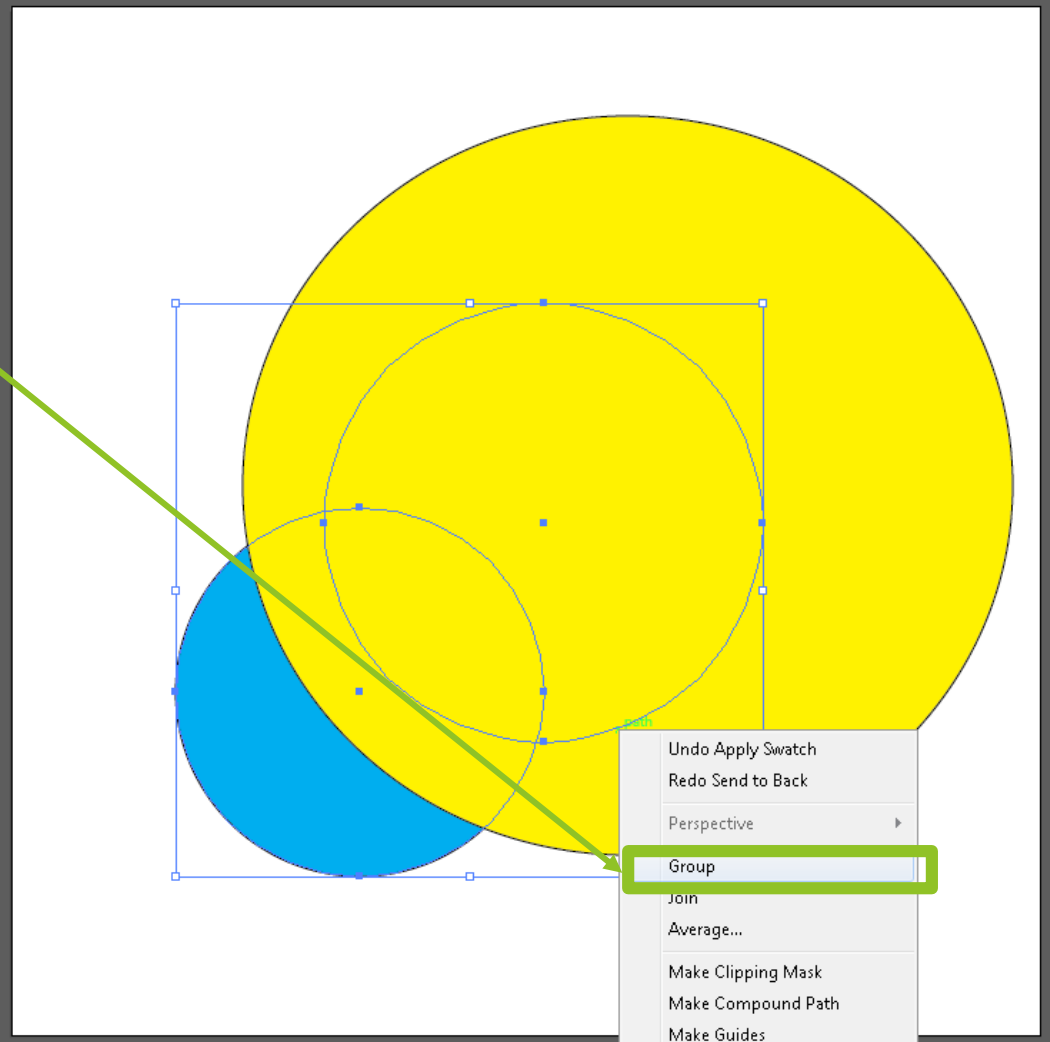
Grouping is a convenient way to manage multiple objects at the same time.



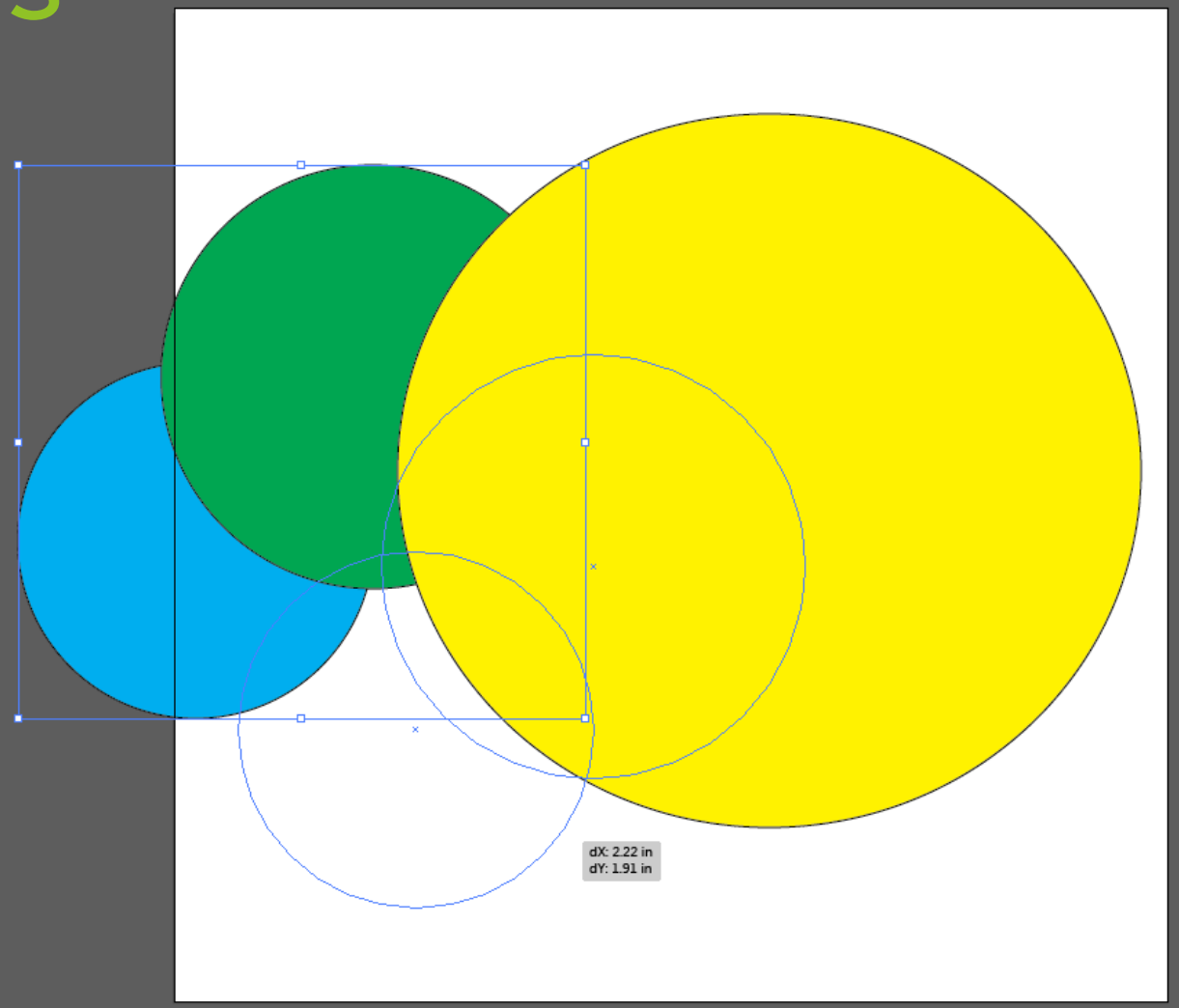
Grouping

To Group, select the objects you wish to place in a group (either with the selection tool or by **SHIFT+CLICK**):

- Right Click -> Group
- Hotkey: **CTRL+G**

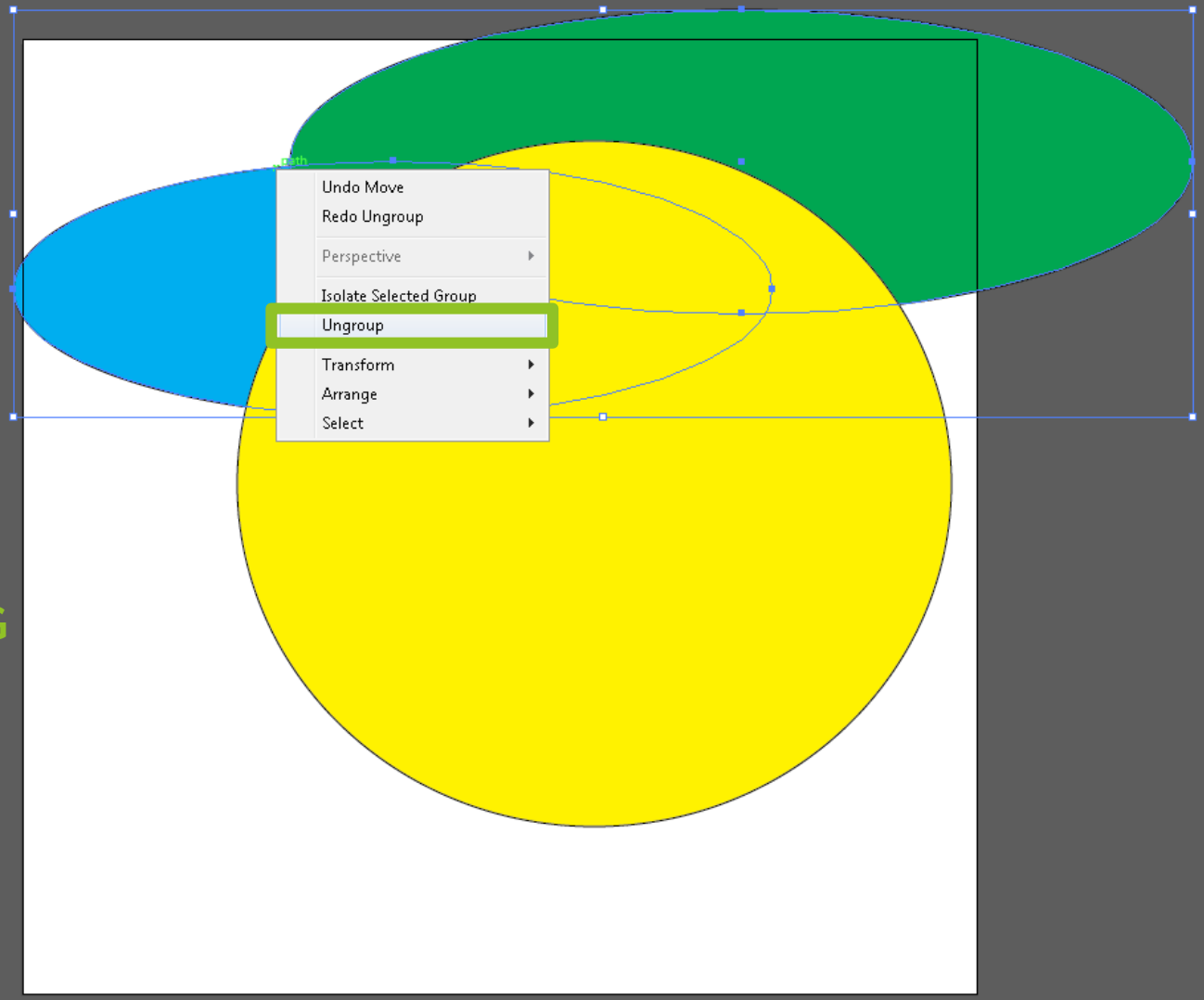


Grouping



The grouped objects now behave as a single shape. You can rotate, resize, and otherwise transform them as you would a single object.

Grouping



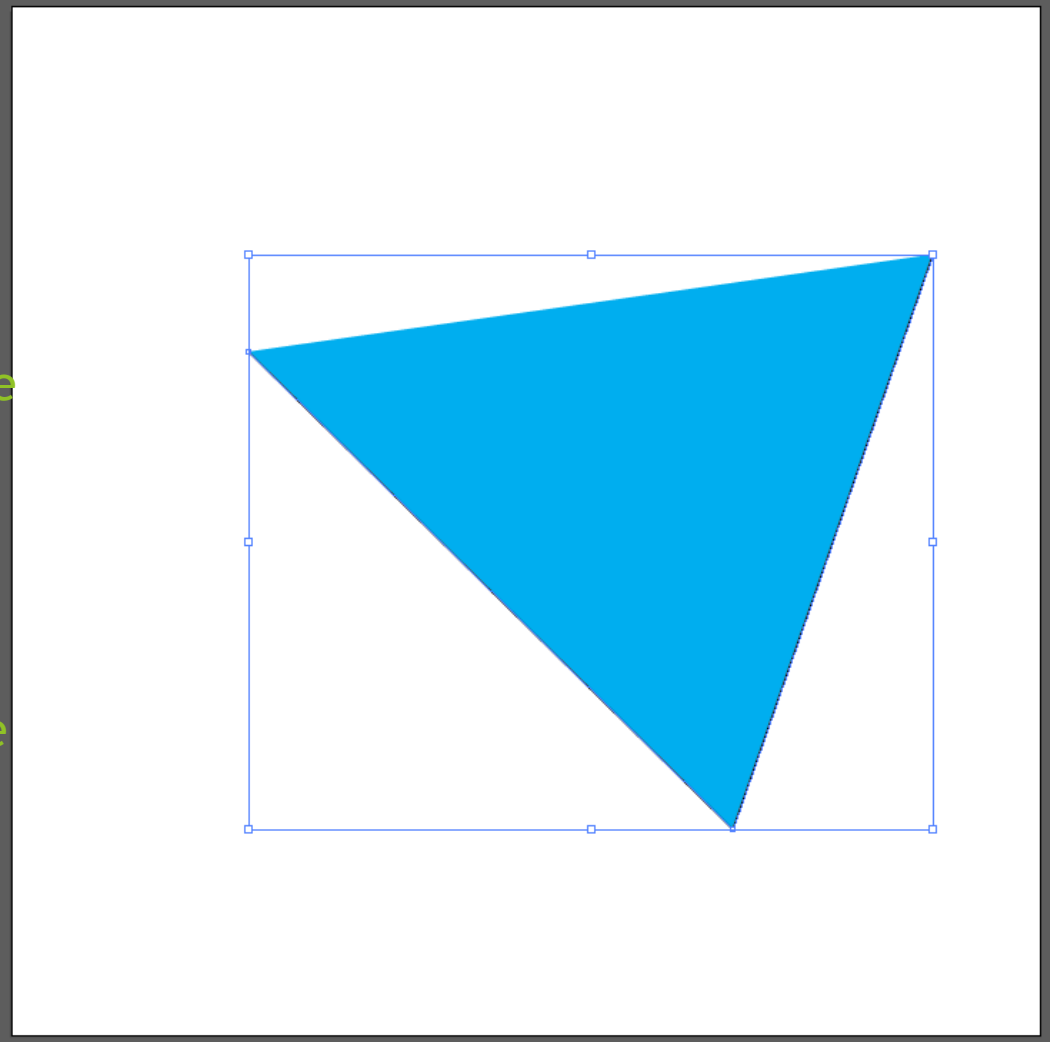
To Ungroup:

- Select objects -> Right Click -> Ungroup
- Hotkey: CTRL+SHIFT+G

Paths

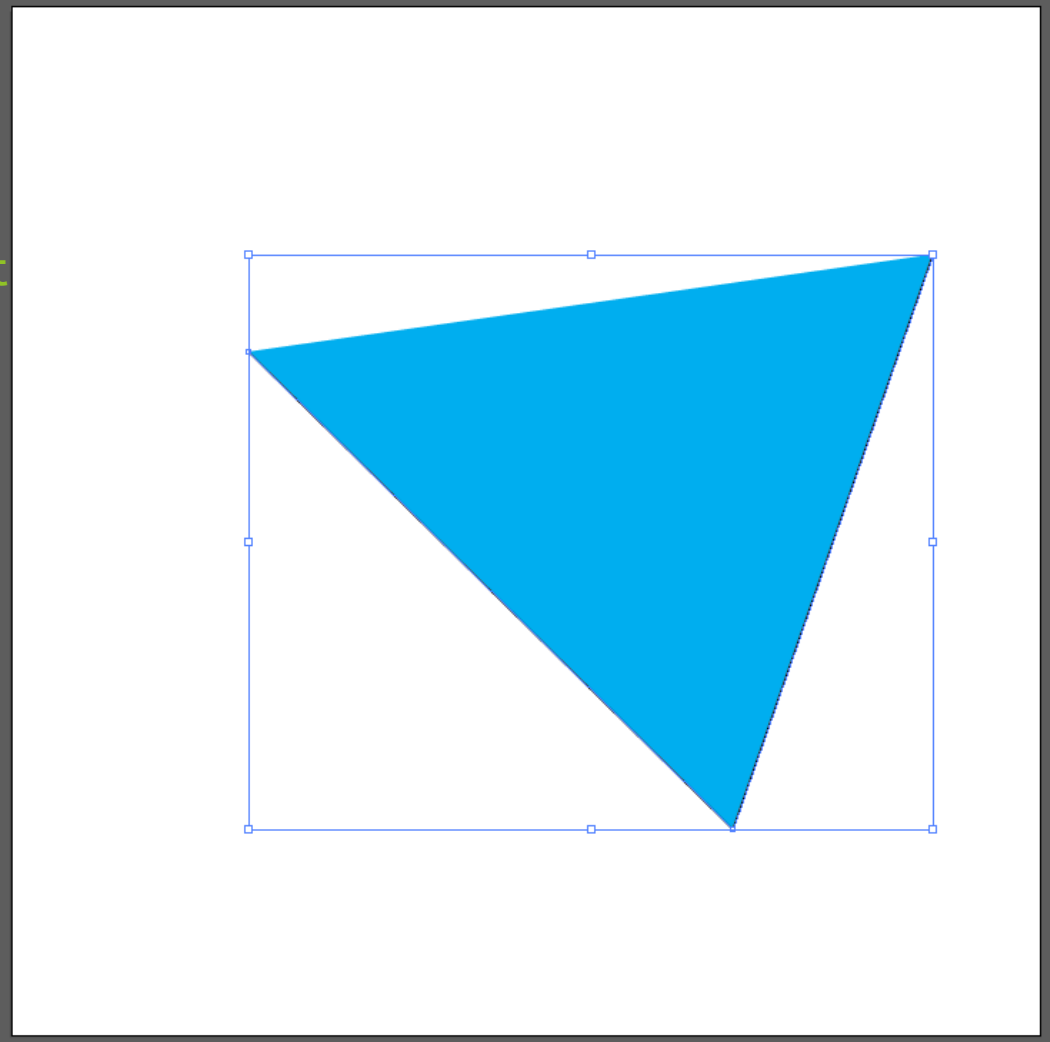
At first glance, the Pen/Path tool may seem like a fancier version of the Line tool. However, it has two major differences. To find the first, begin by selecting the Pen tool to create a shape:

- Select Pen from the side
- Hotkey: **P**



Paths

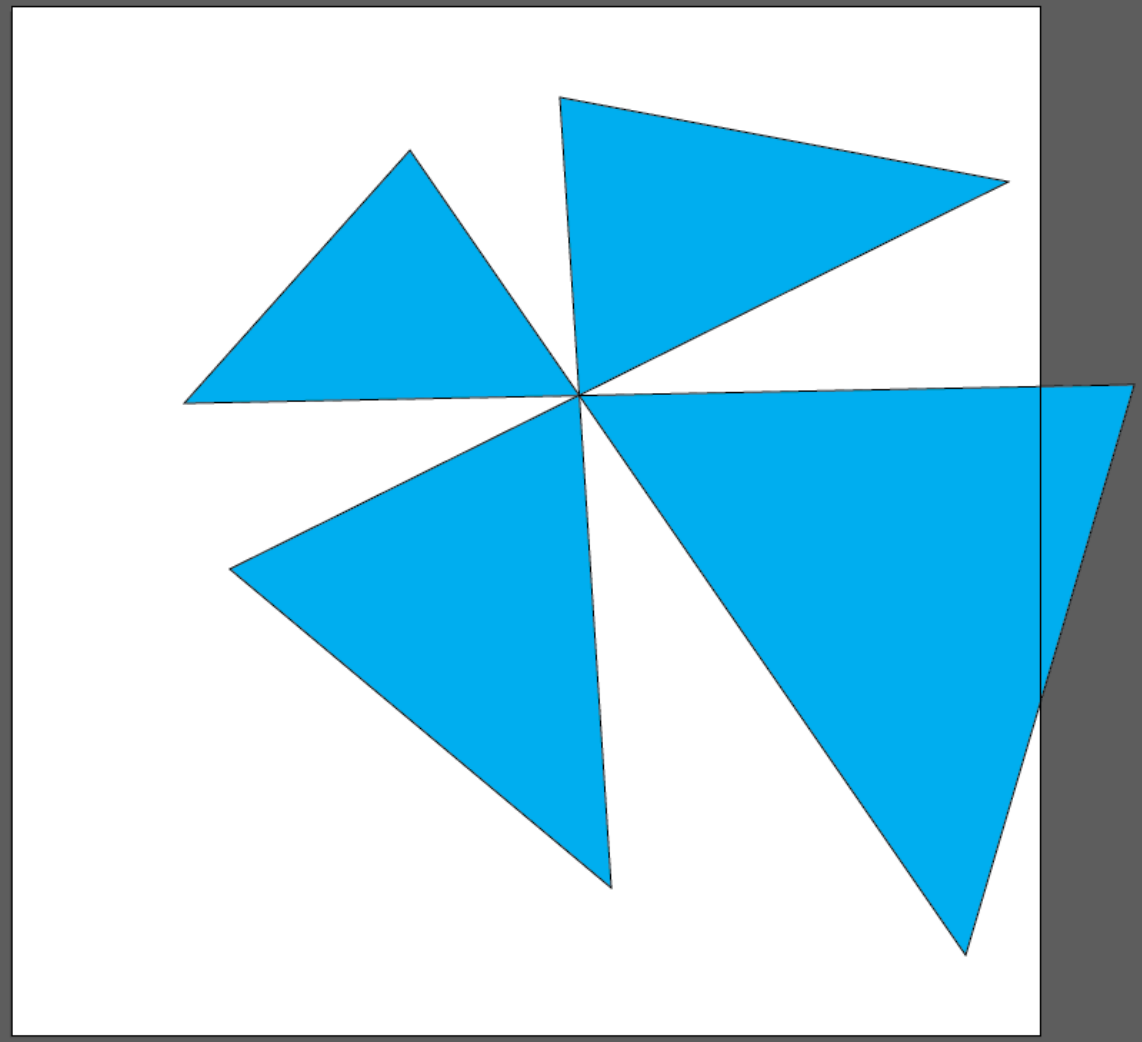
The first improvement that the Pen tool offers is the ability to automatically create shapes. Clicking with the Pen tool active will create a corner of a shape (called a *node*). Clicking on the first node will close the shape.



Paths

This works with non-continuous shapes as well: so long as you don't click on the first node, you will not close the shape.

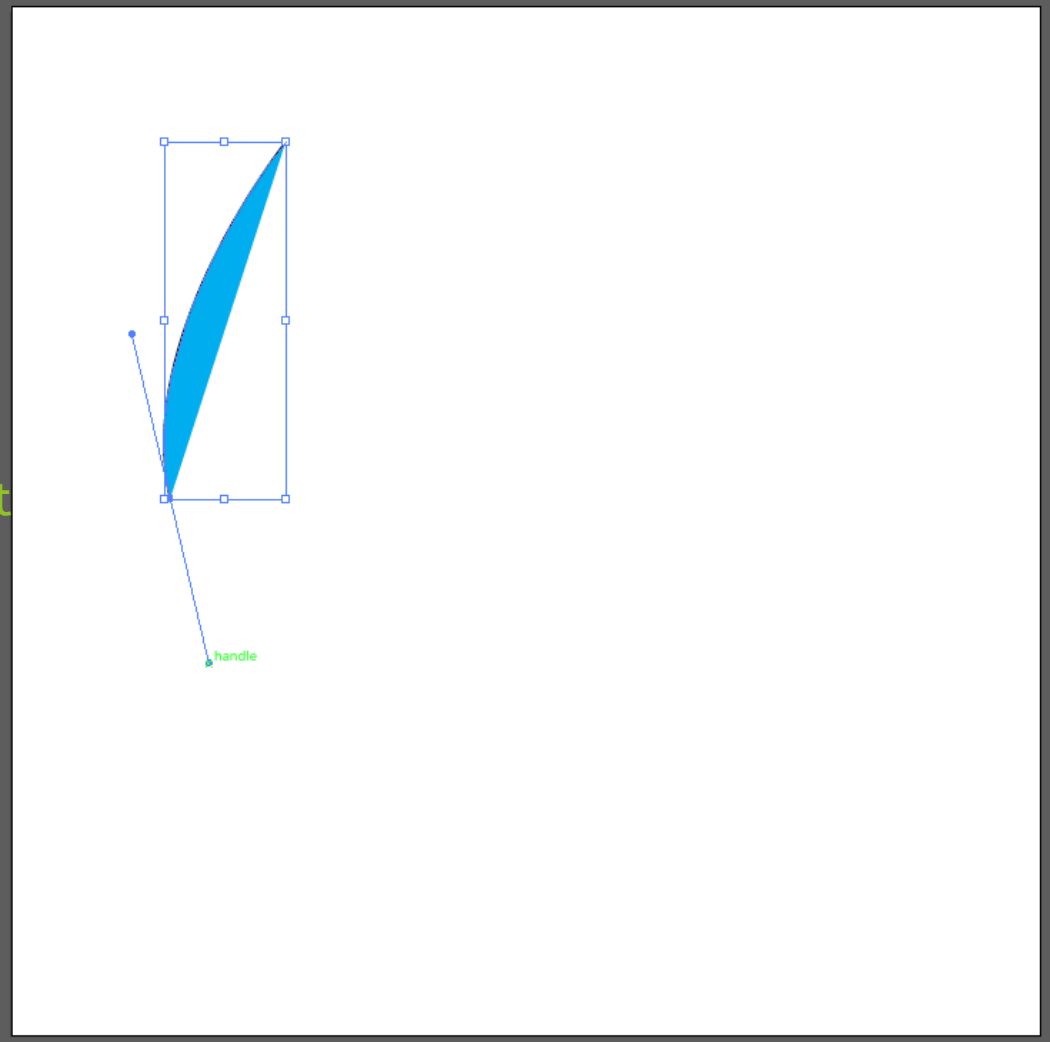
This function of the Pen tool is useful for creating shapes quickly.



Paths

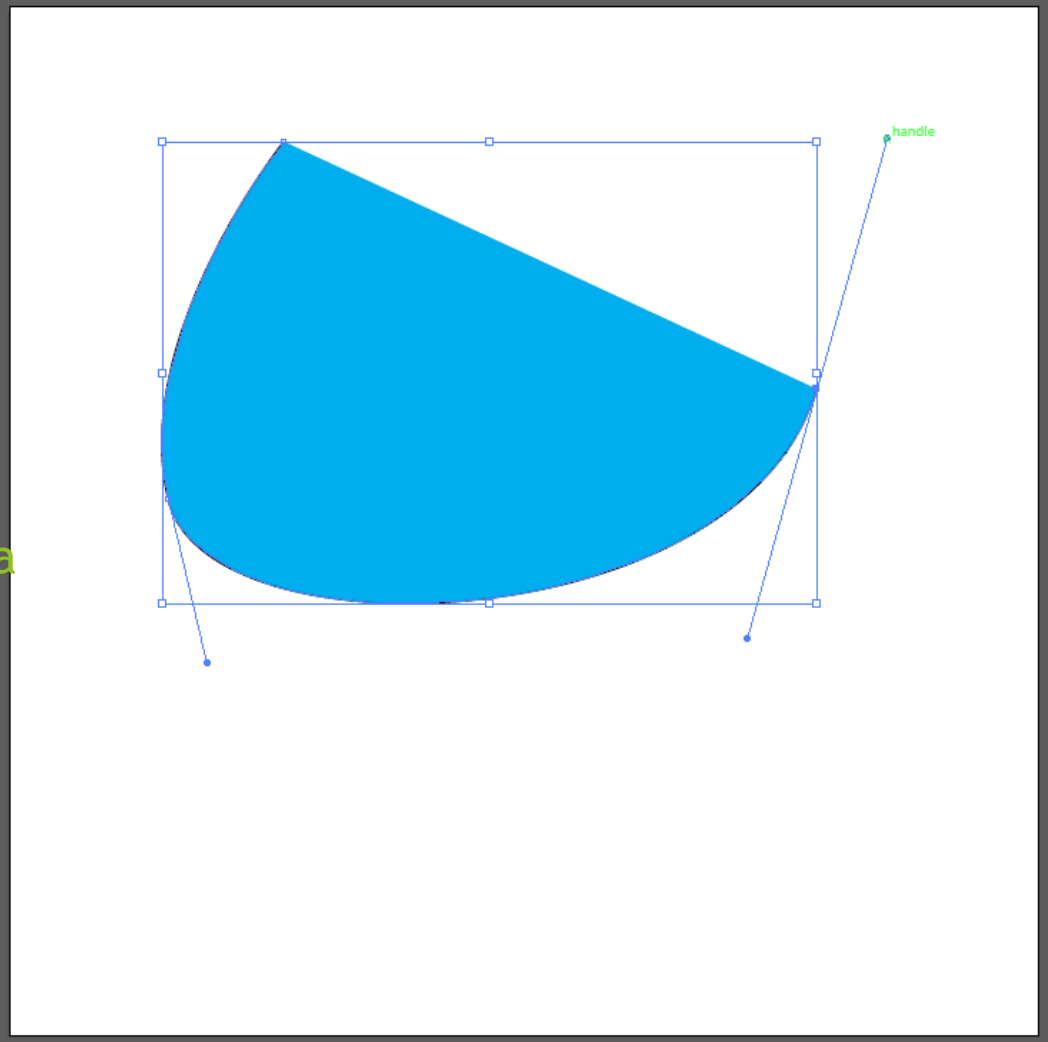
The second function is far more unique: you can create custom curves.

Begin by clicking on a point to start a path. However, rather than just clicking to create a second node, **CLICK+DRAG.**



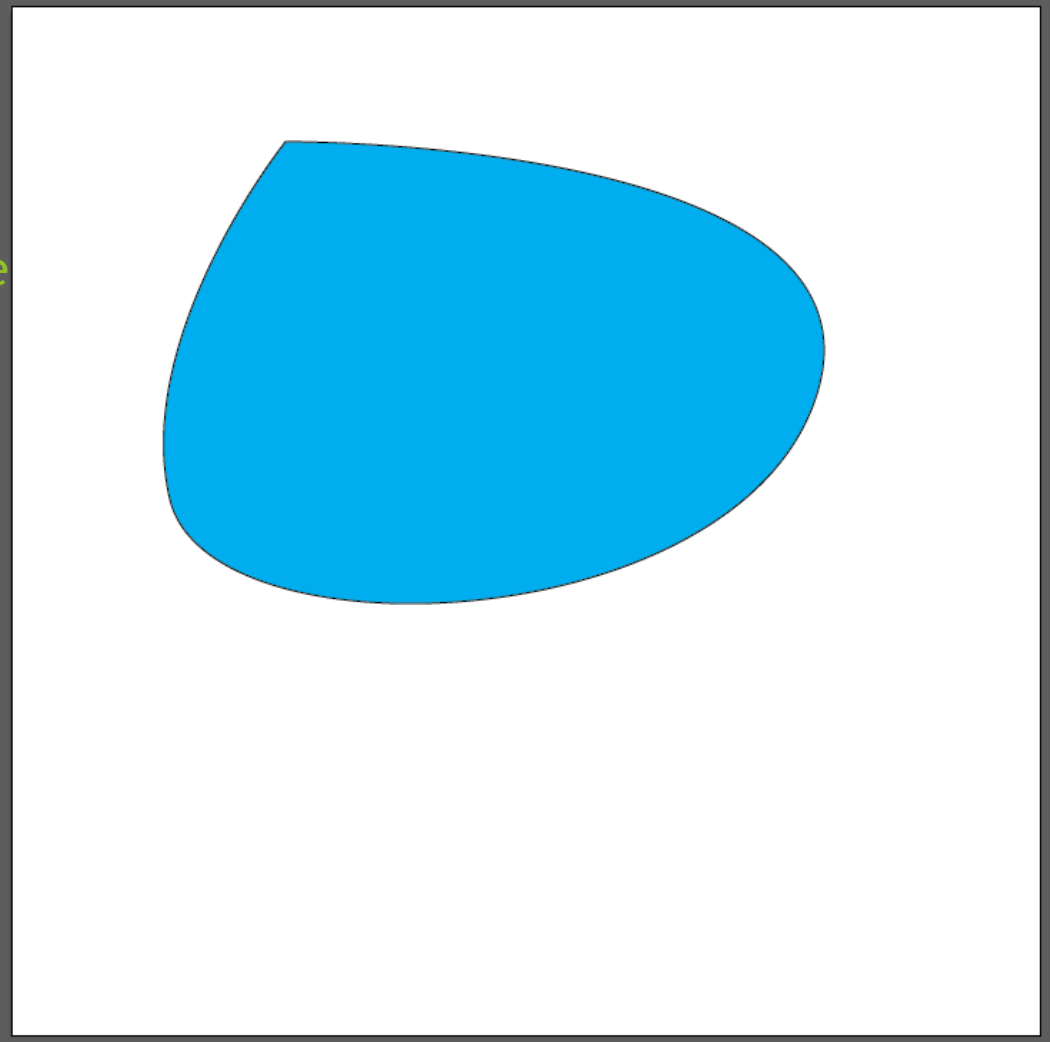
Paths

This creates a chain of curved paths. Each subsequent Path attempts to maintain the curvature set by the Path before it, with the previous Node as a sort of middle ground.



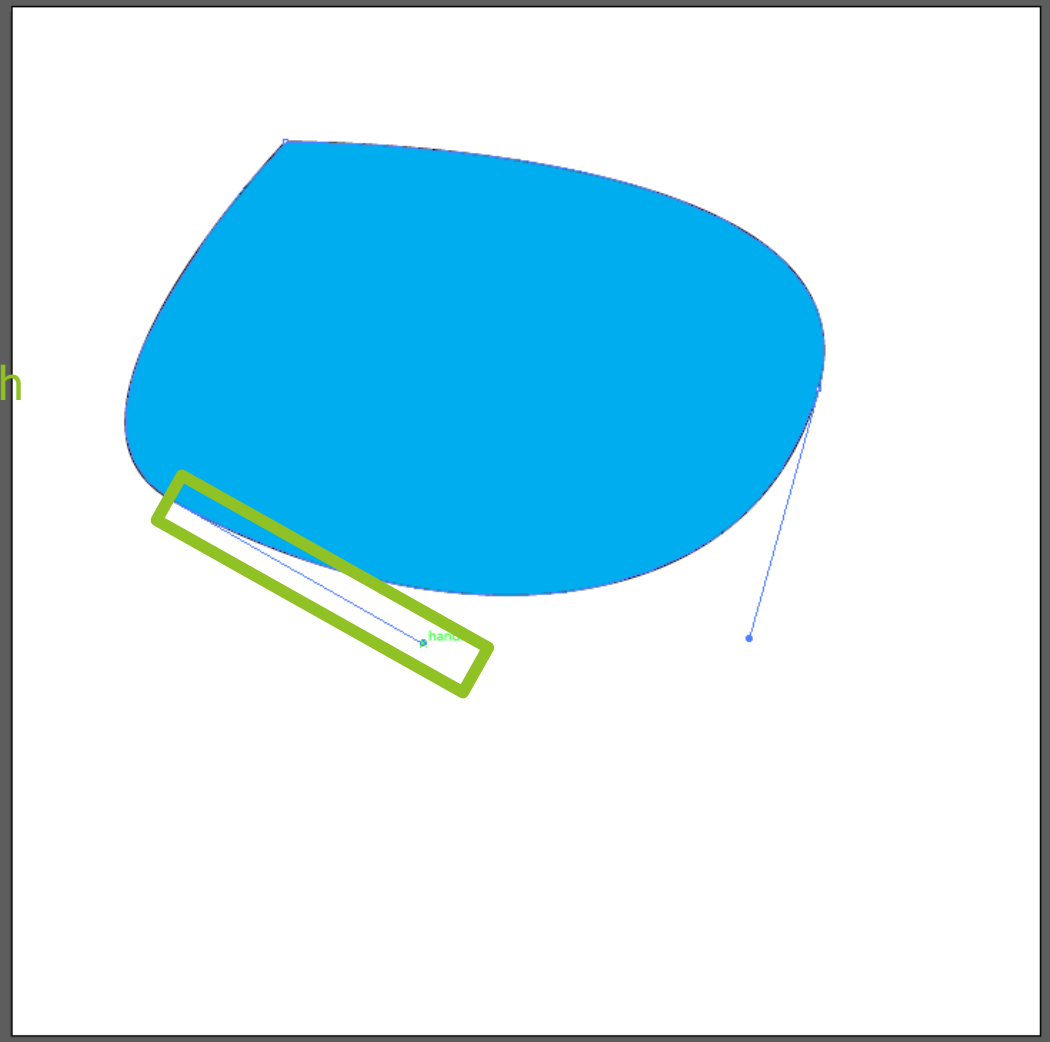
Paths

Note how in places that we **CLICK+DRAG**, the curve appears continuous, while the nodes create discontinuities.



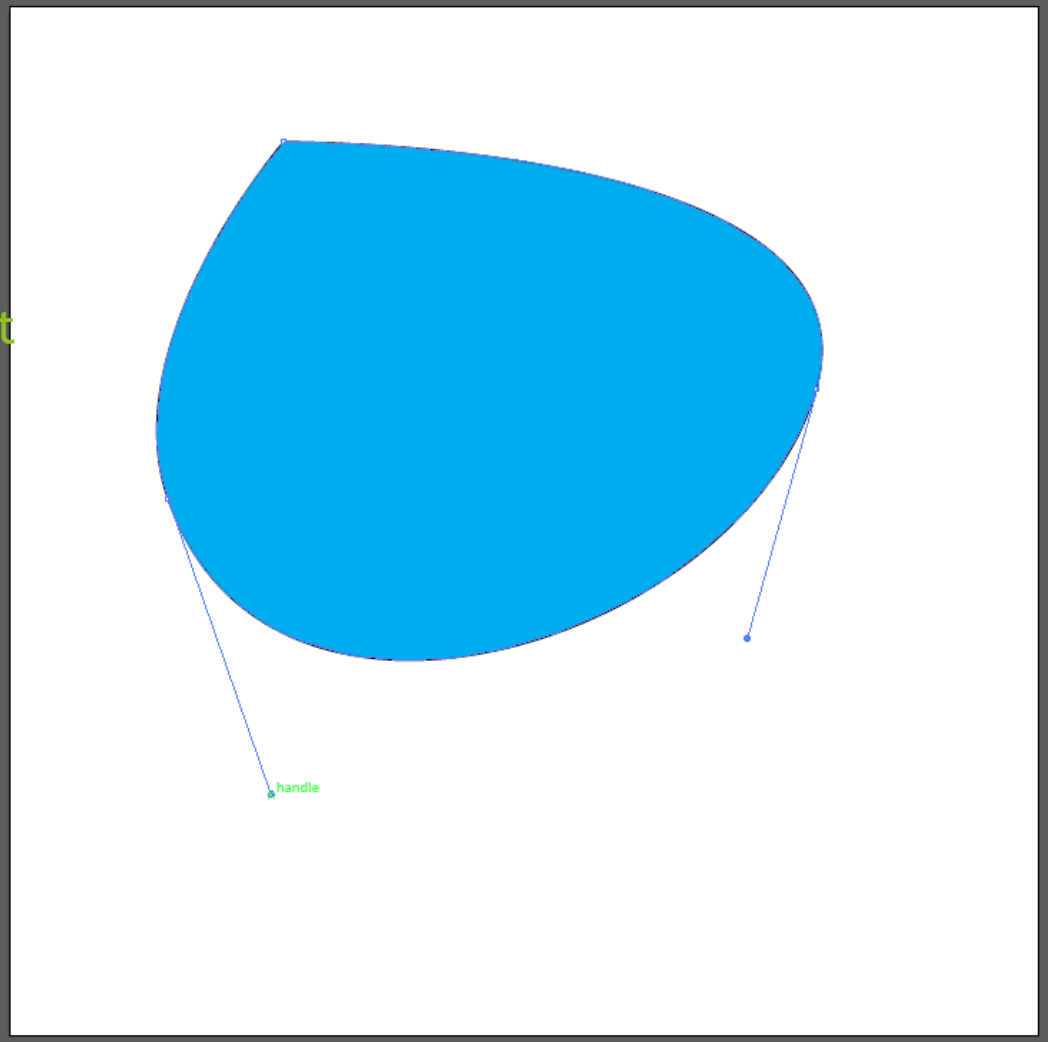
Paths

Using the Direct Selection (white mouse/A), you can edit the curvature of a path by changing the *handles* of each node



Paths

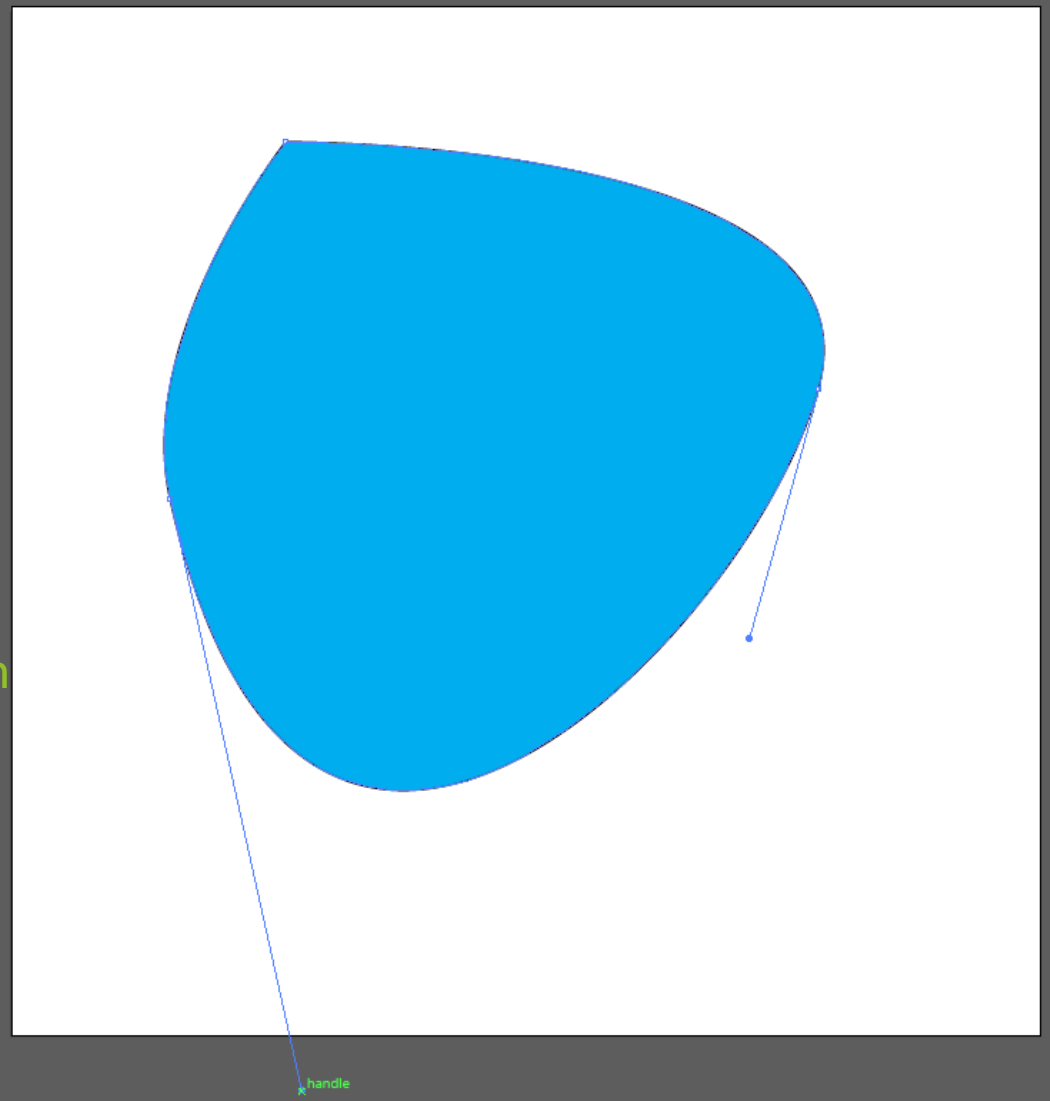
Changing the *angle* of the handle changes the tangent of the curve at the node (the handle represents the tangent)



Paths

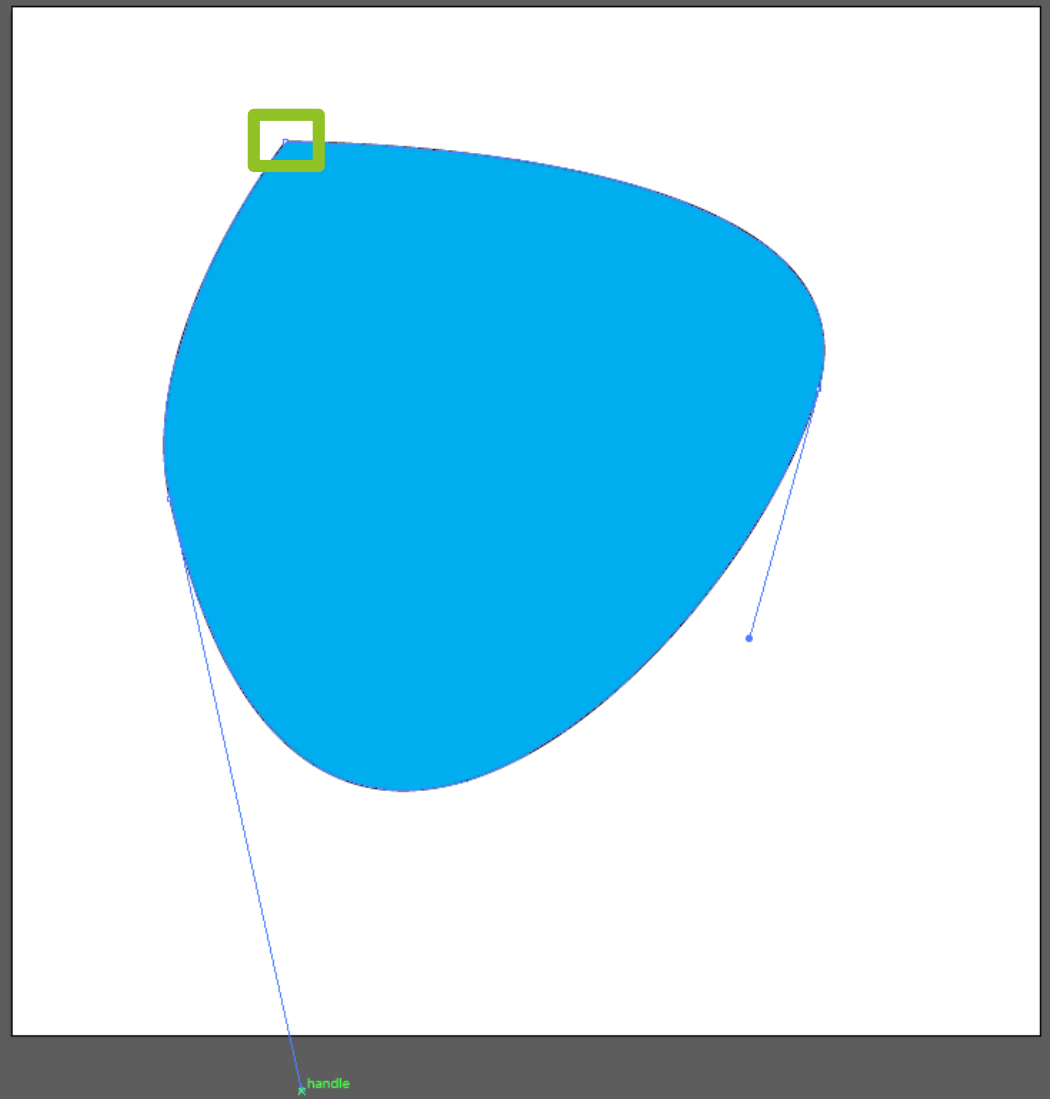
Whereas the *length* of the handle determines how long the curve will stay pointing in the same direction as the handle:

- Handle of no length = a corner
- Handle of infinite length = a line



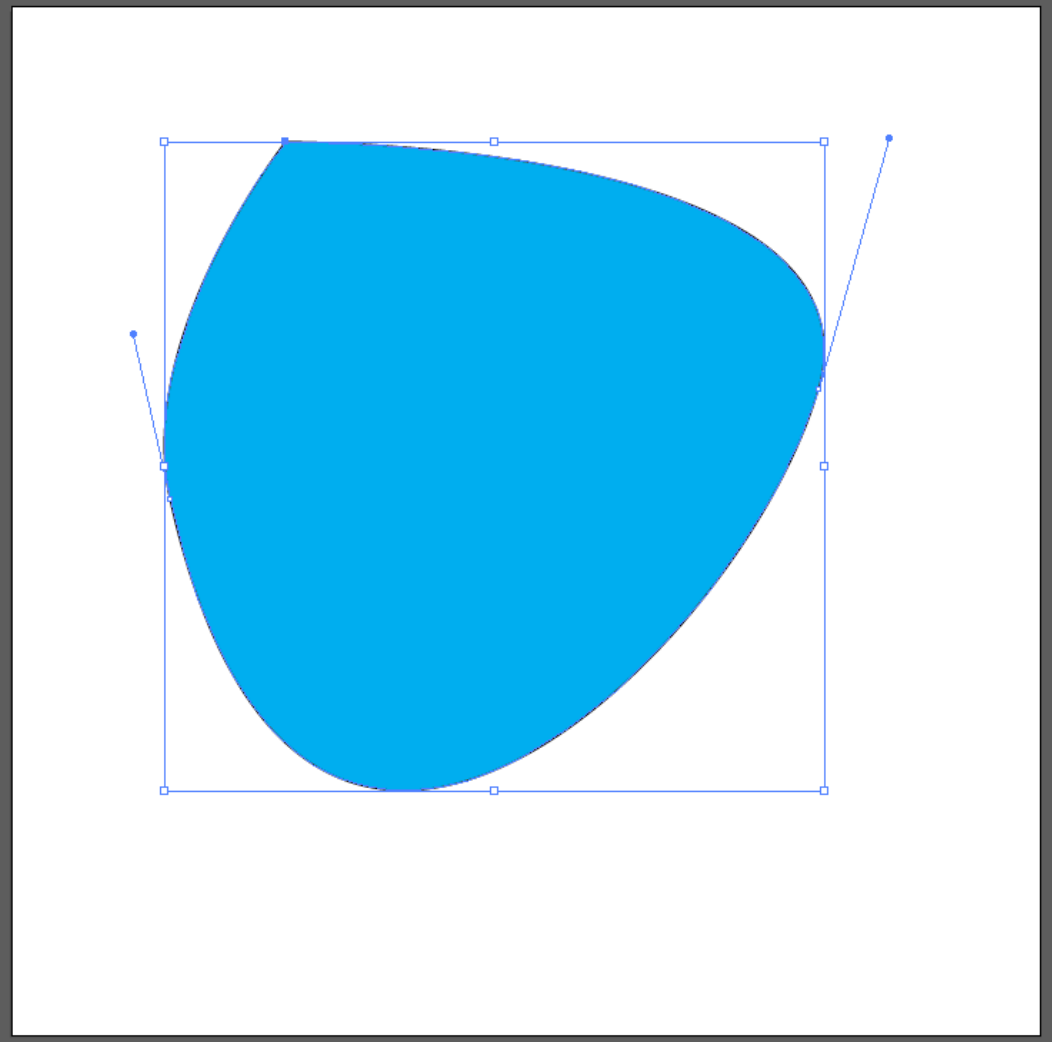
Paths

You can also numerically determine the radius of curvature of a figure. Use Direct Select to click on a node.



Paths

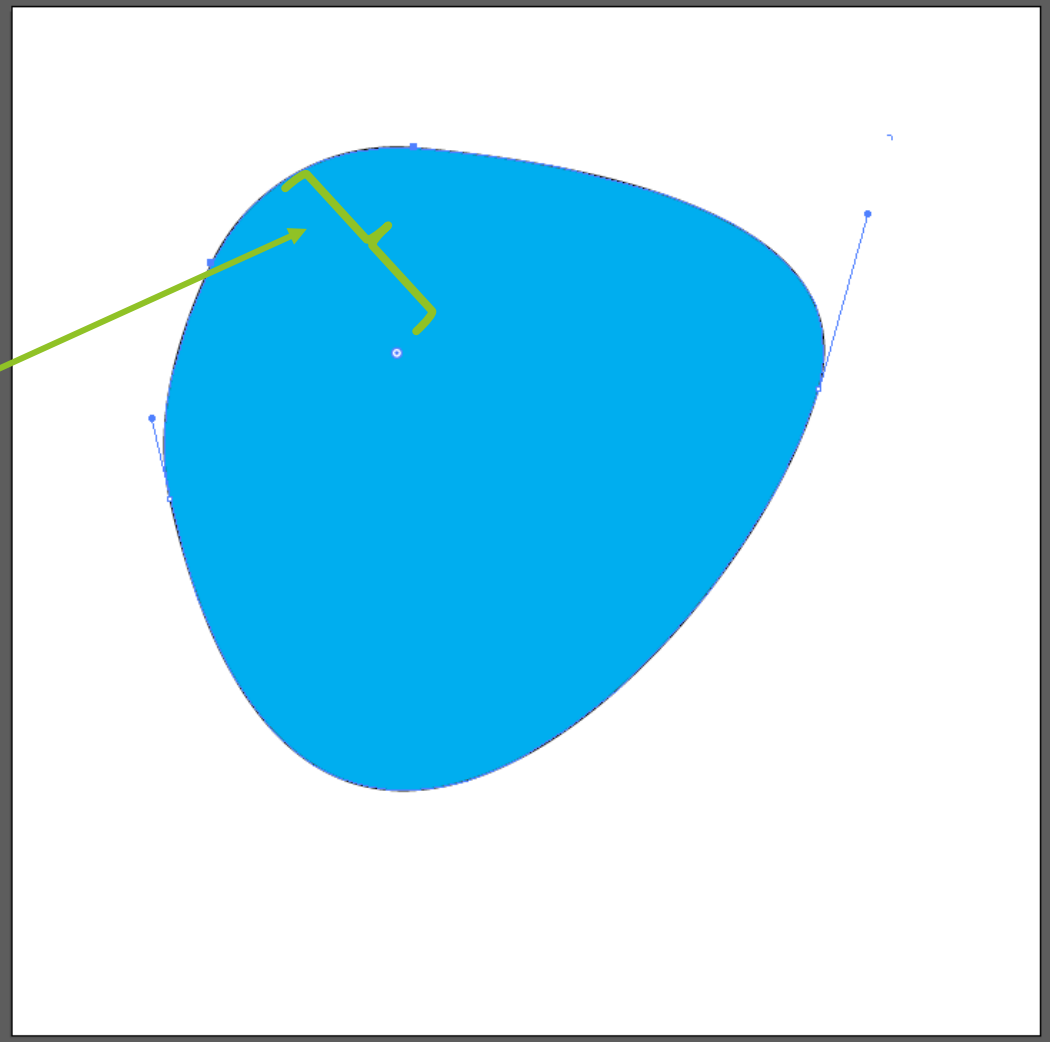
Change this value to round the edges of the corner.



Paths

Change this value to round the edges of the corner.

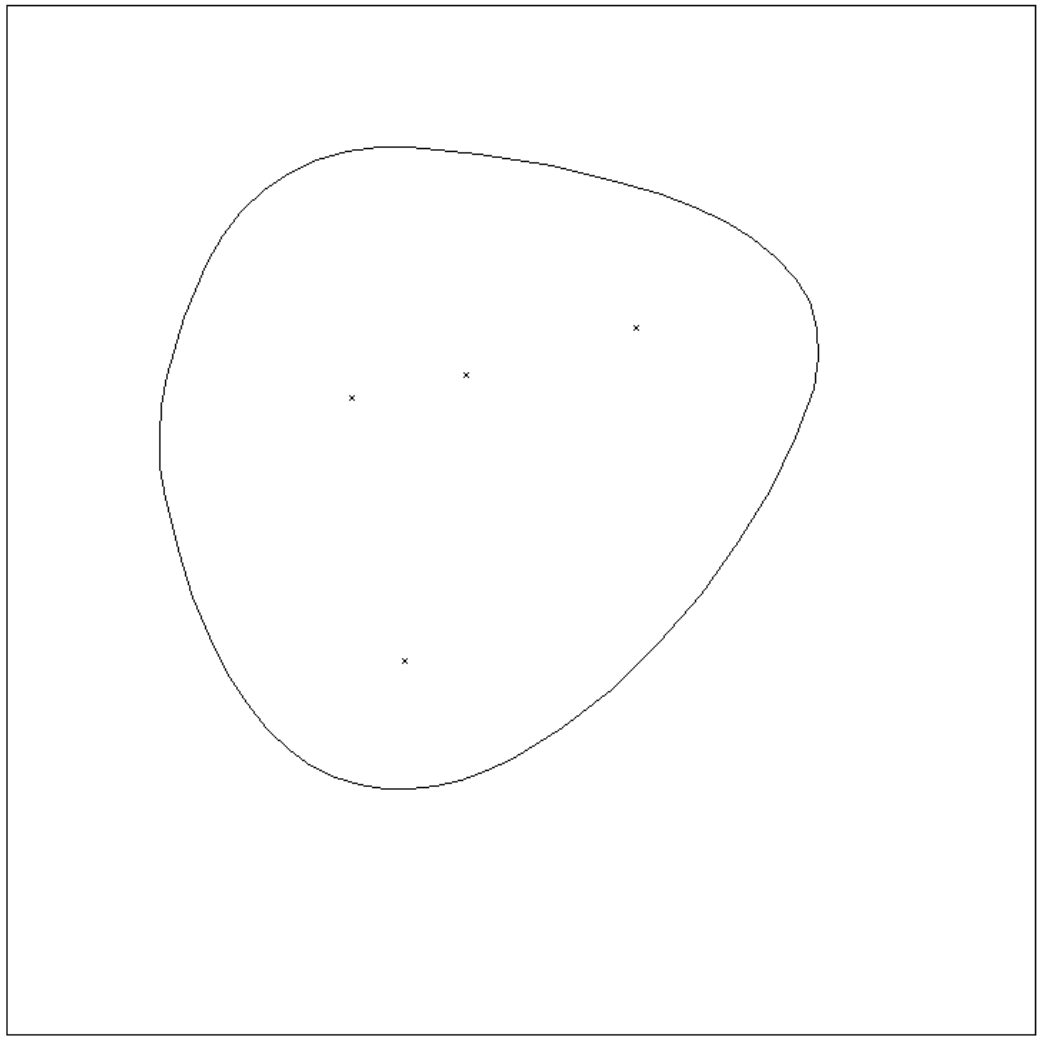
(This value represents the radius of curvature)

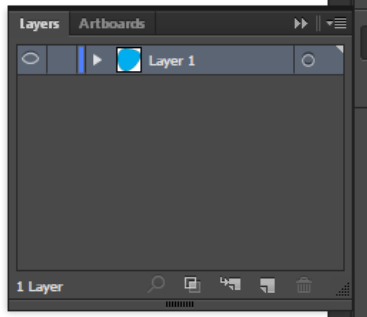


Paths

Be careful of *hanging anchors* (or nodes). This happens when you create a node that is not part of a line or a path, and you can see these nodes using the Overlay View (**CTRL+Y**).

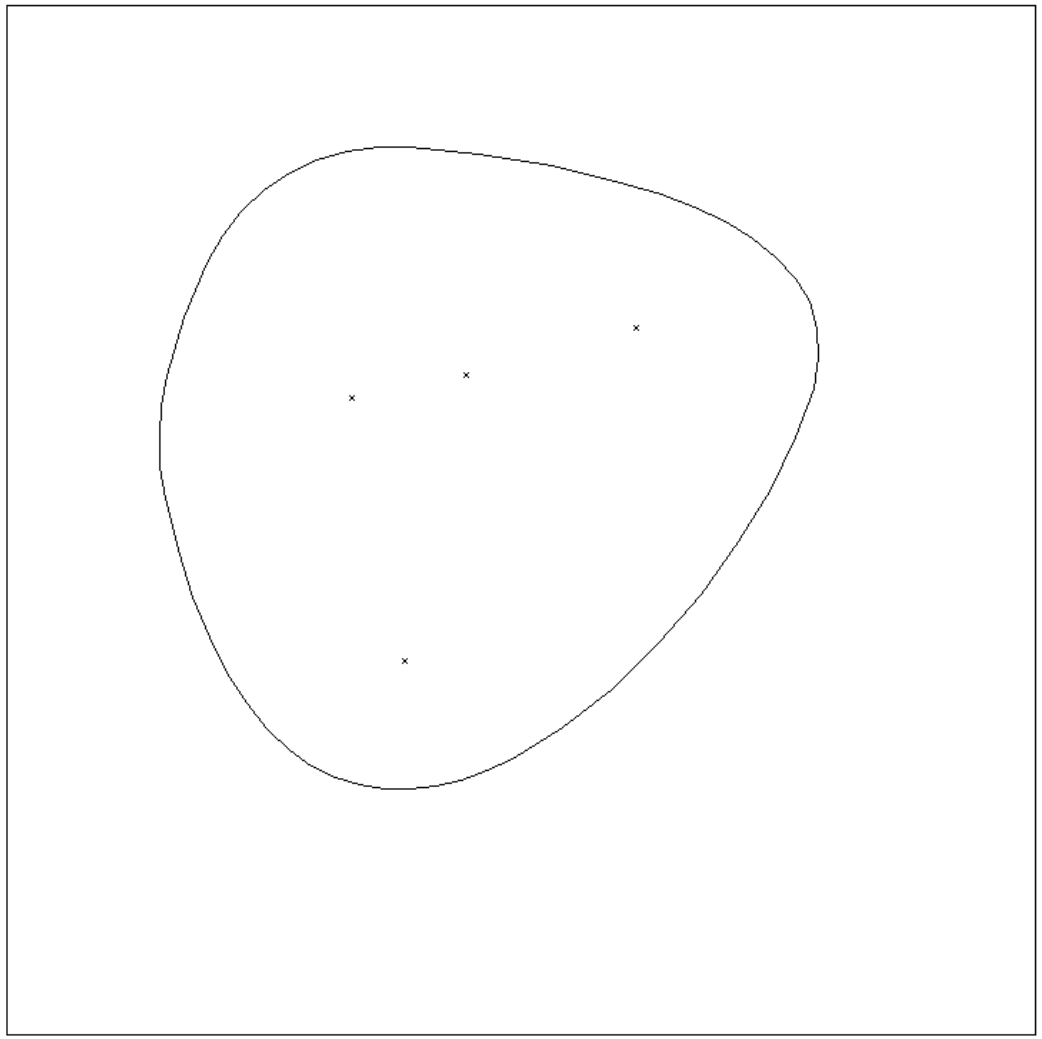
Hanging anchors will sometimes be cut by the laser cutter and can cause errors when you attempt to export to other programs (ie SolidWorks)

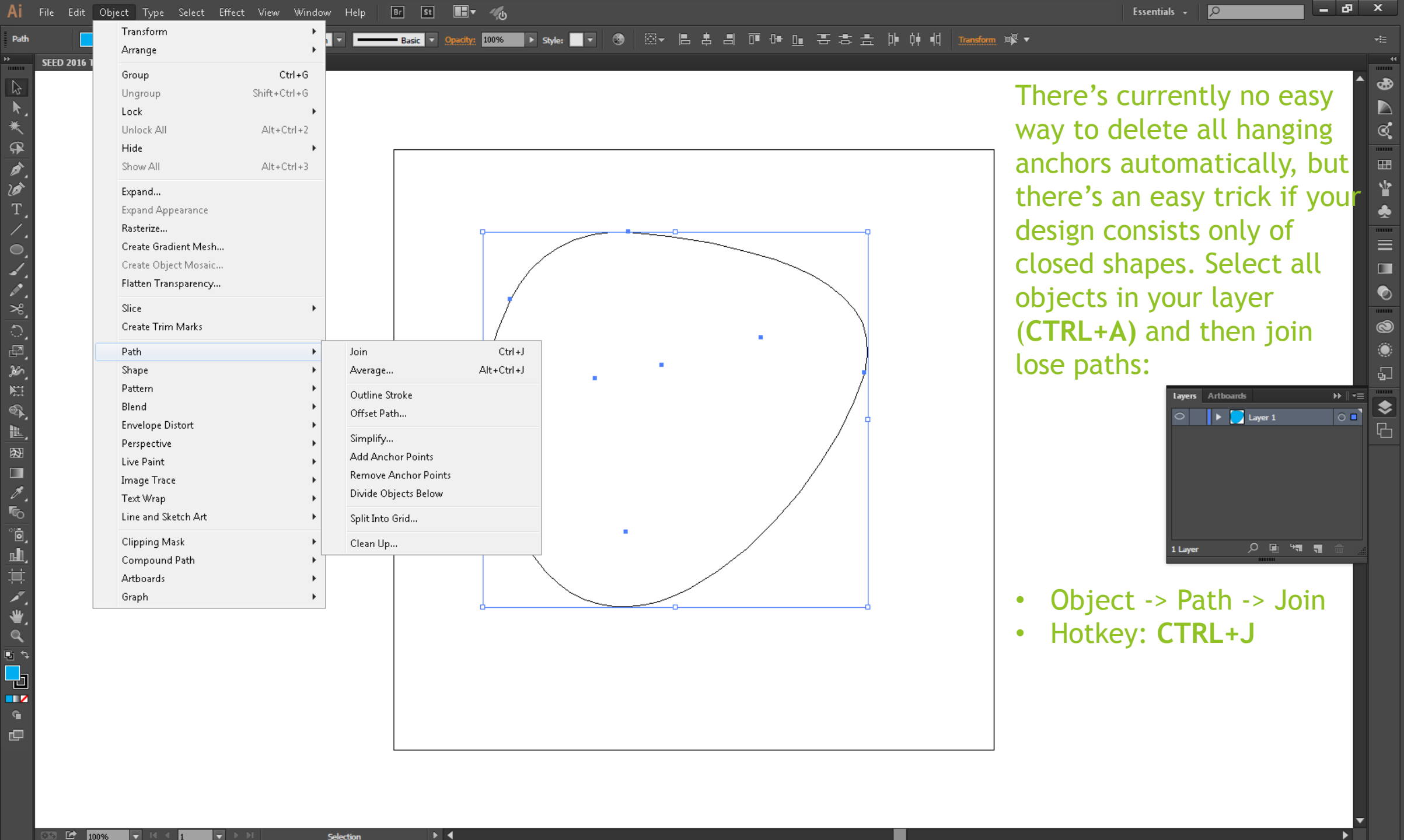


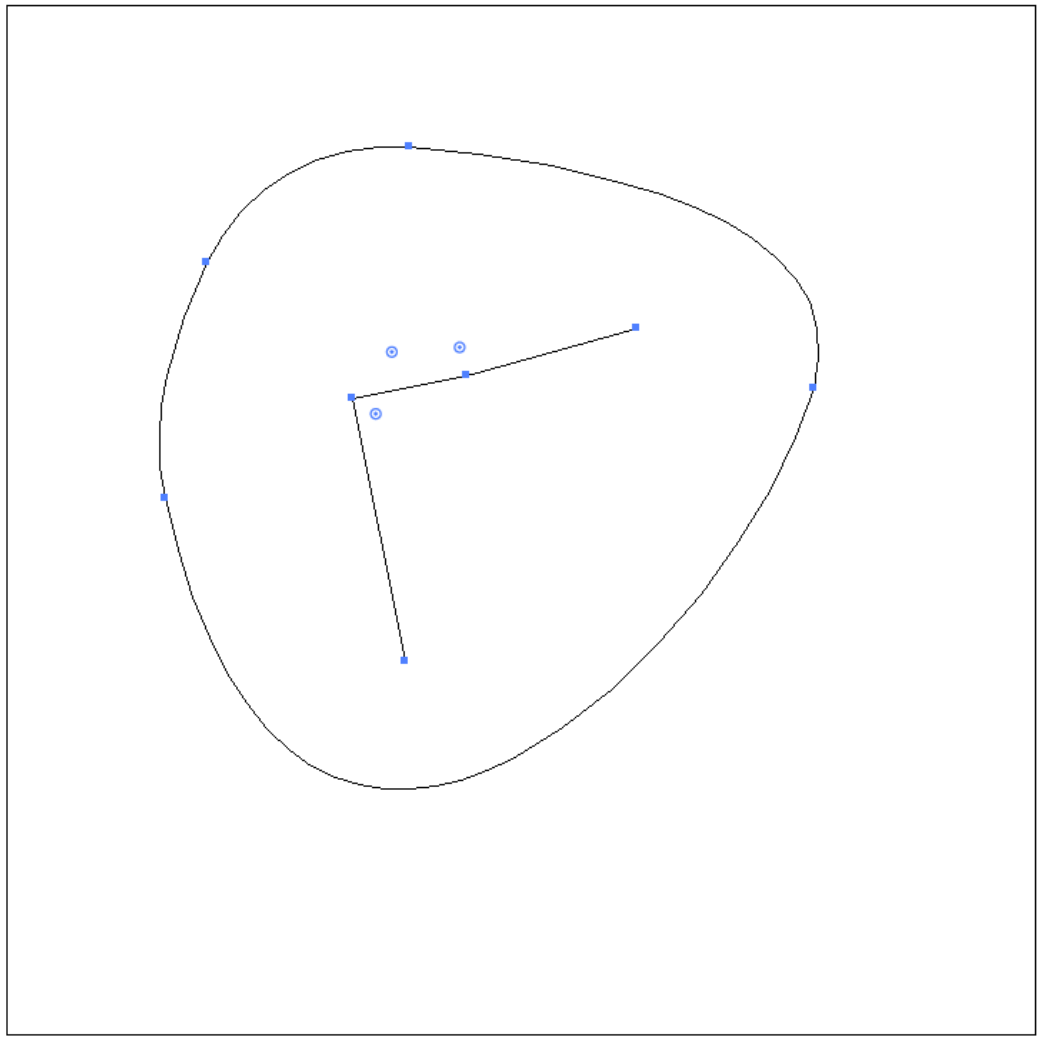


Paths

You can manually add or delete anchors by using + or - (plus and minus) respectively, but if you have a lot of anchors, that can be quite tedious.




File Edit Object Type Select Effect View Window Help
Essentials
Path
Basic
Opacity: 100%
Style:
Transform
Transform
Arrange
Group Ctrl+G
Ungroup Shift+Ctrl+G
Lock
Unlock All Alt+Ctrl+2
Hide
Show All Alt+Ctrl+3
Expand...
Expand Appearance
Rasterize...
Create Gradient Mesh...
Create Object Mosaic...
Flatten Transparency...
Slice
Create Trim Marks
Path
Shape
Pattern
Blend
Envelope Distort
Perspective
Live Paint
Image Trace
Text Wrap
Line and Sketch Art
Clipping Mask
Compound Path
Artboards
Graph
Join Ctrl+J
Average... Alt+Ctrl+J
Outline Stroke
Offset Path...
Simplify...
Add Anchor Points
Remove Anchor Points
Divide Objects Below
Split Into Grid...
Clean Up...
There’s currently no easy way to delete all hanging anchors automatically, but there’s an easy trick if your design consists only of closed shapes. Select all objects in your layer (CTRL+A) and then join lose paths:
Layers
Artboards
Layer 1
1 Layer
• Object -> Path -> Join
• Hotkey: CTRL+J
100%
Selection



You can now delete this line rather than trying to track down all your anchors.

Note that if you have unconnected shapes or hanging lines, these will be pulled in as well.

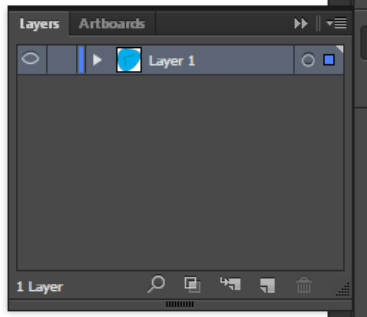


Image Trace

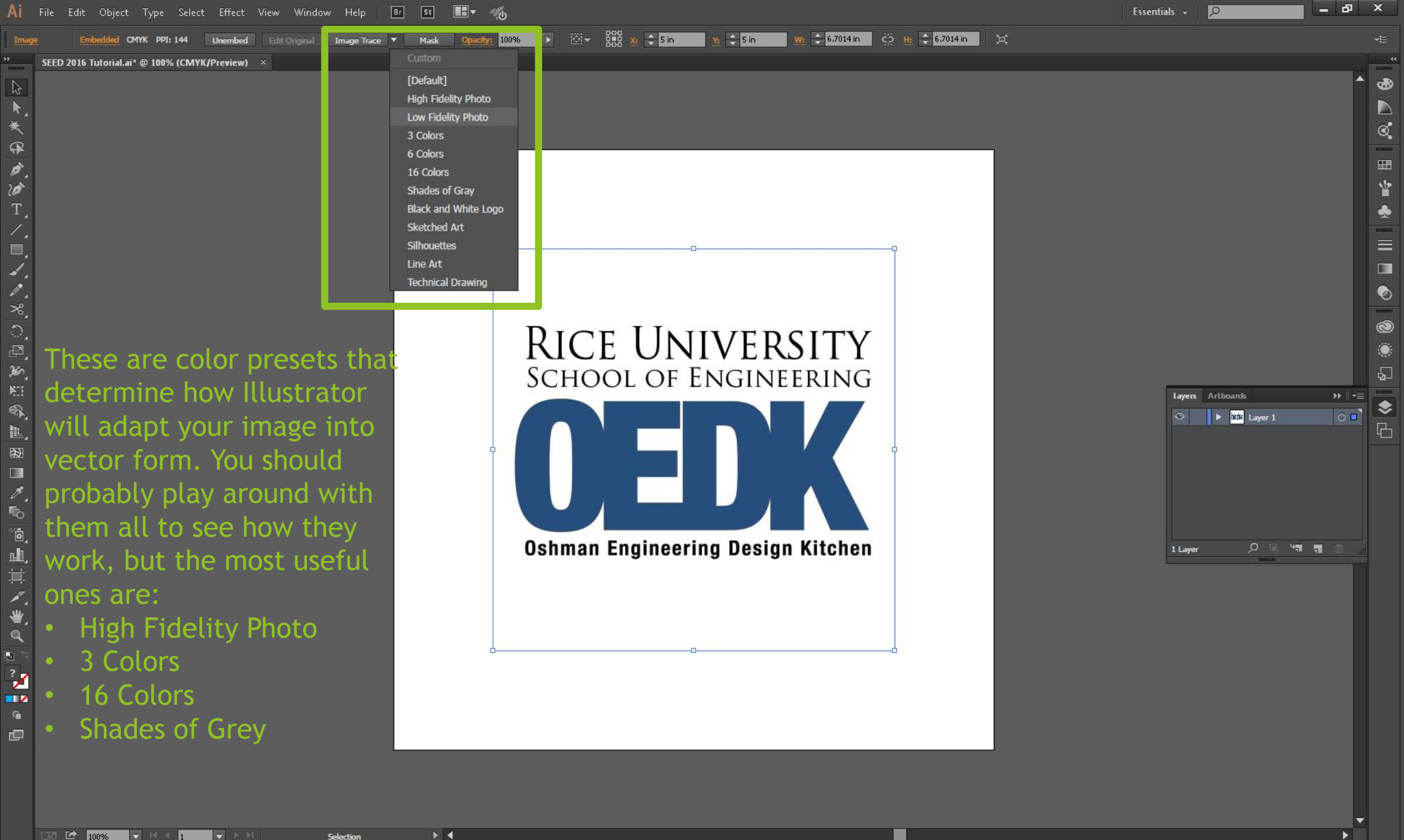
As you remember, Illustrator works in *vector* images. Most file formats stored online are rasters (.png, .jpeg, .gif), which means that Illustrator cannot read them initially.

There is, however, a workaround for this.

Image Trace

If you try to click on the image, you'll notice two things:

- First, that you can't edit the individual components as you'd like
- Second, that the toolbar has changed to an Image Trace toolbar. Let's look into that.


File Edit Object Type Select Effect View Window Help
Essentials
Image
Embedded CMYK PPI: 144
Unembed
Edit Original
Image Trace
Mask
Opacity: 100%
SEED 2016 Tutorial.ai* @ 100% (CMYK/Preview)
Custom
[Default]
High Fidelity Photo
Low Fidelity Photo
3 Colors
6 Colors
16 Colors
Shades of Gray
Black and White Logo
Sketched Art
Silhouettes
Line Art
Technical Drawing
RICE UNIVERSITY
SCHOOL OF ENGINEERING
OEDK
Oshman Engineering Design Kitchen
Layers
Artboards
Layer 1
1 Layer
These are color presets that determine how Illustrator will adapt your image into vector form. You should probably play around with them all to see how they work, but the most useful ones are:
• High Fidelity Photo
• 3 Colors
• 16 Colors
• Shades of Grey

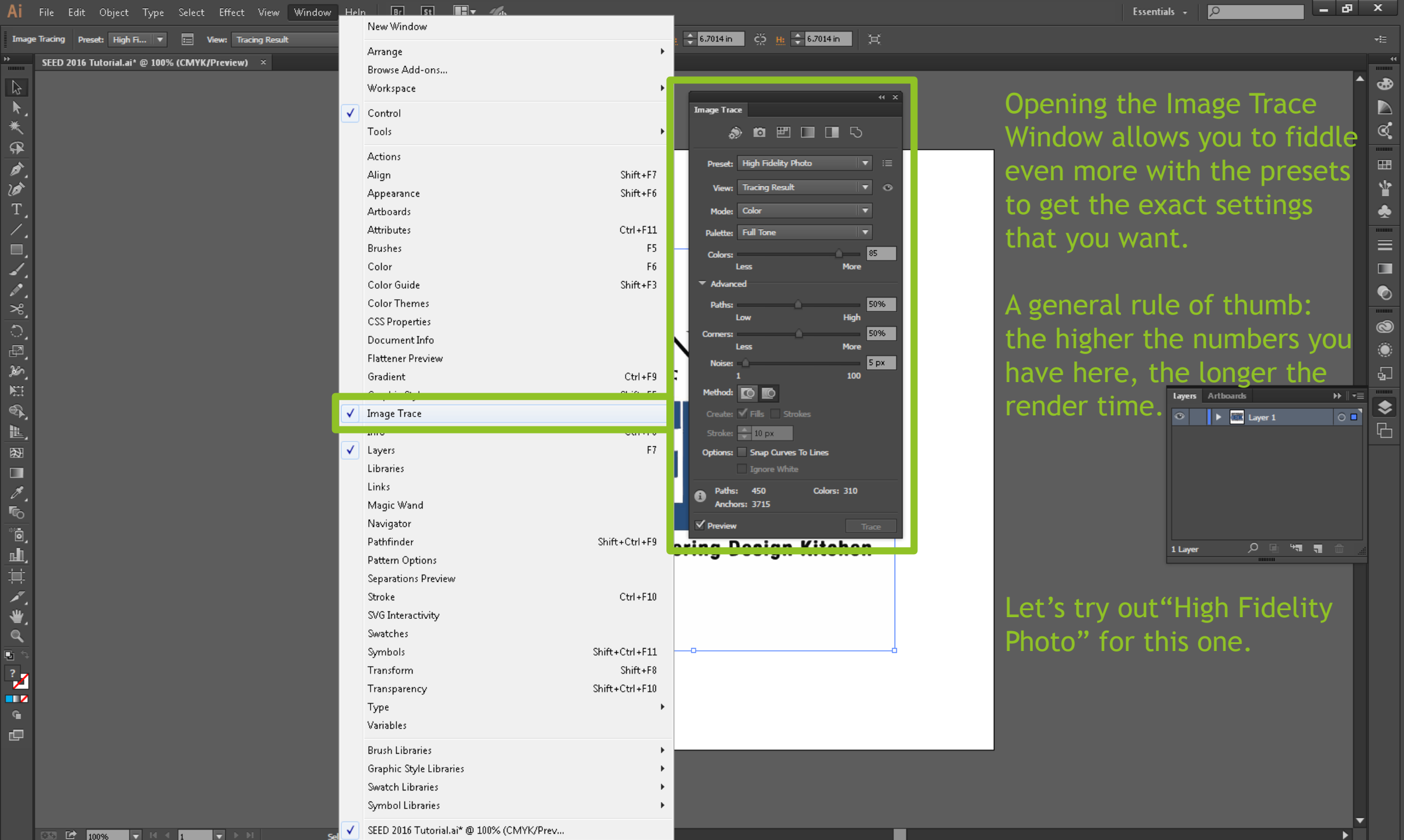

File Edit Object Type Select Effect View Window Help
Essentials
Image Tracing Preset: High Fi... View: Tracing Result
SEED 2016 Tutorial.ai* @ 100% (CMYK/Preview)
New Window
Arrange
Browse Add-ons...
Workspace
Control
Tools
Actions
Align Shift+F7
Appearance Shift+F6
Artboards
Attributes Ctrl+F11
Brushes F5
Color F6
Color Guide Shift+F3
Color Themes
CSS Properties
Document Info
Flattener Preview
Gradient Ctrl+F9
Image Trace
Layers F7
Libraries
Links
Magic Wand
Navigator
Pathfinder Shift+Ctrl+F9
Pattern Options
Separations Preview
Stroke Ctrl+F10
SVG Interactivity
Swatches
Symbols Shift+Ctrl+F11
Transform Shift+F8
Transparency Shift+Ctrl+F10
Type
Variables
Brush Libraries
Graphic Style Libraries
Swatch Libraries
Symbol Libraries
SEED 2016 Tutorial.ai* @ 100% (CMYK/Prev...
Image Trace
Preset: High Fidelity Photo
View: Tracing Result
Mode: Color
Palette: Full Tone
Colors: 85
Less More
Advanced
Paths: 50%
Low High
Corners: 50%
Less More
Noise: 5 px
1 100
Method:
Create: Fills Strokes
Stroke: 10 px
Options: Snap Curves To Lines
Ignore White
Paths: 450 Colors: 310
Anchors: 3715
Preview Trace
Layers Artboards
Layer 1
1 Layer
Opening the Image Trace Window allows you to fiddle even more with the presets to get the exact settings that you want.
A general rule of thumb: the higher the numbers you have here, the longer the render time.
Let’s try out“High Fidelity Photo” for this one.

Image Trace

Press “Expand” to create your Image Trace. This approximates the photo in vector form.

Image Trace

Ungroup the resulting Group.

You may need some fine-tuning in your settings before you get the color presets right.

Image Trace

You may need some fine-tuning in your settings before you get the color presets right.

In this case, the precision of High Fidelity Photo actually worked against us: we only have two colors in this logo, so the 3 Colors preset does a much better job.

Image Trace

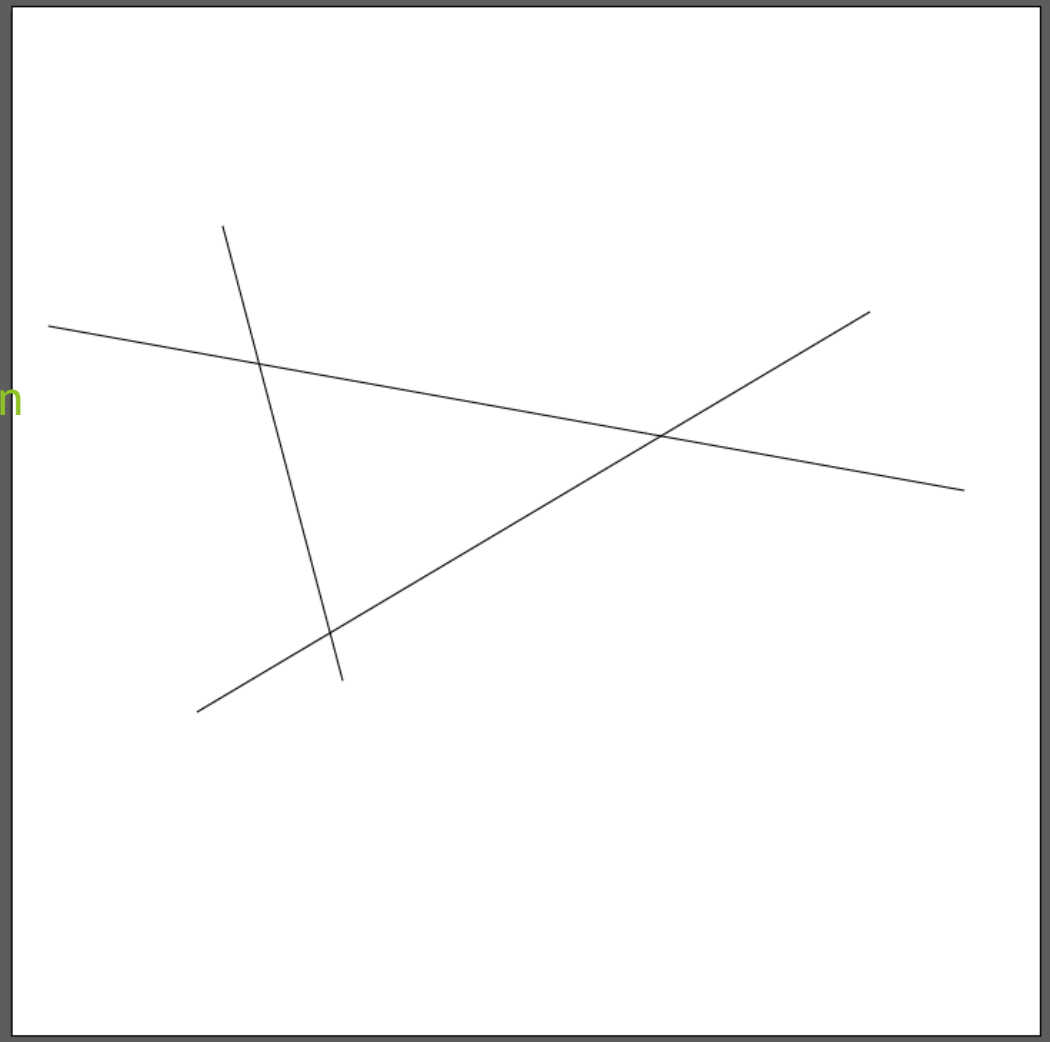
Note that, even with the highest settings, Illustrator struggles to render photos properly.

Image Trace

Note that, even with the highest settings, Illustrator struggles to render photos properly.

Outlines

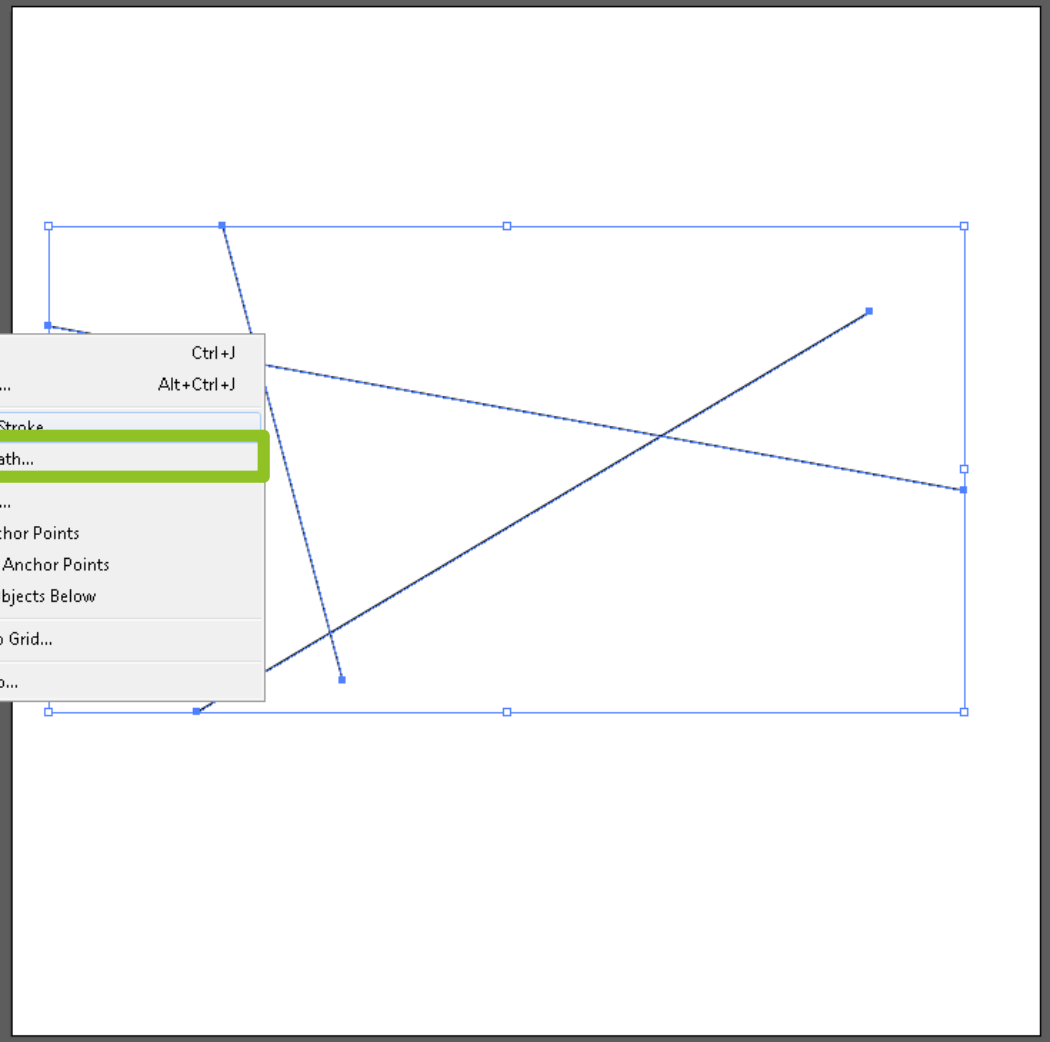
Some tools such as the plasma cutter may work better if you try to cut the outline of a line rather than a line. This can be quite tedious; luckily, there's an easy workaround.



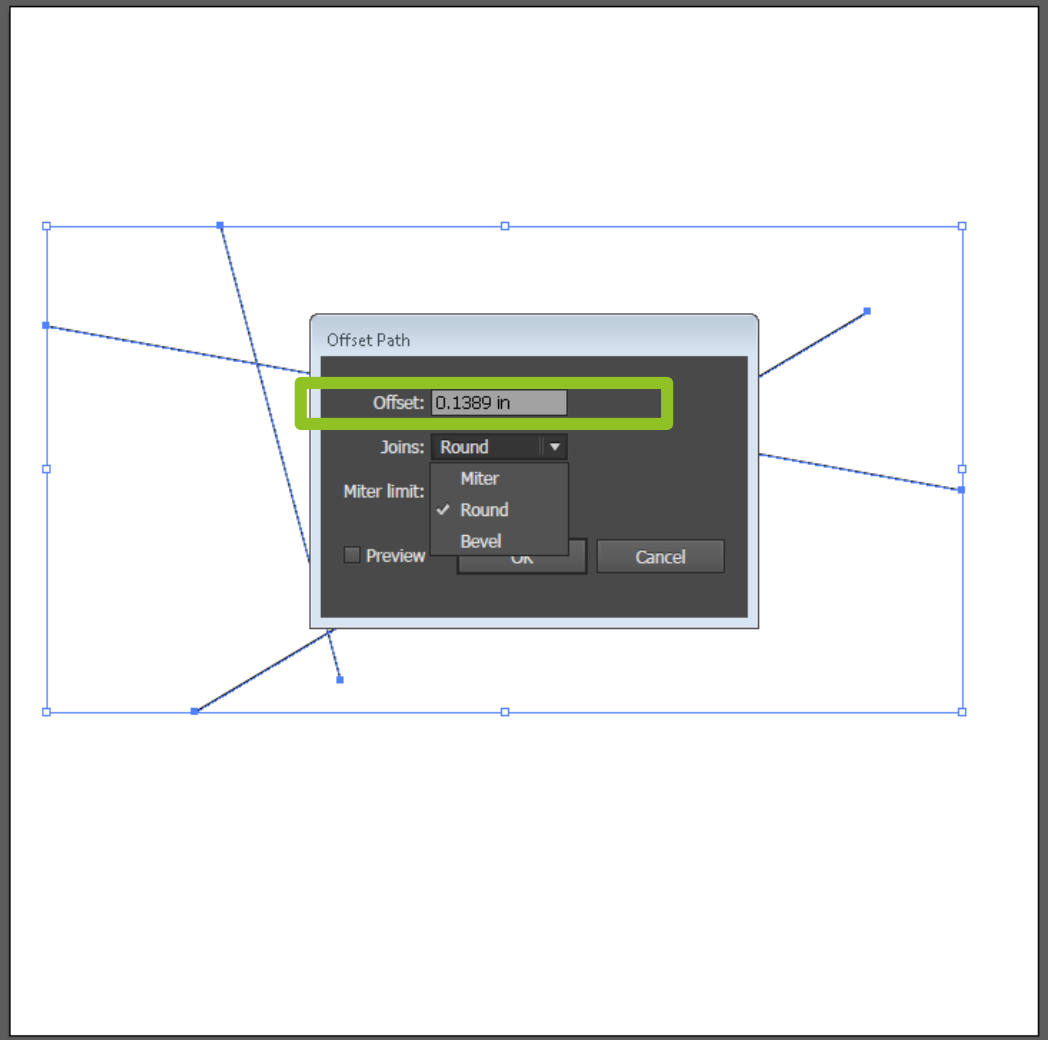
Outlines

Select the collection of lines you want to outline:

- Object -> Path -> Offset Stroke



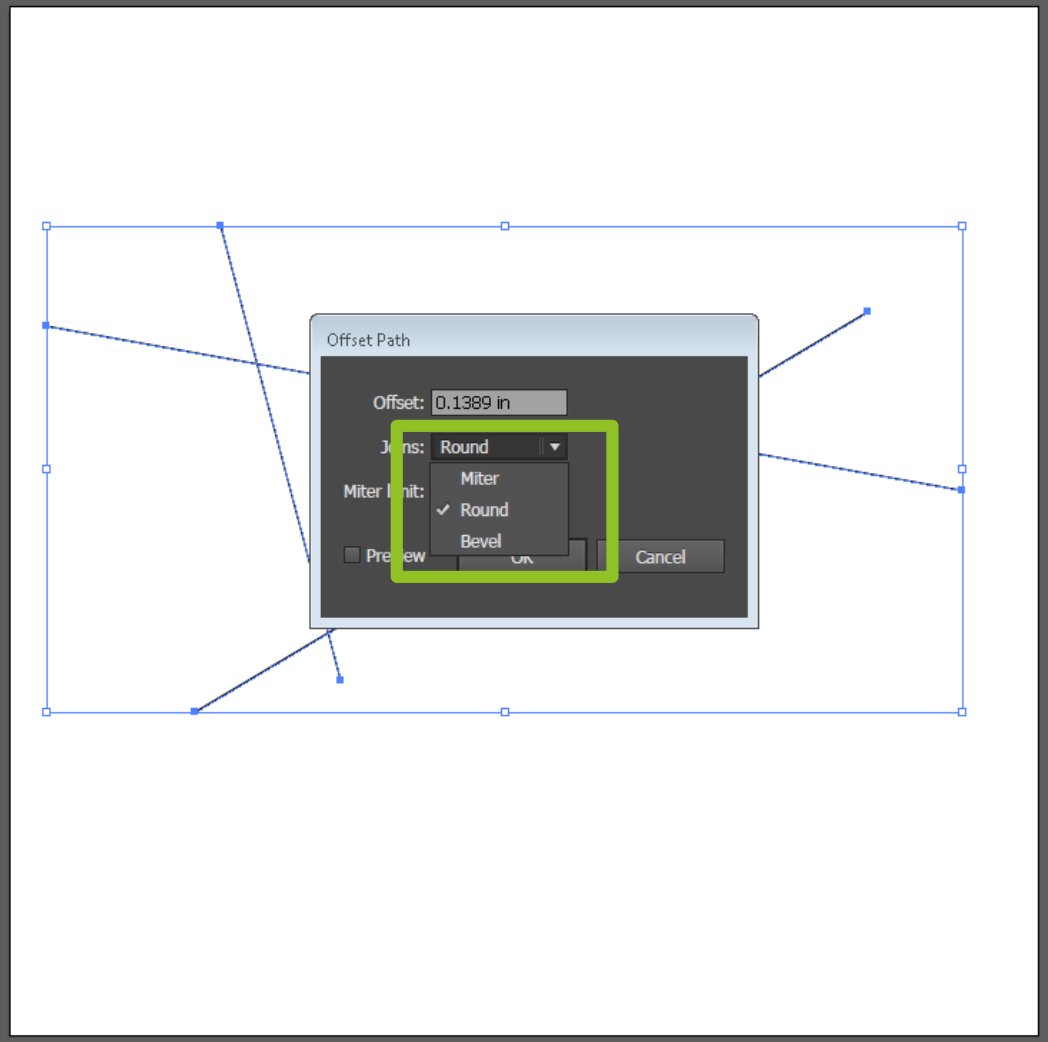
Outlines



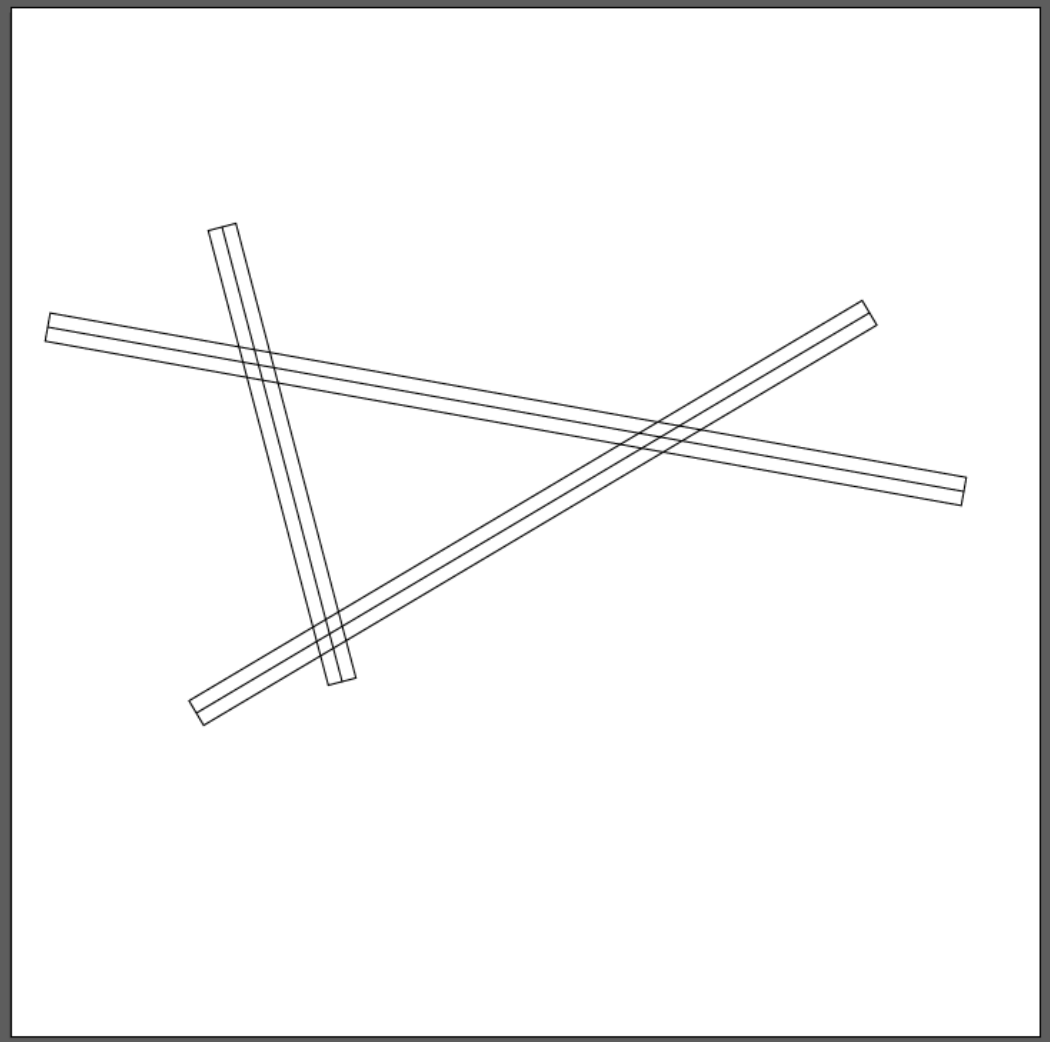
The Offset window determines the distance between the original path and the outline.

Outlines

You can choose between types of offsets.

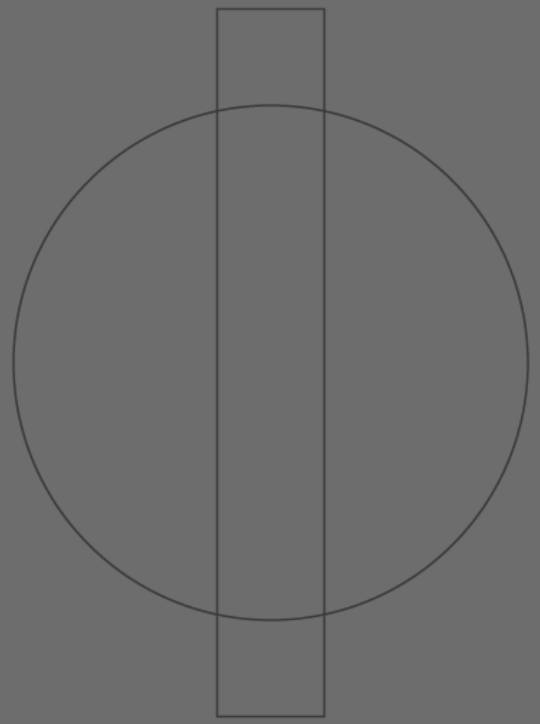


Outlines



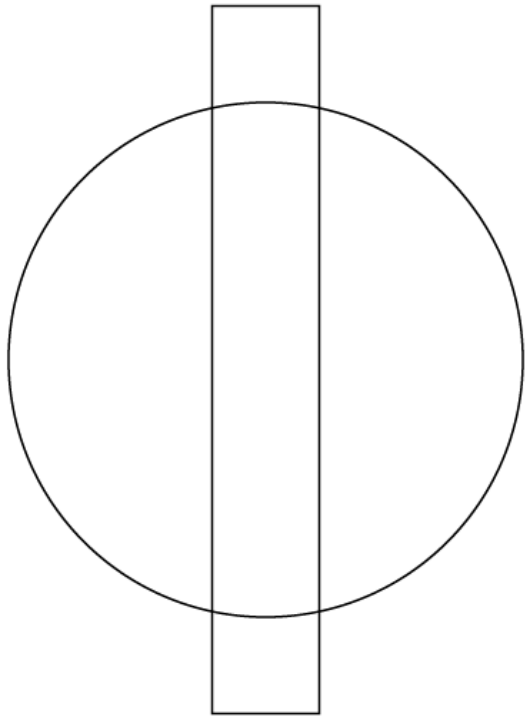
Offset Rotation

Let’s practice by making the outline of a spur gear. You will need to use offset rotation, shapebuilder, and the pen tool.



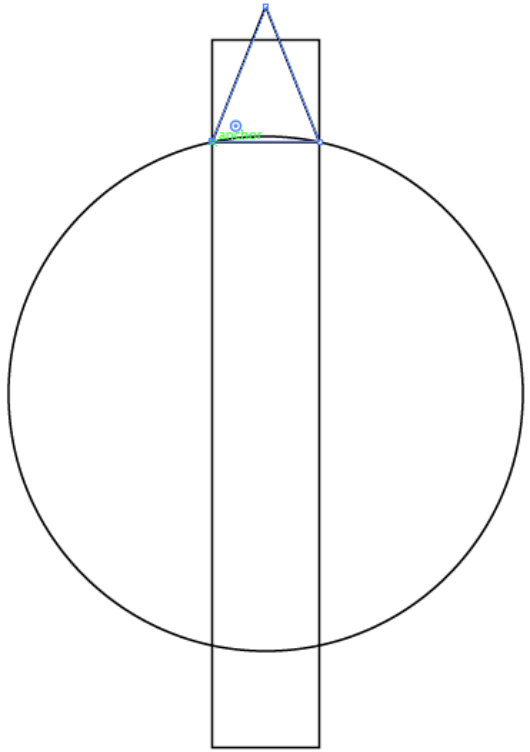
Offset Rotation

We begin with a circle, and then a centered rectangle to serve as a guide for symmetry.



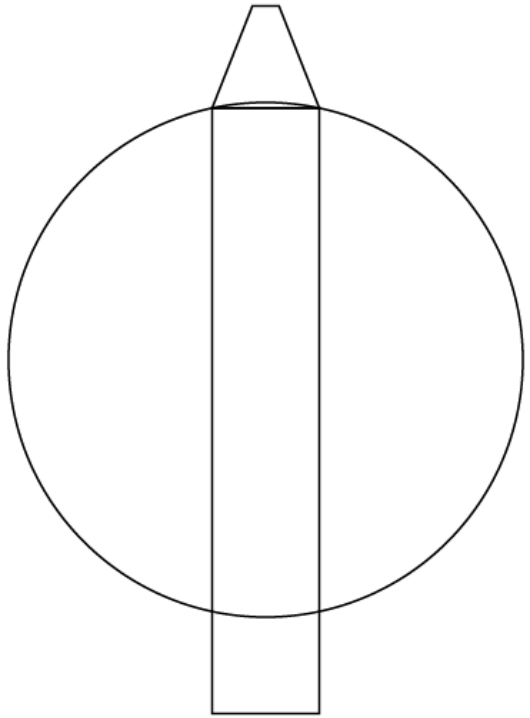
Offset Rotation

Using the pen tool, we can create a shape for a geartooth whose center we know aligns with the center of the gear hub.



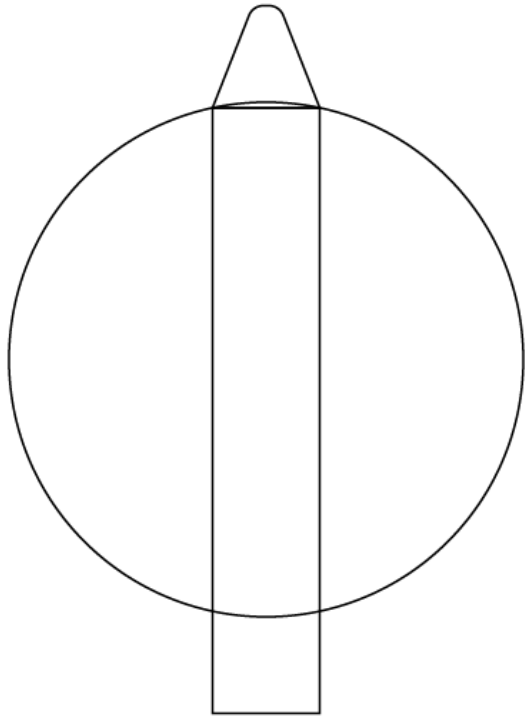
Offset Rotation

A bit of Shapebuilder gives us the shape we want.

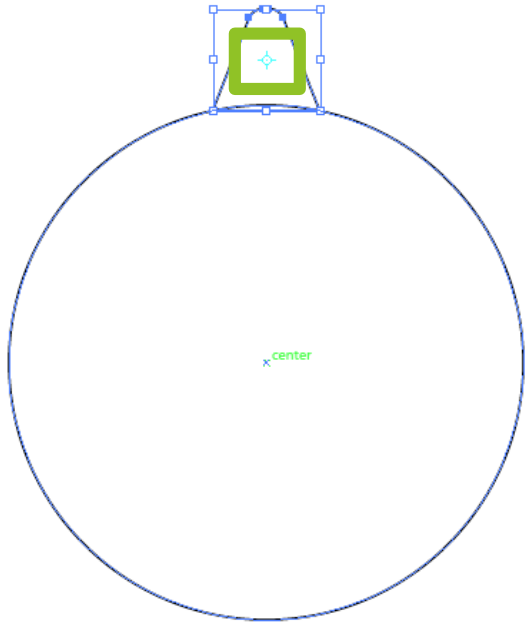


Offset Rotation

And we can round off the corners using our techniques from before.



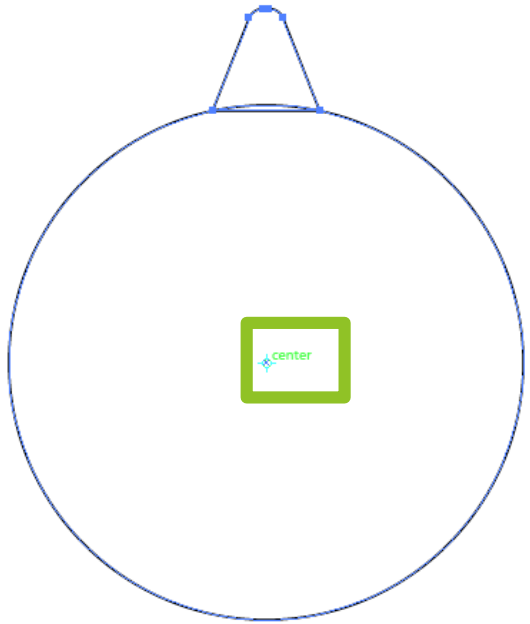
Offset Rotation

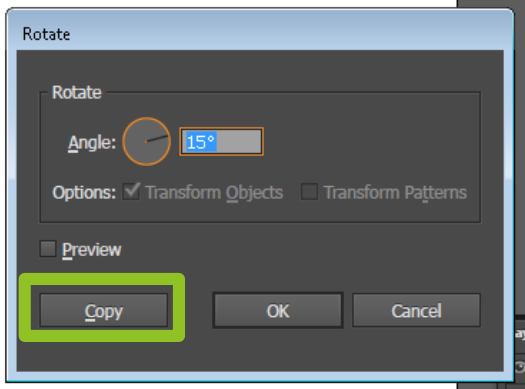


Select the Rotate tool from the side (Hotkey: **R**). Notice that a blue crosshairs now appears on the screen. This represents the point about which your shape will be rotated. The default center of rotation is the center of the shape, but we can move that point with **ALT+CLICK**.

Offset Rotation

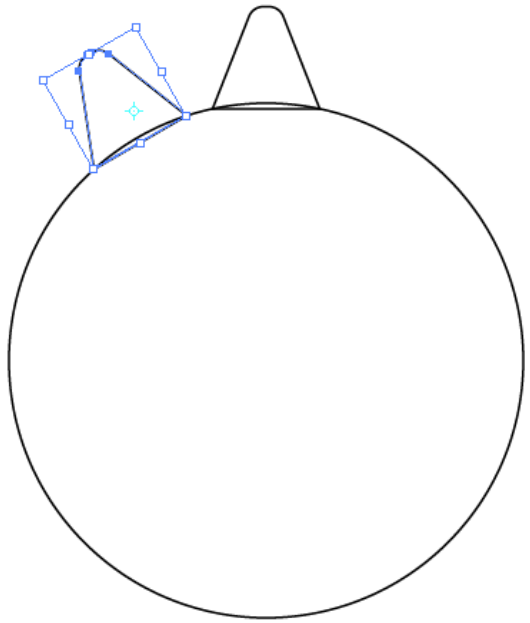
Use the SmartGuides to find the center. **ALT+CLICK** will cause a rotation window to pop up. We'll make sure to use the Copy button.





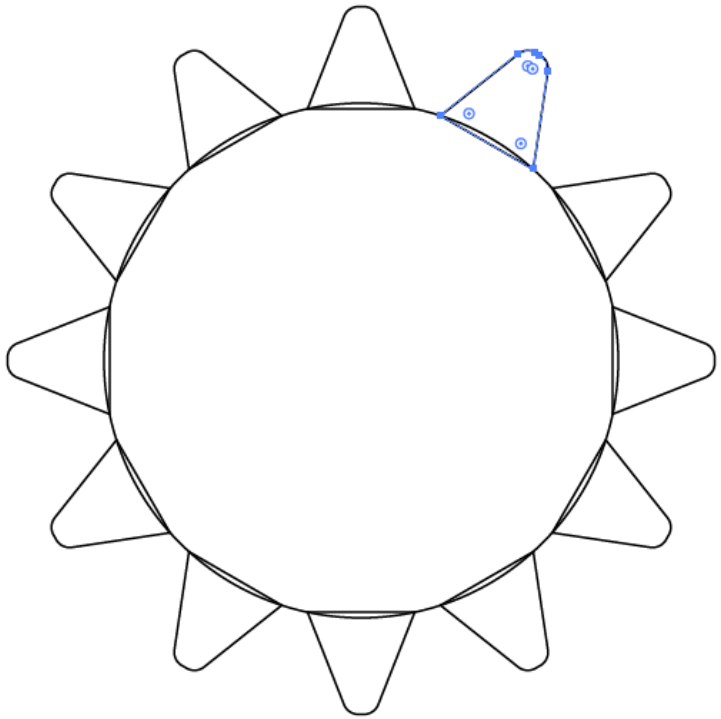
Offset Rotation

Note that this will only work with angles that fit evenly into 360°.



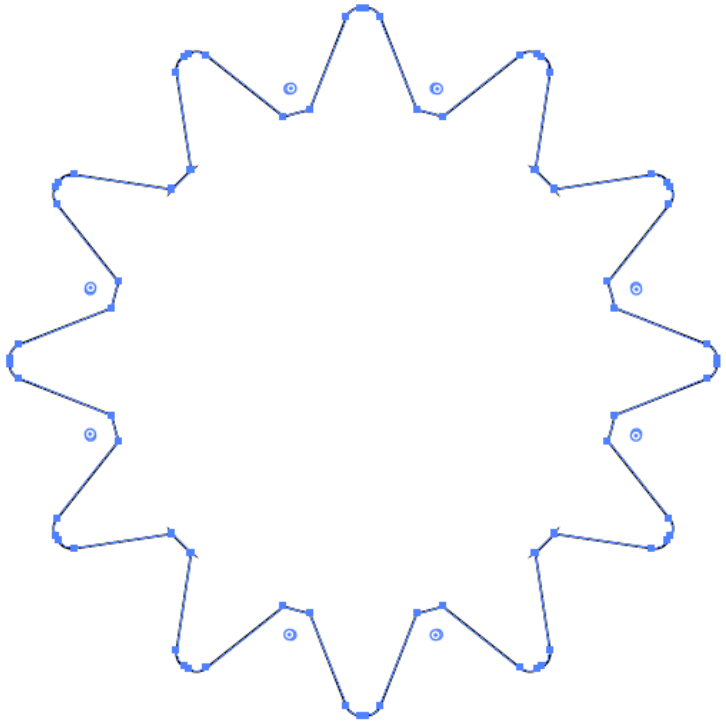
Offset Rotation

Use CTRL+D to repeat the transformation as necessary.



Offset Rotation

And Shapebuilder to complete the shape!



Moderates Wrap-Up

- You should now be able
  - Use grouping and order to more specifically control your shape selection
  - Create and edit paths using the pen tool to make more customizable shapes and splines
  - Use image trace to convert objects into vectors
  - Offset outlines of your pieces to account for tolerances
  - Perform off-center operations (such as rotation) for more flexibility in part generation