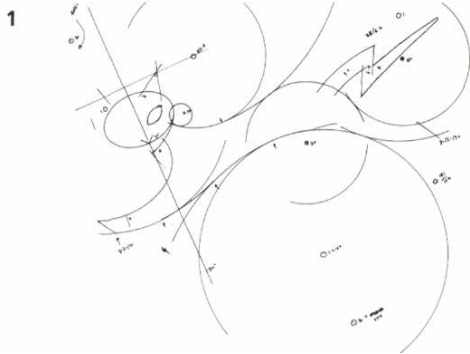# Cutting & Joining

Basic Path Construction with Pathfinders

Overview: *Design an illustration using overlapping objects; use the Pathfinder palette to join and intersect objects, join lines to circles, and cut objects from other objects.*
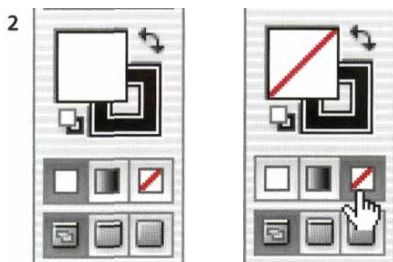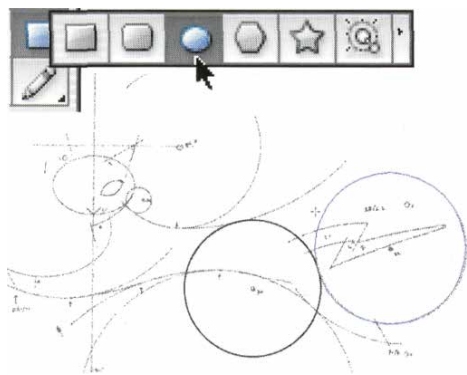

Fox's inked sketch drawn with a compass
NOTE: the Fox created his image in reverse. As a last step, he used the Reflect tool to flip the final image (see the *Zen* chapter for help reflecting).

Using the Tools palette to set the Fill to None before starting to draw

Drawing constrained circles from the center with the Ellipse tool (while holding Option-Shift/ Alt-Shift) to trace over the placed template

FOX / BLACKDOG (Art Director: Jeff Carino, Landor Associates)

To redesign the classic "9 Lives" cat symbol that has appeared on Eveready batteries for over 50 years, Mark Fox began with a hand-drawn sketch. Once his sketch was approved, he inked the sketch with a Rapidograph pen and a compass, and then reconstructed the ink image in Illustrator using permanent (destructive) Pathfinder commands. To permanently apply the top row of Pathfinders, you'll have to hold Option (Mac)/Alt (Win) when you click these icons. The bottom row of Pathfinder icons are always permanent. *Especially* when you work with permanent Pathfinders, make sure you save incremental versions of your image as you work.

1 Creating a sketch and placing it as a template. Fox used a compass to create a precise drawing constructed of fluid curves. Using his inked sketch as a template, Fox then used the Ellipse tool to recreate his compass circles in Illustrator. Create your own sketch using traditional materials and then scan it, or sketch directly into a painting program (such as Painter or Photoshop). Save your sketch as a TIFF or your preferred raster format, and place it into a new Illustrator document as a template. To do this, choose File > Place to locate the image you wish to use as a template, then enable the Template option and click Place (see the *Layers* chapter for more on templates).

2 **Tracing your template using adjoining and overlapping objects.** In order to see what you're doing as you work, use the Fill/Stroke section of the Tools palette to

set your Fill to None and Stroke to black before you begin drawing. Now use the Ellipse and Rectangle tools to create the basic shapes that will make up your image. Fox used some circles to form the shapes themselves (like the rump of the cat), and others to define the areas that would later be cut from others (like the arc of the underbelly). To create perfect circles or squares hold the Shift key while you draw with the Ellipse and Rectangle tools. By default, ellipse and rectangles are drawn from a corner—in order to draw these objects from a center point, hold down the Option (Mac) or Alt (Win) key as you draw. To create a circle from its center point, you'll need to hold down the modifier keys Shift+Option (Mac), or Shift+Alt (Win) as you draw—don't release the modifier keys until after you release your mouse button. Because Fox measured everything in millimeters in his inking stage, he created his circles numerically. With the Ellipse tool, Fox Option-clicked (Alt clicked for Win) on each center point marked on his template, entered the correct diameter for Width and Height, and clicked OK.

3 Constructing curves by combining parts of different circles. Once your paths are drawn and in position, use the Pathfinder palette (Window > Pathfinder) to combine portions of different circles to create complex curves. After drawing basic circles, use the Line Segment tool to draw a line through the circles at the point where you want to join them, and choose Object > Path > Divide Objects Below. Then select the sub-sections of the divided circles that you don't want and delete. To join separate adjoining curves, select them, hold Option/Alt, and click the Add to Shape Area Pathfinder icon.
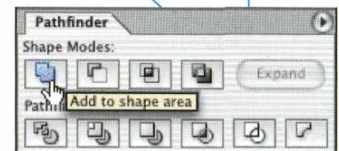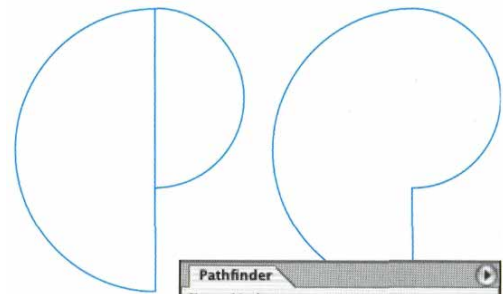
4 Constructing objects using the Intersect Pathfinder command. If the area you wish to keep is the portion where objects overlap, use the Intersect command. Fox used Intersect to create the eyes and the nose of the cat. To make the eye shape, he drew a circle and then dragged off a duplicate by holding Option/Alt as he moved it with
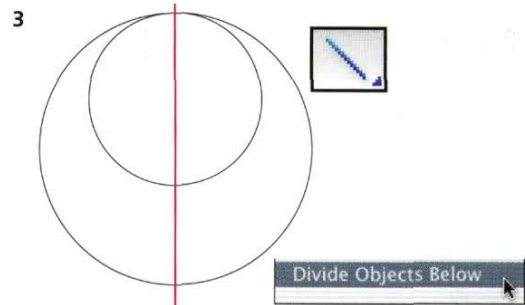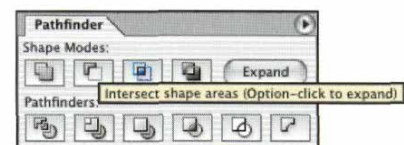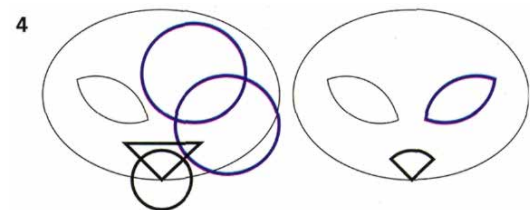

Draw a line to mark where objects will be joined and apply Object > Path > Divide Objects Below
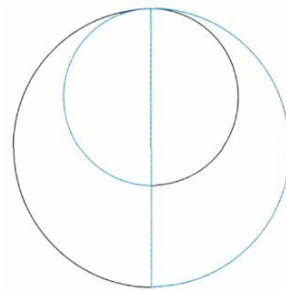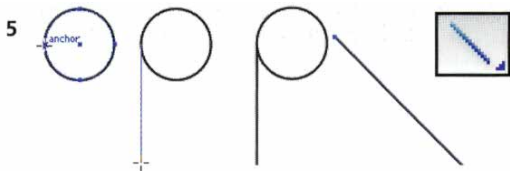

Select and delete unwanted portions of objects that won't be part of the final curve
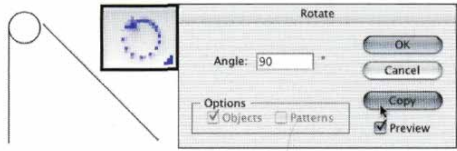

Once only the elements you wish to be joined remain, select them, hold Option/Alt and click on the Add to Shape Area Pathfinder icon
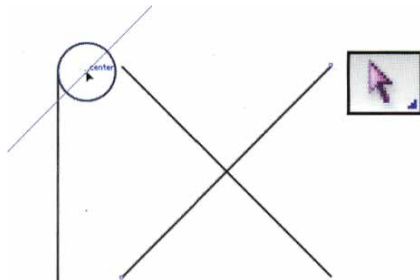

Constructing the eyes and nose using the Intersect Shape Areas Pathfinder command
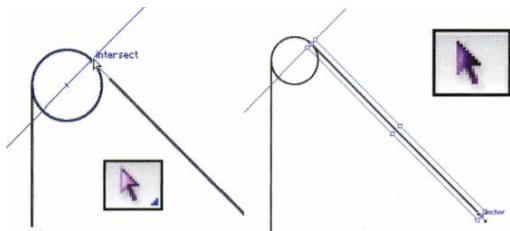
5

Drawing one line from an anchor point on the circle and another angled line slightly removed
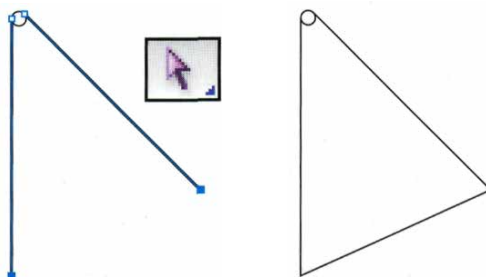

Creating a perpendicular copy of the angled line by double-clicking the Rotate tool, specifying a 90° Angle, and clicking copy
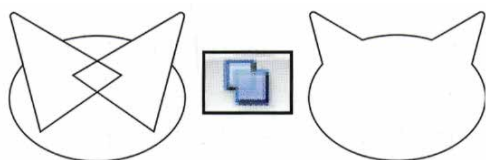

Moving the perpendicular copy to the circle's center and then making it into a guide

Moving the angled line tangent to the circle using the guide, then lengthening the line

Selecting the two end anchor points of the lines and closing using Join to connect the lines

Using the Add to Shape Pathfinder command to attach the circle to the angled shape, then the completed ears to the cat-head ellipse

the Selection tool. He then positioned the two circles so the overlap created the desired shape, selected both circles, and held down Option/Alt while he clicked the Intersect Shape Areas Pathfinder icon.

5 Attaching lines to circles. Fox connected angled lines to a tiny circle to form the cat's ear. To smoothly attach lines to circles, the lines need to lie "tangent" to the circle (touching the circle at only one anchor point). To work with precision, turn on Smart Guides (View menu).

Start with the Ellipse tool and draw a small circle. To create the first tangent line, choose the Line Segment tool, and place the cursor over the left side anchor-point of the circle. When you see the word "anchor point" click-drag downward from that anchor point to draw a vertical line (hold the Shift key to constrain your line to vertical).

Creating a tangent line that doesn't begin at an anchor point is trickier. Start by drawing another line slightly apart from the circle, but at the angle you desire (holding the Shift key constrains your line to horizontals, verticals, and 45° angles). To help you find the tangent point for this line, you need to create a line perpendicular to it. With your angled line selected, double-click the Rotate tool, enter 90°, and click Copy. Use the Direct selection tool to grab this perpendicular copy of your line near the middle and drag it toward the center of your circle; release the mouse when you see the word "center." With this line still selected, make it into a guide with View > Guides > Make Guides. Now select your angled line (marquee it with the Direct selection tool, or click it with the Selection or Group selection tool). Finally, with the Direct selection tool, grab the top anchor point and drag it to where the perpendicular guide meets the circle; release the mouse when you see the word "intersect."

To adjust the length of either line, switch to the Selection tool, select the line, and drag the bounding box from the middle end handle at the open anchor point.

The Add to Shape Pathfinder ignores lines, so to attach the lines to the circle, first connect the lines

together to form a two-dimensional shape. Using the Direct Selection tool, marquee the two open anchor points and choose Object > Path > Join (⌘-J/Ctrl-J) to connect the points with a line.

Finally, to unite your angled shape with the circle, select them both, hold Option/Alt, and click the Add to Shape Area Pathfinder icon. Fox also used Add to Shape Area to join the ears to the head (he rotated the first ear into position, and used the Reflect tool to create a copy for the other ear—see the *Zen of Illustrator* chapter for help with rotation and reflection).

6 Cutting portions of paths with another object. To create the rear flank of the cat, Fox used a large object to cut away an area (subtract) from another circle. Use the Selection tool to select the path you'll use as the cutter and bring it to the top of the stacking order (in the exact position) either by choosing Object > Arrange > Bring to Front, or Edit > Cut and then Edit > Paste in Front (⌘-F/Ctrl-F). Marquee or Shift-select to select the cutter object as well as the objects you want to cut. To apply the cut, hold Option/Alt and click the Subtract from Shape Area Pathfinder icon. If you want a different result—Undo, make adjustments and reapply the Pathfinder.
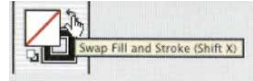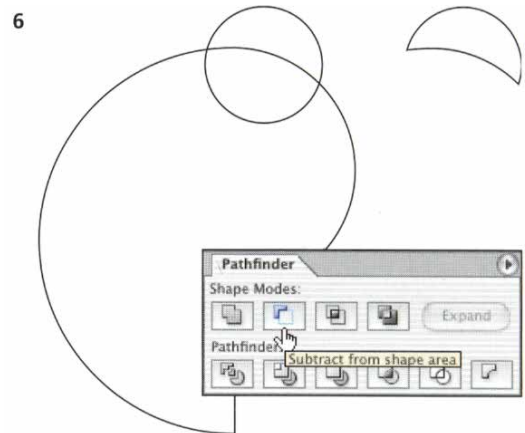
Using the Subtract from Shape Area to cut one object from others