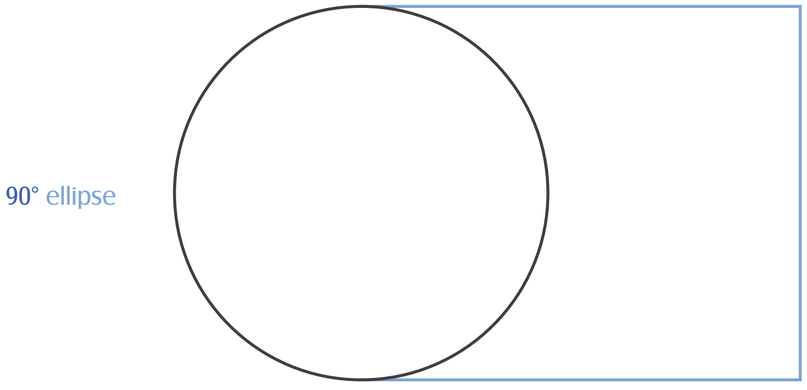
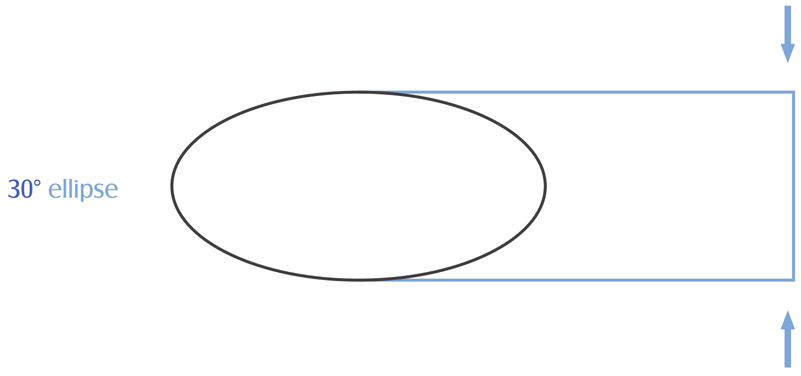
ELLIPSE-GUIDE–STYLE ELLIPSES AND CYLINDERS 1

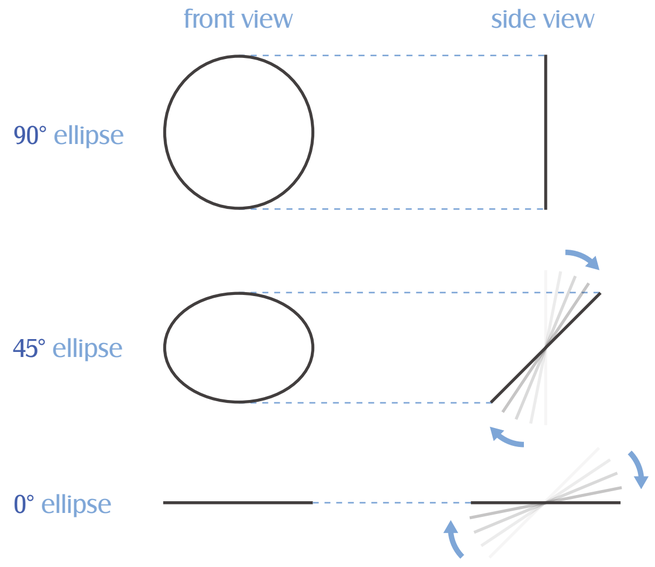
Drawing Foundations 1 Course
By Joshua Jacobo



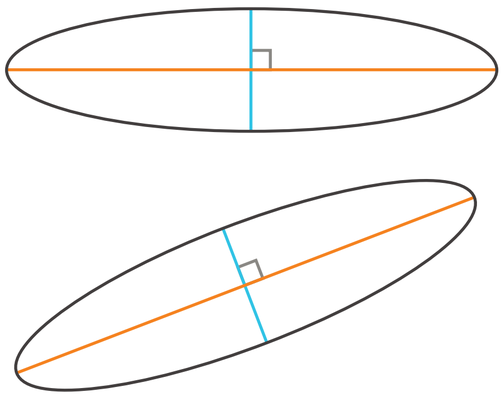
A circle has no axis. It's the same length in all directions!



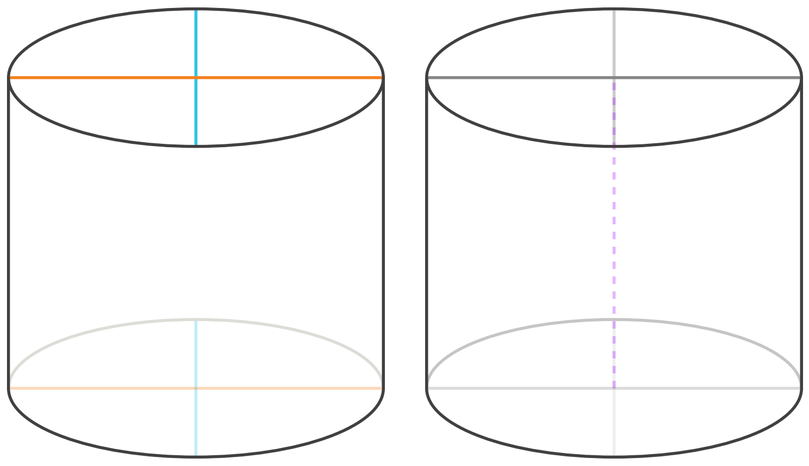
The ellipse can be thought of as a circle compressed in one axis. The amount of compression or squish is expressed in degrees. The ellipse above is a 30° ellipse.



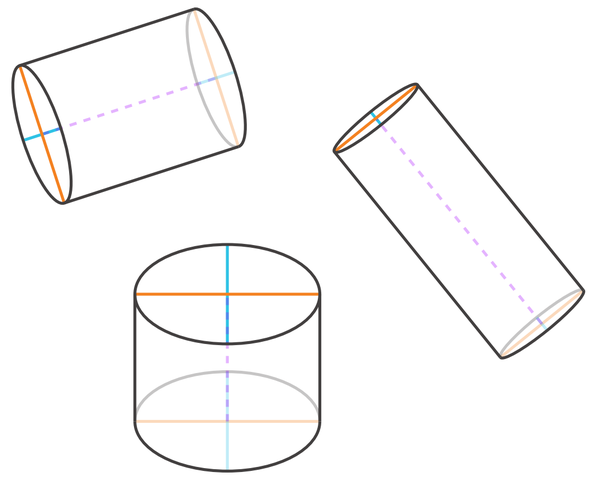
What causes this squishing or compression? In the two columns above, we show a circle from the front and side. As we rotate or tilt the circle, at the side view the front view appears to compress. The angle the side view circle forms with a horizontal line is the same as the degree of the ellipse.



Compressing the circle creates a long axis. It's the longest line we can fit into the ellipse. That long axis is called the major axis.
The shortest distance through the center should be at right angles (90°) to the major axis. Because it is shorter, we call it the minor axis.



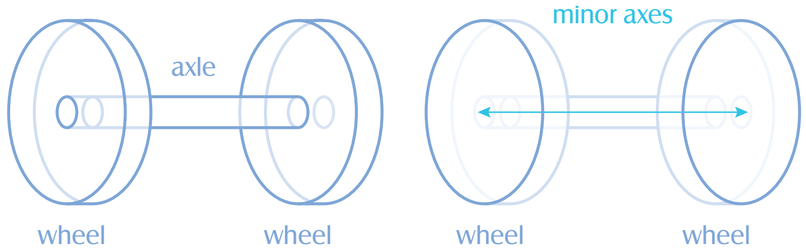
We can construct cylinders by connecting two ellipses along a center axis that connects the minor axes of each ellipse. We can also think of it as an axle between two wheels.



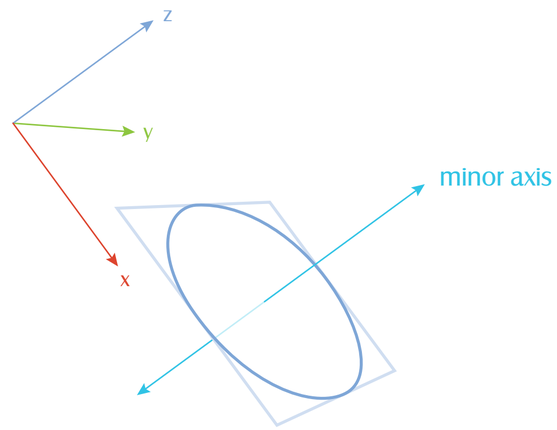
If our cylinder is resting on the ground plane, the minor axes and center axis will be vertical. If our cylinder is tumbling through space, the axes can be angled in any direction!

ELLIPSE-GUIDE–STYLE ELLIPSES AND CYLINDERS 2

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By Joshua Jacobo



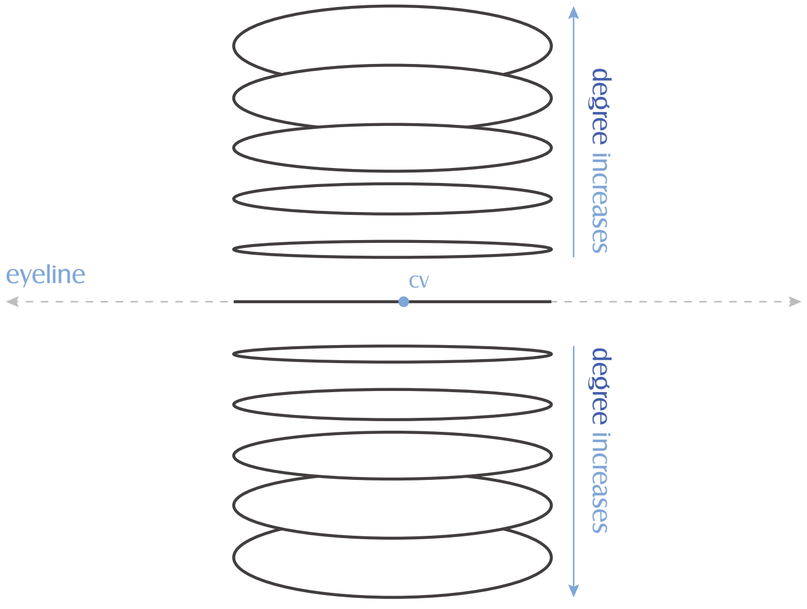
In a wheel-and-axle simple machine, the wheels are placed 90° to the axle. This is also how ellipses are drawn relative to the minor axes.



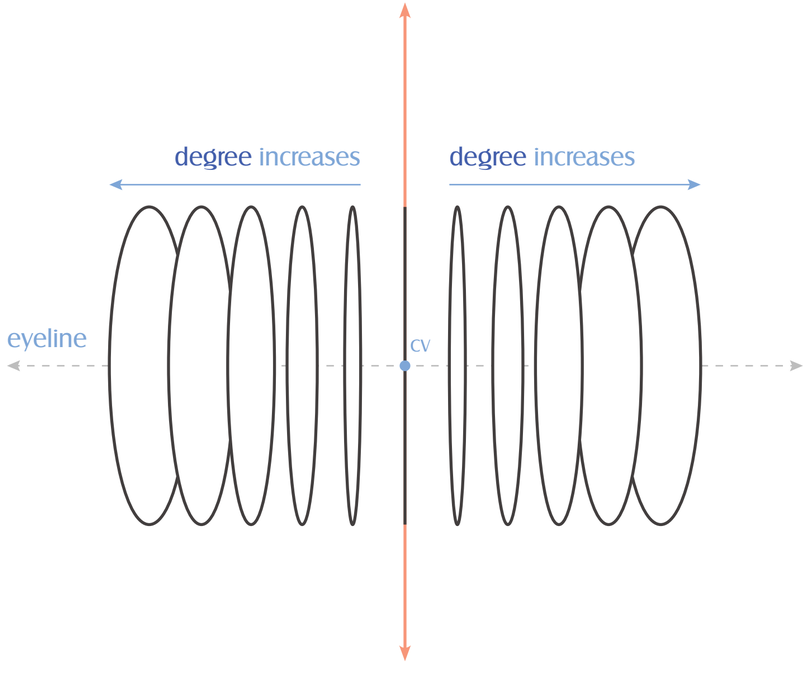
It can be useful then to think of the minor axis as being in the third dimension relative to the ellipse, which is on a flat plane (2D).



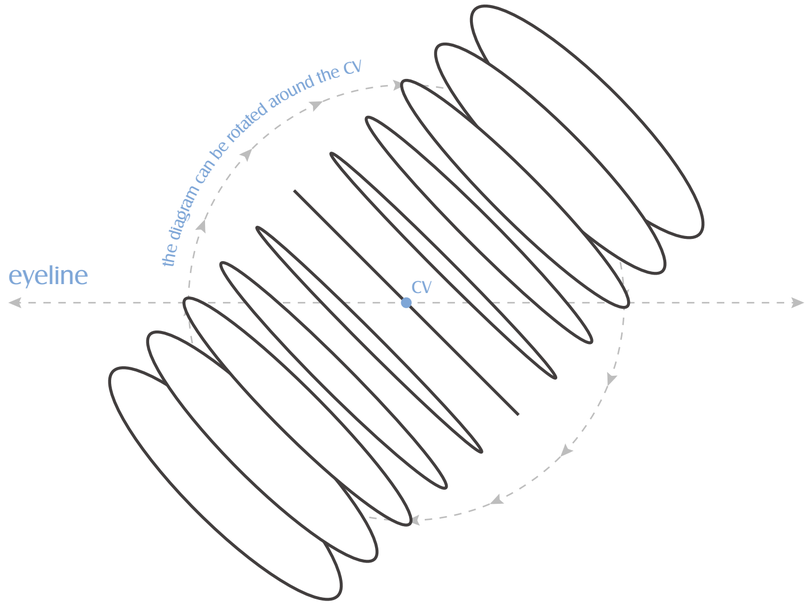
The eyeline is an imaginary horizontal line right in front of our eyes that follows us anywhere we look. The **center of vision** (CV) is how far to the left or right our head is. You can place the **eyeline** wherever you like on your page, and you can place your **center of vision** anywhere on that line.



Hold a coin flat in front of your eyes. Coins are like very short cylinders, but we can imagine them as flat planes. Now carefully lift and lower the coin in front of you without twisting it. As the coin moves away from your eyeline, it appears less like a flat line (0°) and more like a full round circle (90°). To draw these ellipses correctly, we only need to change the degree.



What if we hold the coin vertically and move it to the left and to the right instead? The same principle applies, except this time an imaginary vertical line cutting through the **center of vision** will determine which side of the coin we see. As the coin moves away from our **center of vision**, the degree of the ellipses changes from 0° towards 90°!

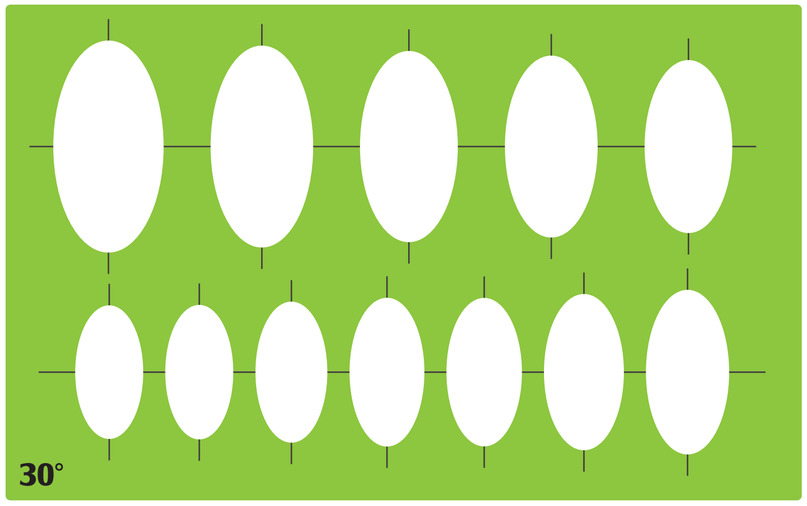


Does the principle still apply if we rotate the coin diagram to any other angle? As long as we rotate the diagram using the **center of vision** as the pivot point, yes!

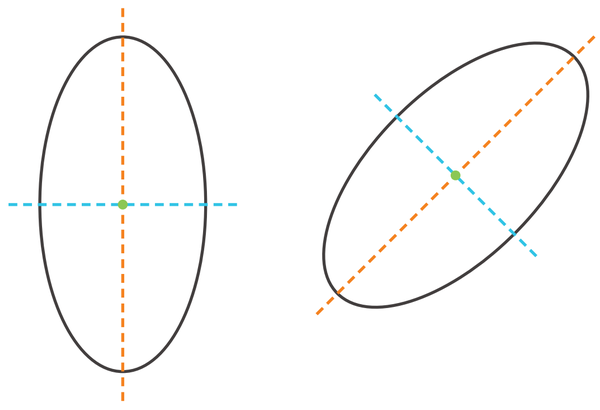
ELLIPSE-GUIDE–STYLE VERSUS PERSPECTIVE ELLIPSES

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By Joshua Jacobo

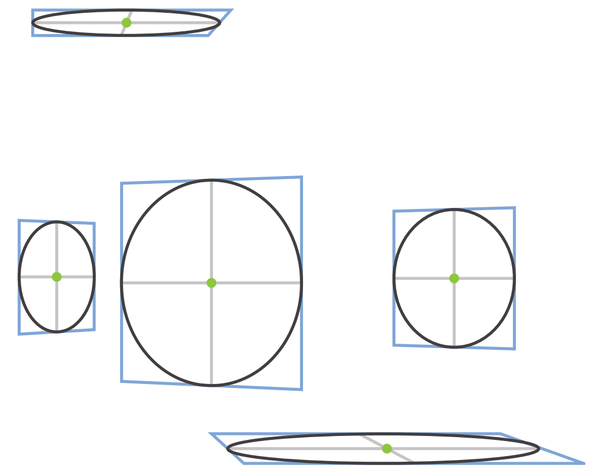
30° ellipse-guide template



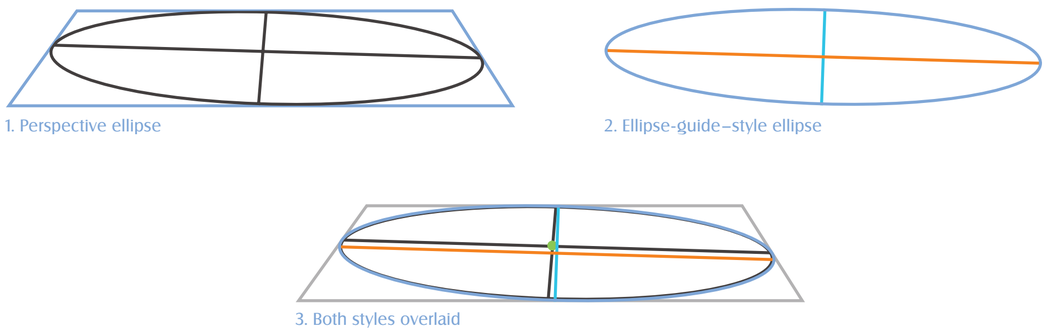
A set of ellipse guides is a useful tool for artists. Ellipse guides are plastic stencils that artists use to draw perfect ellipses. Each stencil sheet has a degree—usually shown in the corner—and a variety of sizes. Major and minor axes are indicated with thin lines.



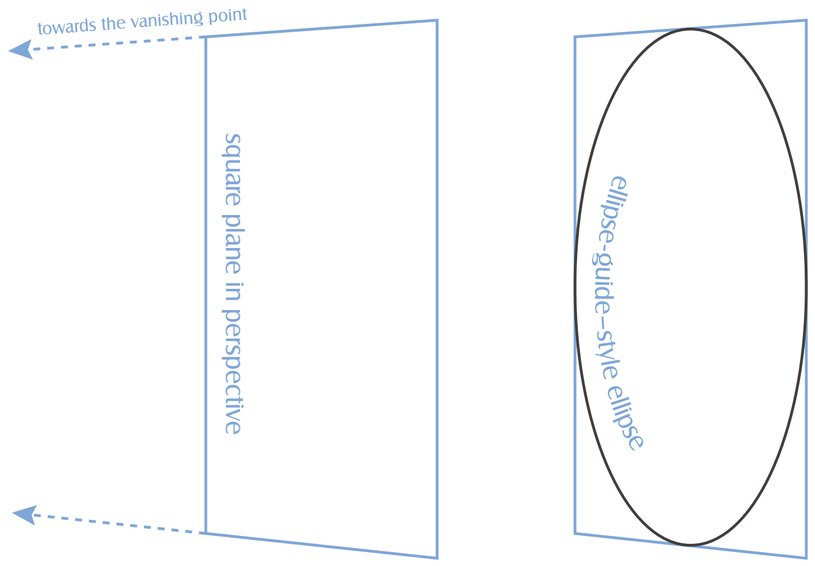
These ellipse-guide style or orthographic ellipses are **symmetrical** on both the major and minor axes.
The circle center and the major-minor axes join at the same point.



Perspective ellipses are not symmetrical. They are usually drawn by inscribing circles into squares in perspective.
The perspective center and the major-minor center are not the same.
Technically, this is not a true ellipse!



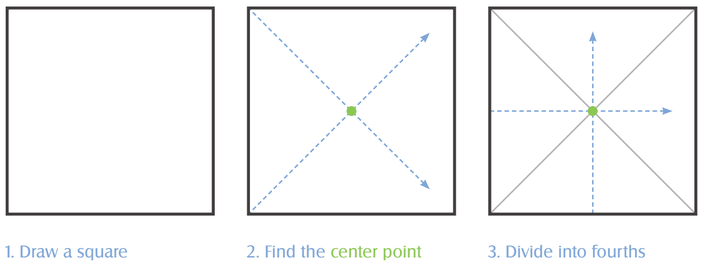
These two styles of ellipses are not the same on the page. Notice the slight difference in shape and how the perspective circle center does not lie on the same point as the intersection of the major and minor axes.
Also, the major and minor axes do not align with the axes of the square plane.
That said, in most cases ellipse-guide–style ellipses work just as well as plotted perspective ellipses and in some cases they appear more visually correct than perspective ellipses.



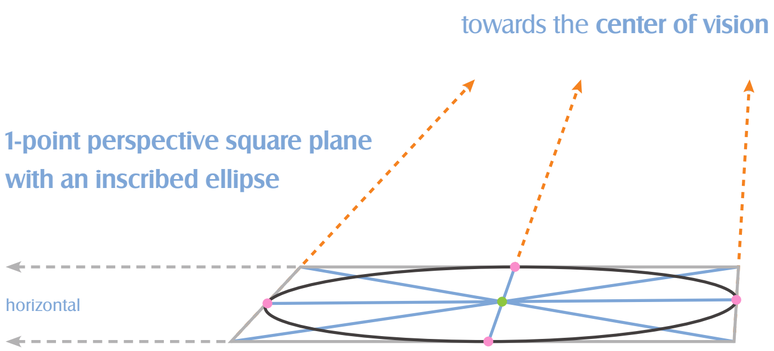
A hybrid approach is possible where an ellipse-guide–style ellipse can be drawn into a perspective square plane. This can be done freehand or using a carefully oriented ellipse-guide template.

SKETCH PERSPECTIVE: PERSPECTIVE ELLIPSES AND CYLINDERS

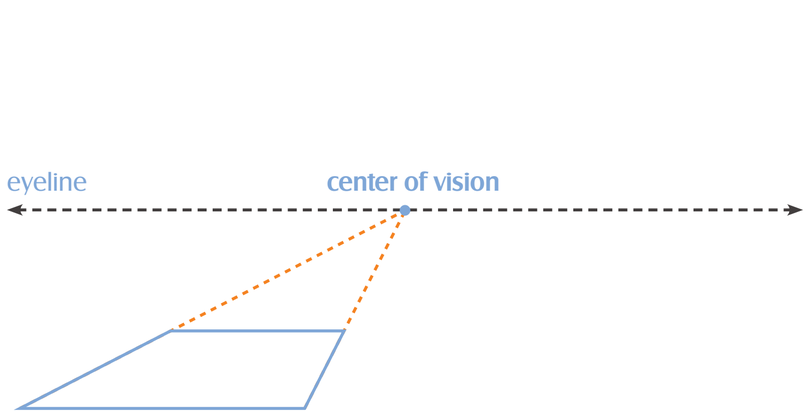
Drawing Foundations 1 Course
By Joshua Jacobo



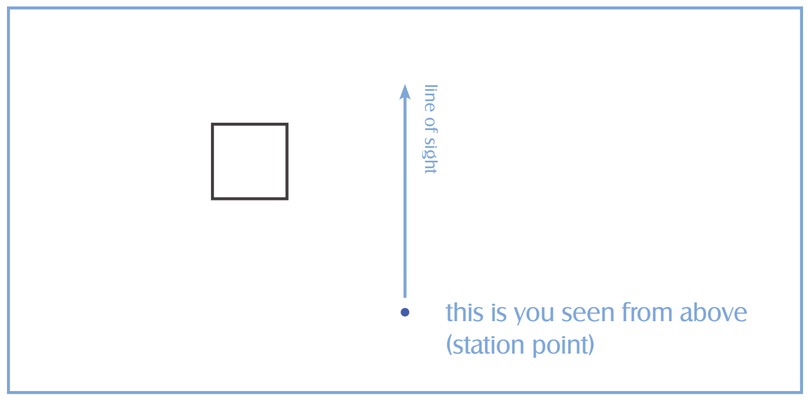
Here is the simplest way to place an ellipse in a square plane. First we draw the square, then we use diagonal lines to connect the opposing corners. The center of the square is where the lines cross. Run lines through the center point parallel to the edges to divide the square into fourths. Where these crossed lines meet the square we call touch points. Then we draw our circle centered on the center point touching each touch point.



All horizontal ellipses can be drawn using 1-point perspective because rotating the plane along the minor axis doesn't change the shape of the ellipse. Remember that the center line that passes through the center also goes toward the **center of vision**!

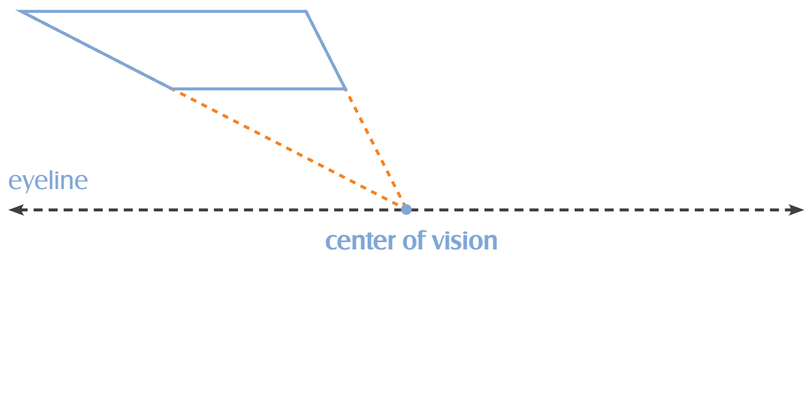


We can draw a square plane on the ground in front of us and to the left (or wherever we want). If the square is rotated, so two of its edges are parallel to our eye line, then we can use 1-point perspective to draw it. We draw the parallel pair of edges as horizontals whereas the perpendicular edges converge towards the **center of vision**.

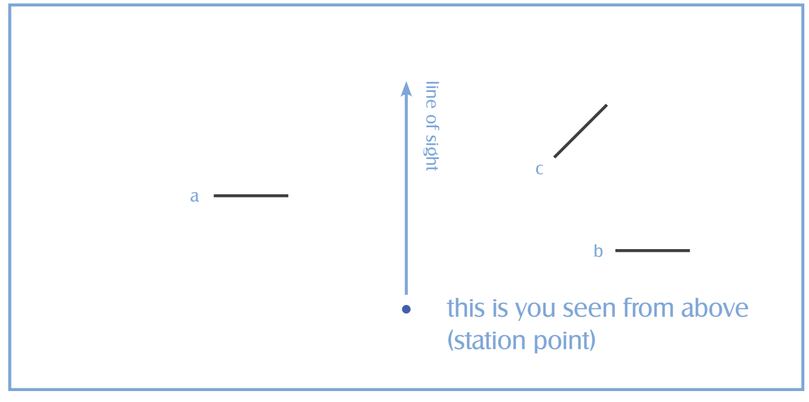


top view (plan)

Here's the plan-view from above with no perspective. Notice that our line of sight extends infinitely forward towards our **center of vision**. The square plane is in front of us and to the left. To make things easier, we make sure the plane is rotated so one pair of edges is parallel with our line of sight. This can be done for any horizontal ellipse!



If we lift the square plane off of the ground and above our eyeline the same principles apply. Now we are looking up at the square plane from below.

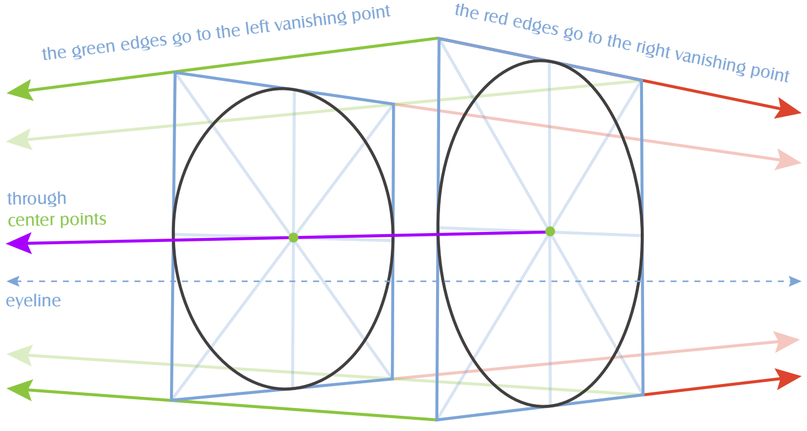


top view (plan)

Here's a plan view showing three vertical planes. They look like lines because they have no thickness. Here we can see that planes a and b could be drawn using 1-point perspective but because c is angled to the viewer, we would need to use 2-point perspective.

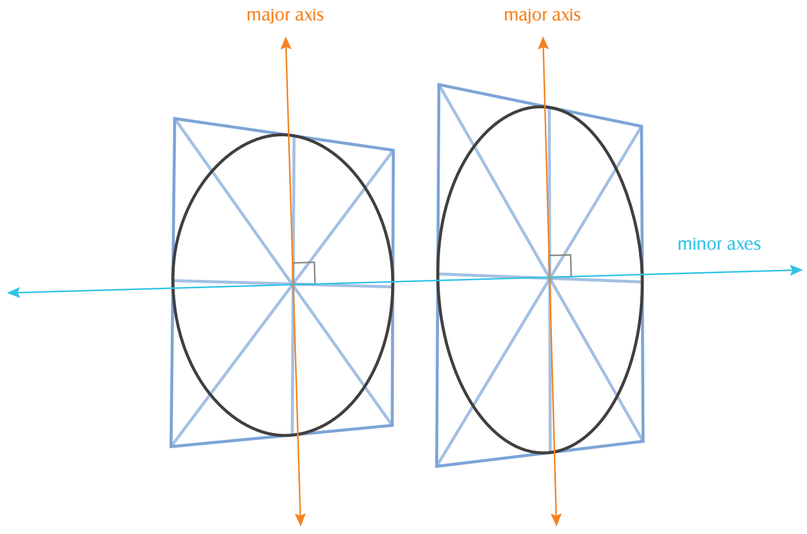
SKETCH PERSPECTIVE: PERSPECTIVE ELLIPSES AND CYLINDERS 2

Drawing Foundations 1 Course
By Joshua Jacobo

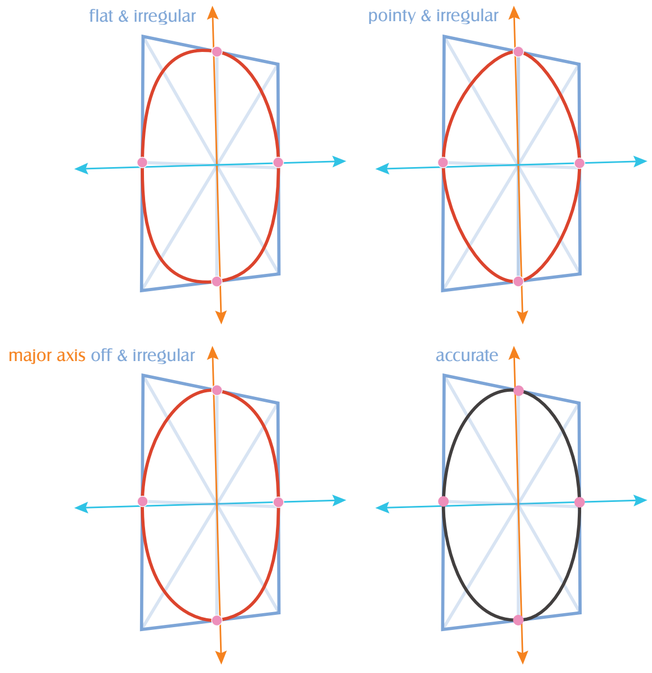


two 2-point vertical ellipses

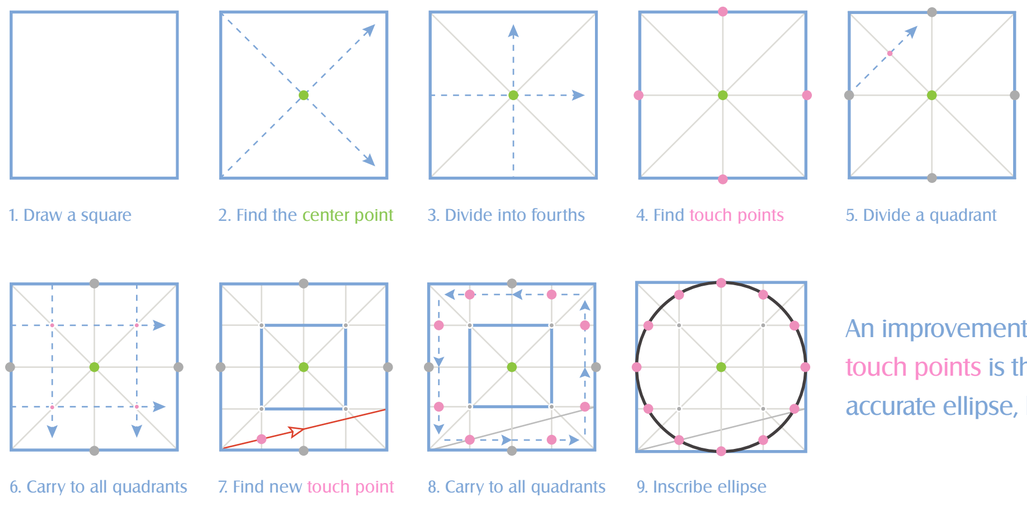
For vertical ellipses, 1- or 2-point perspective can be used. If the vertical plane is perpendicular with the line of sight (like planes a and b in the previous diagram), we can use 1-point perspective. If the plane is rotated relative to the line of sight (like plane c) we use 2-point perspective. If we connect the center points of these two ellipses above, notice something curious. The center axis line passing through the center of each ellipse towards the left vanishing point is not the same as the horizontal division across the ellipse (9 to 3 on a clock). These axes are slightly off.



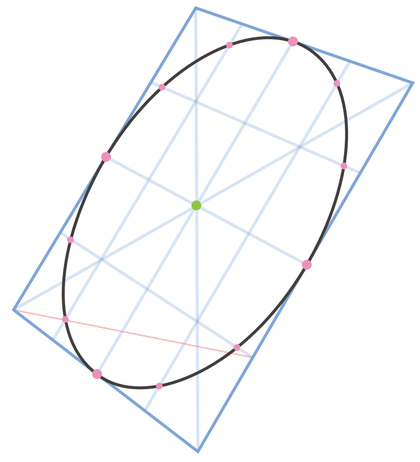
Remember that the minor axis can be thought of as an axle. It's an axis running through the ellipse at right angles to the plane, as if it were in 3d, not flat 2d. If we treat the minor axes this way and then place a major axis through the center at 90° (on the page not in 3d space) to the minor axis, we see that the major-minor axes logic describes what we see beautifully! Even if we are drawing ellipses in perspective planes, this principle helps us to draw our ellipses correctly.



So if we draw a proper plane in perspective and do our clever touch points, and remember to enforce the major and minor axes, there's no way we can go wrong, right? Unfortunately, even with all these procedures, there are many ways to draw an ellipse incorrectly.



An improvement on the previous method where we used four touch points is this version with twelve touch points. This gives a more accurate ellipse, but it requires more lines and more time to plot.



Here is an example of an ellipse drawn in perspective using twelve, rather than four, touch points.