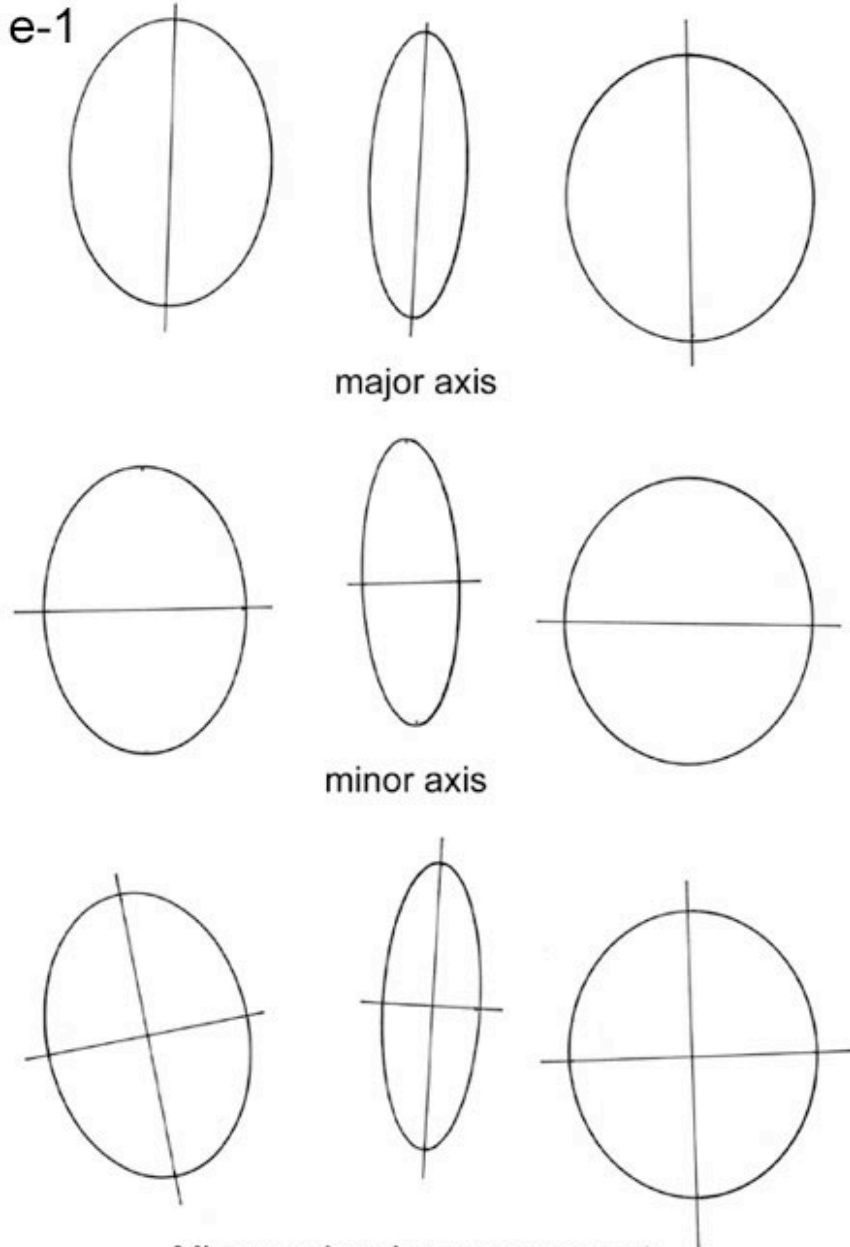


Drawing Ellipses

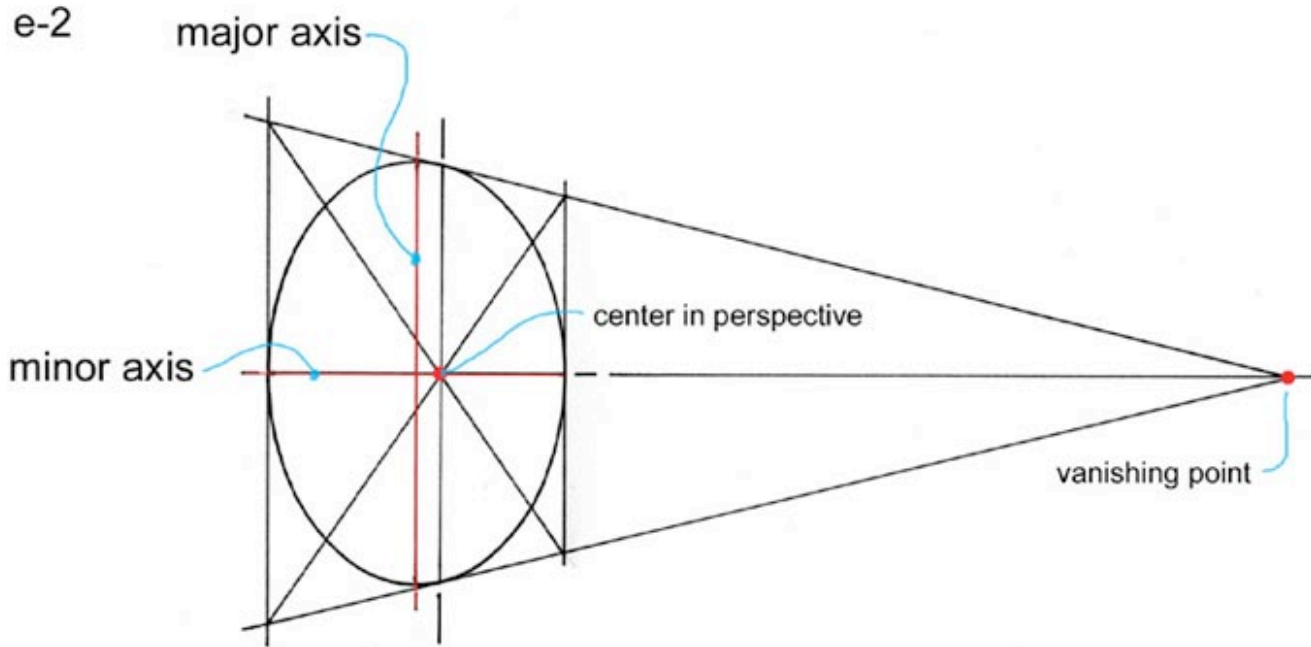
A tutorial by Scott Robertson & Neville Page

Anatomy of an ellipse:

When we view a circle at an angle we see an ellipse. We refer to this viewing angle as the degree of the ellipse. A perfect circle is viewed at 90 degrees and at angles less than that we see various degree ellipses on the way down to a zero degree ellipse (a straight line). Understanding the mechanics of drawing ellipses is not difficult, mastering the drawing of ellipses is. An ellipse has two axes we need to know about, the minor axis and the major axis. The minor axis divides the ellipse into two equal halves across its narrow dimension. The major axis divides the ellipse across its long dimension into two equal halves. The minor and major axes cross each other at a 90 degree angle. See drawing e-1.



Minor and major axes cross at 90 degrees to each other.

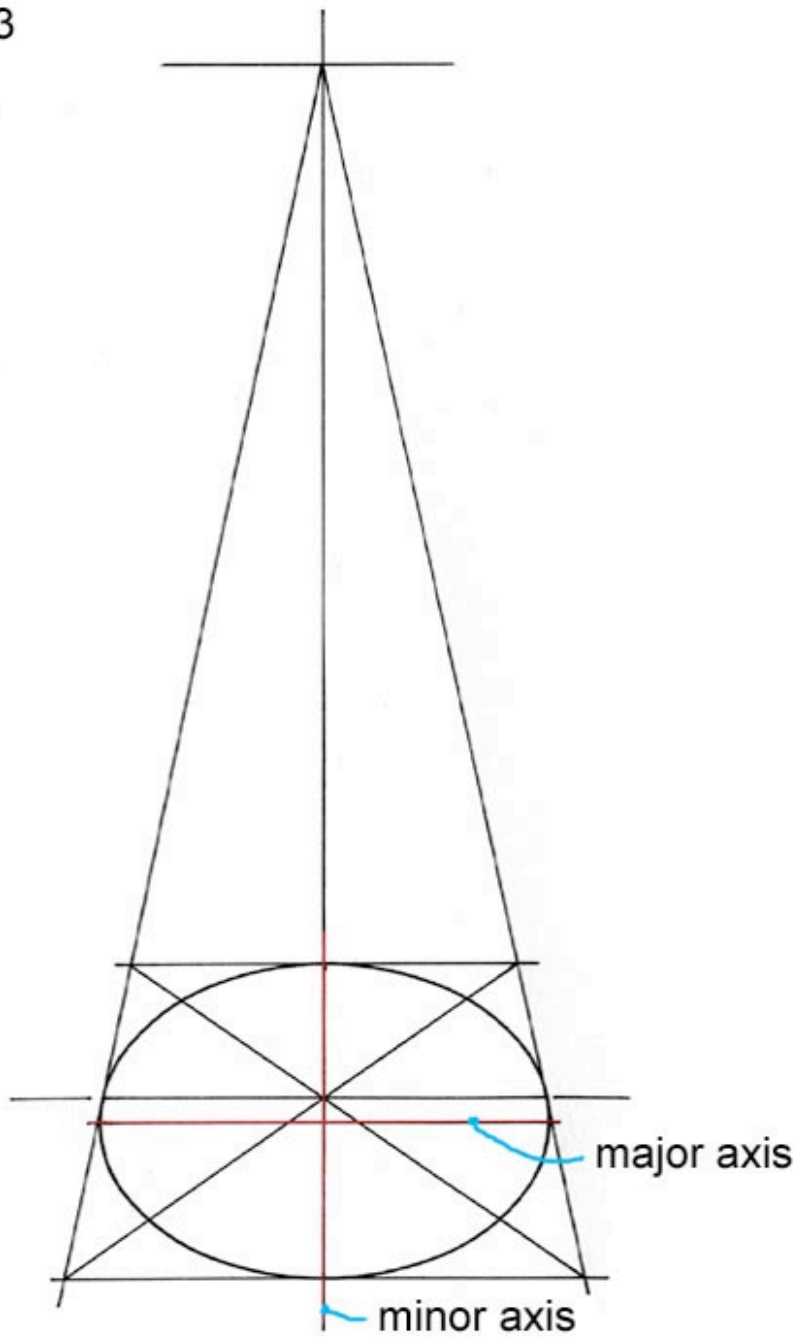


How you can use these axes for drawing:

If we look at the drawing in e-2 we can see that I have drawn a square around our ellipse. After I draw the square I draw an "X" across it to find its center in perspective. When you observe the minor and major axes of the ellipse we see that the minor axis goes through the center of the square while the major axis does not. We also observe that the ellipse touches tangent exactly in the middle of each side of the square, exactly where we would expect it to. This is a bit of a mind bender. We have taken a symmetrical shape, the ellipse, and dropped it into perspective. This always works if you do your drawing within the allowable limits of distortion. Regardless of whether your ellipse is rolling on the ground or resting on it, as we see in drawing e-3, the construction result remains the same. Learning from this observation and now knowing where the minor and major axes of our ellipse should be is the single greatest help in drawing ellipses properly. Since the ellipse minor axis always goes through the center of our square this is something we can use to help us draw it. Conversely the major axis references nothing that can help us in locating it in our perspective square. This is why I do not recommend using the major axis when drawing ellipses.

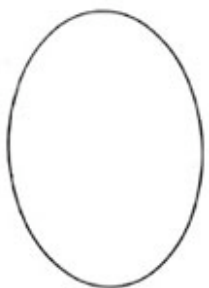
Practice drawing ellipses without worrying about locating them in perspective. Here are a few examples of my rusty arm trying to draw some ellipses for this tutorial this morning. Draw various sizes and differing degrees. After you draw the ellipse identify its minor axis by drawing a line across its narrow dimension that divides each side equally.

e-3

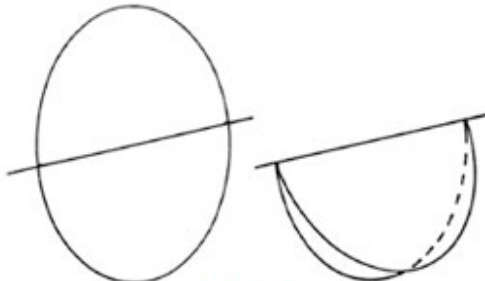


I find it helpful if you imagine that you are going to fold your ellipse along this line. You want it to fold along this line and land exactly back on itself. If your minor axis is incorrect we can see what happens in drawing e-4.

1. ellipse

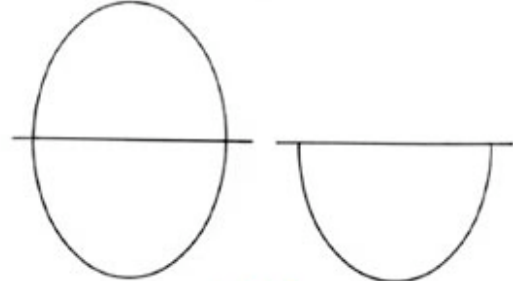


2. Incorrect minor axis



NO

3. Correct minor axis

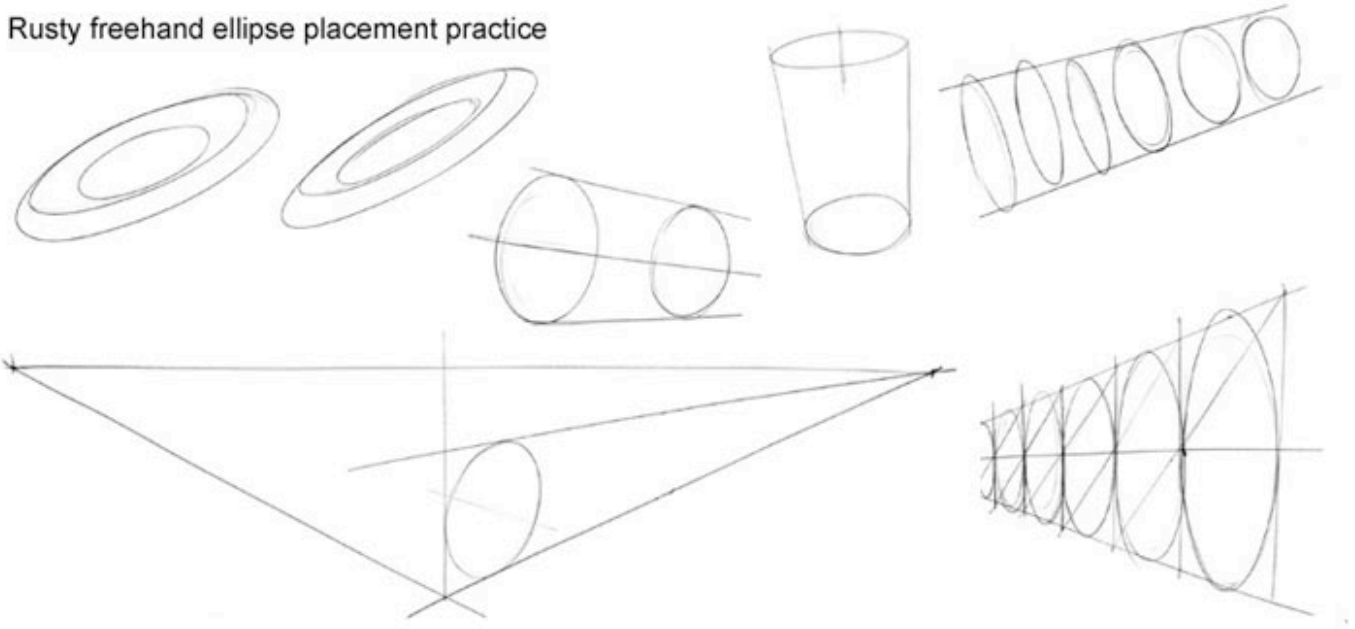


YES

e-4

After you are feeling good about how your ellipses are looking and you are confident you can locate the minor axis of each properly you are ready to start trying to locate your ellipses within perspective constructions. Start with something simple like drawing a straight line that represents the minor axis of your ellipse and then try and draw ellipses of various sizes and degrees on that line. This is a little harder than drawing the ellipse first and then drawing the minor axis. After you nail that exercise try drawing two converging straight lines and drawing ellipses that touch tangent to each line. This is harder still. One of the most difficult exercises is to draw a page of cubes and then draw an ellipse on each face that touches tangent to the side of each square as we observed in drawings e-2 and e-3. Drawing concentric ellipses are also good practice.

Rusty freehand ellipse placement practice



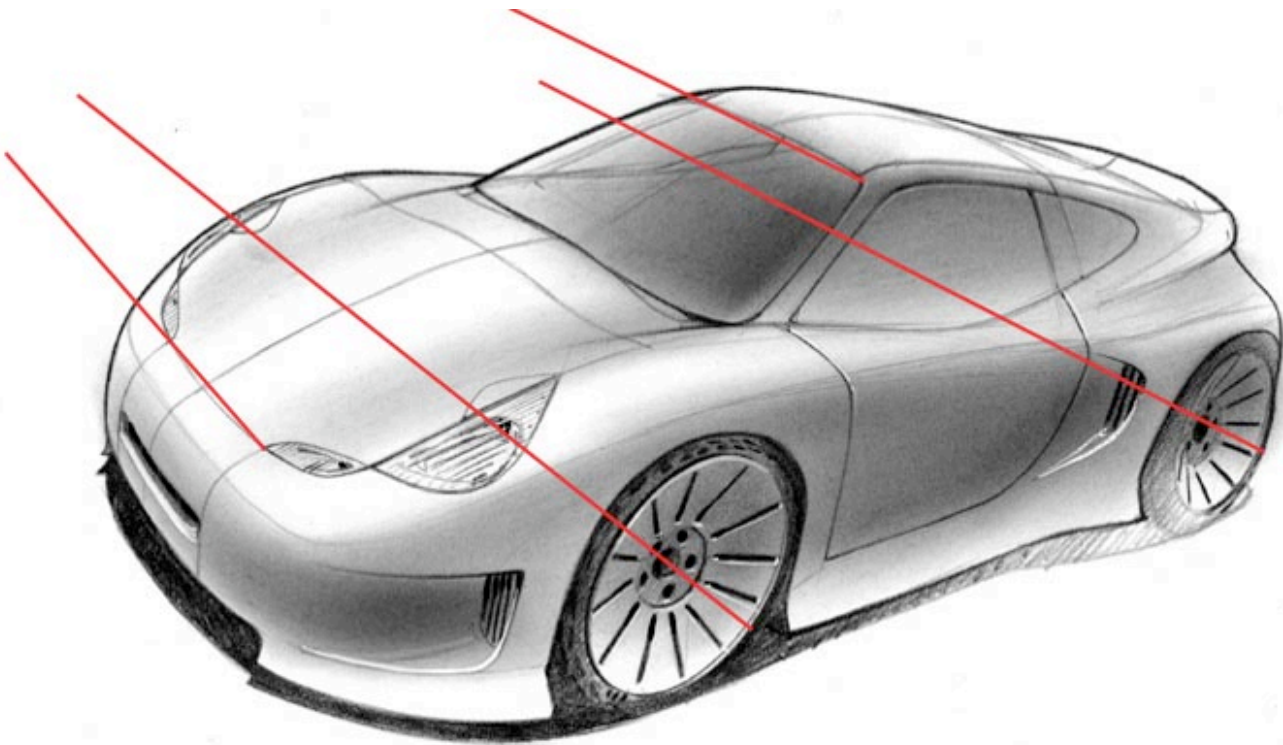
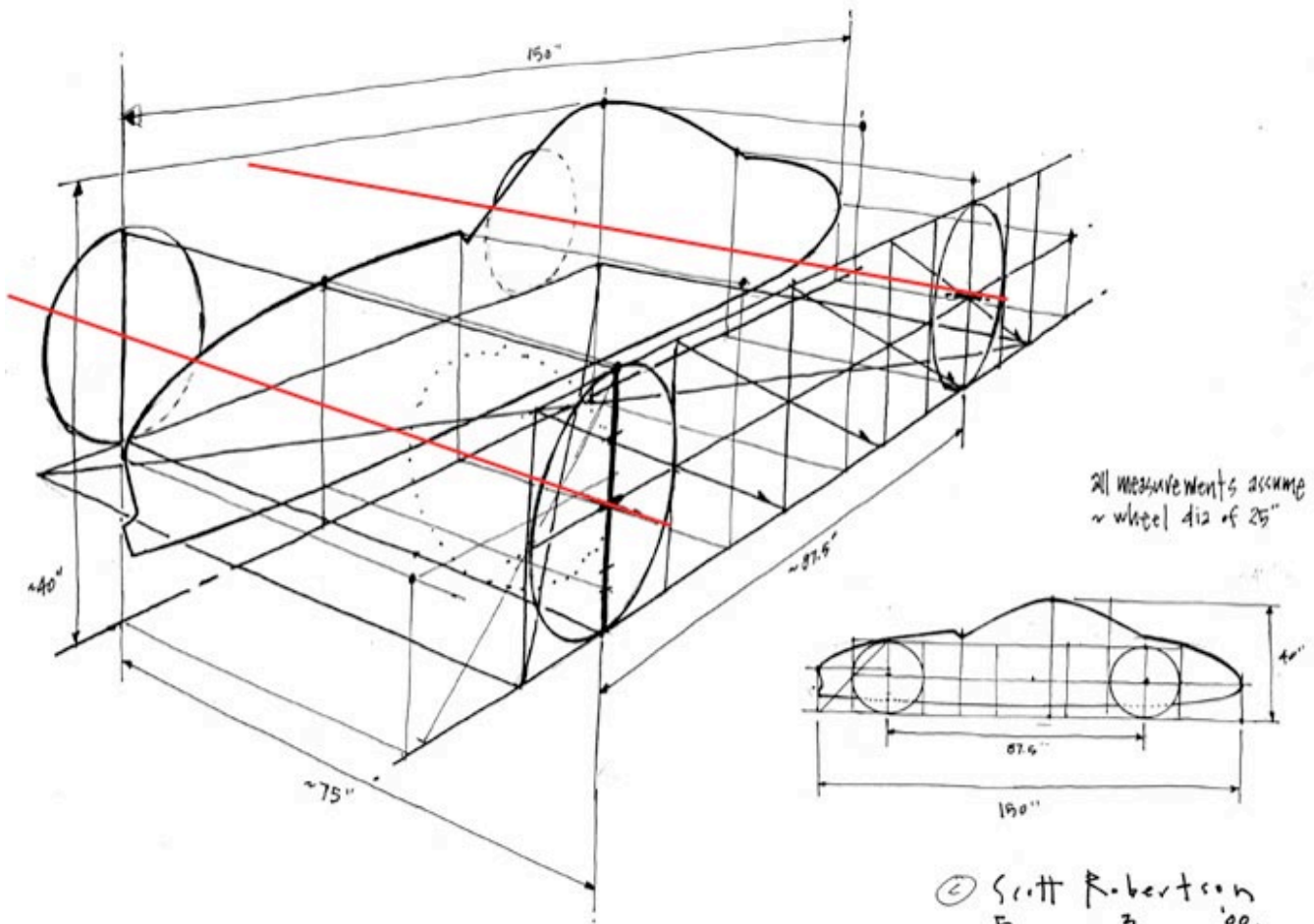
You can use ellipse guides to straighten up your ellipses but do not try to sketch with them. I have yet to see this done efficiently. You are much better off to do all of your perspective layout work freehand and then break out the sweeps and ellipse guides to tighten things up if you need to. Once you have practiced enough you will find that you can do very competent drawings entirely freehand. There is a great sense of satisfaction that comes from achieving nice line quality and proper perspective in a freehand sketch.

How to check if your ellipse is correctly drawn.

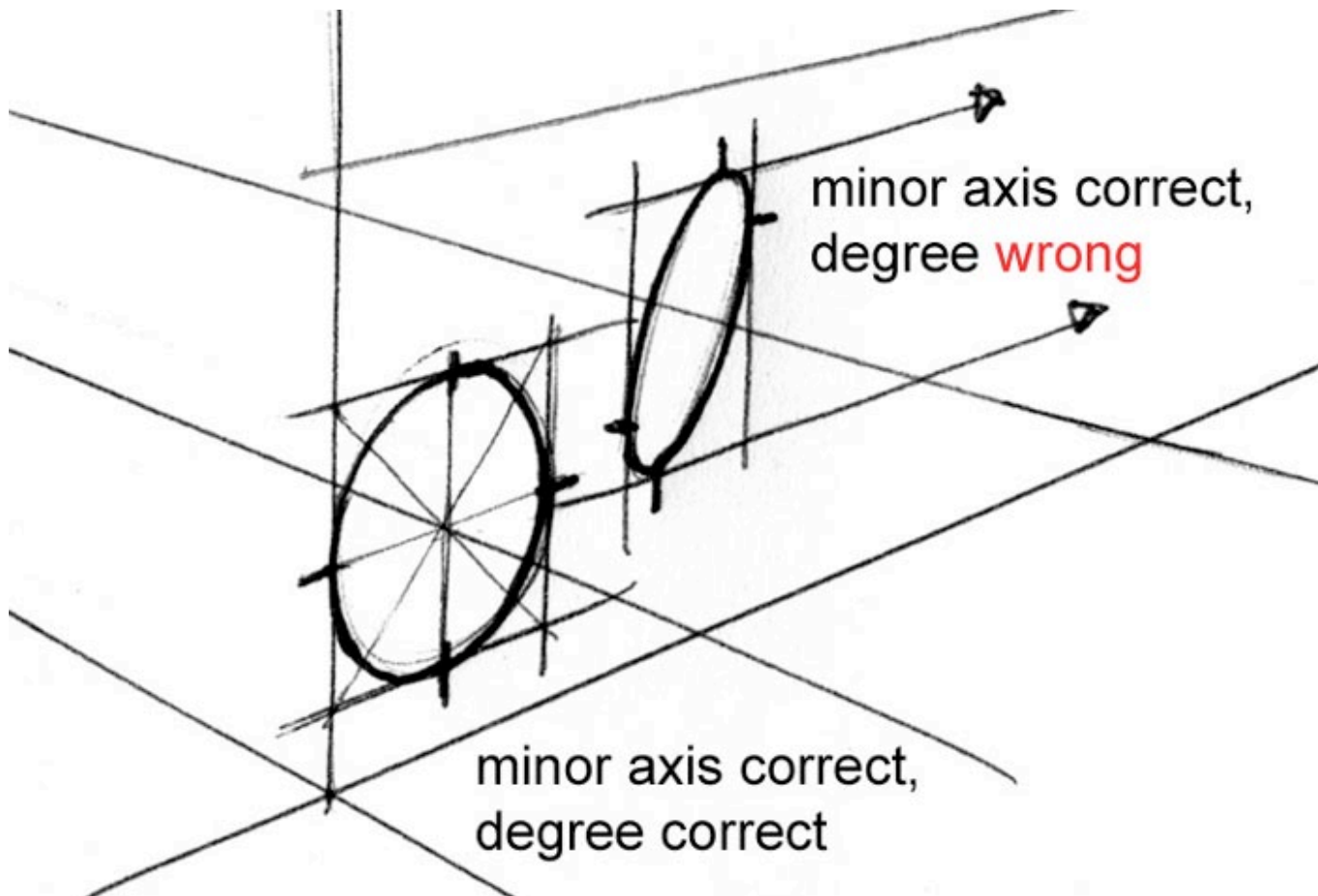
It is important to understand the mechanics of ellipses so you can make adjustments to them after you have drawn them. Basically there are only two things that make an ellipse either properly drawn in perspective or not.

Minor axis and your vanishing points.

The first thing to check is whether your minor axis is correct. In the case of putting wheels on cars the minor axis is always common to the axle of the wheel. Most of the time this axle is also perpendicular to the centerline of your car. So it follows that the minor axes of your ellipses (wheels) are also perpendicular to this centerline. There are cases such as when the front wheels are turned or the wheels have been set up with extreme camber that they are no longer perpendicular to the centerline of your vehicle. Another easy example for us to visualize is that the minor axis of a propeller on an airplane is parallel to the centerline of the fuselage and therefore they go to the same vanishing point. Remember when perspective drawing that “all parallel lines go to the same vanishing point”.



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**Degree of your ellipse.**

Assuming the minor axis of your ellipse is correct and your ellipse still looks wrong it can be only one thing, the degree. Before trying to adjust the degree of an ellipse the minor axis must be correct. No amount of adjustment to the degree can make up for an incorrect minor axis. Checking the degree is a simple perspective construction.

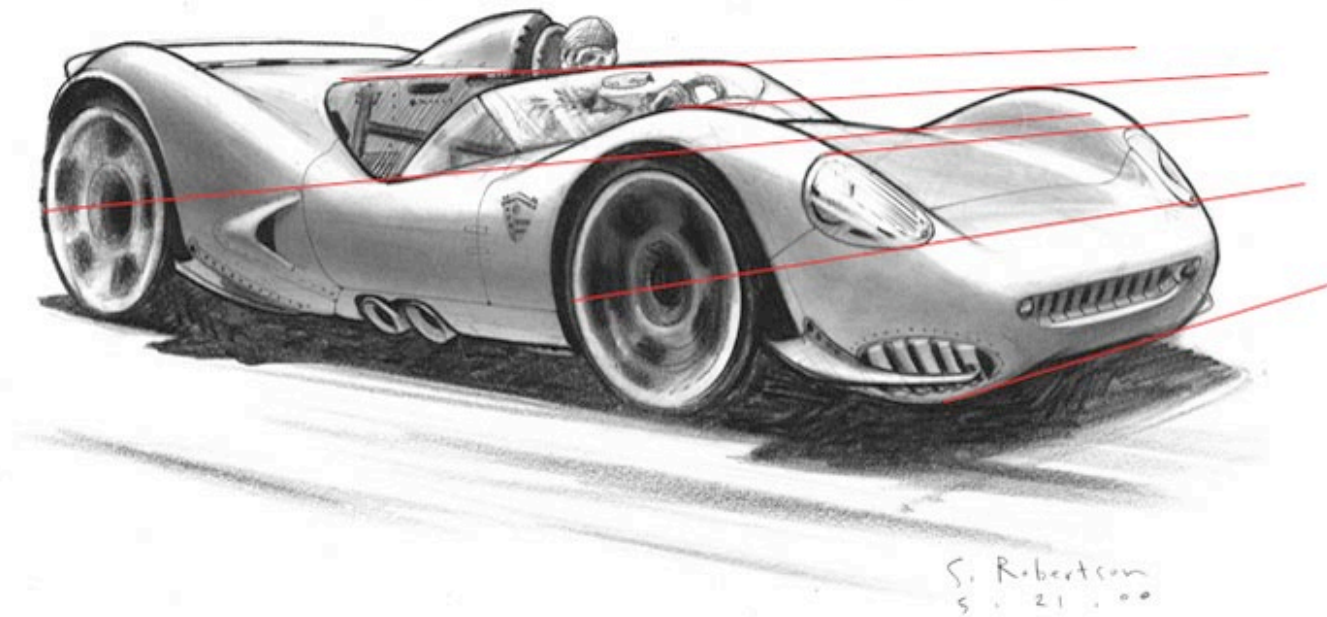
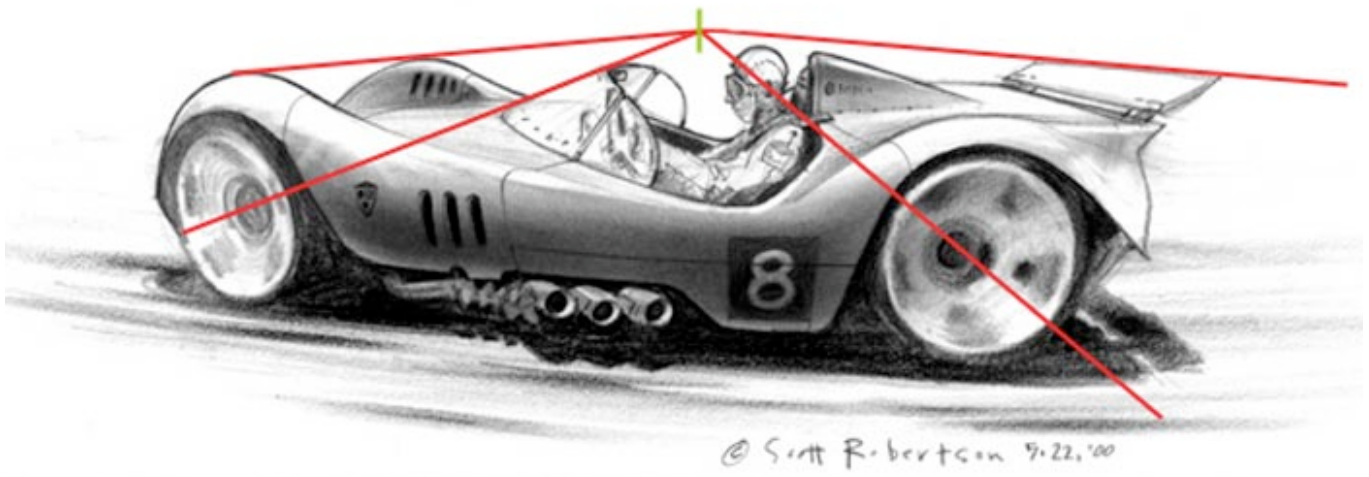
Step 1:

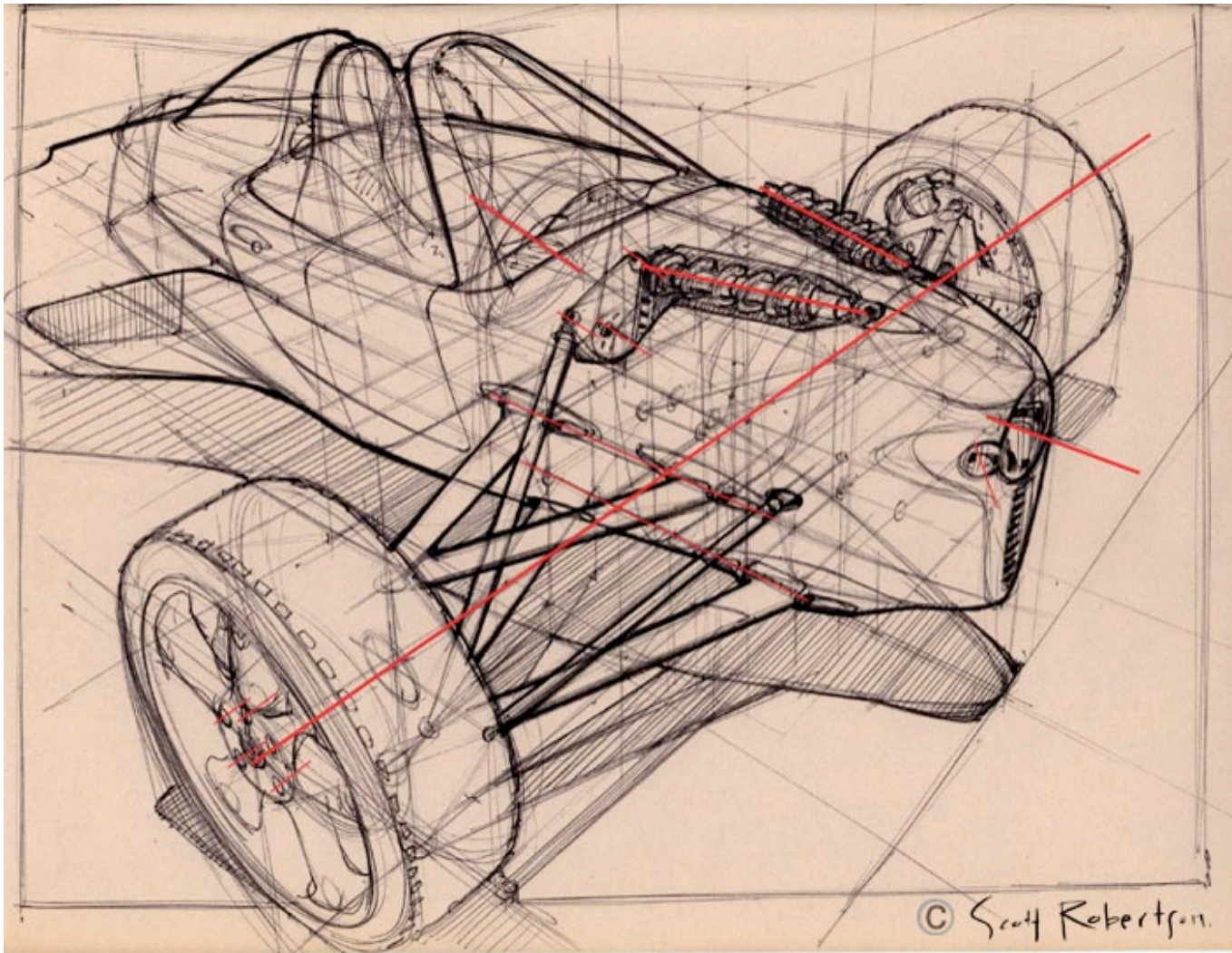
Draw a box around and tangent on each side to your ellipse. Be sure to follow your perspective guidelines when doing this.

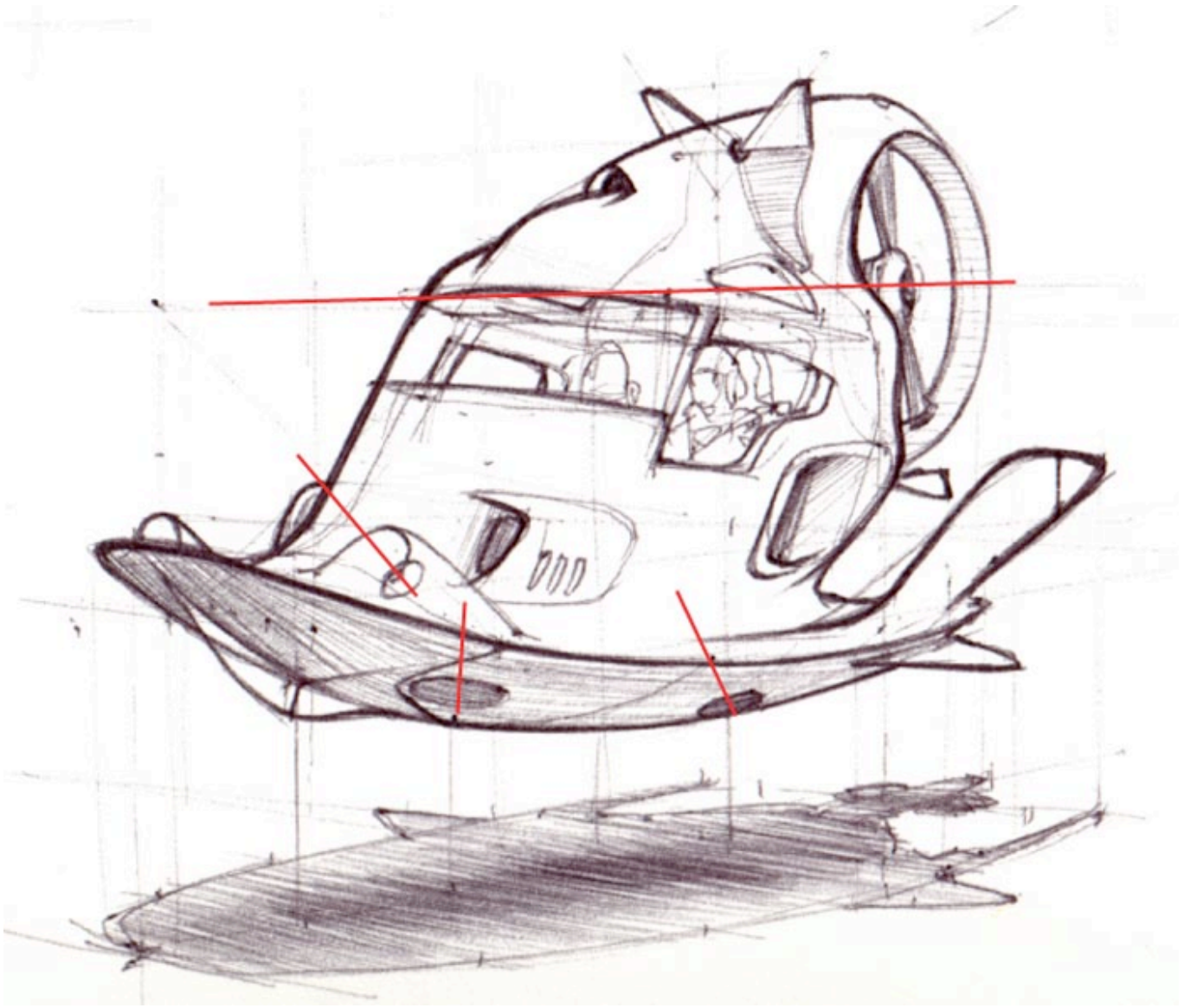
Step 2:

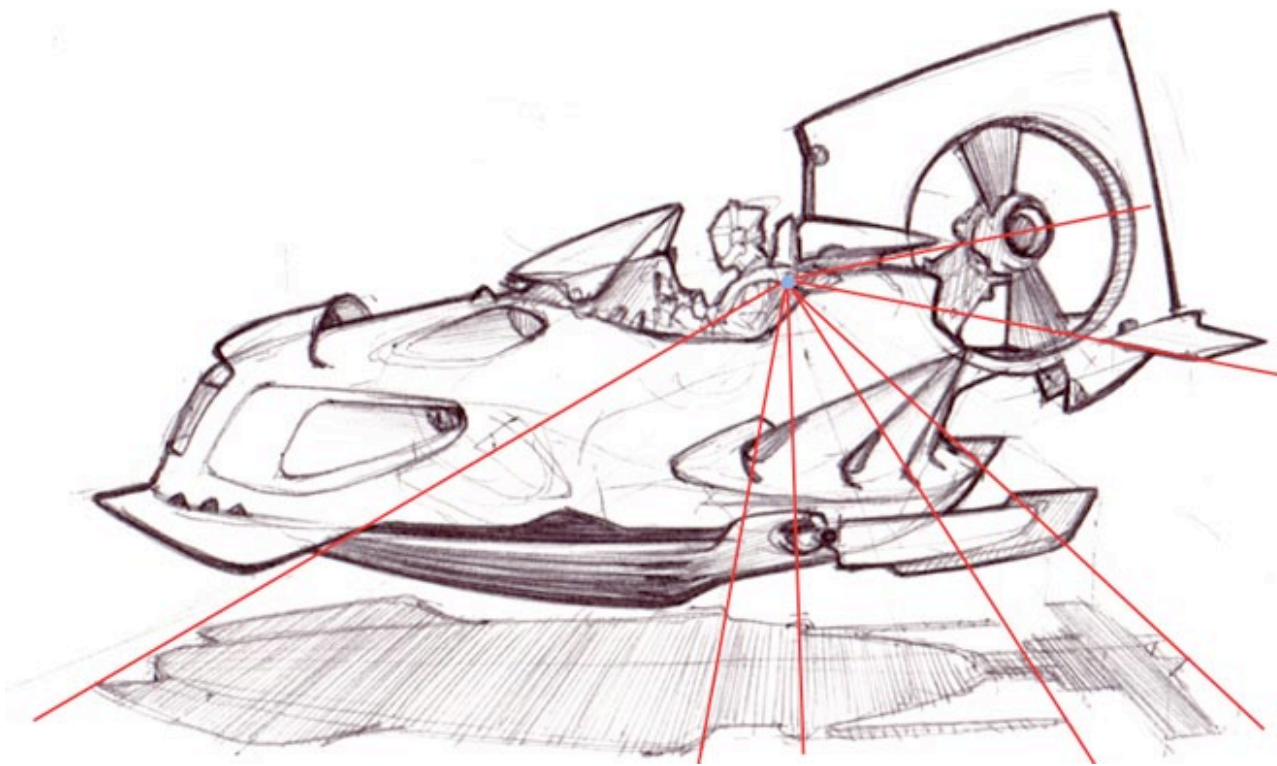
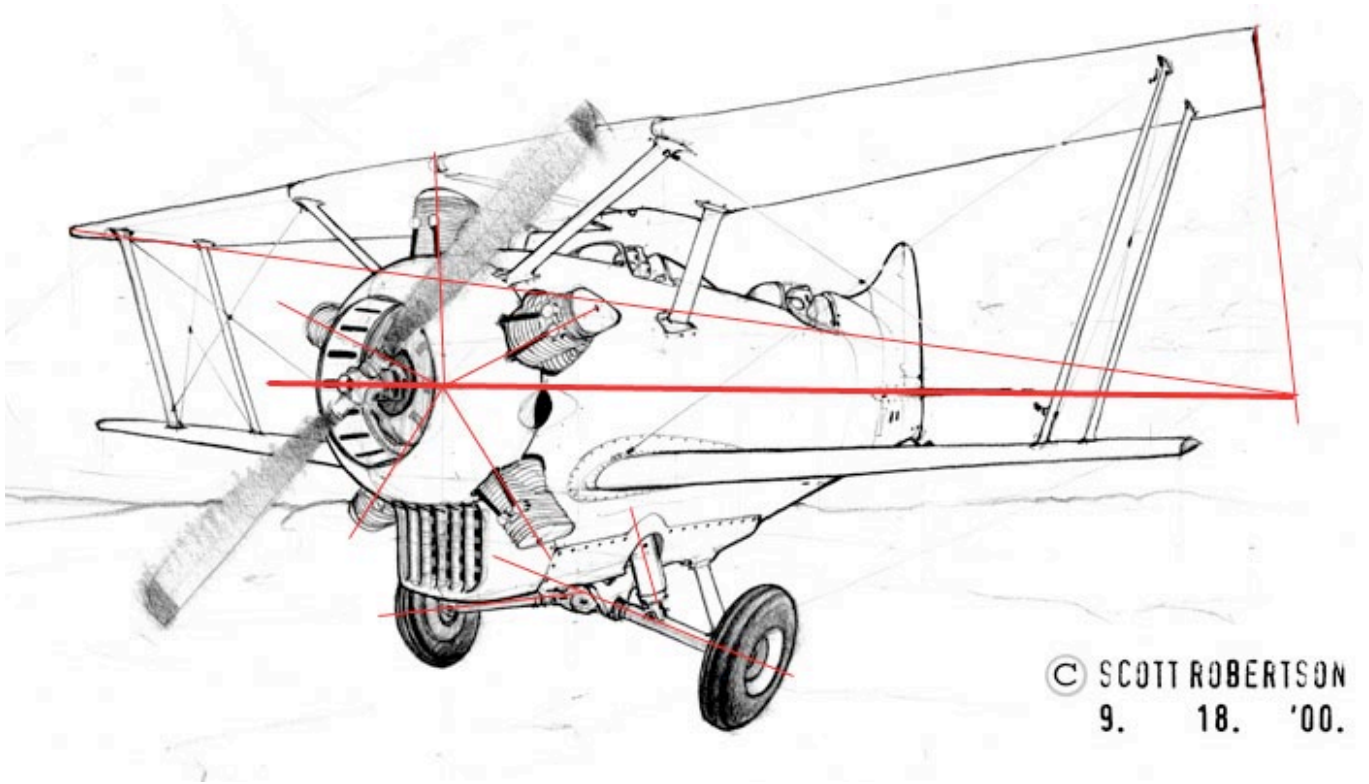
Observe where your drawn ellipse contacts the box you have drawn around it. If your ellipse does not touch in the middle of each side of the box then the degree is wrong. Adjust the degree of your ellipse by making it wider or narrower until you can draw a box around it that touches exactly in the middle of each side. When you have done this you will have a properly drawn ellipse at the correct degree.

Here are a few more sketches I quickly put perspective guidelines on top of to help you see the minor axes of the ellipses within the drawings.









Congratulations you are now master of the ellipse!

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