How to Draw With Perspective

Created exclusively for Craftsy
by Paul Heaston

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MEET THE EXPERT

Paul Heaston

Paul Heaston was born and raised in San Antonio, Texas. He received his BFA in painting from the University of Texas, San Antonio, in 2002 and his MFA from Montana State University in 2008, where he continued on as a faculty member. He is an obsessive sketchbook-keeper and spent 6 months between 2008 and 2009 meticulously drawing every building in downtown Bozeman, Montana, in a pocket-sized sketchbook. Heaston is a correspondent for Urbansketchers.org, an internationally known website showcasing visual journalism all over the world, and in addition maintains his own sketch blog, *Three Letter Word for Art* (http://paulheaston.blogspot.com/). He lives in Denver, Colorado with his wife, Linda, and their dog Freddie.

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ONE-POINT PERSPECTIVE
Drawing a Room

Until artists figured out perspective, there was no accurate system for drawing architecture or other geometric space. In fact, linear perspective was only discovered about 500 years ago, long after humans had figured out algebra and geometry.

Drawing in one-point perspective is one of those things that seems complicated if you've never done it before, but if you follow a set of simple rules, it's actually quite easy.
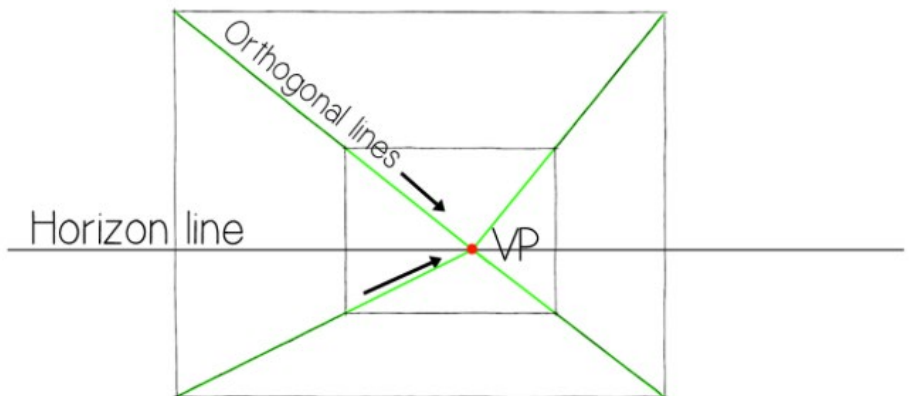
Perspective drawing comes in a few different flavors, with one-, two- and three-point being the most common. However, the principles are essentially the same. All perspective drawings utilize the **horizon line (HL)** and the **vanishing point (VP)**. The horizon line is a horizontal line that not only represents the horizon, but also the viewer's eye level. No matter where it is placed on the page, anything above the HL is also above the viewer's eye level, and anything below the HL is below the viewer's eye level. A rule of thumb in one-point perspective is that straight lines will usually either be vertical, horizontal or recede toward the vanishing point.

The vanishing point is a point on the horizon line where lines that are parallel to the viewer's line of sight appear to meet. In other words, any set of lines that is going the same direction as the viewer is looking will meet at the VP. These receding lines are called **orthogonal lines**.

Seem confusing? Don't worry, it will make sense soon.

With the terminology out of the way, here's how to draw a simple room in one-point perspective.

Step 1

Draw your HL first, anywhere on the page, though closer to middle works best for this exercise. Don't establish a VP just yet. Now, draw the back wall of your room, using only horizontal and vertical lines, making sure at least part of it overlaps the HL. Add any elements you choose — a door and a window should work just fine. The back wall can be square or rectangular, but keep it small enough that you will have room on the page later to add side walls, floor and ceiling.
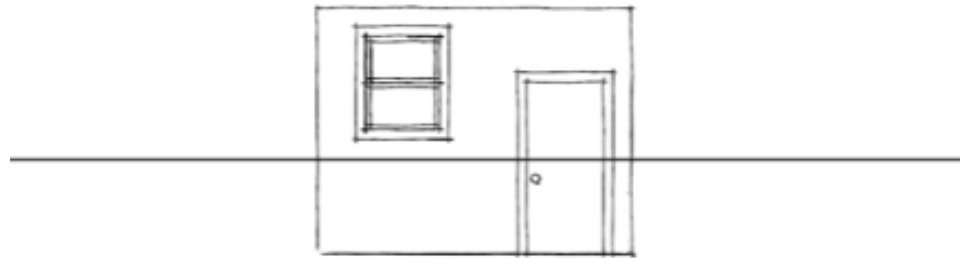
Step 2

Now comes the fun part. You can add your vanishing point anywhere inside the room along the HL. The VP will represent the viewer's point of view. From the VP, draw your orthogonal lines out, making sure they go through the corners of the room. Don't worry that this is not a perfect X — that would only happen if your back wall was a perfect square and the VP sat directly in the center of it.
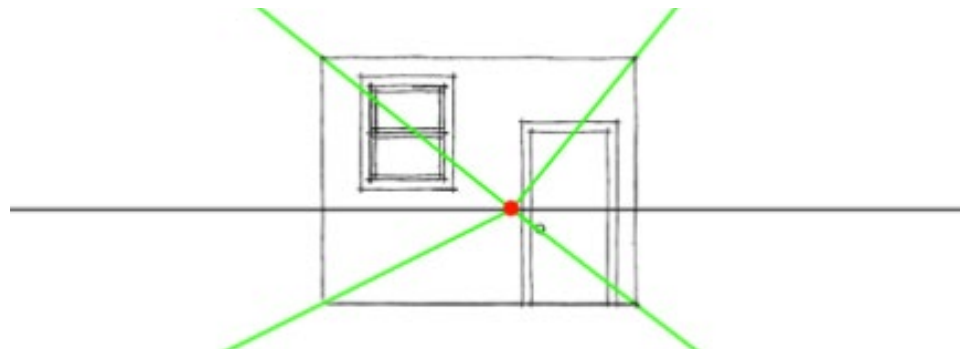
Step 3

At an arbitrary point along one of the orthogonals, draw a new box, using only vertical and HLs that intersect at each orthogonal. You've already created a room in one-point perspective! At this point you can erase the HL inside your room, making sure to leave the VP.

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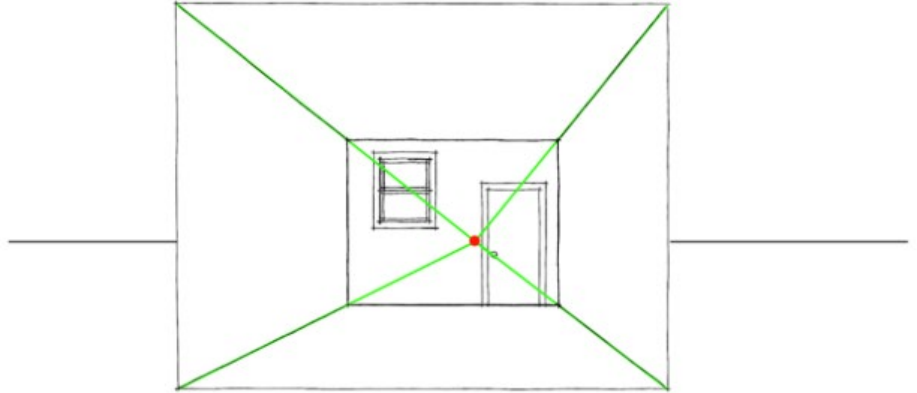
Step 4

Of course, a room needs furniture, so you can use the same principles to add them to the room. This time you will work from the front back toward the VP. Draw the front face of the furniture first, then add orthogonal lines back to the VP from every corner.
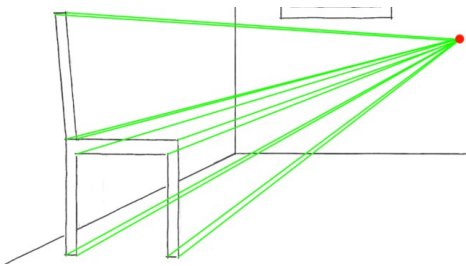
Step 5

Set the depth of your chair by choosing a point along an orthogonal line (closer to the chair than the VP is best). Work your way around all the orthogonal lines, making sure each line is perfectly parallel to its corresponding line on the front face of the chair. You have now drawn the back face of your chair.
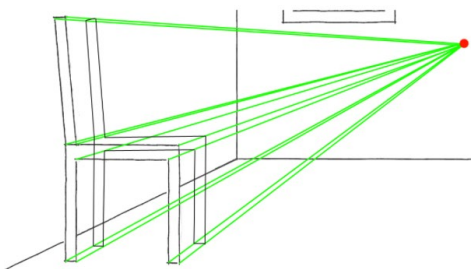
Now add the lines across. You can also use this method to set the depths of the individual legs, etc.

Step 6

Do the same for any other piece of furniture you'd like to add. Windows are even easier: just draw a set of vertical lines connected by orthogonals to make a rectangle in one-point perspective on the wall. When you're done, erase the orthogonal lines and VP and there you have it. A perfect one-point perspective room!
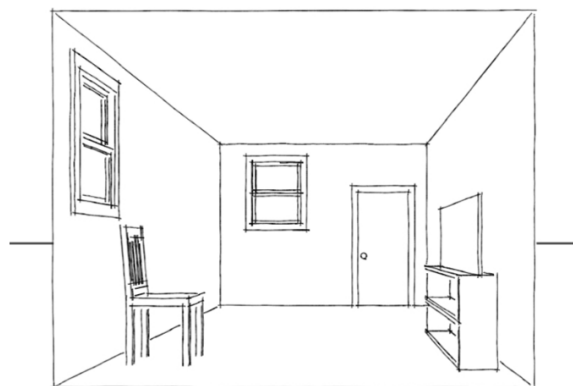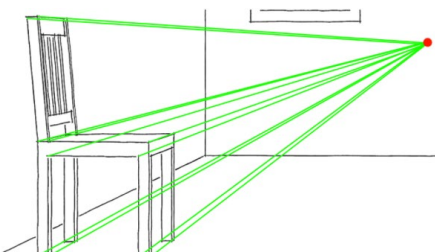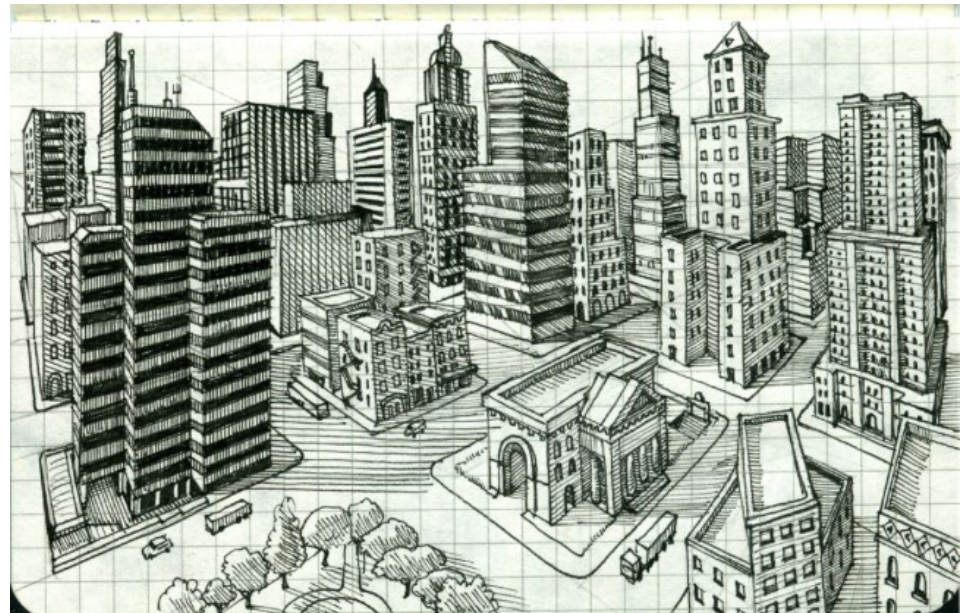
TWO-POINT PERSPECTIVE
Understanding Space

Understanding perspective is fundamental to depicting space in a drawing. Whether you're working on a landscape or a still life, knowing the rules of two-point perspective in particular can be the difference between drawing a believable, realistic space and creating a space that just doesn't work.

Here are some useful guidelines and tips to help you understand and master drawing in two-point perspective.


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Vanishing points

As we discussed earlier, in linear or graphical perspective, a vanishing point (or VP) is where any set of parallel lines appears to meet on the horizon line. In a one-point perspective drawing, a good rule of thumb is that sets of parallel lines must either be horizontal, vertical or meet at the VP. While we know that parallel lines don't actually meet in reality, they get so far away that the distance between them is no longer visible to the naked eye, as in the two rails of a railroad track.

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vanishing point

← horizon line →
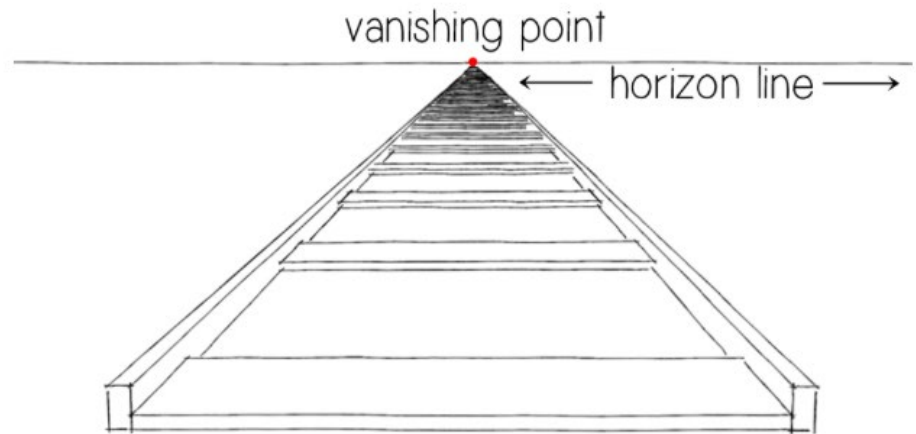
One-point perspective works well for situations like the above, where the viewer is oriented directly in front of a set of parallel lines like railroad tracks or a long hallway. But what if you want to show the viewer something from an angle?

vanishing point 1
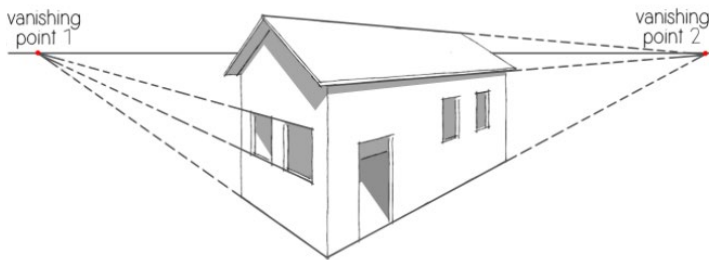
vanishing point 2

Two-point perspective uses two vanishing points set well apart on the horizon line. The rule of thumb here is sets of parallel lines must be either vertical or recede toward one of the two VPs. The exception would be sloped or curved surfaces, such as the roof in the example to the left.

Let's go through some simple steps to draw basic shapes in two-point perspective.

Step 1

Draw your horizon line (HL) with a straight edge. You can place it anywhere on the page, keeping in mind the HL always is the same as the viewer's eye level. That means that anything above the HL is taller than the viewer, and anything below the HL is shorter than the viewer.

Step 2

Establish your two vanishing points on the HL. Make them as far apart on the page as possible. You can even place one or both VPs off the page, so long as they are still on the horizon. If you place them too close together, and the object you are drawing isn't completely between them, it can lead to a very distorted image like below.
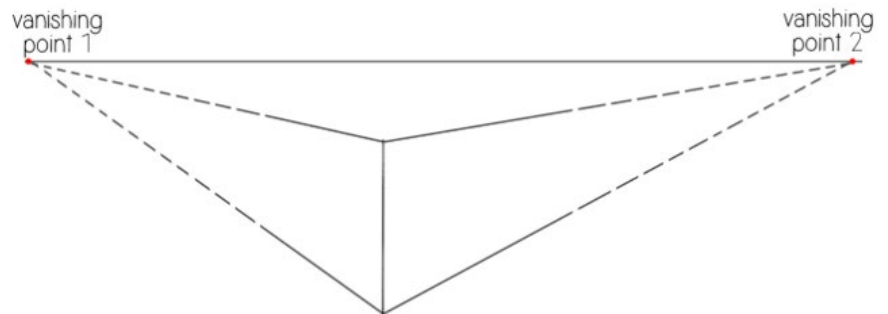

vanishing point 1

vanishing point 2
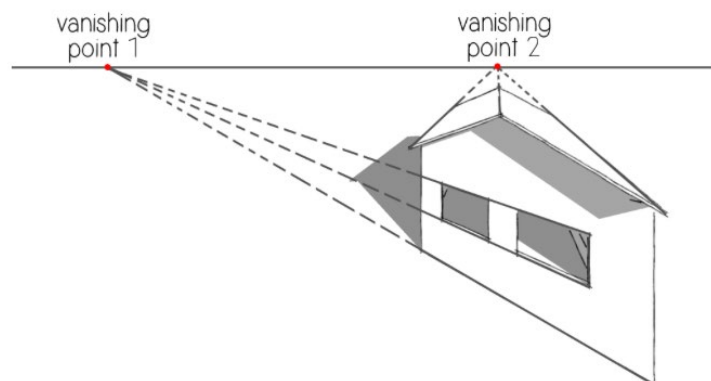
Step 3

Draw a vertical line anywhere you'd like between the two VPs. For the best view of both faces, establish your line closer to the middle than to either VP. This line will be the closest vertical edge of your object.
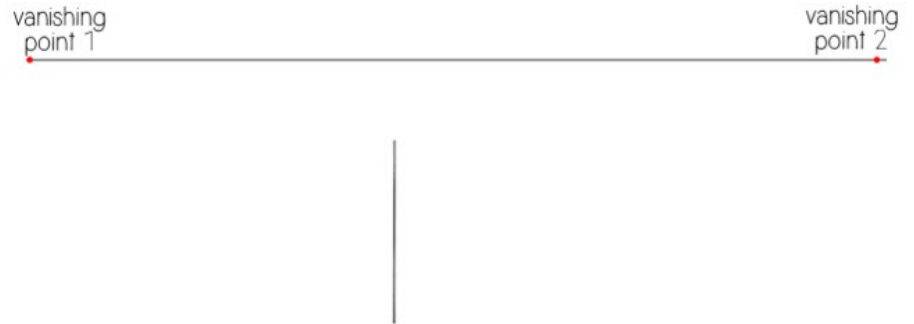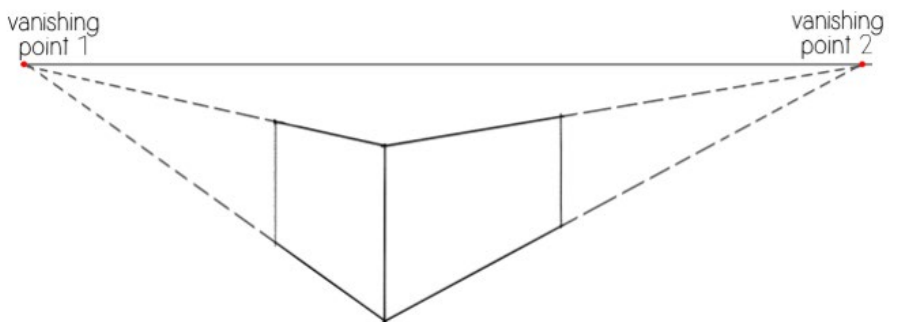

Step 4

From this line, draw lines receding from the top and bottom ends to both VPs.

Step 5

Establish where each face will end in space by drawing vertical lines connecting the two sets of receding lines. Since this is a made-up object, you can determine this arbitrarily.

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Step 6

From the tops of the back vertical edges, draw lines to the opposite vanishing points. Where they cross establishes the back corner of your object.
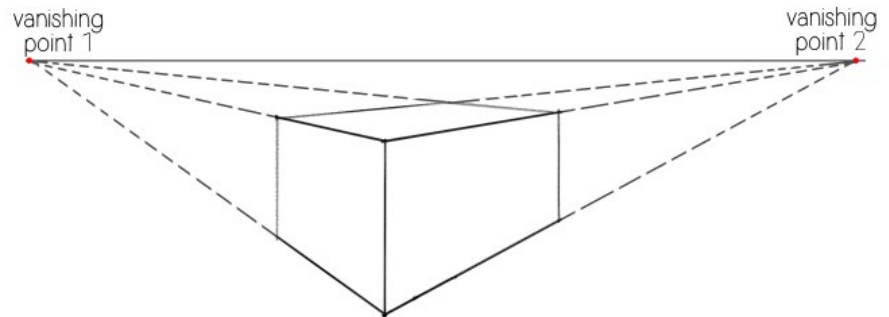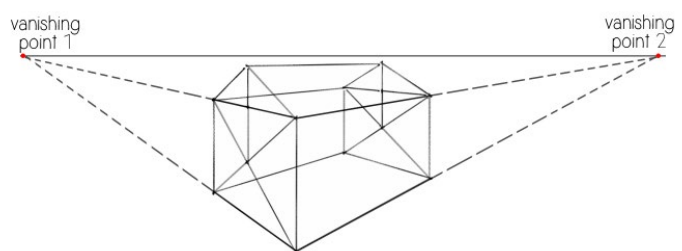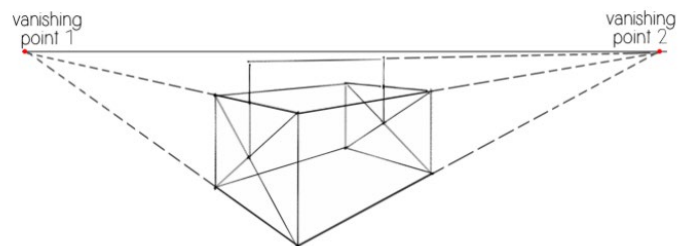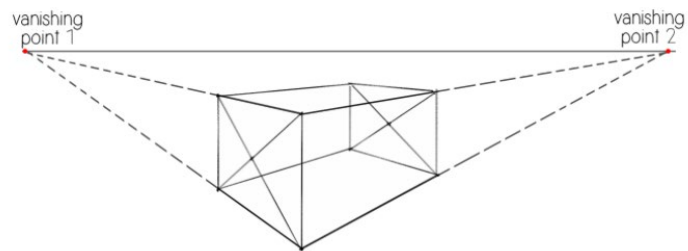

These are the basics of two-point perspective. From here you can add doors, windows, steps, etc.

Tip: A peaked roof can be added easily. First, find the center of any two walls on opposite sides by drawing an "X" in them from corner to corner.

From the center of one X, draw a vertical line as high as you'd like the peak to go. Then draw a line toward the opposite VP. Where this passes over the center of the opposite X, draw another vertical line. This is the end point of the roof's peak.

Connect each end of the peak to the top four corners of the initial box and you've drawn a perfectly peaked roof.
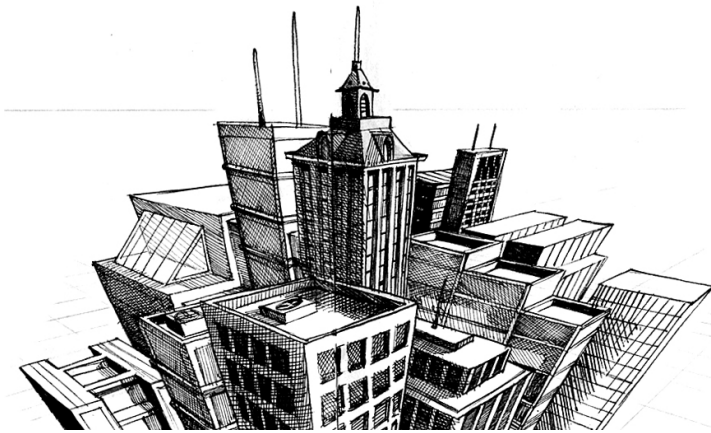
THE BASICS OF THREE-POINT PERSPECTIVE

One-point perspective and two-point perspective are excellent methods for drawing when you are looking out toward the horizon line. But what if you are looking toward the ground or up into the sky?

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These are situations when the rules of one-point and two-point perspective begin to break down and distortions starts to happen. But there is a solution! Three-point perspective gives you the ability to make far more dynamic drawings.

Here is a useful tutorial to help you understand the basics of three-point perspective.

The biggest difference in three-point perspective is that there are three vanishing points (VPs). Two are along the horizon, just like two-point, but the third VP is located either above the horizon (at the **zenith**) or below the horizon (the **nadir**), depending on the area you intend to draw.

Remember that in basic one-point perspective, lines are either vertical, horizontal or recede toward the VP. In two-point, lines are either horizontal or recede toward one of the two VPs. In three-point perspective **all lines recede toward one of the three VPs**.

The three VPs make up a triangle, with the viewer's center of vision roughly in the middle.

**Try this technique to start making basic three-point perspective drawings.**

Step 1

To draw a simple shape in three-point perspective, start just as you would in two-point perspective, with a HL and two VPs as close to the edge of your page as possible. Only this time, rather than in the middle, place the HL close to the top of your page if the viewer will be looking down, or the bottom of your page if the viewer will be looking up.

Then, as far from the horizon as possible, place a third VP. It can fall anywhere between the horizon VPs, though closer to the middle is better for our purposes.

Then, draw lines connecting the three VPs.

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VP 1 HORIZON LINE VP 2

VP 3
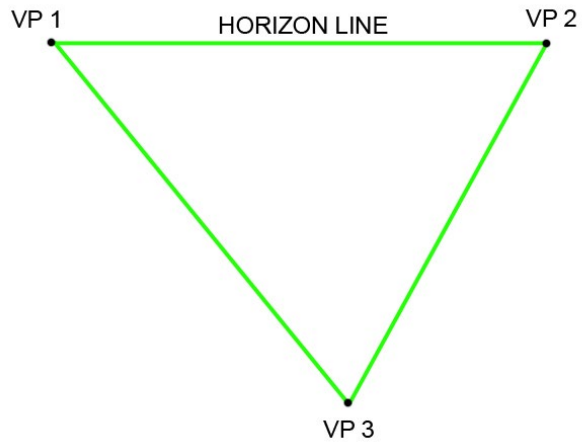
Note: This triangle is very important. In order to avoid distortion, you must try to keep your drawing within this triangle. Anything outside the triangle won't look right, but everything inside should appear normal. The two shapes below are the same box drawn inside and outside the triangle.


VP 1 HORIZON LINE VP 2

VP 3
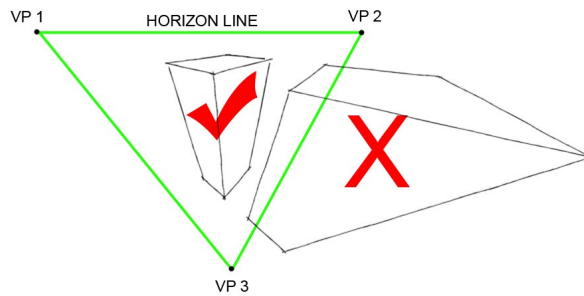
Step 2

To begin, draw a line anywhere you'd like within the triangle toward VP3. It doesn't have to be vertical. You can make this line any length as well. It can end before it reaches VP3 so long as it will end up there if extended.
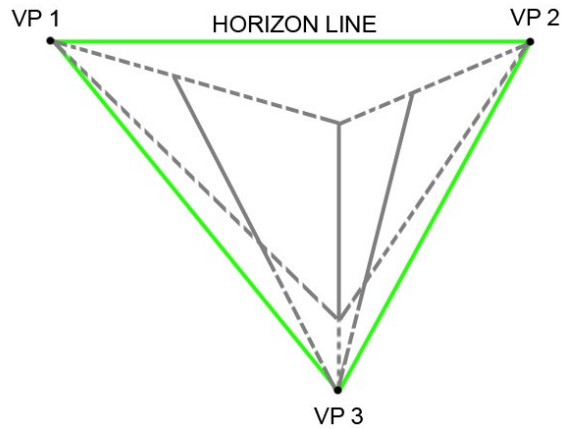

VP 1 HORIZON LINE VP 2

VP 3
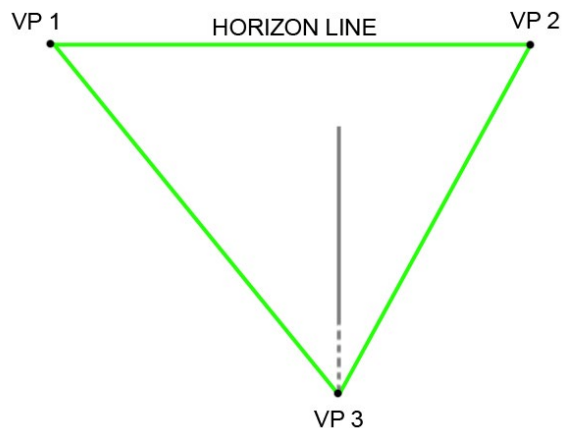
Step 3

Draw lines from both ends of this line toward both of the horizon VPs, just as you would in a two-point perspective drawing.
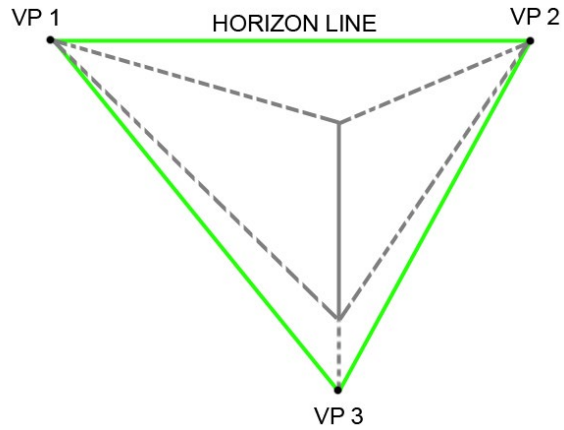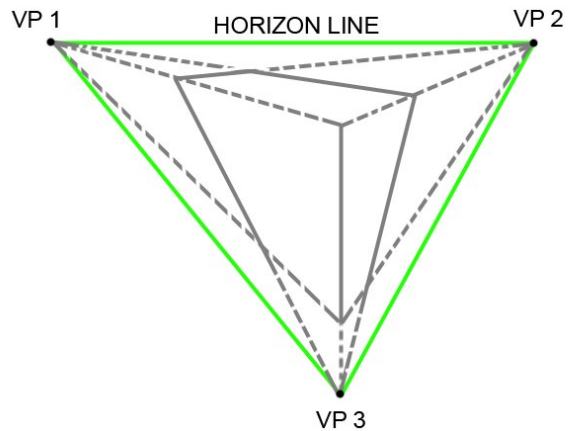
Step 4

To determine where your shape ends in space, draw lines from VP3 through both sets of lines receding toward the two horizon VPs.
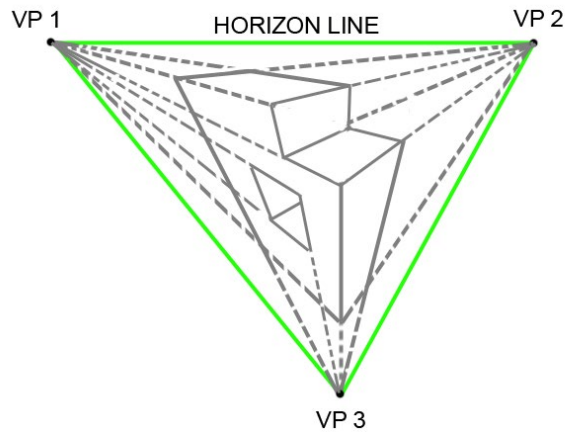
Step 5

Draw lines from the back corners toward the opposite horizon VPs and you've completed a simple shape in three-point perspective. You can erase any construction lines as needed.

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From there, it's easy to explore making more complicated shapes, so long as you remember that all lines should recede toward one of the three VPs.

Tip: By constructing your vanishing points outside your picture plane, you can easily avoid the problem of accidentally drawing outside the triangle.

There are a few ways to do this:

- You can tape down your paper to keep it stationary, then place pieces of tape on your work surface outside of your paper to locate your VPs.

- Or you can keep your VPs on the page, place a rectangle within the triangle and only draw within that rectangle. Later, you can crop your image to the size of this smaller rectangle.
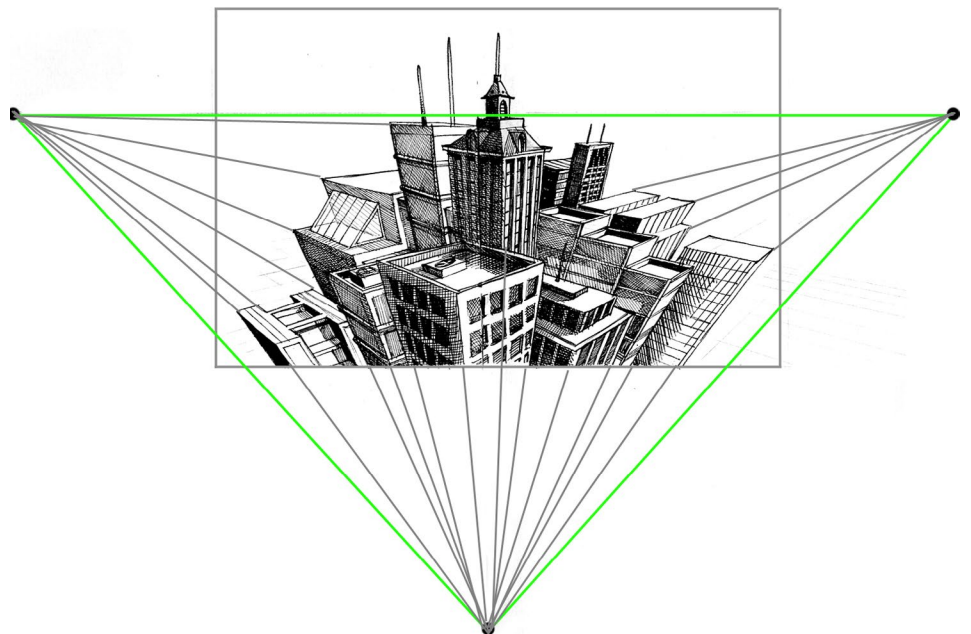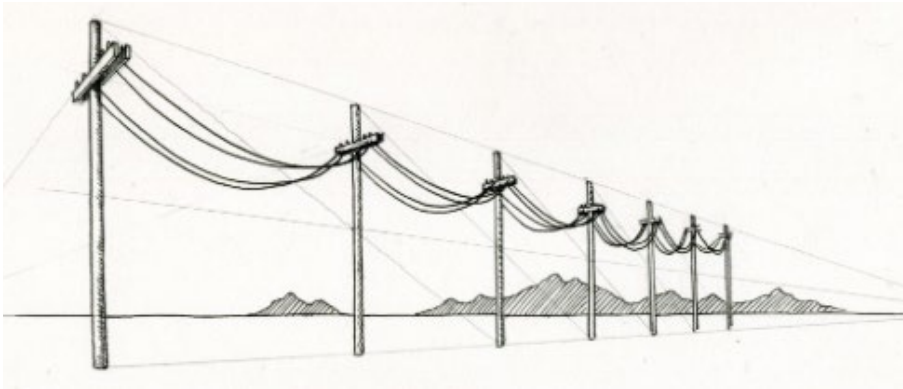

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DIVIDING SPACE IN PERSPECTIVE

One of the trickiest parts of drawing in perspective is figuring out how far apart regularly-spaced objects should be. If you've ever tried to draw windows on a building, the arches under a bridge, or telephone poles along a road, you've encountered this problem. Regularly-spaced objects should get closer together the closer they are to the horizon line, but how do you determine how close?

Here's the best way to solve the conundrum of dividing space in perspective.

Step 1

As with any perspective drawing, first draw a horizon line (HL) and establish your vanishing point (VP). Draw your first object (in this case, a utility pole) as tall as you want. Then draw lines from the top and bottom of your object to the VP. Draw your second object any distance from the first, making sure it also falls between the two perspective lines you've drawn.
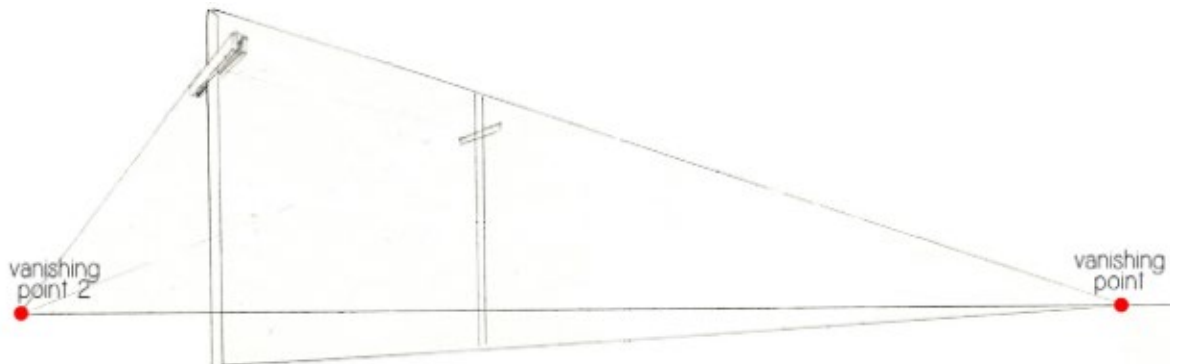
Tip: You can add a second VP to determine the angle of anything perpendicular to the row of objects, like the cross-braces on the top of these utility poles.

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Step 2

Using a ruler, find the exact center of the first pole, and draw a line from that point to the main VP.
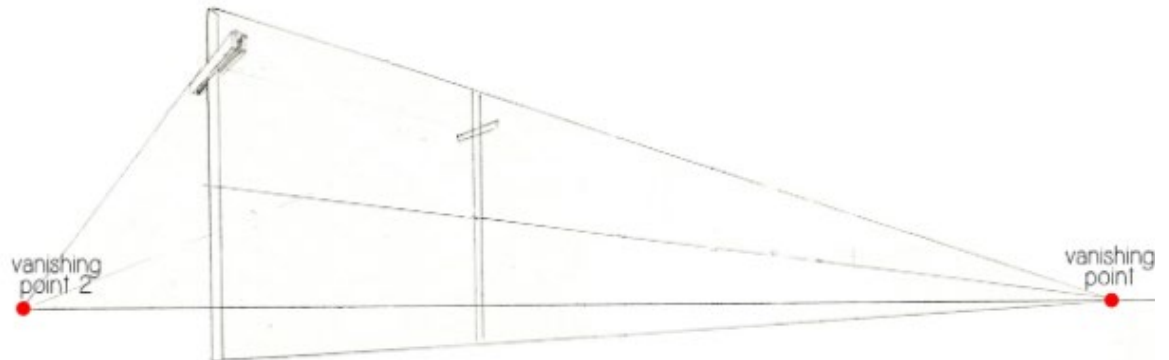

Step 3

From the top of the first pole, draw a diagonal line through the center of the second pole until it meets the bottom perspective line. That point represents the base of your third pole, which you can now draw, making sure it doesn't extend higher than the top perspective line.
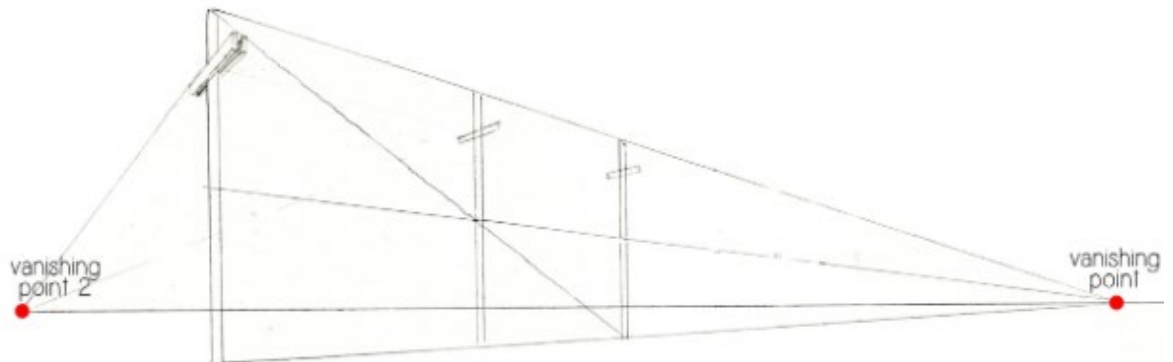
Step 4

Continue these steps for each successive pole, as far as you'd like. The space between each pole should get smaller every time.
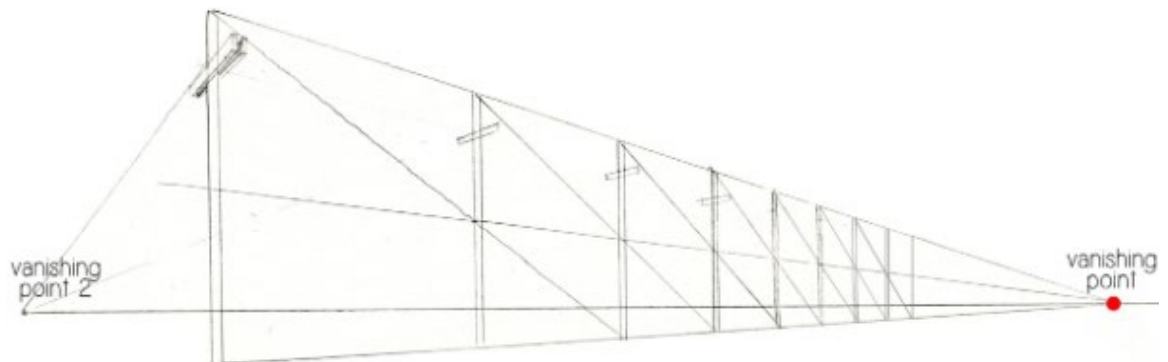

Tip: As the objects get further away, they should also get progressively skinnier. If your furthest telephone pole is just as fat as the closest, things won't look right.

For columns, windows and other regularly spaced objects that require you to consider both the width of the objects and the width of the spaces between the objects, the process is a bit trickier.

Step 1

Instead of one vertical line, draw two (1A and 1B) to represent the width of the column.

1A   1B

vanishing
point 2

vanishing
point
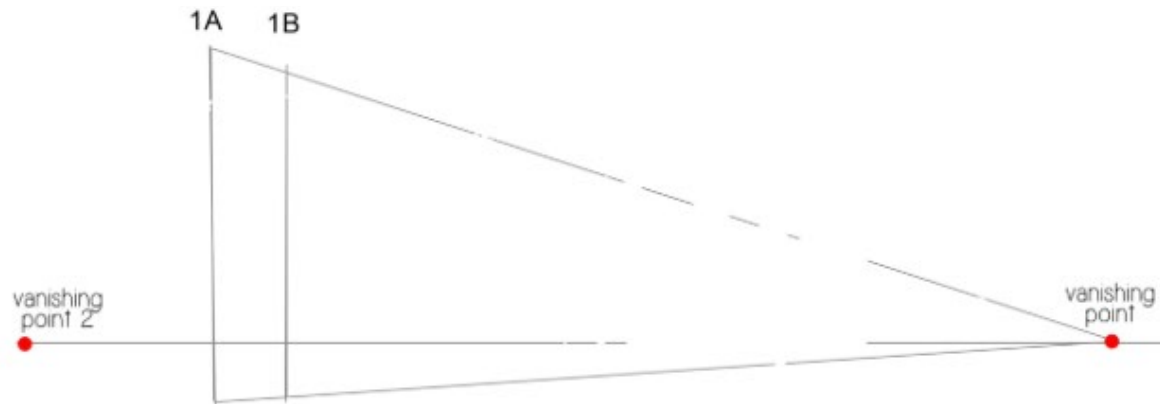
Step 2

Then continue the previous steps for 1A and 1B separately. That means, start dividing space for the line 1A as you would normally, while ignoring 1B for now. Establish a new vertical (2A) for the next column, find the center of 1A and use the diagonal line method from above to find the third vertical (3A).

1A   1B

2A

3A

vanishing
point 2

vanishing
point
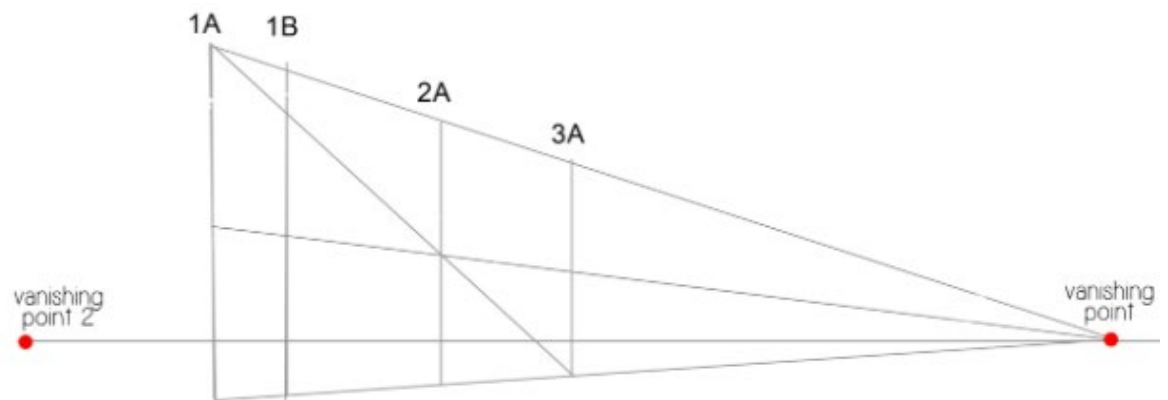
Step 3

Now for the tricky part. Draw a diagonal line from the top of 1B to the base of 3A. Then draw a line from the top of 2A through the point where the new diagonal intersects the middle perspective line. Where that line hits the bottom perspective line is the base of 2B, and you have now defined the width of the second column.

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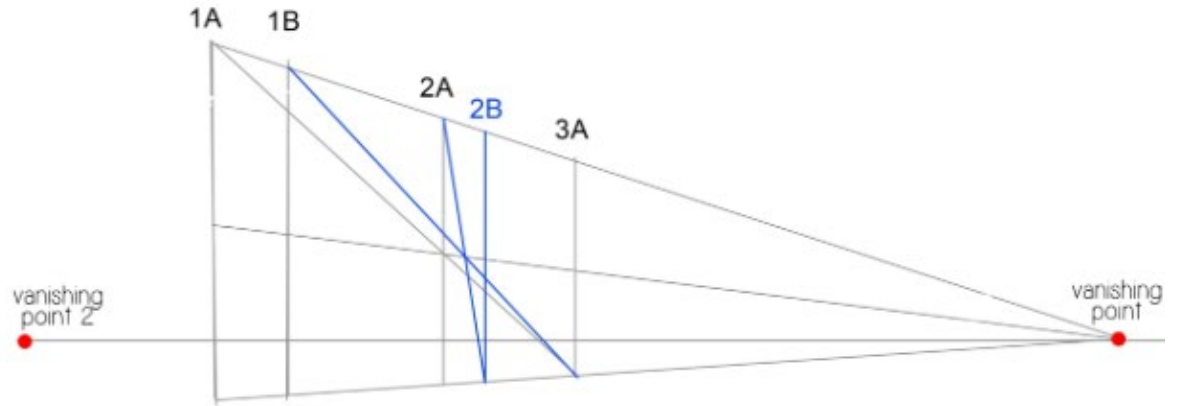
Step 4

From there, just continue on as you normally would for each set of vertical lines separately. Be careful not to confuse your A lines from your B lines!
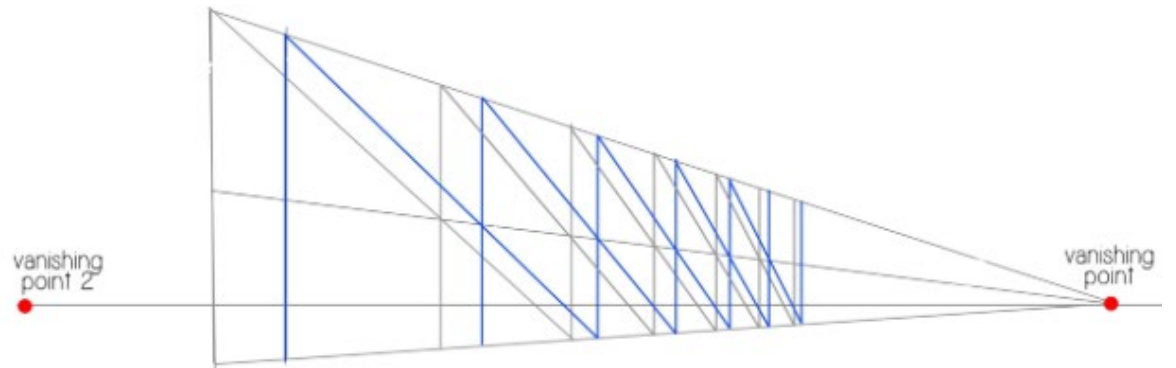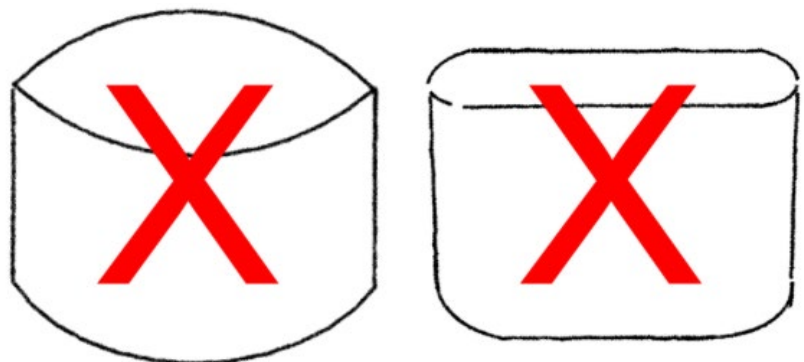
DRAWING ELLIPSES IN PERSPECTIVE

Any artist can tell you how tricky it is to draw ellipses in perspective. The top of the flower pot, the lid on a jar, the base of the barn silo — whether it's a still life or a landscape, you're bound to encounter the challenge of depicting a foreshortened circle, or ellipse, in just about any drawing or painting. Most of us try to "eyeball it" in the hopes that it'll be good enough, but there's an easier and more correct way of getting it just right.

So what is an ellipse? In geometry, it's a closed curve, like a circle, but with a long axis and a short axis — an oval. In terms of perspective drawing, an ellipse is what we see when we view a circle from its edge, rather than from directly overhead.
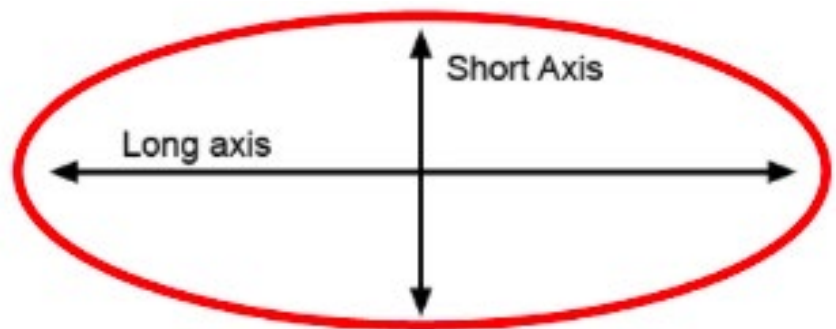
When drawing an ellipse in perspective, there are two common mistakes often made. One is to draw a football shape where the outside edges taper almost to points, and the other is to draw two parallel lines connected with curves at each end.


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In order to avoid these problems, it helps to think "outside the ellipse." If you can draw a square in perspective, it's easy to turn it into an ellipse following these steps.

Most of the ellipses we encounter are at the top and bottom of cylinder shapes, like glasses, flower pots, barrels and buckets, etc. If you think of the cylinder as being within a box, drawing the top and bottom ellipses becomes much easier.
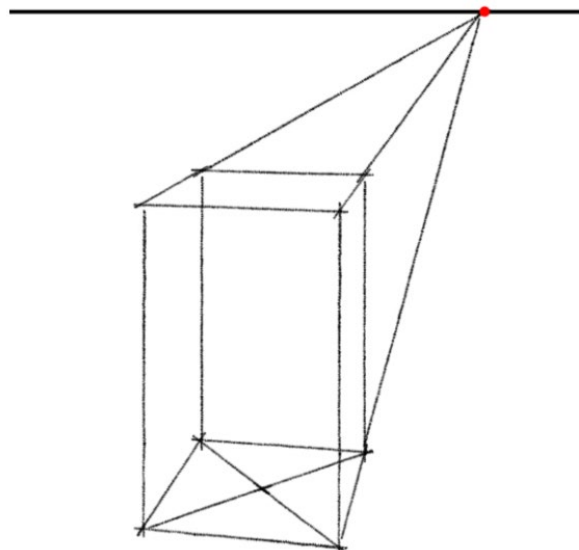
Step 1

Draw a box in one-point or two-point perspective that is big enough to contain your cylinder. The top and bottom planes of the box will be the location of your ellipses.
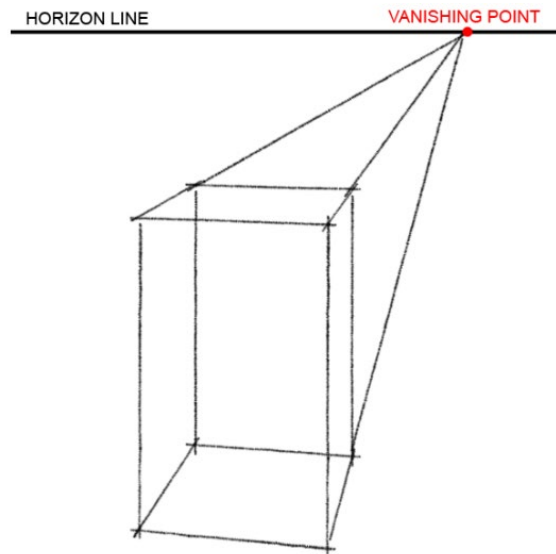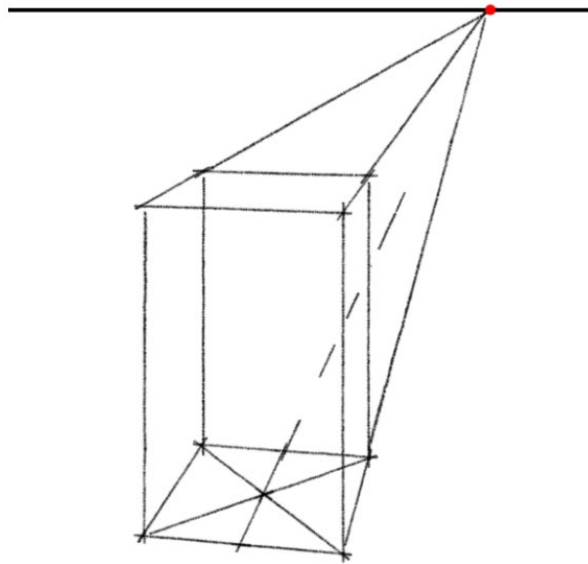

Step 2

We'll start with the bottom square plane. Using a straightedge, draw diagonal lines connecting each corner to create an "x.".

Step 3

Draw a line from the VP through the center of the "x" all the way to the outside edge of the square.


Step 4

Draw another line through the "x" that is parallel to the front and back edges of the square. In one-point perspective, this line will be horizontal, and in two-point perspective, it will recede toward your second VP. Now you have a cross shape that perfectly divides your square into four smaller squares in perspective.

Note: It is important that you do Step 3 first, or you will not have found the true center of the square in perspective. This is one you can't eyeball.
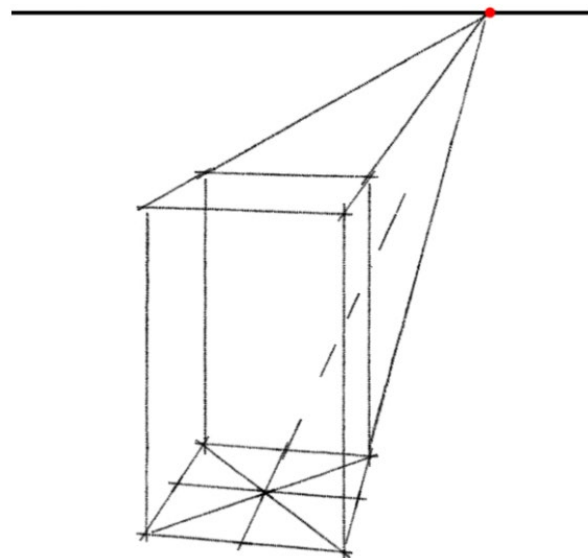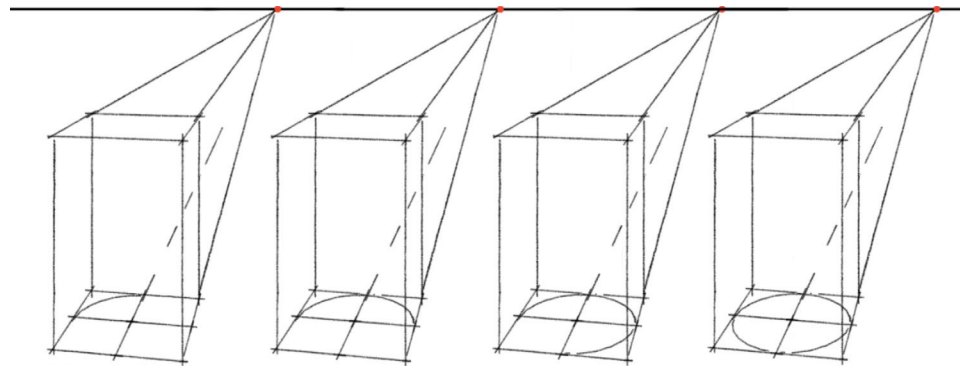

Step 5

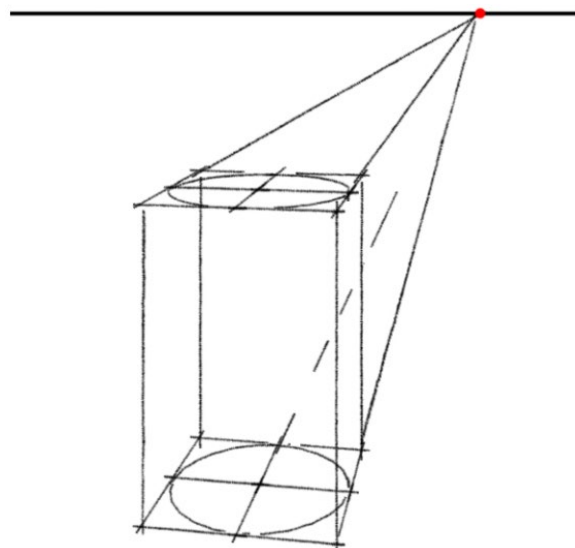Erase the diagonal lines from your initial "x."
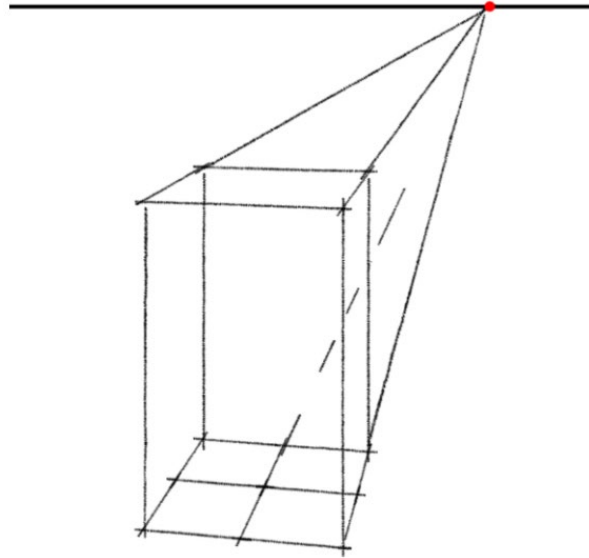
Step 6

Carefully draw your ellipse in four segments, connecting each point where the cross meets the edges of the square.

This takes some practice, but be patient. It will definitely look better than if you freehand it.
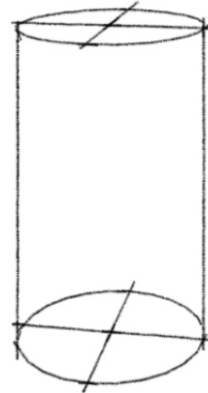

Step 7

Repeat Steps 1-6 for the top square of your box.

Step 8

Erase your perspective lines and the vertical lines in your box, being careful not to erase your ellipses!

Step 9

Using a straightedge, draw vertical lines between the right- and left-most edges of your ellipses. DON'T simply connect the points where the cross meets the edges of the ellipse, as these aren't necessarily the outermost edges.
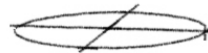
Step 10

Now you can erase the crosses on both ellipses and the rear curved edge on the bottom ellipse.

Congratulations! You've just drawn two perfect ellipses in perspective to make a cylinder, which you can use in still lifes, landscapes, architectural drawings — you name it. And these steps even work if the ellipse or cylinder is on its edge or on a wall (clocks, mirrors, windows and more)!
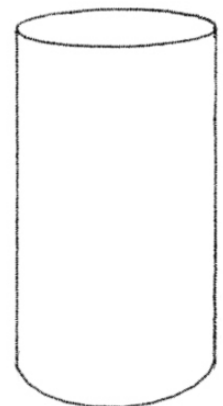
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