Perspective in Art

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Mathematics in the universe

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Introduction:

Although it is believed that science is almost everywhere in our daily lives, few people connect it with art like the paintings and the architecture. However, science dose exist in art and the art also becomes more gorgeous since the existence of science.

One of the most popular techniques used in the paintings is the perspective, which allows the artists to create a 3-dimentional scene just on a 2-dimentional plane so that make the paintings lively. So I am goanna take perspective as the topic of my paper to discuss about its development, its basic construction, and how it works.

What is perspective?

Perspective is an art technique for creating an illusion of three-dimensions (depth and space) on a two-dimensional (flat) surface. Perspective is what makes a painting seem to have form, distance, and look "real". The same rules of perspective apply to all subjects, whether it's a landscape, seascape, still life, interior scene, portrait, or figure painting. [1]

How dose perspective work?

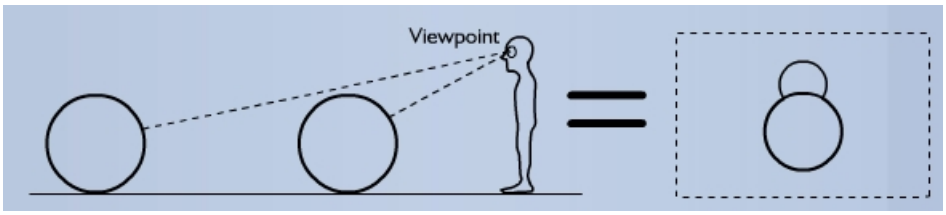
Firstly, let’s get familiar with the terminology in perspective:

1. Viewpoint

Viewpoint is the spot (point) from which you, the artist, is looking at the scene. Linear perspective is worked out according to this viewpoint. There's no right or wrong choice of viewpoint, it's simply the first decision you make when beginning to plan your composition and figure out the perspective.

Normal viewpoint is how an adult sees the world when standing up. When painting in a realistic style, this is the viewpoint you'll probably use because it's what we're accustomed to seeing. It's what looks most real. A low viewpoint is when you're looking at a scene from much lower than you would stand up. Of course, it's also the level from which small children see the world. A high viewpoint is when you're looking down on a scene. The rules of perspective don't change between a normal, low, or high viewpoint. The same rules apply in all cases. What changes is what you see in a scene.

The rules of perspective help us interpret and understand what we're seeing, and enable us to "get it right" in a painting.[2]



[3]

Horizon line:

Horizon line is a confusing perspective term because when you hear it, you tend to immediately think of "the horizon" we see in nature. That is, the horizon as in the line where the land or sea meets the sky in the distance. In a painting, the horizon line *might* be this if you're painting a landscape, but it's best to disconnect the two. Rather, when you hear "horizon line", you want to be thinking "eye level line".

If you draw an imaginary line across the scene at the level of your eyes, that's the horizon line. As you change position like walking up a hill, the horizon line moves up with you. When you glance down or up, the horizon line doesn't move because the level of your head hasn't moved.

The horizon line is an imaginary line used to create accurate perspective in a painting. Anything above the horizon line slopes down towards it, and anything below the horizon line slopes up towards it. Depending on what it is and how it is positioned, this may be very obvious or it may be very slight. Something that straddles the horizon line

will slope both up and down. The horizon line is important because the painting's perspective is constructed from this.

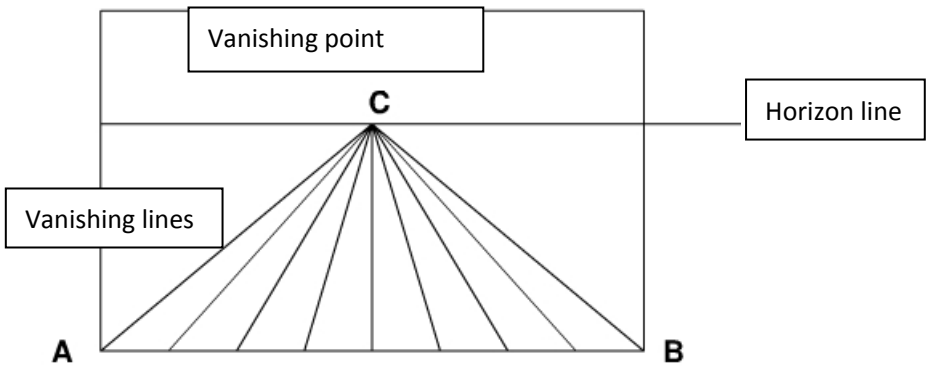
The Vanishing Point

Dots placed on the horizon are called the "vanishing points". One point perspective utilizes one vanishing point. All of the lines of perspective will recede back to this singular dot in space. This dot can best be thought of as the place where objects begin to disappear because of distance. Some of the lines used in one point perspective will use the "vanishing point" as an anchor.

Vanishing lines:

Vanishing lines are drawn on the top and bottom horizontal edges of an object, along the object and then extended all the way to the horizon line. For instance, on a building, there would be a vanishing line along the top of the roof and the bottom of the wall. If the object is below the horizon line, its vanishing lines angle up to the horizon line. If the object is above, they slope down. All vanishing lines end at the horizon line. And vanishing lines from parallel edges on the same object meet at a point on the horizon line. Whether or not an object has vanishing lines depends on how it's positioned in relation to the horizon line. Edges of objects parallel to the horizon line

don't have vanishing lines. Because they don't recede into the distance and never intersect the horizon line. For example, if you're looking straight onto a house (so you're seeing one side only), the front face of the building is positioned parallel to the horizon line (and so are its edges).

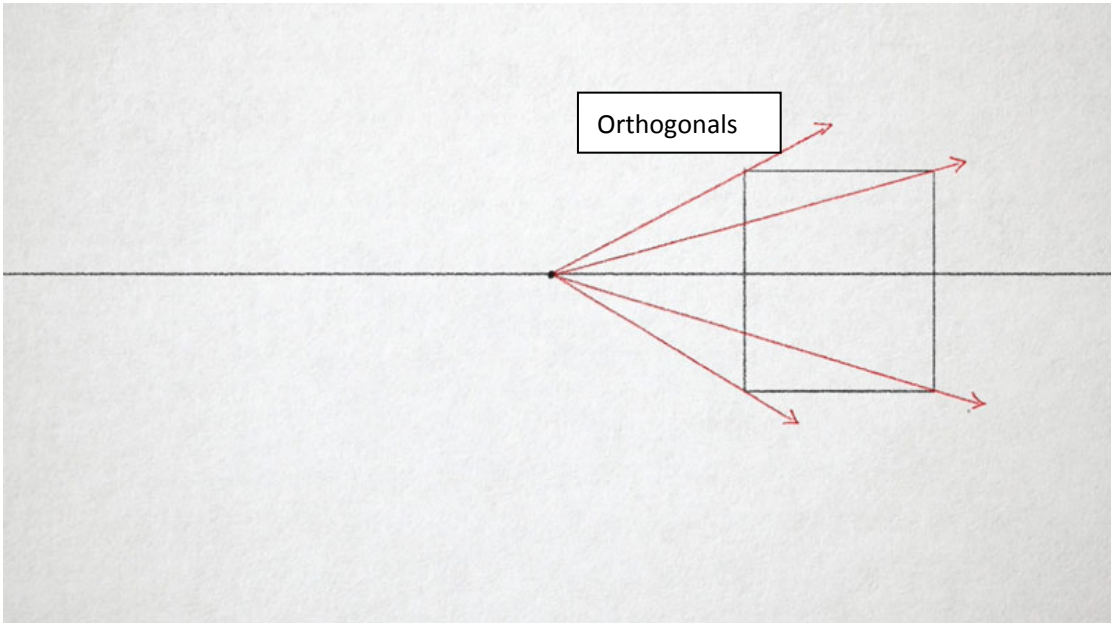


Different kinds of perspective in art

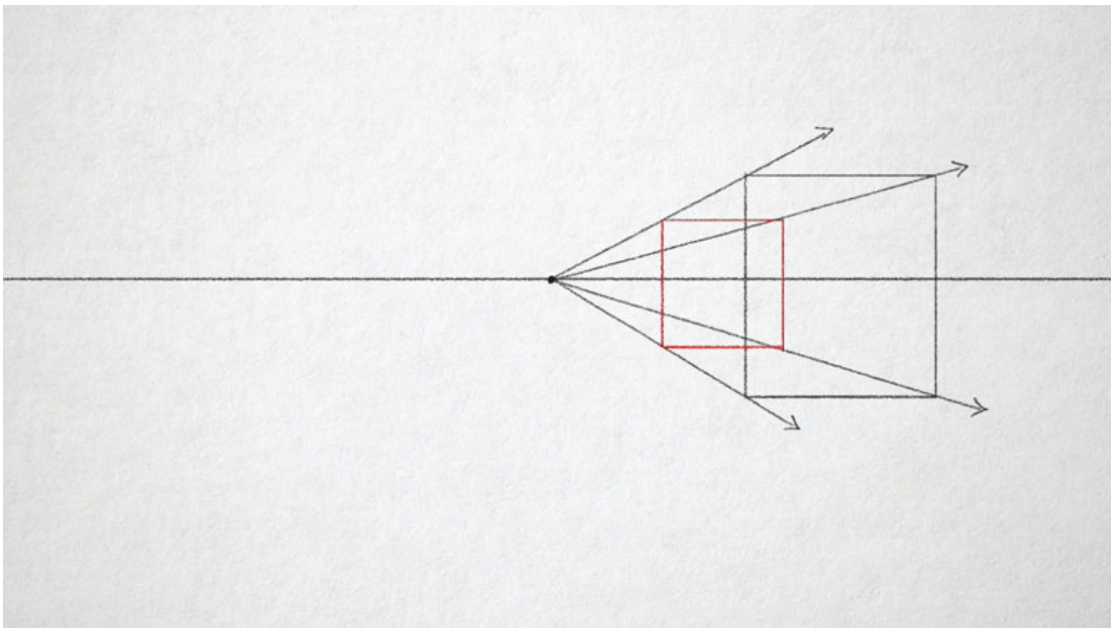
One-point perspective :

It is the simplest method of drawing perspective. It uses only a single vanishing point on the horizon line. A vanishing point is when two or more parallel lines converge into each other at "infinity." A good example of this type perspective is a long hallway, railroad track or road where the viewer is positioned face-on looking down the center. As you can see in the illustration, the two tracks are parallel to each other and you know they will remain the same distance apart, however, the further away they get the closer they appear to be until they eventually disappear at the horizon.

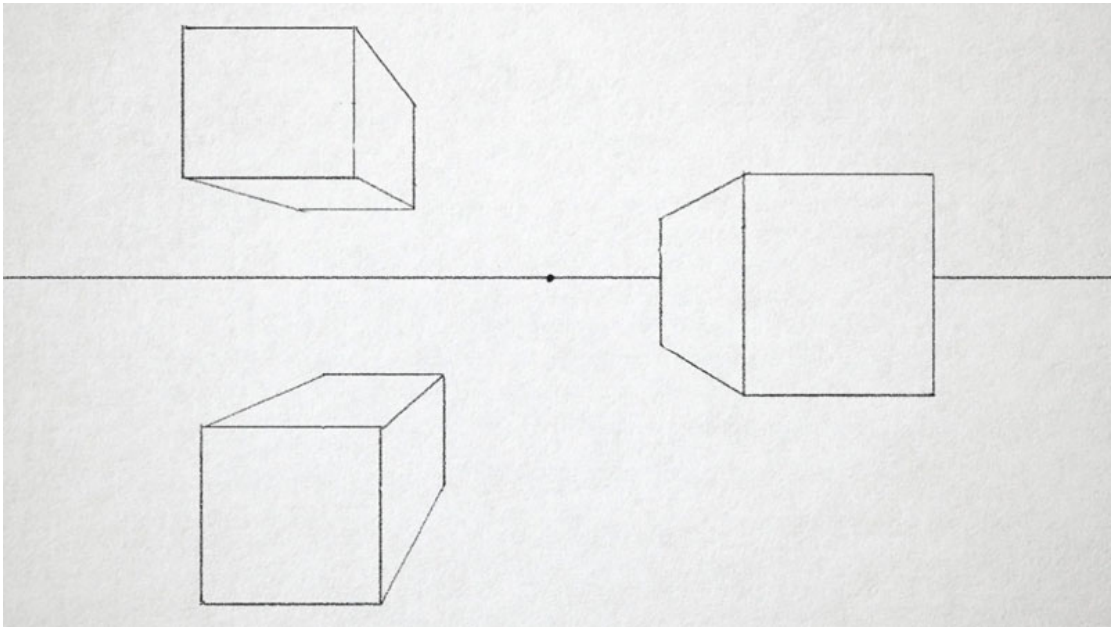
Once the basic shape of the object is defined, lines that recede back to the vanishing point are added from each corner of the object. These diagonal lines are called orthogonals.



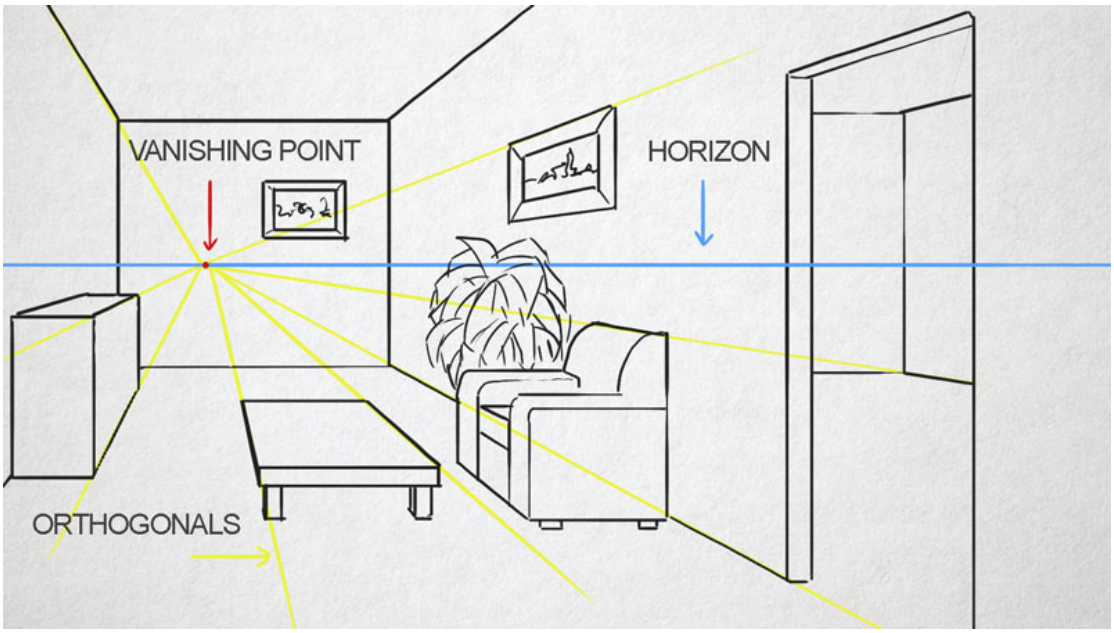
The back "face" of the cube is added by drawing another square that touches all four orthogonals as they recede back in space.



The shape of the cube has now been defined and the lines that were used to draw it can be erased, revealing a three dimensional cube in space.



This process is simply replicated to create additional forms. Each form that is drawn utilizes the same vanishing point. A new vanishing point is not created within the picture plane.



Scenes can become more complex as more features are added. The illusion of space is maintained by following a structured approach for additional details.

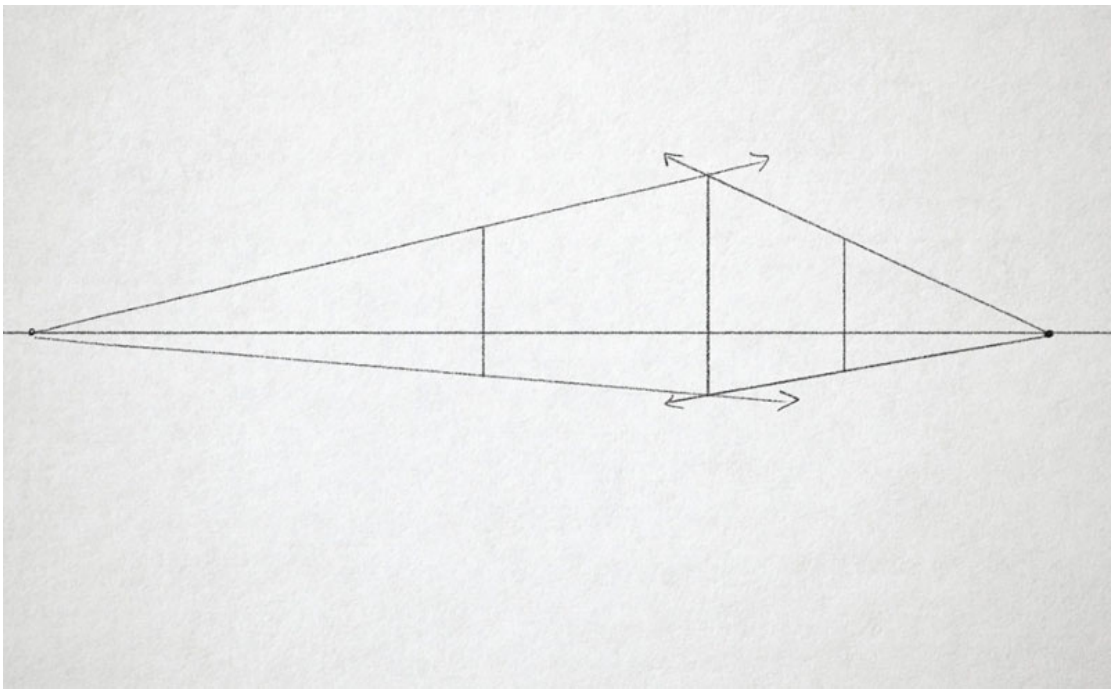
2-point perspective

With two point perspective, two vanishing points are placed on the horizon line. These two points should be spaced out from each other to prevent distortion. Both vanishing points need not both be within the picture plane, just as long as they are found on the horizon line, which continues on off of the picture plane in both directions.

The next step is to draw the corner of the object. Most commonly, two-point perspective is used for drawing buildings or interiors, so this line could be the corner of a building. This line is drawn in between the two vanishing points and can cross over the horizon line.

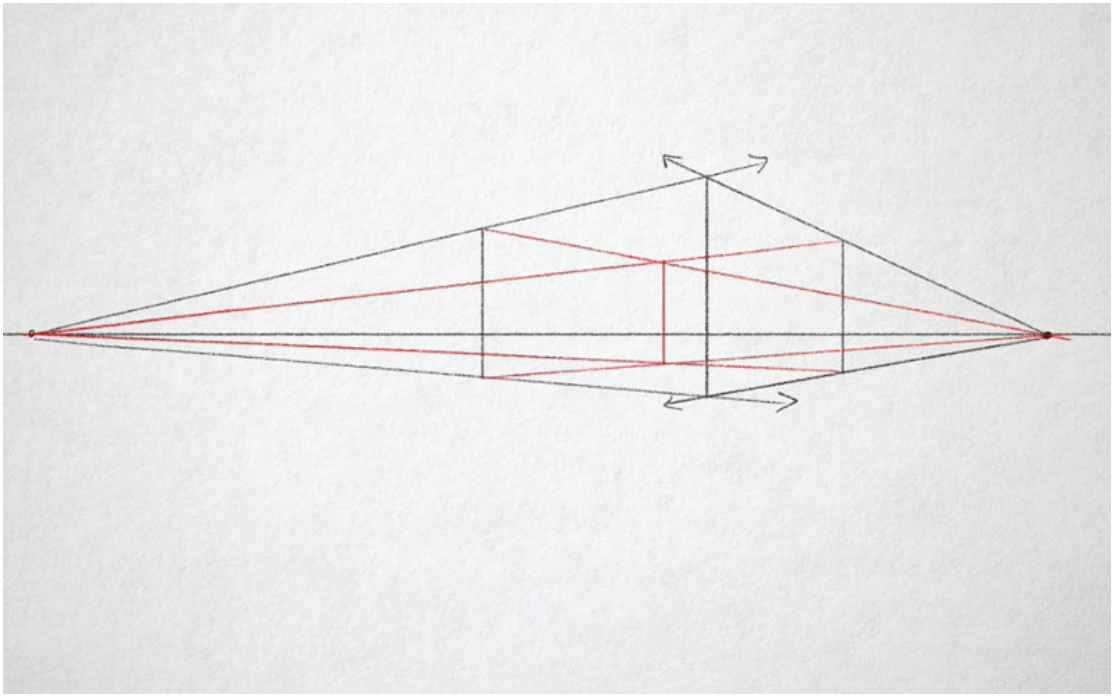
Receding lines are next drawn from each end of the corner to each one of the vanishing points. These lines are called orthogonal lines. Any set of parallel lines that recede away from the viewer will follow along these lines

to one of the vanishing points.

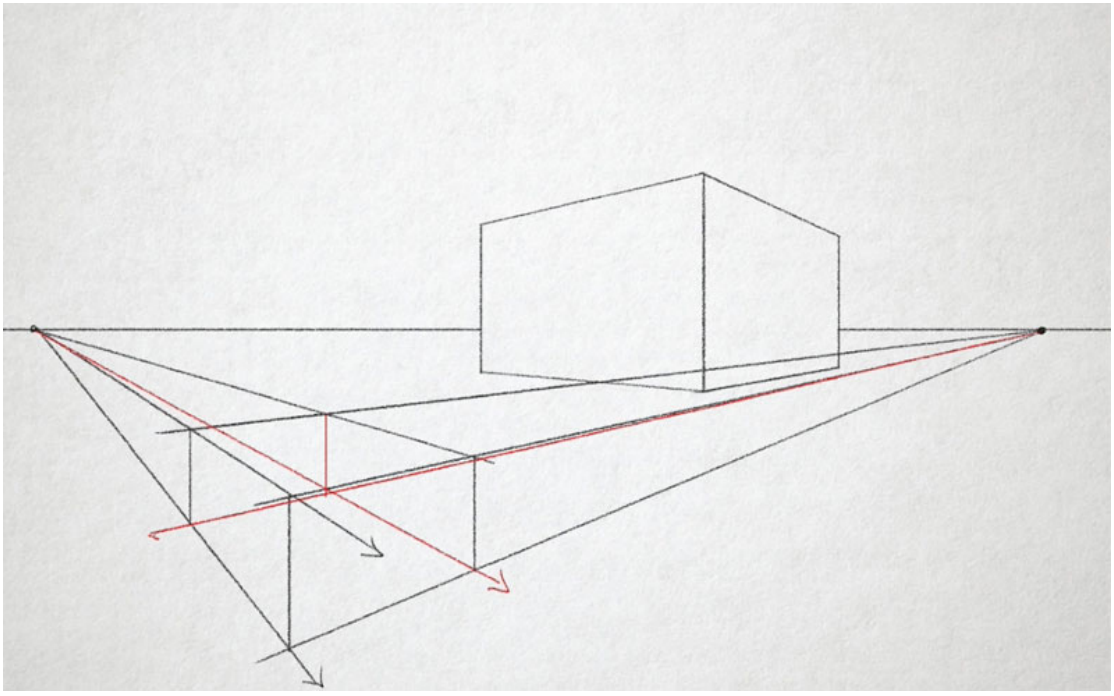


Parallel, vertical lines are drawn to indicate where the building or form ends. The closer that these lines are placed in space to the vanishing points on either side, the longer the form appears.

When a form is placed so that it overlaps the horizon, no additional lines are needed to define the overall form of the object. However, it is important to note that additional lines do exist. These lines are visible when the subject is placed above the horizon line or below it.



Below the Horizon Line

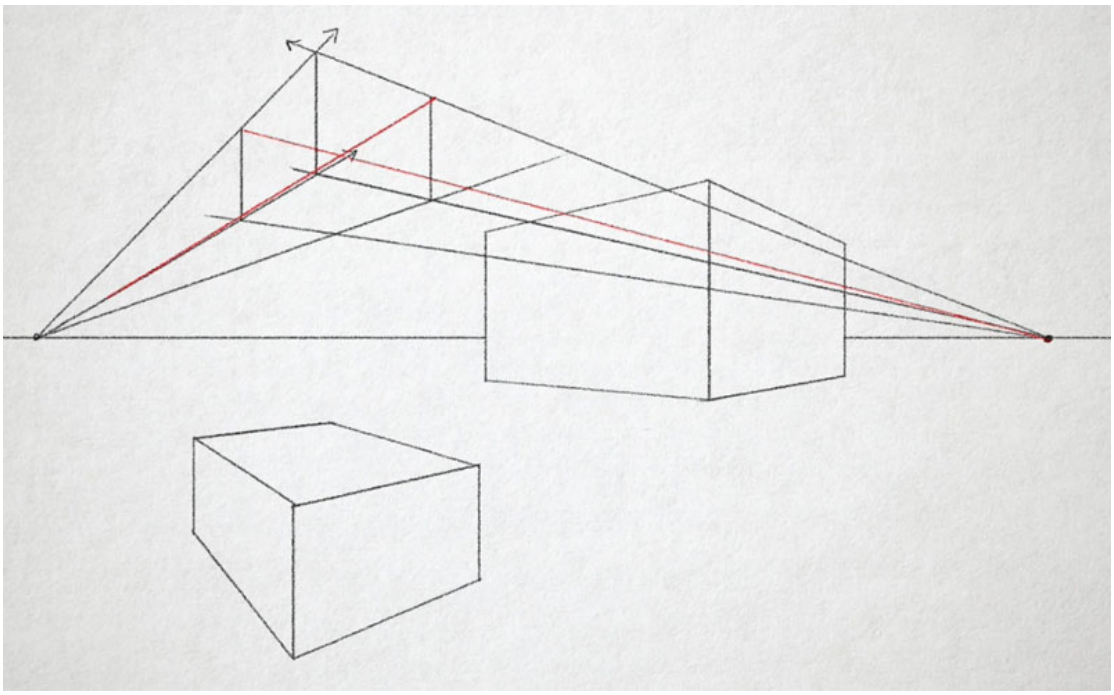


For forms placed below the horizon line the steps remain the same.

However, the top of the form will be visible. This means that the top portion

of the form will be defined by the orthogonal lines that extend from each end to the opposite vanishing point.

Above the Horizon Line



For forms placed above the horizon line, the same steps are followed. In this case, the bottom portion of the form is now visible to the viewer. The bottom portion is defined by extending lines from each end of the cube to the opposite vanishing point.

By the use of the perspective, a sense of depth and reality can be created so that the painting becomes better with the application of mathematical phenomenon.

Conclusion:

By admiring the beautiful paintings, I found out that mathematics in art—perspective. In case of the principle of optics and the use of different kinds of methods like one-point perspective and linear perspective, we can put the 3-dimentional objects in on the 2-dimensional paper, which create a strong sense of reality.

Reference

[1] Paper from Marion Boddy-Evans which is published on ThoughtCo.

[2]By Marion Boddy-Evans

[3] *Perspective and Art* from Perspective Tutorials

[4] One Point Perspective by Matt Fussell