7 Pictorial Projection 2

SYLLABUS OUTLINE

Areas to be studied:

• Principles of pictorial perspective drawing. • Parallel and angular perspective. • Vanishing points for horizontal lines.

• *Derivation of vanishing points for inclined lines.*

Learning outcomes

Students should be able to:

Higher and Ordinary levels

- Demonstrate a knowledge of vanishing points, picture plane, ground line and horizon lines.
- Determine the vanishing points and height lines for horizontal lines.
- Complete perspective drawings of given objects.

Higher level only

- *Determine the vanishing points for sets of inclined lines (auxiliary vanishing points).*

Perspective

Perspective is a pictorial representation of objects which very closely matches the view from the human eye. It is different from all other projection systems because the projection rays radiate from/to a single point. In the other systems of projection the projection rays are parallel. The effect this has on the pictorial is that objects that are in the distance will appear smaller than the same objects closer to the observer. If you walk up close to an object it appears bigger than if you see the same object from a large distance away. We see everything in perspective and are therefore used to making the adjustment for size. Look down a straight street of houses. The house in the distance appears very small compared to the house nearby, yet we know that all the houses are the same size. The sides of the street appear to narrow in the distance yet we know they stay parallel, Fig. 7.1.

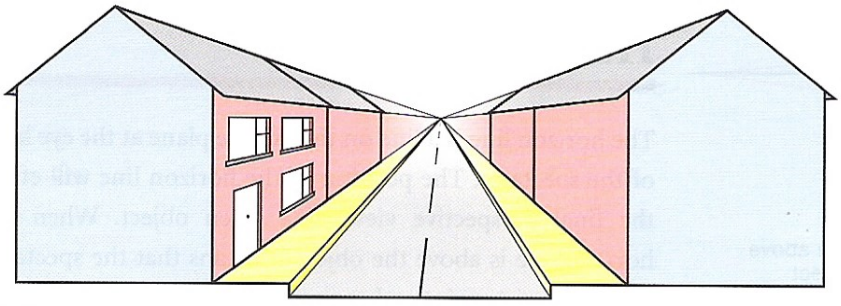


Fig. 7.1

Perspective gives a very realistic view of objects and is very useful for that reason but it should not be used to give sizes as it does not show true lengths.

Terms Associated with Perspective

Picture Plane

As with all projection systems the image is projected onto a plane. This plane is called the picture plane. The picture plane may be passing through the object, may be between the object and the observer or may be behind the object. Fig. 7.2 shows each of these arrangements. It can be seen that the placing of the picture plane does not effect the proportions of the perspective, only the size of the perspective.

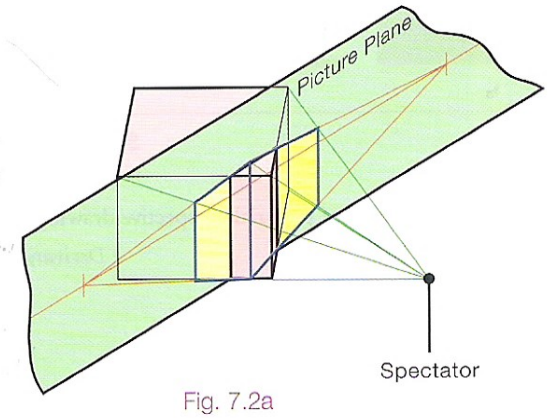


Fig. 7.2a

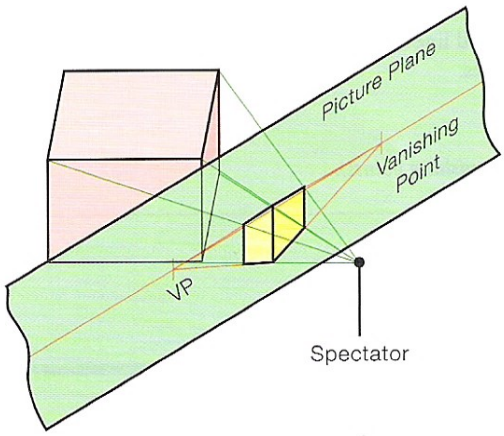


Fig. 7.2b

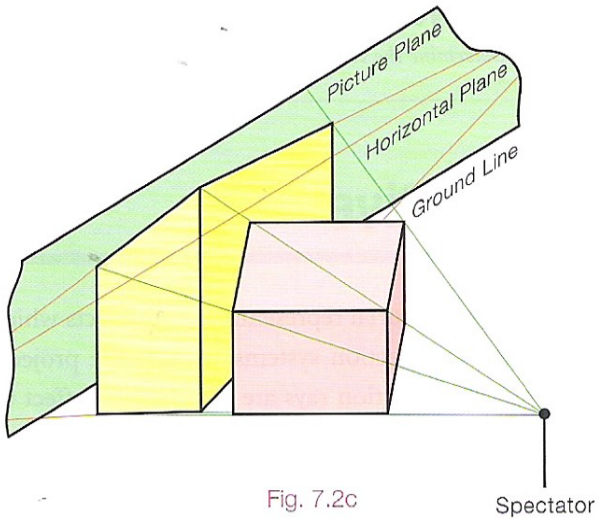


Fig. 7.2c

When the picture plane is in front of the object the perspective drawing is smaller than the object. Having the picture plane behind the object means that the perspective projects larger than the object.

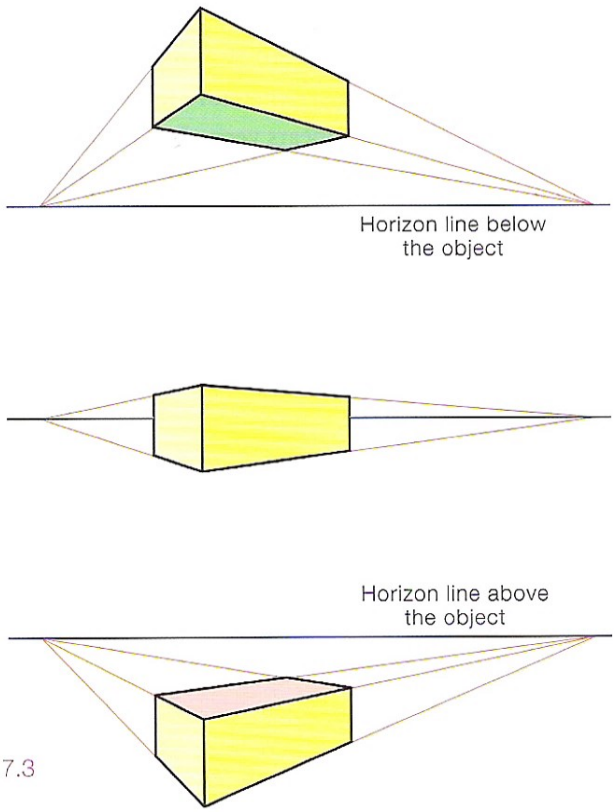


Fig. 7.3

Horizon Line

The horizon line is a line on the picture plane at the eye level of the spectator. The position of the horizon line will effect the final perspective view of a given object. When the horizon line is above the object it means that the spectator has a high viewpoint and can see the top surface of the solid. Having the horizon below the object results in a perspective that shows the bottom surface of the object, Fig. 7.3 demonstrates how horizon level changes the perspective.

The upper diagram shows a perspective with the spectator lower than the object, the horizon line is below the perspective of the object and therefore we see its bottom surface. The lower diagram shows the other extreme – the spectator's viewpoint is high, the horizon is therefore high and so we see the upper surface of the object.

Position of the Station Point

The position of the station point (SP) relative to the object also has a huge effect on the final perspective. When the SP is close to the object we are viewing the object from nearby and when the SP is far away we are viewing the object from a large distance away. Fig. 7.4 shows two perspective views of the same object. The upper diagram is produced by having the spectator near the object and the view we get is quite distorted. The lower diagram is produced having the spectator further away. The sides of the box are closer to being parallel. It is worth noting that the perspective produced when the spectator (S) is further from the object, the second perspective, is actually larger than the first.

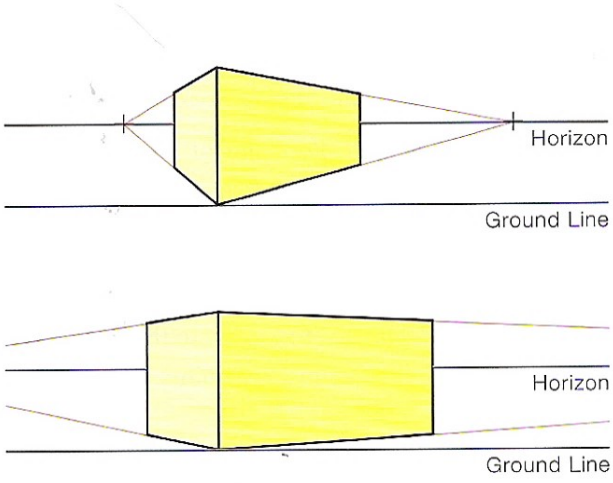


Fig. 7.4

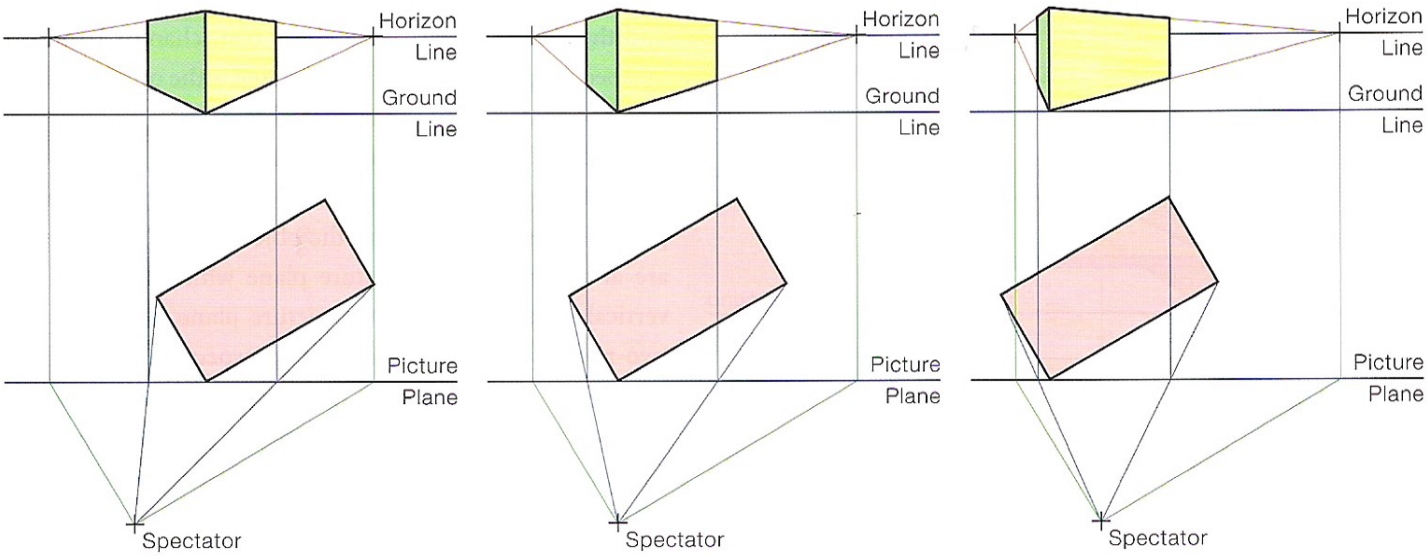


Fig. 7.5

This would appear to break the rules. Objects in the distance should appear smaller than objects nearby. It is, however, the position of the picture plane that determines the size of the perspective, not the position of the spectator.

The spectator can be moved from left to right, and again this will effect the final view. In general, the centre line of the cone of visual rays should be directed toward the centre of the object, or the centre of interest of the object, see Fig. 7.5.

Terms Used in Perspective

Just a quick recap on some of the terminology.

Picture Plane: The image is projected onto the picture plane. It is a vertical plane and can be moved. The position of the picture plane, relative to the object being viewed, affects the size of the finished perspective. Having the picture plane behind the object means an enlarged perspective, a view larger than the actual object. Having the picture plane in front of the object means a reduction in the size of the perspective.

Ground Line: The ground line is the line of intersection between the picture plane and the horizontal plane.

Horizon Line: This is a horizontal line on the picture plane that matches the height of the spectator's eyes.

Spectator: The person viewing the object.

Station Point: The position of the spectator relative to the object and the picture plane.

Vanishing Points: All lines vanish off into the distance. Sets of parallel lines vanish off to the same point, a vanishing point. Horizontal lines will have vanishing points on the horizon line.

The Three Types of Perspective

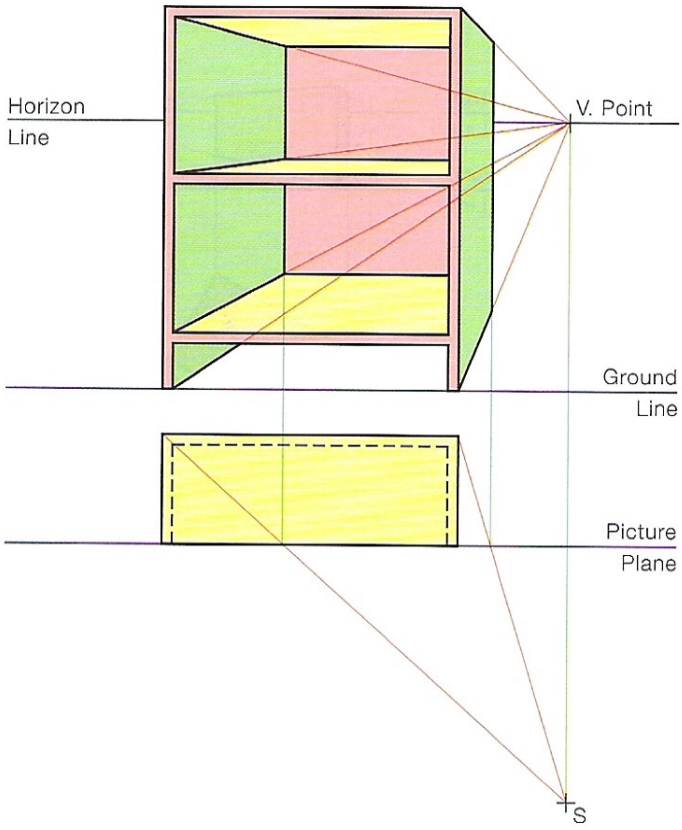


Fig. 7.6

So far we have been experimenting with the various elements of perspective to see how they affect the final drawing. We have moved the picture plane, horizon line and the spectator, each making its own changes to the perspective produced. The last variable is the object itself and its orientation to the picture plane.

Placing the object so that one of its faces is parallel to the picture plane results in a **one-point perspective** or **parallel perspective**. Tilting the object so that two faces are at an angle to the picture plane while still having vertical edges parallel to the picture plane, produces a **two-point perspective** or **angular perspective**. Finally, if the object is so placed so that none of its edges are parallel to the picture plane we get a **three-point perspective**. Three-point perspective is not on the syllabus but we will just look at it briefly to tie in with the other two.

One-point Perspective

Two of the object's principal axes must be parallel to the picture plane, leaving the third to vanish off to a single vanishing point. This is the least complicated of the perspectives and is quick to produce. Useful for presentation work and for representing the interior of a room. It is also useful for solids containing circular curves. Position the object so that the surface(s) containing the circles are parallel to the picture plane and the perspective view of these circles can be drawn with the compass, Figures 7.6, 7.7 and 7.8.

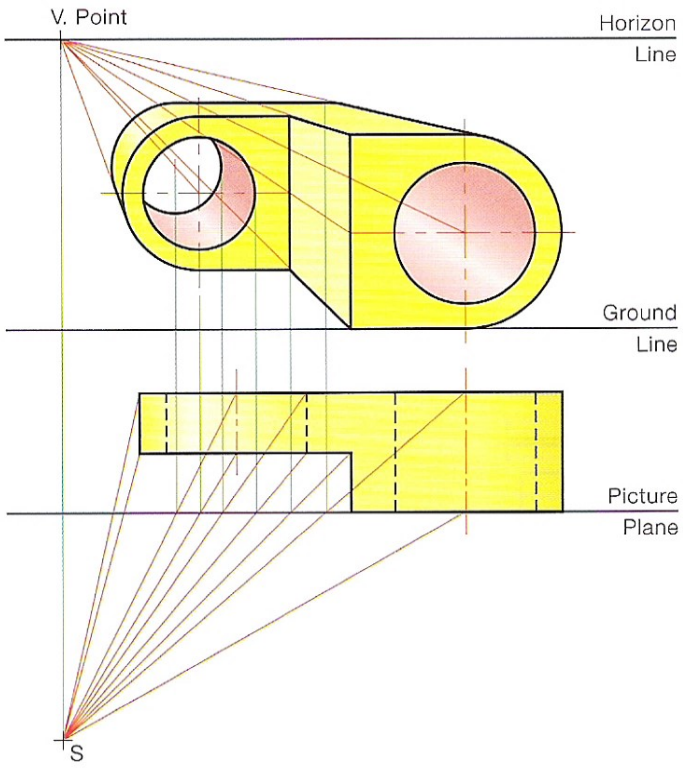


Fig. 7.7

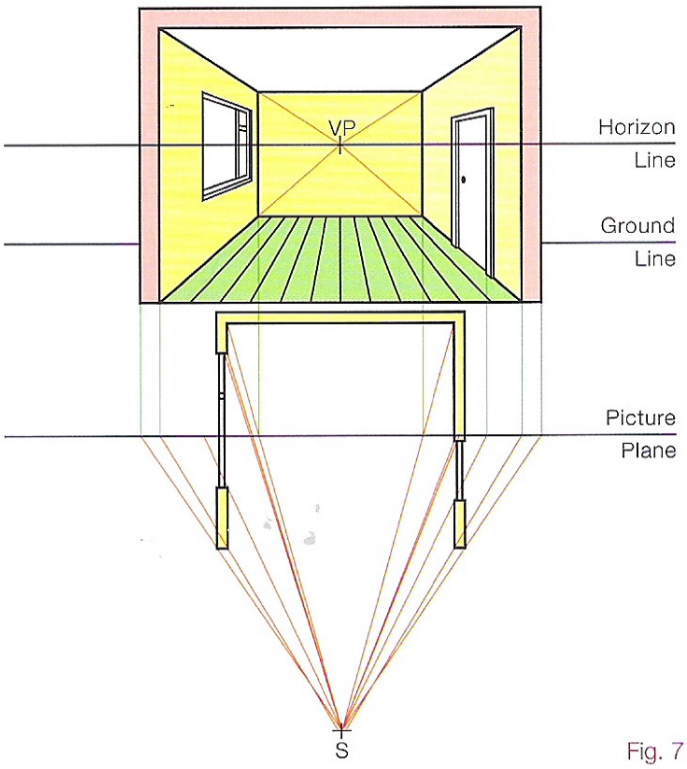


Fig. 7.8

Two-point Perspective

This is the most commonly used perspective. The object is placed so that one set of edges is vertical and therefore parallel to the picture plane and the other two sets are inclined to the picture plane, thus giving two vanishing points. It produces a very realistic view and is used extensively to represent buildings in architecture, Fig. 7.9.

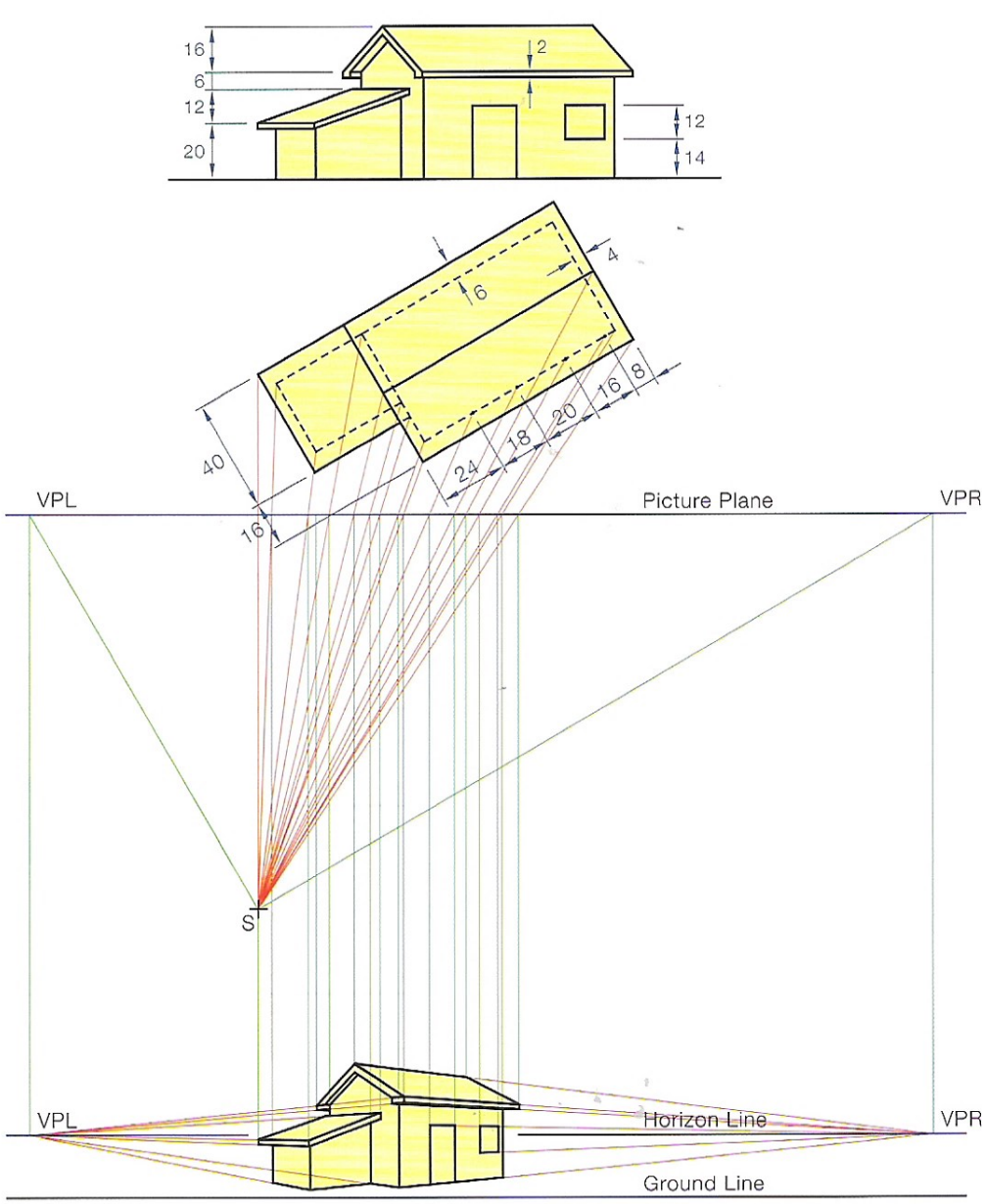
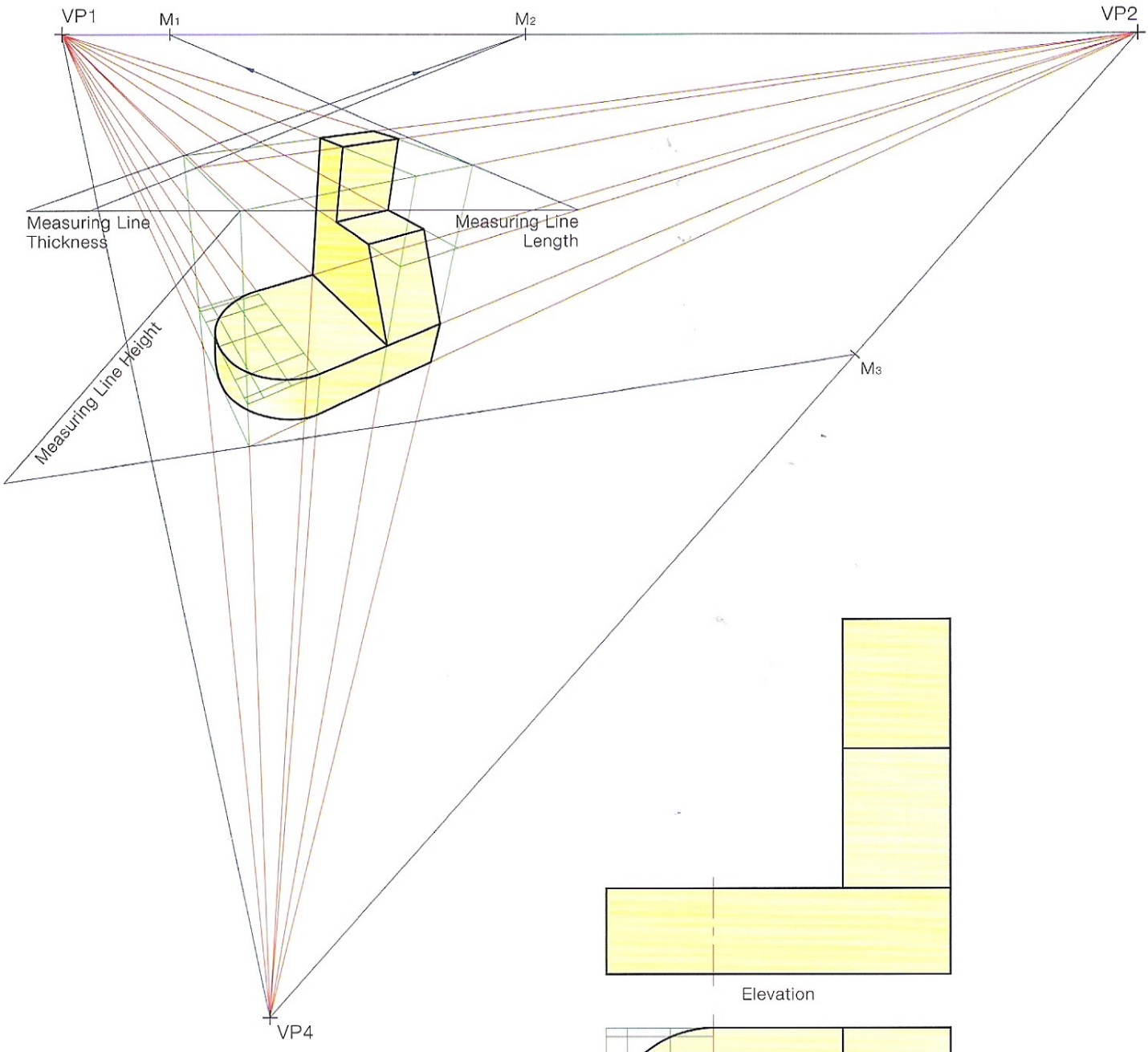


Fig. 7.9

Three-point Perspective



Three point perspective is not on the syllabus and we will only take the briefest of looks at it. The object is placed so that none of its principal axes are parallel to the picture plane. Each set of parallel edges will have its own vanishing point. It can be quite difficult to draw one of these perspectives. In the method shown in Fig. 7.10 the perspective is drawn directly from measurements and not projected from views.

Fig. 7.10