

Notes On Drawing Cylindrical Forms From Observation

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TEACHING
ART & DESIGN

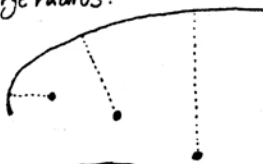
Sheeaun, Kilmaley, Ennis,
Co. Clare, Ireland.

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Shapes That Involve Drawing Cylindrical Forms

Many of the shapes that you have to make in a drawing from observation are basically cylindrical. These notes are intended to clarify what to look out for in drawing them accurately. Besides obviously cylindrical shapes such as pots or jars, there are other forms that can be treated similarly, for example thinner disc-like shapes such as plates or shallow bowls, shapes that are partially cylindrical but which may be flat on one side, or round holes that are at a right angle to the surface of the object. All these will involve the drawing of ellipses.

The curve gradually changes from a small radius to a large radius.



The four quarters should be the same



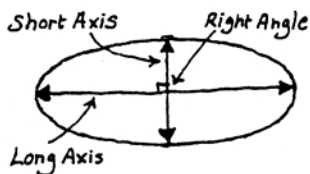
Incorrect shape

Defining What An Ellipse Is

An ellipse is a symmetrical shape with a variable radius. At no point should the radius of the curve remain constant (as a circle does), but rather it gradually changes from a sharp curve with a short radius, to a gentle curve with a larger radius, and back again as you move around its circumference.

It is possible to see if the ellipse that you have drawn is symmetrical by dividing it up into four equal quarters. Each quarter should be identical to, or a mirror image of the others, and any discrepancies should then show up. Of course this is thinking of the ellipse solely as an abstract shape, and ignoring for the moment the effect of perspective.

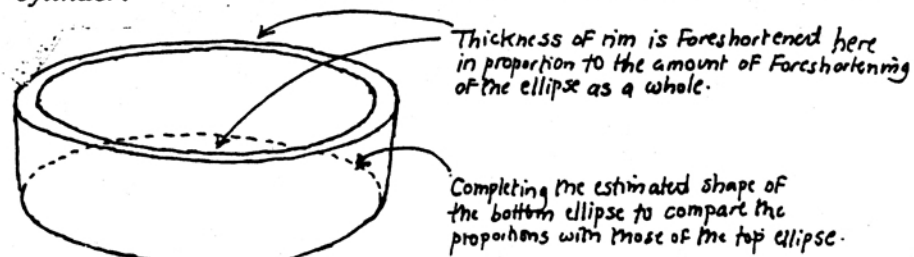
Nowhere on the ellipse should there be any sudden changes of angle; the change should be gradual. A common mistake is to draw something more like an 'eye' rather than an ellipse with a sudden change of angle at the sides; to correct this effect the line will need to be curved round at a slightly wider radius.



Working Out The Proportions Of An Ellipse

In dividing our ellipse into quarters we have in fact defined the longer and shorter dimensions across it. These two 'axis' lines will always be at a right angle to one another. If we compare the length of the two axis lines on the real object, then the ellipse in the drawing can be drawn with the same proportions.

This is easier to do if the whole of the circumference is in view, for example on the top of a jar. Ellipses that are partly out of sight, (for example the bottom of a jar standing on its base) are easier to draw if the whole ellipse is drawn in, imagining where it will go as it passes around the back of the cylinder. You can then make an estimate of its proportion, comparing it to that of the ellipse at the other end of the cylinder.



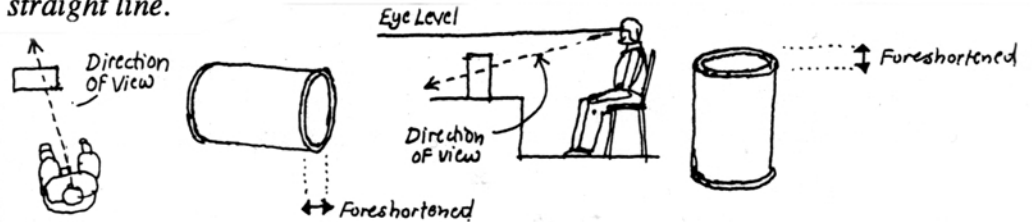
Thickness of rim is foreshortened here in proportion to the amount of foreshortening of the ellipse as a whole.

Completing the estimated shape of the bottom ellipse to compare the proportions with those of the top ellipse.

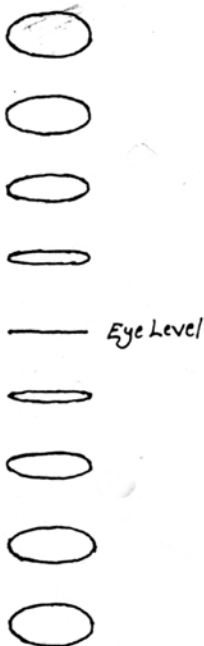
As always the measuring of the proportions on the subject has to be done on the picture plane, since the object will be in reality circular, but we are interested in the shape as it will appear to be in our picture. The proportions of the ellipse will depend on the amount of foreshortening.

The Foreshortening Of Circular Shapes Related To Perspective

As with any shape the amount of foreshortening will increase, the closer the surface comes to the direction in which you are looking. For example if a can is laid on its side so that it is almost at a right angle to our direction of view, then the distance across the lid will appear very foreshortened. Similarly if the can is placed in an upright position with the surface of the lid almost on your eye level, then the lid will appear very foreshortened. If a circular surface coincides exactly with our direction of view, then the foreshortening will reduce the proportions of the ellipse to a straight line.



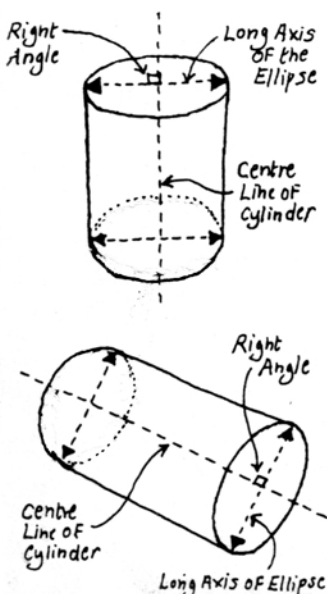
This is best illustrated by way of example. If you hold a circular disc in front of you, in a horizontal position on your eye level, it will appear as a straight line. Move it above or below your eye level but keeping it horizontal, and it will appear more elliptical. The ellipse will become rounder the further it is moved above or below your eye level. If it were possible to place it in a horizontal position directly above or below you, it would appear as a circle. Similarly if you hold the disc vertically in front of you, directly along your line of sight, it will appear as a vertical straight line. Moving it to right or left, but keeping it parallel to your line of sight, will make it appear increasingly elliptical.



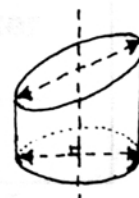
This has important implications for a cylinder which has depth. The two ends of the cylinder, if they are any distance apart, will be viewed from different angles, so that the two ellipses will be of differing proportions. In the example of the jar standing on its base, the top being nearer to the eye level, will be more foreshortened than the base. In the example of the jar lying on its side, the top being nearer to your line of sight will be more foreshortened than the base which is further to the left.

Deciding On The Orientation Of Ellipses

In the case of the jar standing on its base, the ellipse would be drawn with its longest axis horizontal. This seems to be obvious and we would draw it this way without really thinking too much about it. However for cylinders lying on their sides, the orientation of the ellipse seems to present more of a problem. In fact the rule is simple. The longest axis of the ellipse will always be at a right angle to the centre line of the cylinder itself. This is because in nearly all cases cylindrical shapes have a top and bottom that is horizontal (i.e. at right angles to a centre line running down through the cylinder). Very rarely you might come across a cylindrical shape with an end that is on a slope, but this doesn't happen very often. In this case the angle of the ellipse would have to be sloped accordingly.



← Turn this drawing on its side, so that the centre line is vertical, and it should look like a cylinder standing on its base

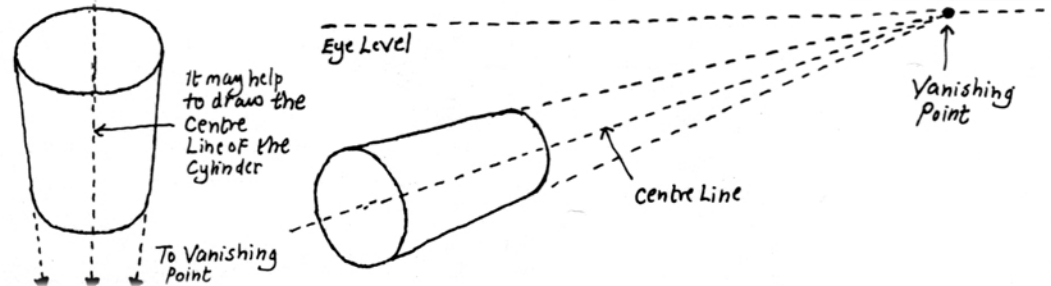


Example of a cylinder with a sloping top surface.

The Perspective Of The Sides Of Cylindrical Shapes

Obviously the angle that you view a cylinder will affect the perspective of the sides. In the example of the jar standing on its base, the edges of the cylinder will appear to converge downwards, since they point away from you in that direction.

For the jar lying on its side, the edges of the cylinder appear to converge on a vanishing point at the side of the picture, in the direction which is away from the viewer. Assuming that the jar has parallel sides and is lying on a horizontal surface, the vanishing point will be on the eye level.



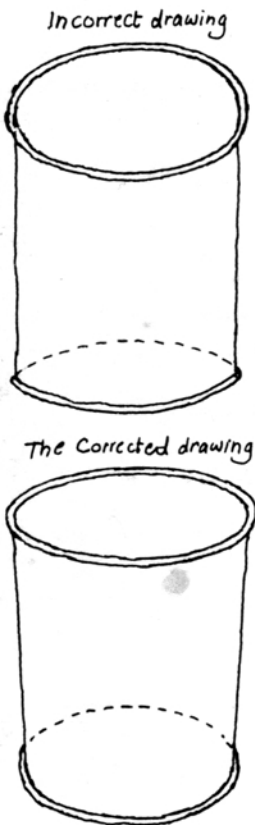
Common Errors In Drawing Cylindrical Shapes

Very commonly a person who does not yet understand how to draw cylindrical shapes, will produce something like that shown here. There are three errors in the drawing:

1. The proportions of the two ellipses are wrong; the top one should be the more foreshortened of the two, assuming the cylinder is below the eye level. This due to the person drawing what they know, rather than what they actually are seeing. In this case the top has been made more rounded because we know it to be circular in reality, and the bottom of the shape has been flattened because we know that the object has in reality a flat base. However a more careful look at the object will show that both of these shapes are considerably different as they appear on the picture plane.

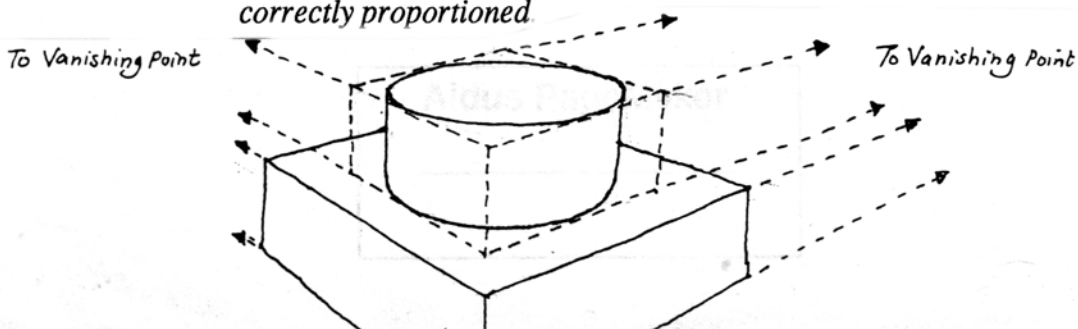
2. The bottom ellipse is the wrong shape (see above). This is because the person has not properly analysed the shape of the ellipse. Drawing the complete ellipse (even if part of it is out of sight) will help in getting this right as described previously. In this example the bottom ellipse could not be continued around the back without either a sudden change of angle, or emerging beyond the sides of the shape, which of course it cannot do.

3. There is no perspective applied to the sides. This due to not appreciating the effect of perspective on lines moving away from you; a comparison between the apparent width of the cylinder at the top, and the apparent width at the bottom, should confirm what perspective theory will tell you.

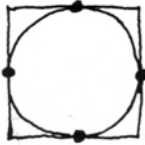


Relating Circular And Rectangular Shapes In Perspective

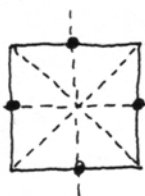
Obviously if a circular and a rectangular shape exist together on the same plane it is important that the foreshortening of the two is related. If the two shapes are properly observed this should be correct anyway, but another way of checking that this is so is to draw a box around the cylindrical shape. If the box matches the perspective of the other rectangular forms, then the cylinder inside should be correctly proportioned.



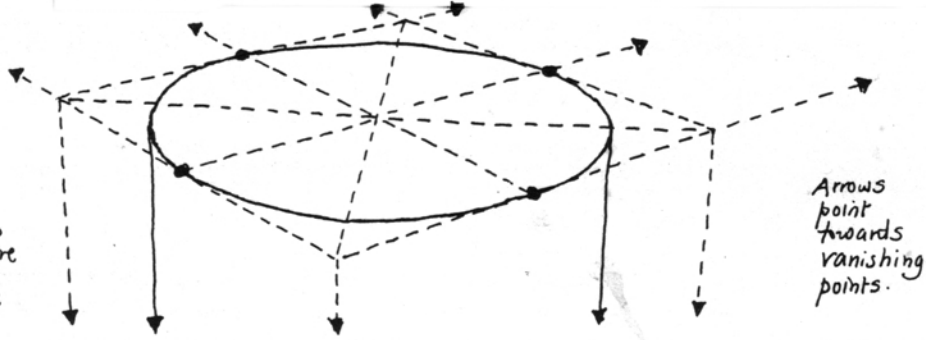
This method could be used for example to locate the position of a circular or cylindrical form within a larger shape. First a box representing a square in perspective, would be drawn around the intended position of the cylinder, being careful to make sure that it conformed to the perspective of the larger shape itself. If a circle is drawn inside a square it will touch the middle of each side of the square, so to draw the cylinder we have to find the middle of each side of the box in perspective. Here we have to be careful because in a perspective drawing the middle of the line cannot be found by simply using a ruler; the half nearer to the observer will need to look bigger to the observer than the half that is further away. Fortunately there is an easy solution. The centre of the square can be found by drawing in the diagonals; then by drawing lines passing through the centre but going in the same direction as the sides of the square (using the vanishing points) the middles of the four sides can be found. Finally it is possible to draw an ellipse passing through these four points.



The circle touches the middle of each side of the square.

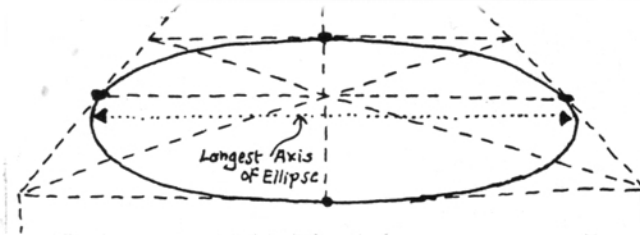


Using the diagonals to find the centre of the square and thus the middles of the sides.



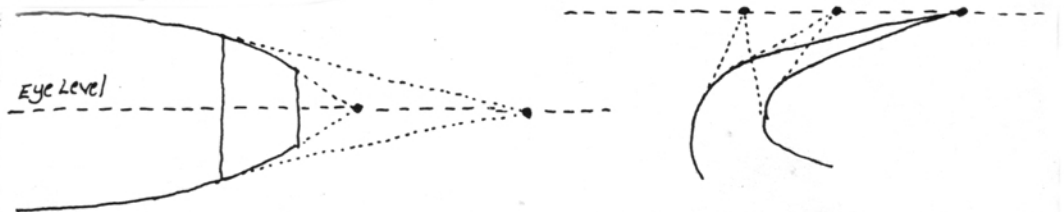
Arrows point towards vanishing points.

If part of the larger shape is facing the observer, some of the lines will be parallel to the picture plane and will be drawn parallel in the picture. It is worth noting that the line that is drawn horizontally through the centre of the circle will not be the longest axis of the ellipse, since the half of the circle that is nearer to you will appear larger than the half which is further away.



Other Kinds Of Rounded Forms

Larger curving surfaces can be related to perspective by finding the vanishing point for a flat plane that would be at a tangent to the curved surface at that point. In this way a number of vanishing points could be used to relate to points around a larger curved object.



Spheres are not really affected by perspective, since a ball looks the same from whichever side it is viewed. The most important thing is to make sure that it has the correct proportion for the rest of the drawing, and that it is in the right place.

A dome would consist of half a sphere cut off by a horizontal circular plane. This circular base would appear as an ellipse.

