Given the plan and end view of two intersecting prisms. Draw the given views and project the front elevation, Fig. 10.7.

(1) Draw the given views.

(2) The edge, 1 of the square prism intersects the triangular prism in two places. Similarly for edge 2 and edge 3 of the square prism. It can be seen from the end view that edge 4 does not intersect the triangular prism. All six of these points are found in plan and projected to elevation.

(3) The bend points p, q, r and s are seen in end view and projected across to the front elevation.

(4) The sequence of joining the points is found from the end elevation, s, 1, p, 2, q, 3, r, 3, 2, 1, s, Fig. 10.8.

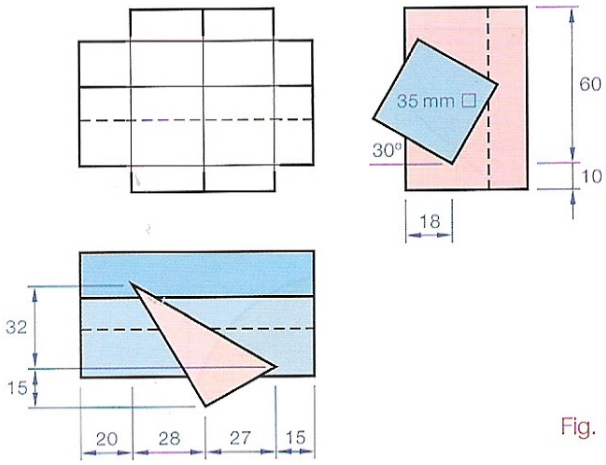


Fig. 10.7

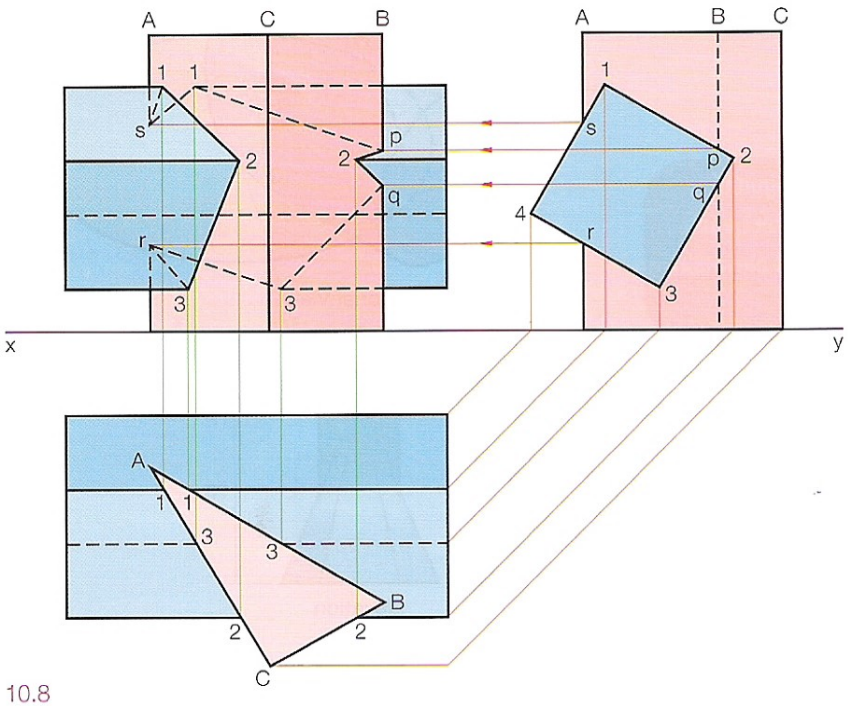


Fig. 10.8

Method Two: Radial Elements Method

This method can be very useful when cones or pyramids are being penetrated by other solids. The limits method used in the previous examples will not work for these types of solids.

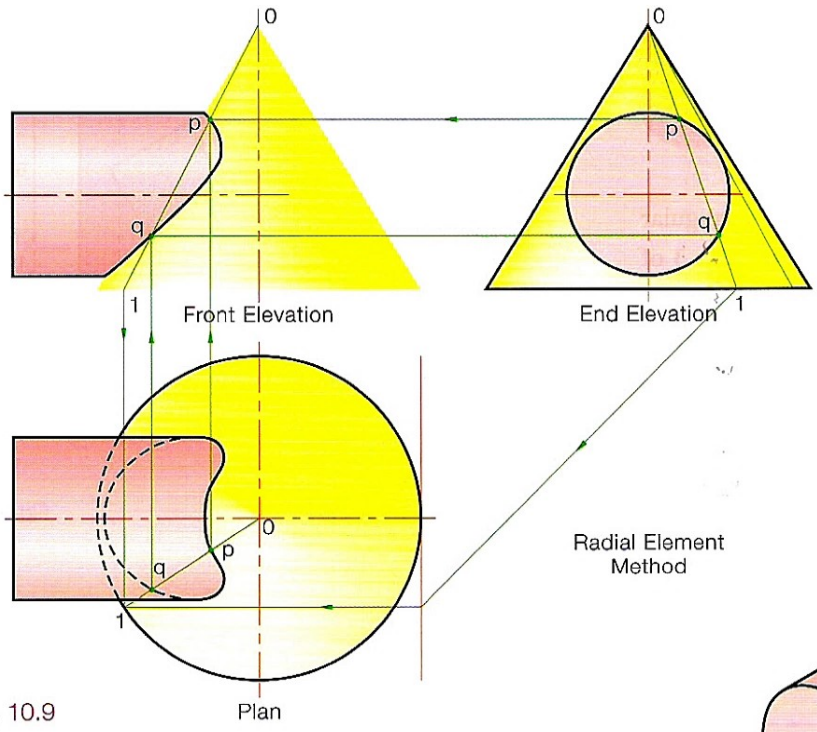


Fig. 10.9

In Fig. 10.9 we can see how a radial element 0, 1 is taken in end view from the apex of the cone and passing through the second solid. This element locates two points p and q. The element can easily be found in the other views and points p and q found on it. Points p and q are on both solids and are therefore on the line of intersection. Many more points on the line of intersection can be found by using more elements, Fig. 10.10.

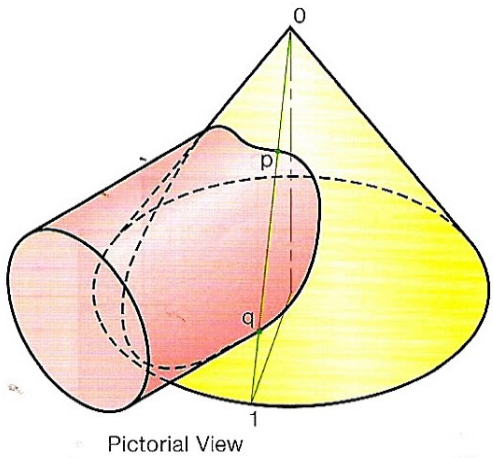


Fig. 10.10

Given the plan and partial elevation of a hexagonal-based pyramid and a square prism which intersect each other. Draw the complete plan, elevation and end elevation of the intersecting solids, Fig 10.11.

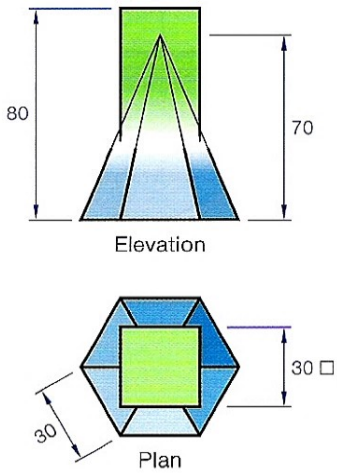


Fig. 10.11

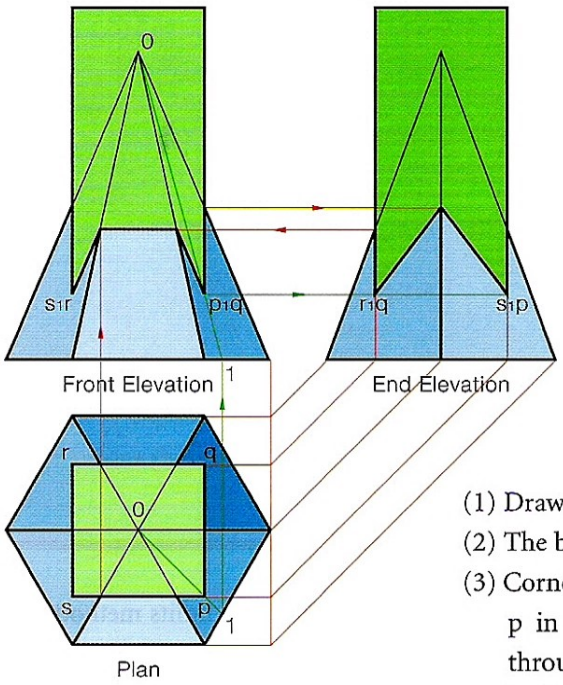


Fig. 10.12

(1) Draw the given plan and elevation.

(2) The bend points are easily found.

(3) Corners p, q, r and s fall on the sloping faces of the pyramid. To find point p in elevation we draw an element from the pyramid apex in plan, through point p to hit the pyramid base at point 1. This element 0, 1 can be found in elevation and p found on it.

(4) The front elevation and end elevation can now be completed. There is no necessity for any more elements as the answer is symmetrical, Fig. 10.12.

Fig. 10. 13 shows the plan of a hexagonal-based pyramid of height 80 mm. The pyramid has a square hole cut through it. Draw the given plan and project a front elevation and end elevation.

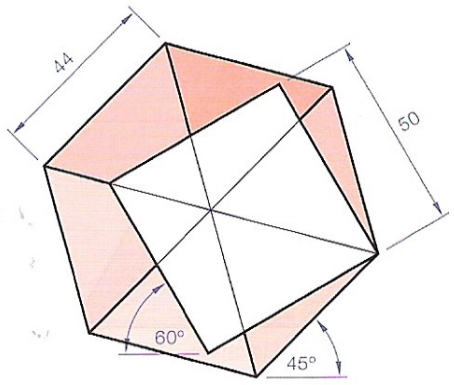


Fig. 10.13

(1) The construction is as before.

(2) Draw the front elevation and end elevation simultaneously as some of the bend points are easier to find in one than the other.

(3) An element is drawn through point b in plan. This element is found in the front elevation and point b is found.

(4) Another element is drawn through point d in plan. This element is found in the end elevation and point d is found, Fig. 10.14.

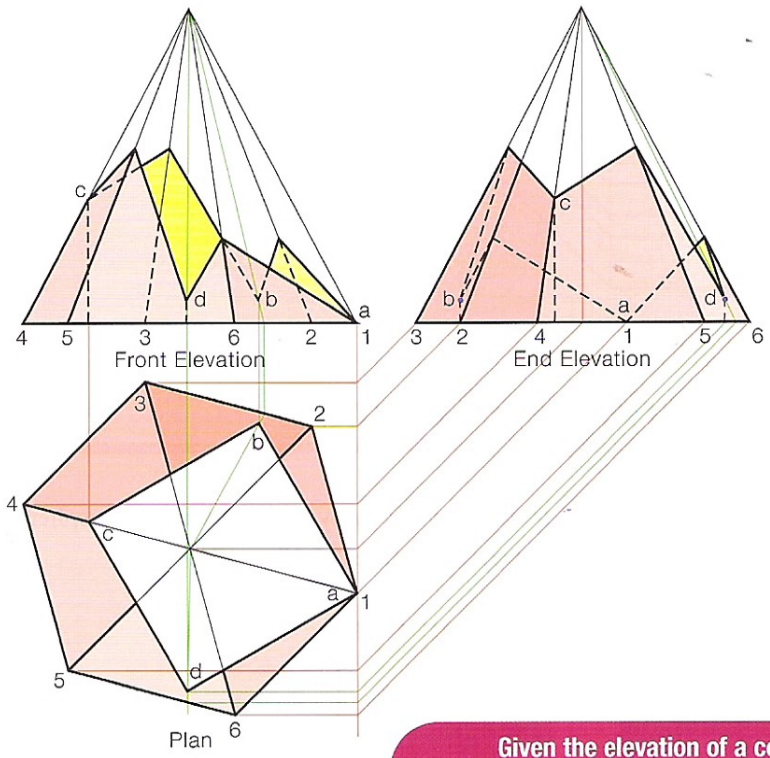


Fig. 10.14

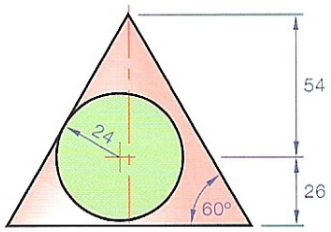


Fig. 10.15

Given the elevation of a cone and a cylinder intersecting each other. Draw the given view and project a plan and end view. The cylinder projects 10 mm beyond the base of the cone, Fig. 10.15.

When drawing in the elements on the cone in front elevation, it is advisable to space them equidistant each side of the centre line. This ensures there are less elements to project across to end view. Do not draw in too many generators as it can complicate the drawing. The method is clear from the drawing Fig. 10.16.

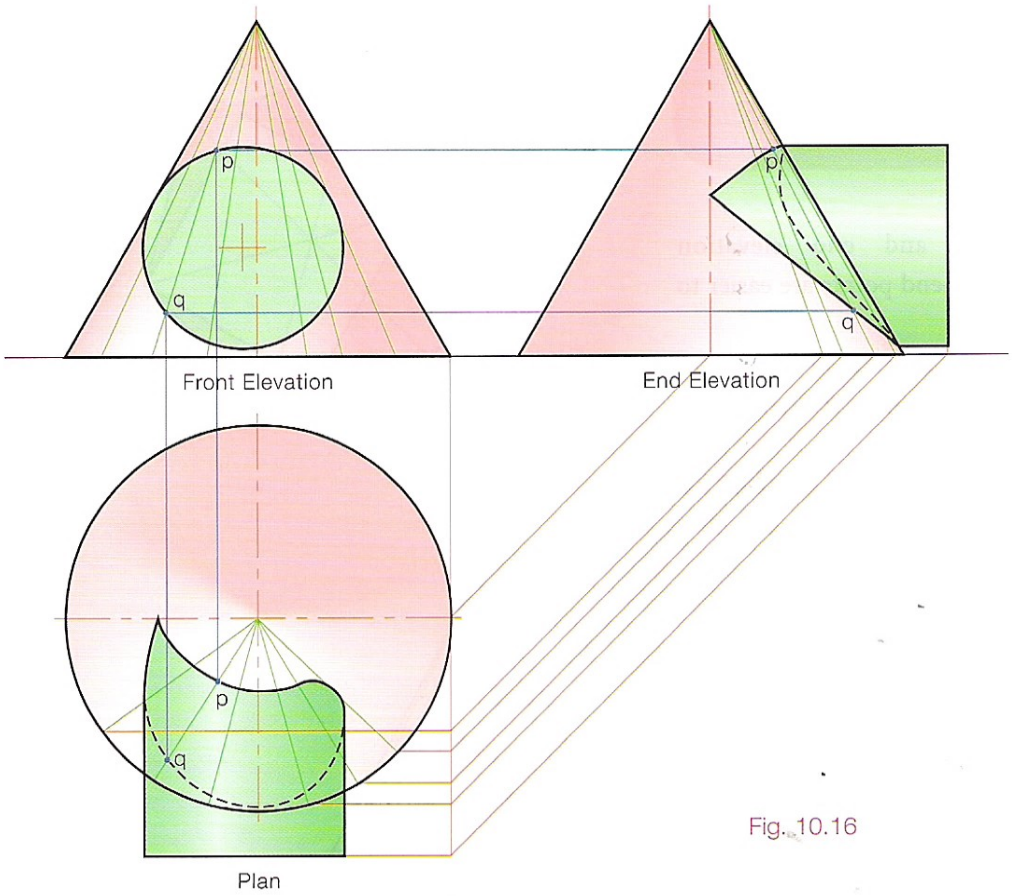


Fig. 10.16

Method Three: Horizontal Sections

The use of horizontal planes is a very useful method, particularly when dealing with spheres, cones and cylinders. The horizontal section of each of these solids produce circles, Figures 10.17 and 10.18.

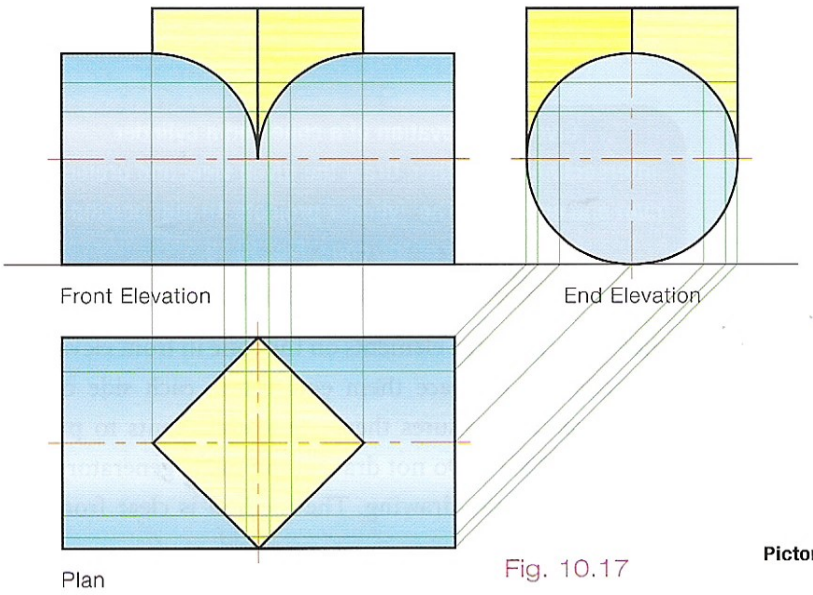
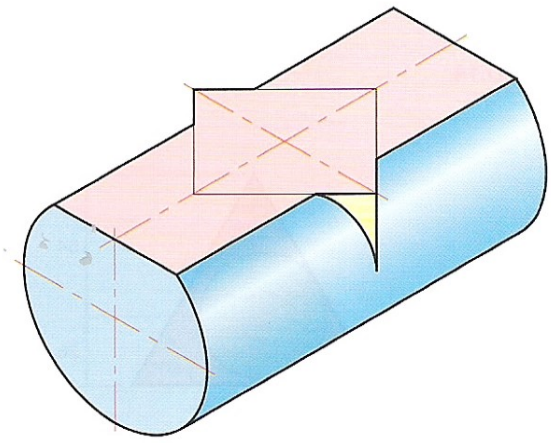


Fig. 10.17



Pictorial showing horizontal section

Fig. 10.18

To draw the plan and elevation of a cylinder piercing a sphere, showing clearly the line of intersection, Fig. 10.19.

(1) A horizontal section through these two solids will produce two intersecting circles. Draw the plan which is complete and draw the partial elevation.

(2) Take any horizontal section in elevation, e.g. at 1.

(3) The section of the sphere is a circle in plan which intersects the plan of the cylinder at points p and q.

(4) Project p and q onto the section line in elevation. Repeat for other sections.

(5) It is worth noting that if the section lines are taken too high or too low the circles produced will not intersect.

(6) The elevation is symmetrical about the horizontal axis, Fig. 10.20.

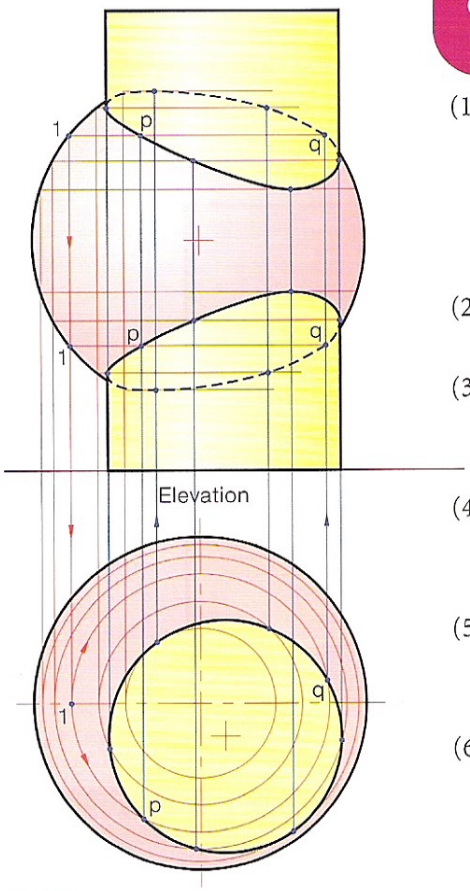


Fig. 10.20

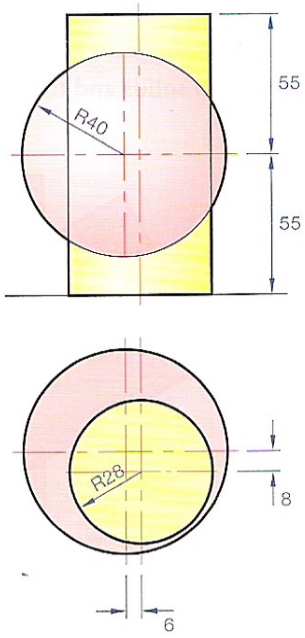


Fig. 10.19

Given the plan and elevation of a sphere and a cone which intersect each other. Draw the given views and find the line of interpenetration, Fig. 10.21.

(1) Draw the plan and elevation as given.

(2) It is advisable to space the horizontal sections at equal intervals each side of the sphere centre line.

(3) The intersections of the cone sections in plan with their corresponding sphere sections gives the points for the curve on the plan.

(4) Project these points of intersection to their corresponding horizontal sections to obtain the curve points on the front elevation, Fig. 10.22.

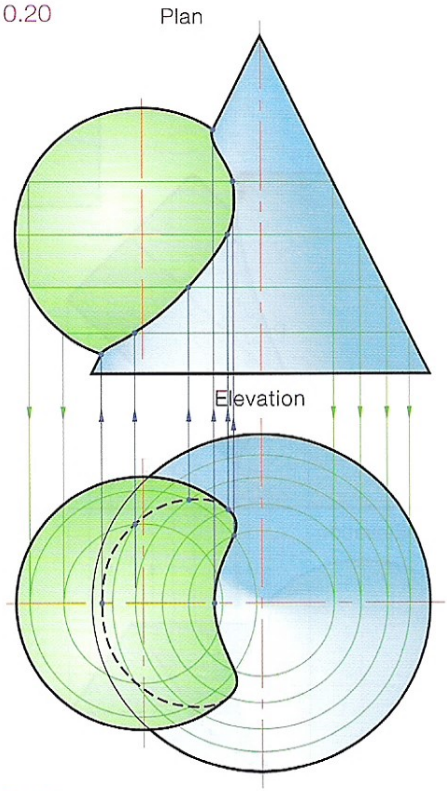


Fig. 10.22

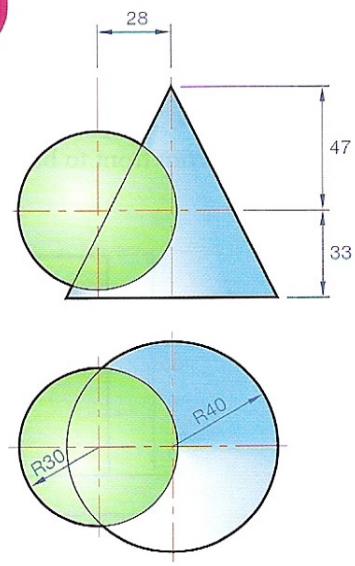


Fig. 10.21

Method 4: Vertical Sections

The method used here is exactly the same as that for horizontal sections. A series of vertical sections are taken at intervals through both solids and the line of intersection is built up, Figures 10.23 and 10.24.

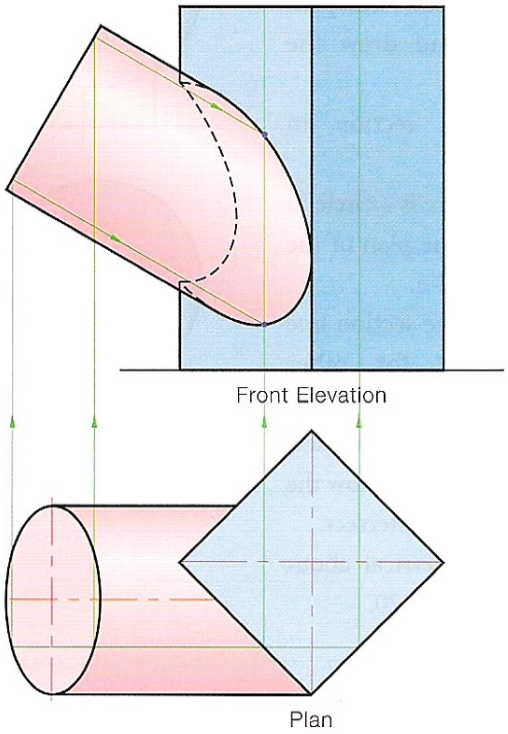
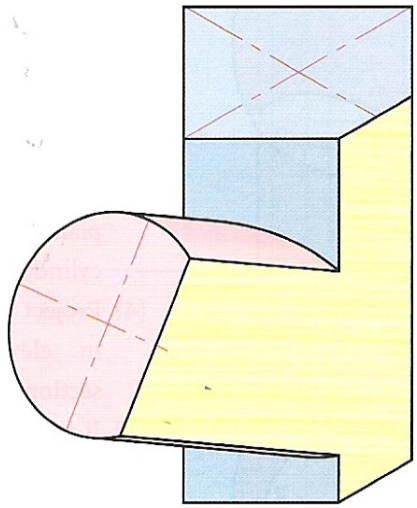


Fig. 10.23



Isometric showing vertical section

Fig. 10.24

Given the plan and incomplete elevation of a cylinder and a square prism intersecting. Draw the given views and find the line of interpenetration, Fig. 10.25.

(1) Set up the plan and elevation.
(2) Vertical sections will produce intersecting straight lines as shown in Fig. 10.26.

Ensure that one of the vertical sections taken is through the centre of the sphere. The points found using this section, points r and s, are the transition points for the line of intersection from front to back.

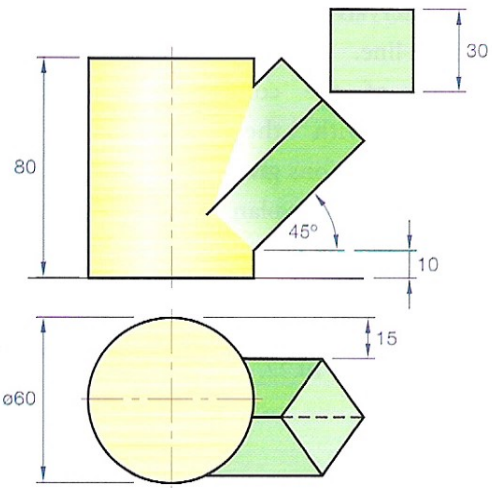


Fig. 10.25

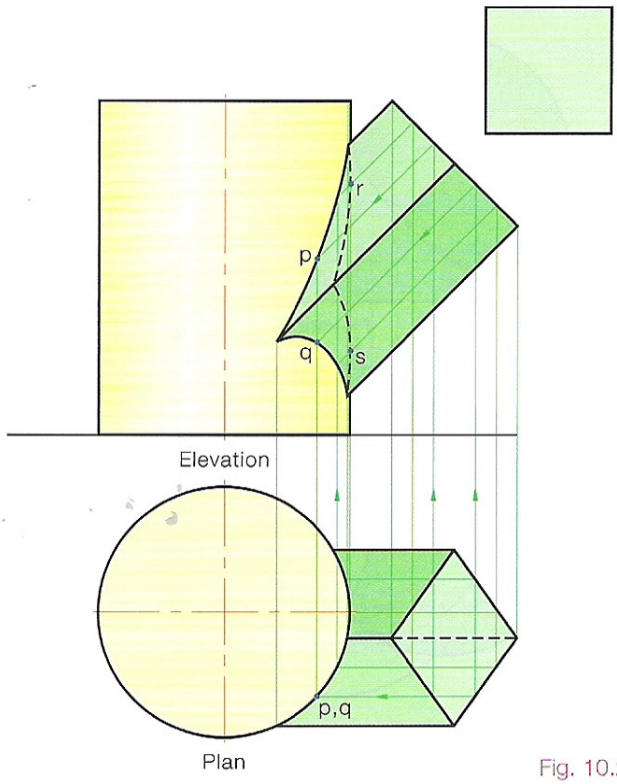


Fig. 10.26

Given the plan and incomplete elevation of a sphere intersecting a triangular prism. Draw the given plan and complete the elevation, Fig. 10.27.

(1) This problem could be solved by using horizontal or vertical cutting planes.

(2) It is advisable to take the cutting planes equidistant each side of the sphere centre line as this will reduce the number of sectional circles needed in elevation.

(3) One of these sectional circles forms part of the interpenetration line to the back of the two solids, Fig. 10.28.

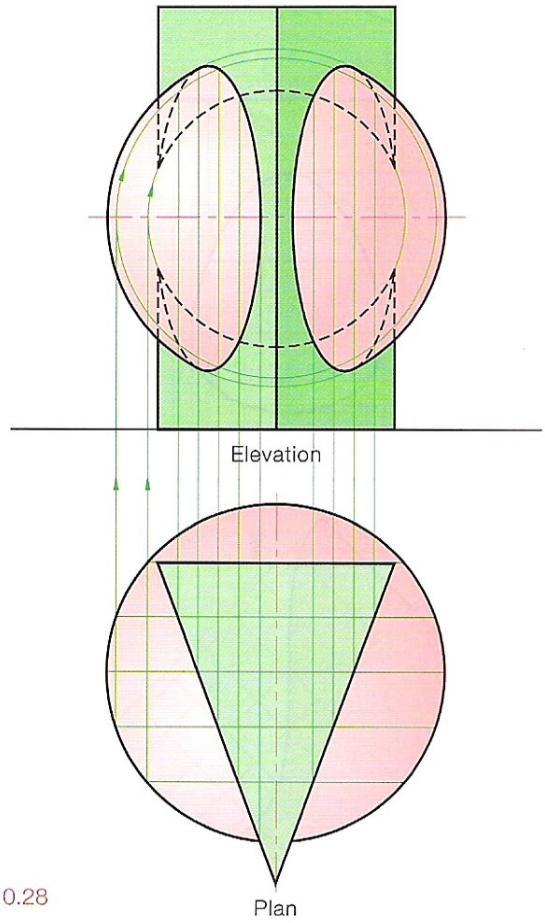


Fig. 10.28

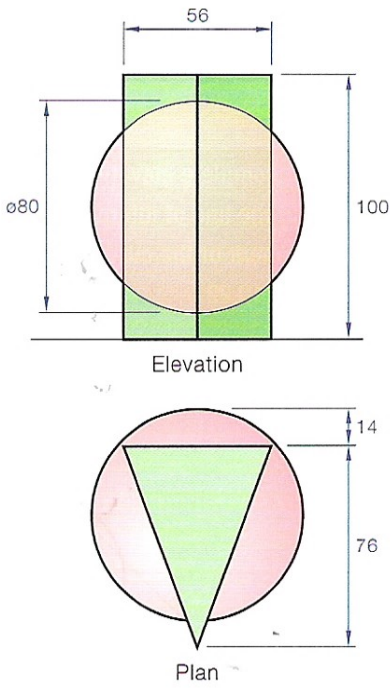


Fig. 10.27