

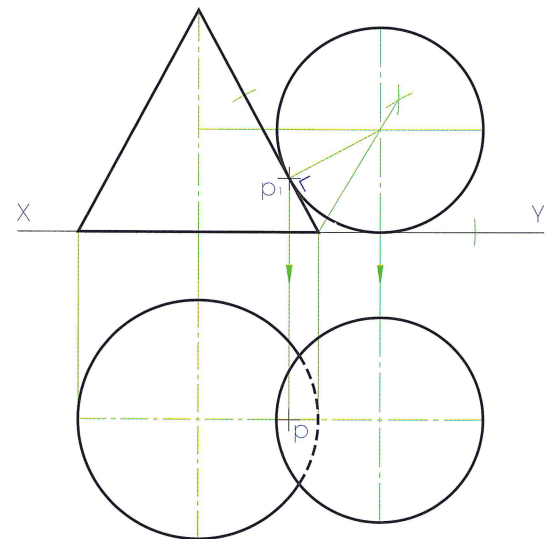
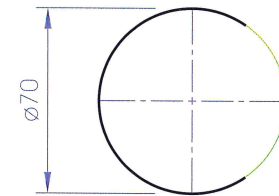
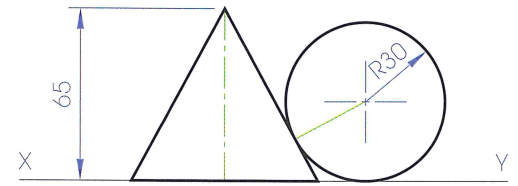
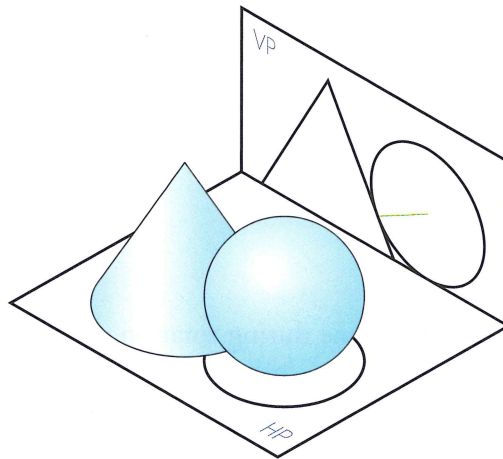
The Cone and Sphere in Mutual Contact

Example

The elevation and incomplete plan of a **cone** and **sphere** in mutual contact are shown across.

- Draw the elevation and complete the plan.
- Show the point of contact in both views.

- The plan of the cone can be drawn lightly and its elevation projected in the normal manner.
- The sphere has a radius of 30 mm and is resting on the HP. As a result its centre will lie on a horizontal line 30 mm from the XY line in elevation.
- The sphere will be tangential to an extreme element of the cone and the XY line in the elevation. Accordingly, its centre will also lie on the bisector of the angle shown. The point where these lines meet gives the location of the centre of the sphere, allowing the sphere to be drawn in elevation.

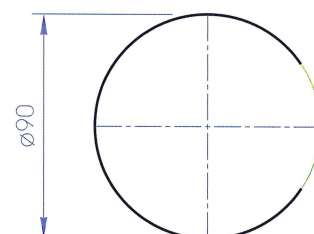
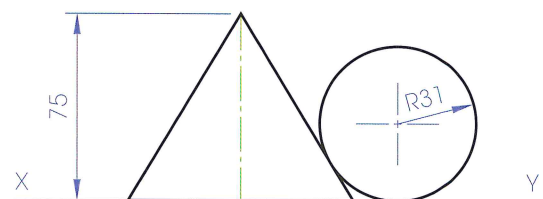


- The centre of the sphere can then be projected to lie on the extended diameter parallel to the XY line in plan as shown over. The plan of both solids can then be completed.
- In elevation the point of contact between the solids (P) will lie on an extreme element of the cone and on the outline of the sphere. Therefore it can be located by constructing the normal shown. Point P can be located in plan by considering it as a point on the cone or sphere.

Exercise

The elevation and incomplete plan of a **cone** and **sphere** in mutual contact are shown over.

- Draw the complete elevation and plan of the solids.
- Locate the point of contact in both views.

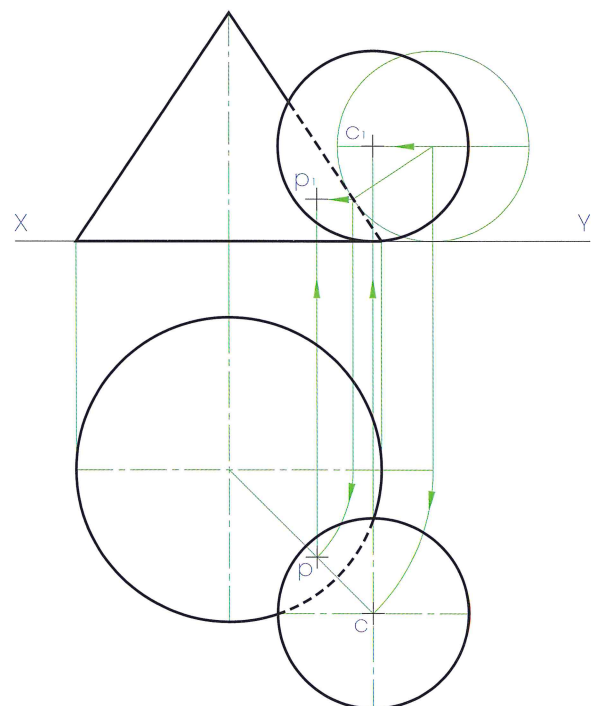
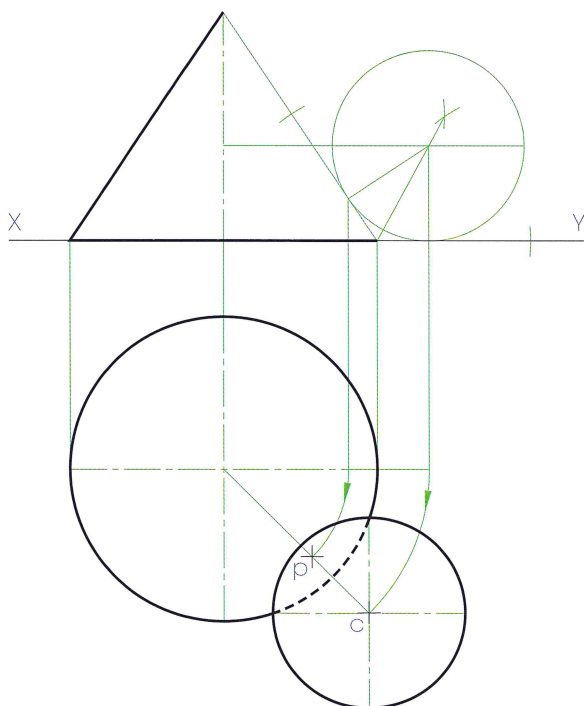
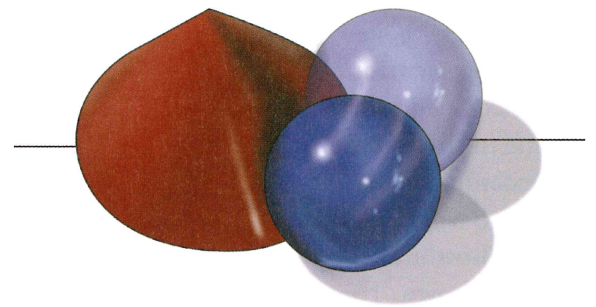
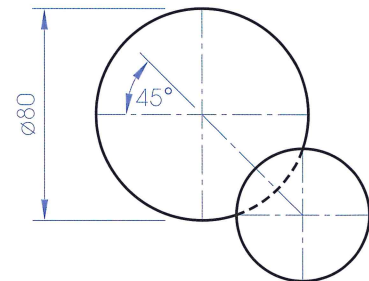
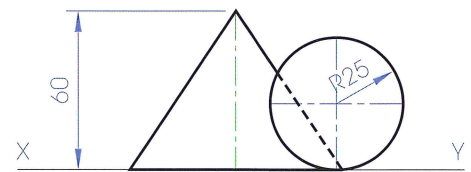


Example

The elevation and plan of a **cone** and **sphere** in mutual contact are shown across.

- Draw the given views.
- Locate the point of contact in both views.

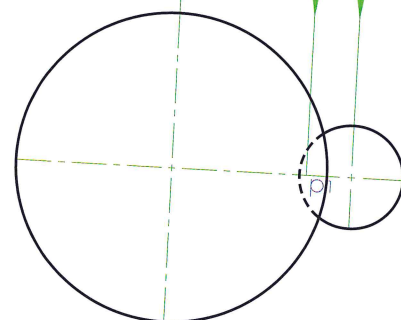
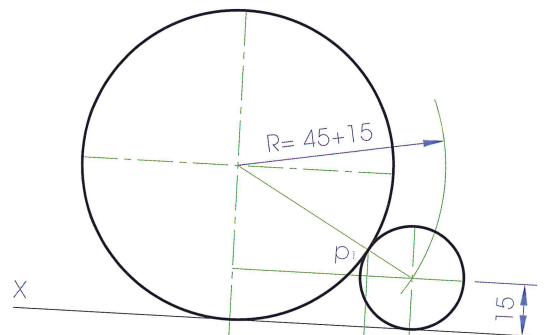
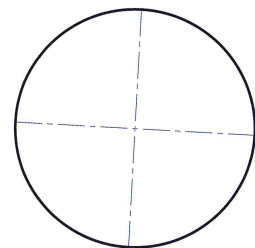
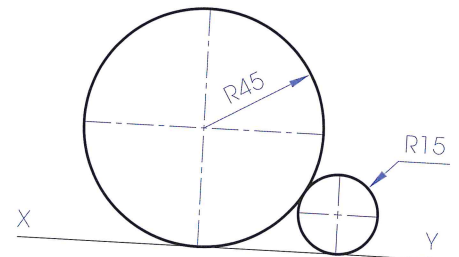
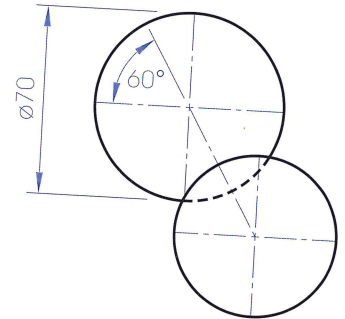
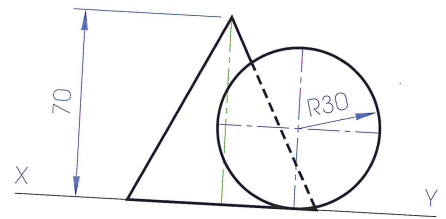
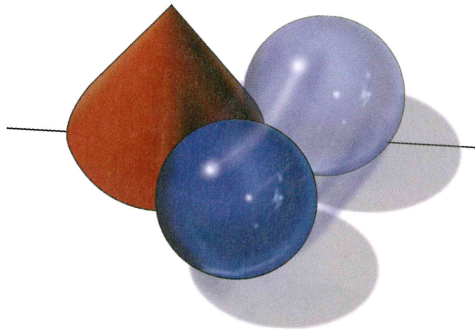
- First, the plan and elevation of the cone are drawn as shown below, left. Imagine that the required sphere has been rotated about the axis of the cone until its centre lies on the diameter parallel to the XY line in plan as illustrated pictorially over.
- In this rotated position the elevation of the sphere will be tangential to an extreme element of the cone and the XY line. The elevation of the sphere can be drawn in this rotated position and the point of contact located as in the previous example. Subsequently the centre of the sphere and the point of contact can be projected to the plan as shown.
- Then imagine that the sphere is rotated about the axis of the cone back into the original position. In plan the centre of the sphere and the point of contact will rotate in circular arcs about the axis of the cone to lie on the inclined line. This allows the plan to be completed.
- The height of the centre of the sphere remains the same during rotation allowing it to be located in elevation as shown below, right.
- The elevation of the point of contact (P) can be located by treating it as a point on the curved surface of the cone. Then the solids are lined in as appropriate.



Exercise

The elevation and plan of a **cone** and **sphere** in mutual contact are shown over.

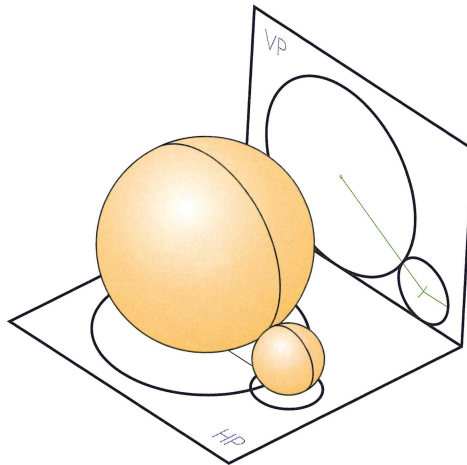
- Draw the elevation and plan of the solids.
- Locate the point of contact in both views.

**Example 1**

The elevation and incomplete plan of **two spheres** in mutual contact are shown over.

- Draw the complete elevation and plan of the solids.
- Locate the point of contact in both views.

- First draw the plan and elevation of the sphere of radius 45 mm as given.
- The elevation of the second sphere will be tangential to the XY line and the first circle in elevation. Therefore its centre will lie on a horizontal line 15 mm from the XY line in elevation.
- Its centre will also lie on an arc of radius 60 mm ($45 + 15$) drawn from the centre of the first circle. The resulting point of intersection is the centre for the second sphere in elevation, allowing it to be drawn, as shown over.
- The centre of the second sphere can be projected to lie on the extended diameter parallel to the XY line in plan allowing both solids to be lined in as appropriate.
- The point of contact between the two spheres (P) will lie on the line joining their centres. It can be located in elevation and projected to plan as shown.



The point of contact between two spheres lies on the line joining their centres.