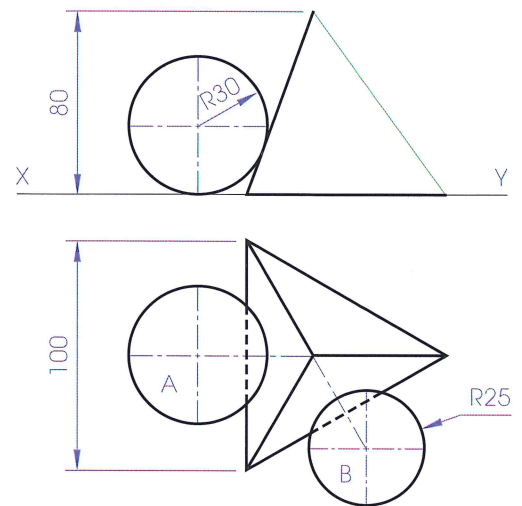


The point of contact between a plane and a sphere can be located in a view showing the plane as an edge.

Example

The incomplete elevation and plan of an **equilateral triangular pyramid** and **two spheres, A and B**, are shown across. Each sphere is in contact with the HP and a sloping surface of the pyramid.

- Draw the complete plan and elevation of the solids.
- Show the position of the points of contact between the pyramid and the spheres in both views.



- The plan and elevation of the pyramid are drawn lightly.

- The centre of sphere A can be located in elevation by drawing a horizontal line 30 mm from the XY line and bisecting the angle as shown across.

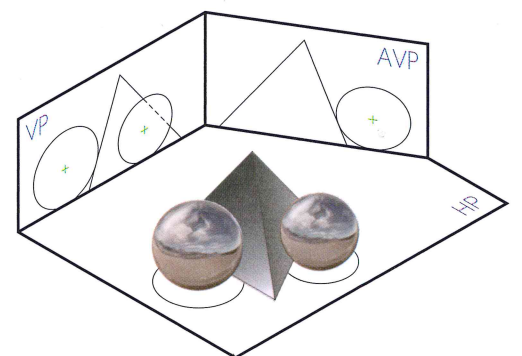
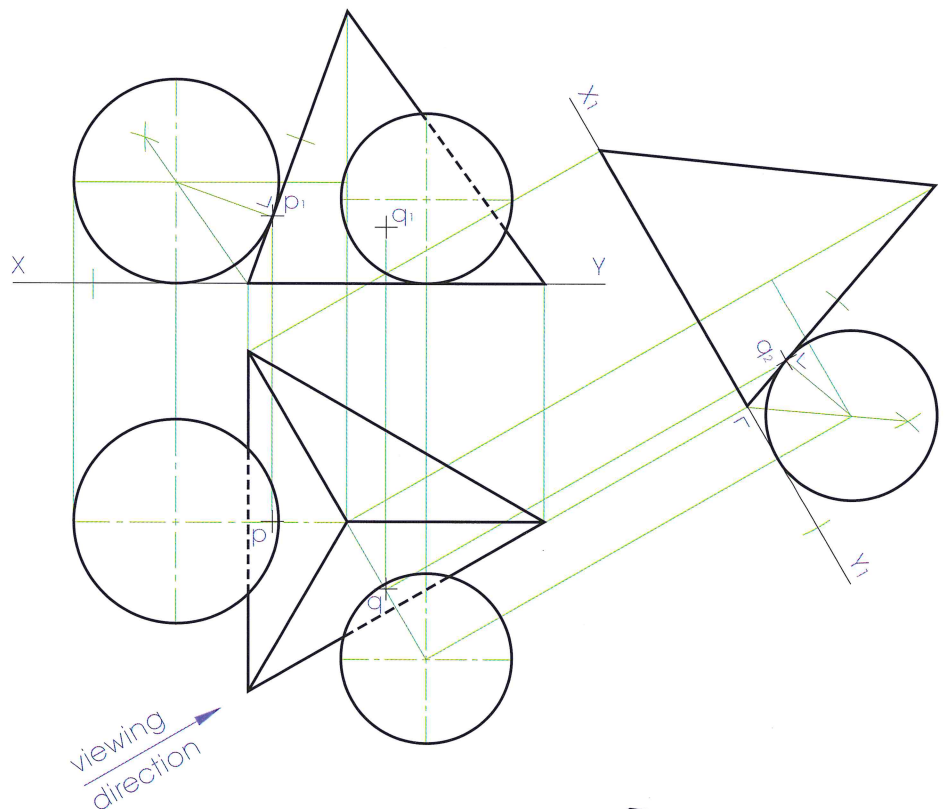
- The sphere can now be drawn in elevation and the point of contact located by constructing the normal to the edge view of the sloping surface as shown. The sphere and point of contact **P** can then be projected to the plan.

- Sphere **B** can be located by constructing an auxiliary elevation in which the sloping surface it is in contact with appears as an edge. The required viewing direction is shown above and the X_1Y_1 line will be perpendicular to this viewing direction.

- The centre of sphere **B** can be located in this view by first drawing a line parallel to the X_1Y_1 line and 25 mm from it and then bisecting the angle as shown.

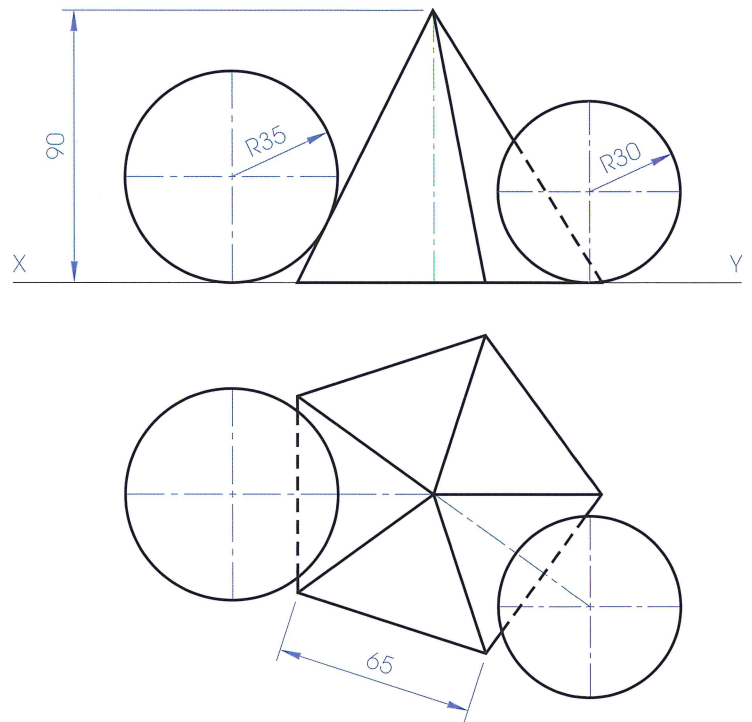
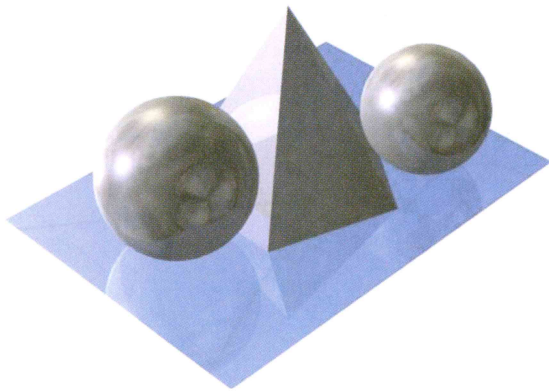
- The point of contact **Q** can be located in this view by constructing the normal to the edge view of the sloping surface. The sphere and point of contact can then be projected to the plan.

- The sphere and point of contact can be located in elevation by transferring the appropriate heights from the auxiliary elevation allowing the drawing to be completed.

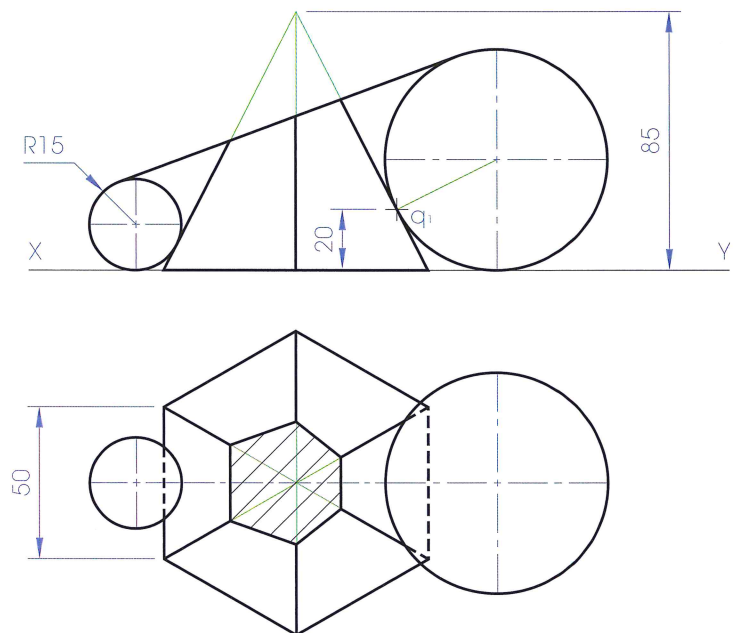
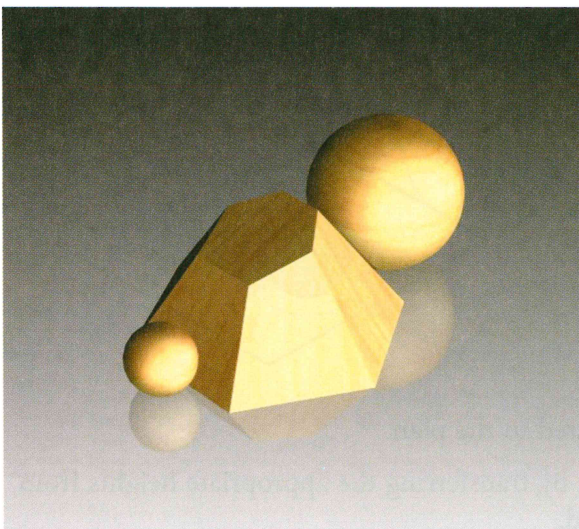


Exercises

1. The elevation and plan of a **regular pentagonal pyramid** and **two spheres** are shown over. Each sphere is in contact with the HP and a sloping surface of the pyramid.
 - (a) Draw the plan and elevation of the solids.
 - (b) Show the position of the points of contact between the spheres and the pyramid in both views.



2. The elevation and plan of **two spheres** in contact with a **truncated regular hexagonal pyramid** are shown below. The pyramid is cut by a plane tangential to the two spheres as shown.
 - (a) Draw the plan and elevation of the solids in contact.
 - (b) Project an end elevation of the solids.
 - (c) Locate the points of contact between the spheres and the pyramid in *all* views.

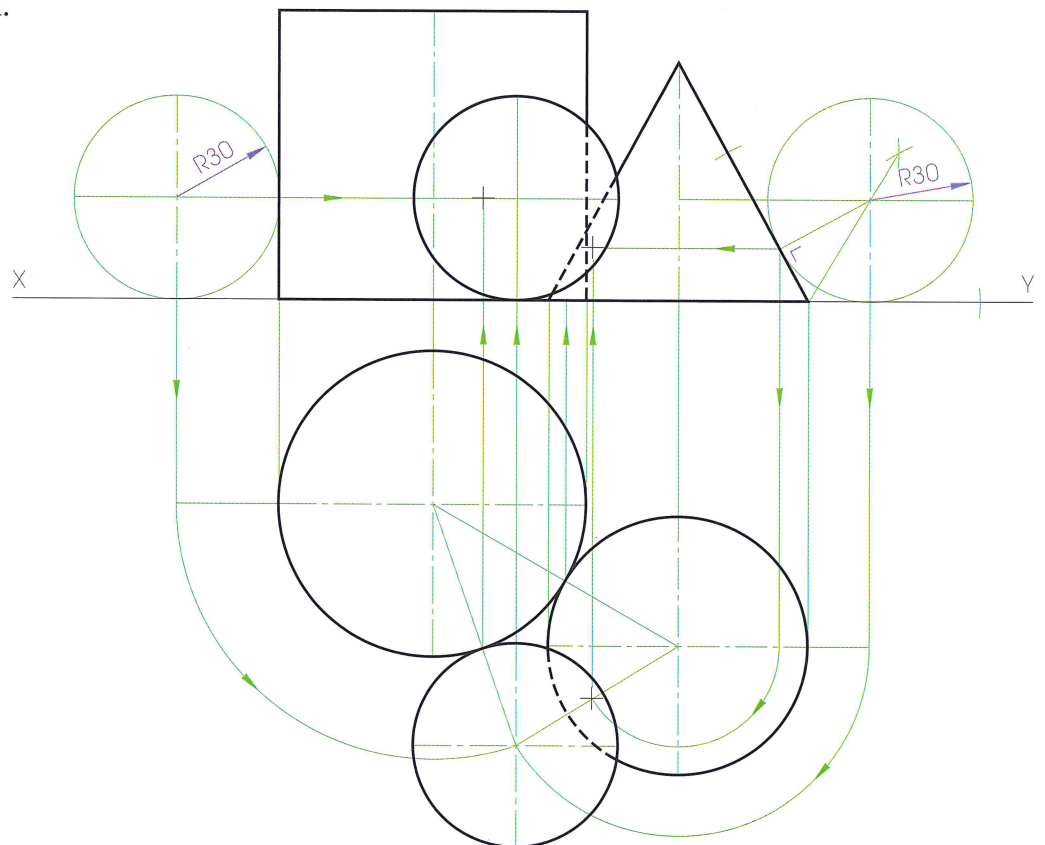
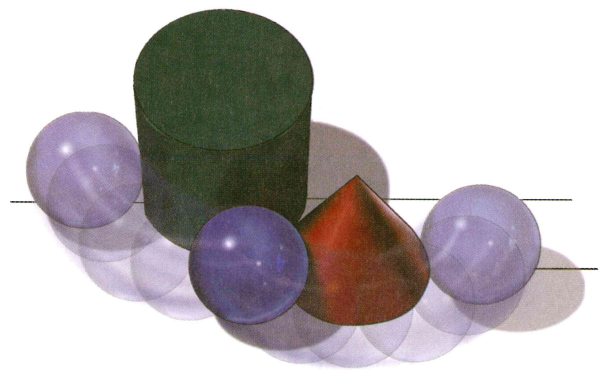
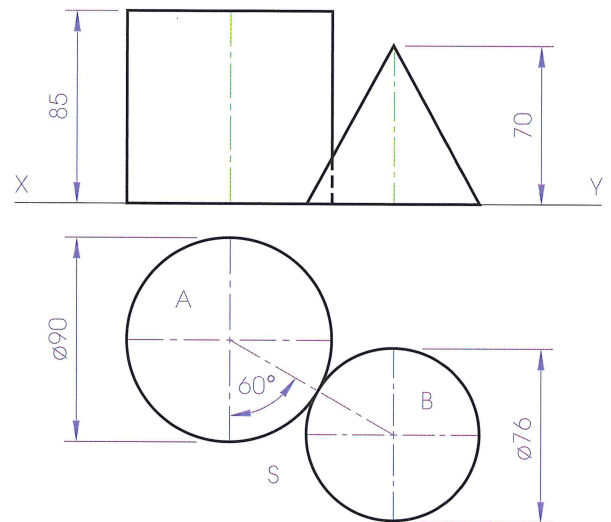


Example

The figure over shows the elevation and plan of a **cylinder A** in contact with a **cone B**.

- Draw the plan and elevation of the solids.
- A **sphere** of diameter 60 mm rests on the horizontal plane in position S so that it is in contact with cylinder **A** and cone **B**. Determine the plan and elevation of the sphere.
- Show all points of contact in plan and elevation.

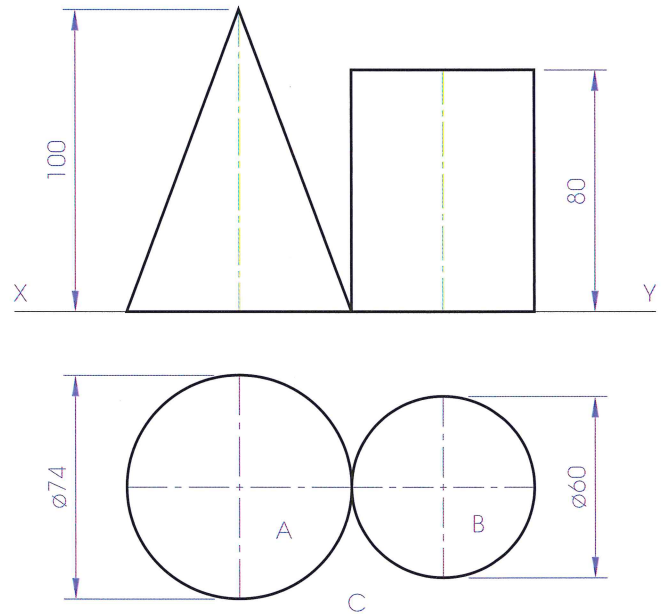
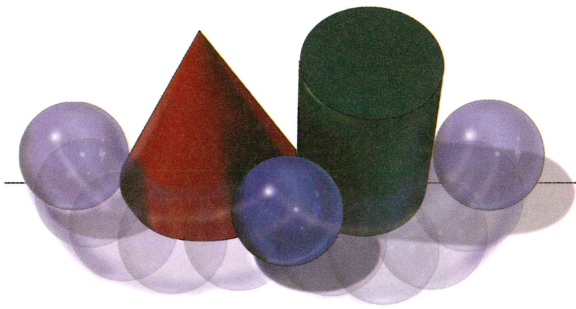
- The given plan and elevation are drawn in the normal manner.
- The required sphere can be located by drawing a sphere of radius 30 mm in contact with the extreme element of the cylinder in elevation as shown below. Project the centre of this sphere to the plan and rotate it about the axis of the cylinder.
- Then draw a sphere of radius 30 mm in contact with the extreme element of the cone in elevation as shown. Project the centre of this sphere to the plan and rotate it about the axis of the cone.
- The centre of the required sphere is the point where the centres of the rotating spheres intersect in plan. This allows the plan and elevation of the sphere to be drawn. This process is illustrated over.
- Locate the points of contact as in previous examples.



Exercises

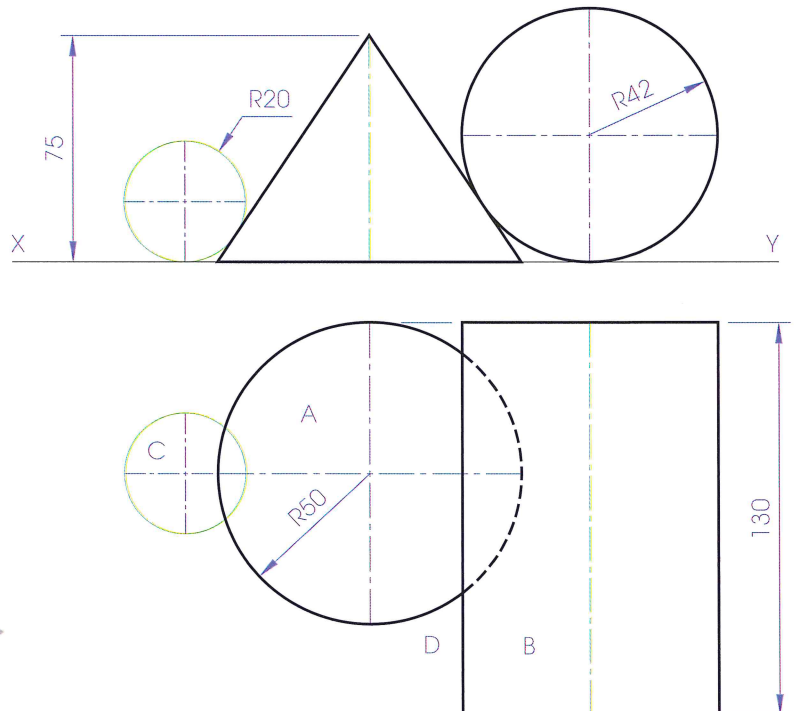
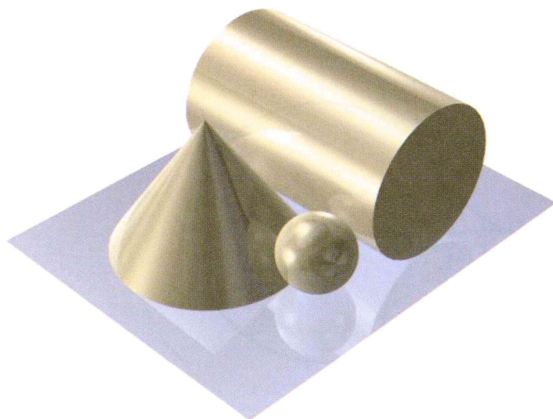
1. The elevation and plan of a **cone A** and a **cylinder B** are shown below. Both solids rest on the horizontal plane and are in contact.

- Draw the plan and elevation of the solids in the given position.
- A **sphere** of diameter 50 mm is to be placed on the horizontal plane in position **C** so that it is in contact with cone **A** and cylinder **B**. Draw the plan and elevation of this sphere.
- Show all points of contact in both views.

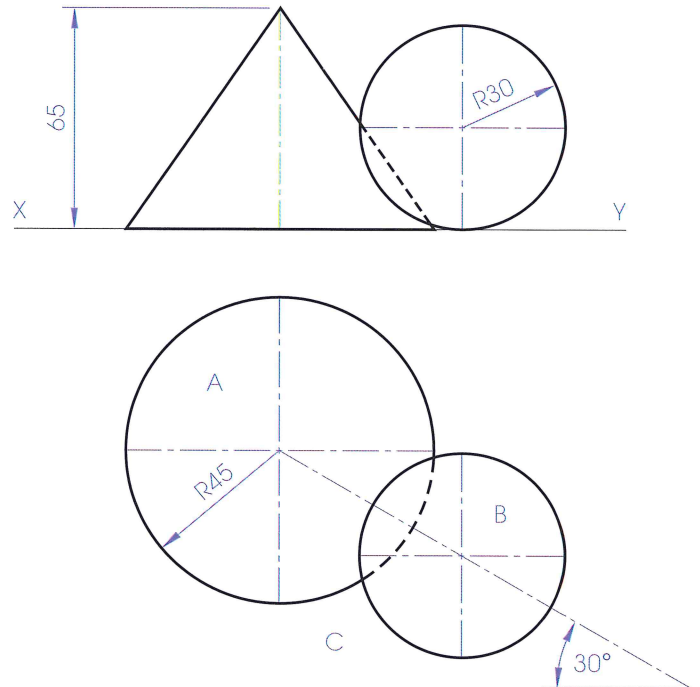
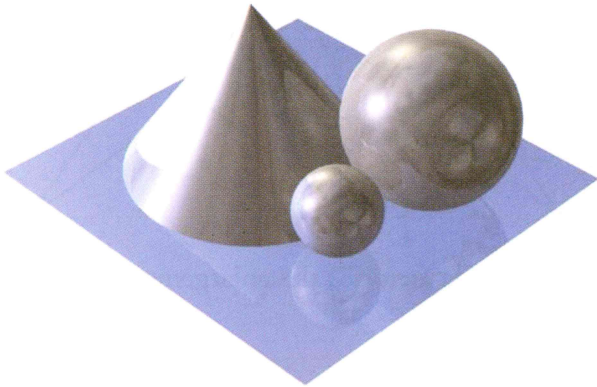


2. The figure below shows the elevation and plan of a **cone A** in contact with a **cylinder B**. Both solids rest on the horizontal plane.

- Draw the plan and elevation of the solids.
- Sphere C** (shown using construction lines) is to be rotated along the horizontal plane to position **D** so that it is in contact with cone **A** and cylinder **B**. Draw the elevation and plan of sphere **C** in this position.
- Show all points of contact in both views.



3. The elevation and plan of a **cone A** in contact with a **sphere B** are shown below. Both solids rest on the horizontal plane.
- Draw the plan and elevation of the solids in contact.
 - Another **sphere** of diameter 30 mm is placed on the horizontal plane in position C so that it is in contact with cone **A** and sphere **B**. Determine the projections of this sphere.
 - Locate all points of contact in both views.



4. The elevation and plan of a box for a **sliotar** of radius 35 mm are shown below. All surfaces of the box are *tangential* to the sliotar.
- Draw the given plan and elevation.
 - Draw an end elevation of the box and sliotar.
 - Locate the *nine* points of contact in all views.

