A photograph of three balls is shown. All three are in mutual contact and rest on the horizontal plane. The centres of the two larger ones lie in a line which is parallel to the vertical plane.

The drawing below shows the elevation of the two larger spheres A and B, which are in contact with each other.
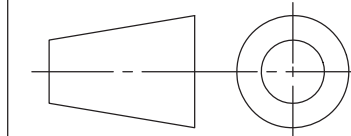
**(a)** Project a plan of the two spheres showing clearly how the projections of the point of contact between them is determined.

**(b)** Draw the projections of the third sphere of diameter 35mm which is in mutual contact with the first two and rests on the horizontal plane. Show all points of contact.

**A**

**B**

**X**
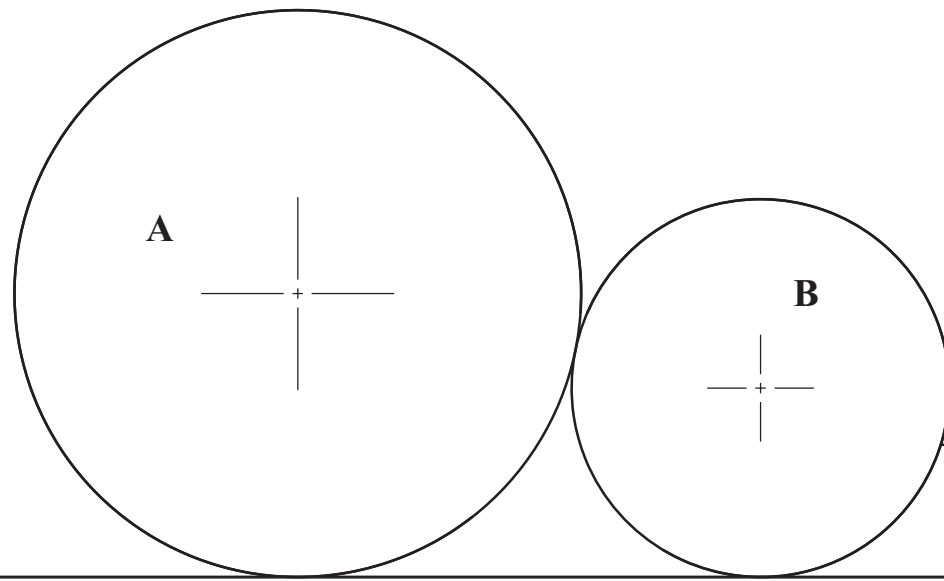
DESIGN & COMMUNICATION GRAPHICS

TITLE: **SOLIDS IN CONTACT 1**

DRAWN BY: YOUR NAME HERE

SIZE A3

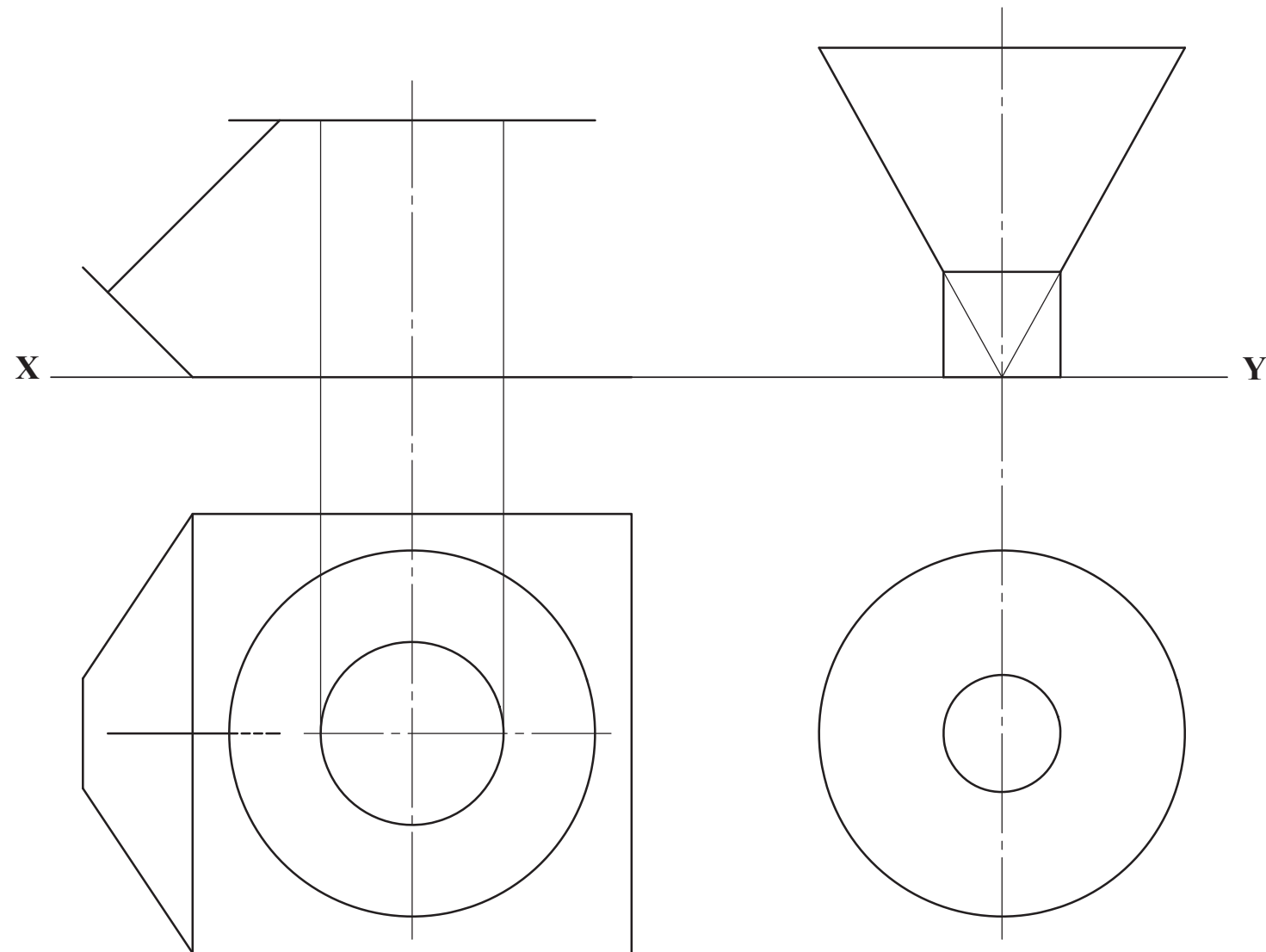UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN mm

SCALE: 1:1

DATE: 20/11/2009

SHEET 1 OF 1

A photograph of a Pot Pourri holder and stand is shown.
The shape of the holder is based on an inverted right cone.
The inverted cone fits into the circular hole in the holder.



The drawing below shows the projections of the holder and stand apart.
Complete the drawing by drawing the elevation and plan of the assembled unit.
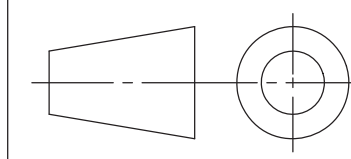


X ——————————————————————————————— Y

DESIGN & COMMUNICATION GRAPHICS

TITLE:  **SOLIDS IN CONTACT 2**

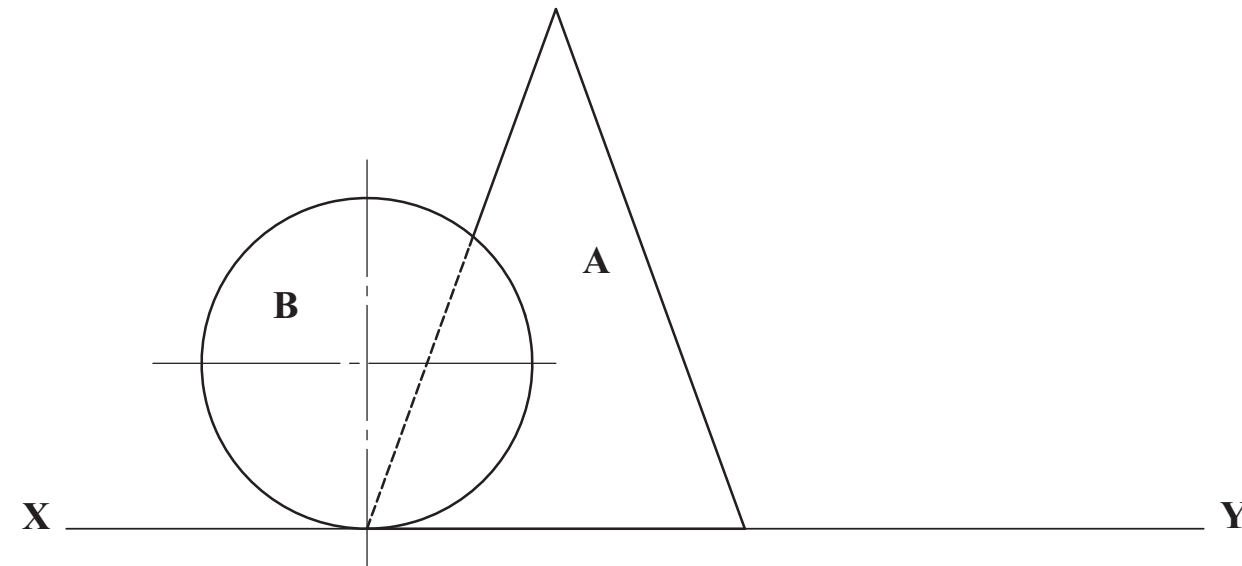| DRAWN BY: YOUR NAME HERE | SIZE A3 | UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN mm |
|---|---|---|
| SCALE:  1:1 | DATE:  20/11/2009 | SHEET 1 OF 1 |

A photograph of a football in contact with a traffic cone is shown across.

The drawing below shows the elevation of the traffic cone (based on a right cone A) and the football (based on a sphere B) in contact with each other.
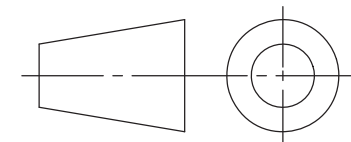
**(a)** Project a plan of the solids in contact.

**(b)** Show the projections of the point of contact between the solids.

B    A

X ———————————————————— Y

DESIGN & COMMUNICATION GRAPHICS

TITLE: **SOLIDS IN CONTACT 3**

DRAWN BY: YOUR NAME HERE

SIZE A3

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN mm
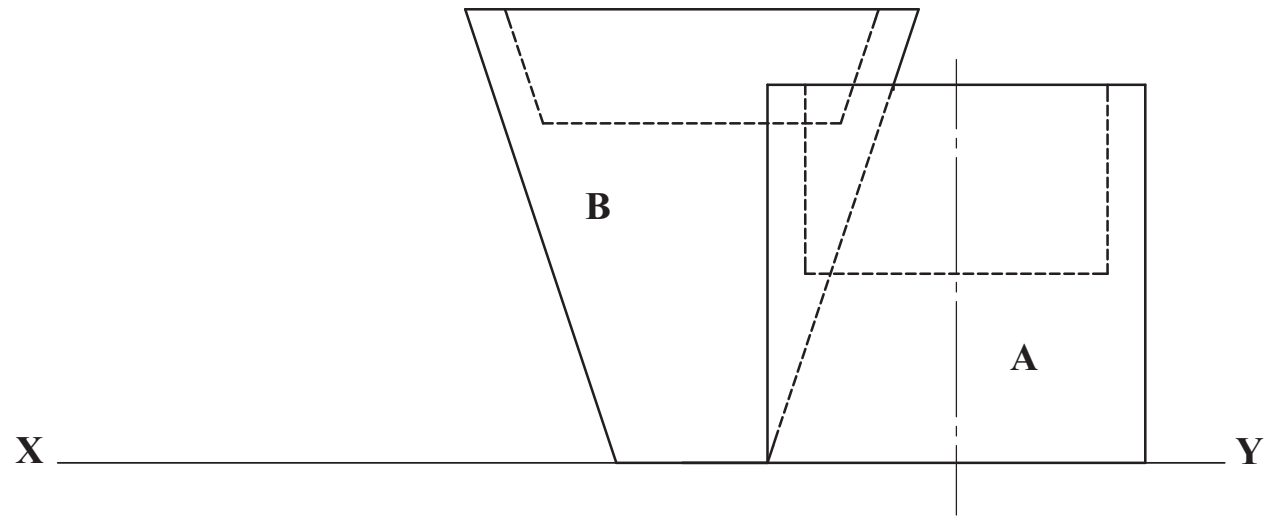
SCALE: 1:1     DATE: 20/11/2009     SHEET 1 OF 1

A photograph of two different shapes of candle is shown. The shapes are based on a right cylinder and an inverted right cone. Both candles are in mutual contact and rest on the horizontal plane.
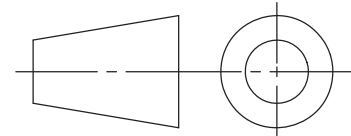
The drawing below shows the elevation of a right clinder A and a frustum of an inverted right cone B which are in contact with each other. Both solids have been shelled as indicated by the hidden detail in elevation.

Project a plan of the solids in contact.

B

A

X

Y

DESIGN & COMMUNICATION GRAPHICS

TITLE: **SOLIDS IN CONTACT 4**

DRAWN BY: YOUR NAME HERE

SIZE A3

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN mm

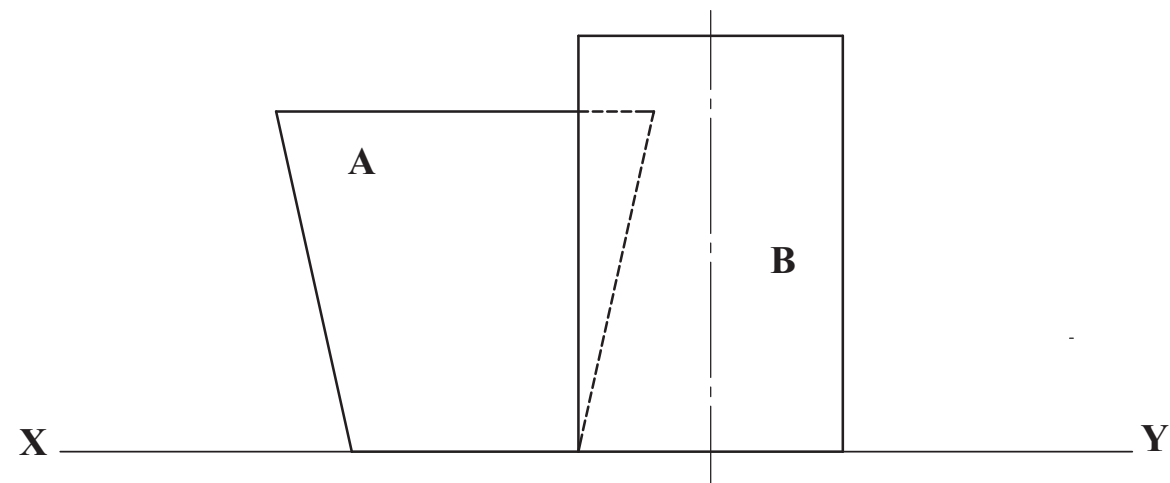SCALE: 1:1

DATE: 20/11/2009

SHEET 1 OF 1

A photograph of some of the contents of a child's **lunch box** shows a **Coke** can, a **Pot Noodles** pot and an **orange** which are in contact with each other.

The drawing below shows the elevation of the **Pot Noodles pot A** and the **Coke can B** which are in contact with each other.
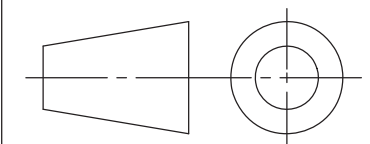
**(a)** Draw the elevation and plan of the frustrum of a cone A and the cylinder B.

**(b)** Draw the elevation and plan of the **orange** (a **sphere** of radius 15mm) in the position shown in the photograph.

A

B

X ——————————————— Y

DESIGN & COMMUNICATION GRAPHICS

TITLE: **SOLIDS IN CONTACT 5**

DRAWN BY: YOUR NAME HERE

SIZE A3

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN mm

SCALE: 1:1

DATE: 20/11/2009

SHEET 1 OF 1

A photograph of three different shapes of candle is shown. The shapes are based on a right cylinder, a frustum of a right cone and a sphere. The cylinder and frustum have been shelled as shown. All three are in mutual contact and rest on the horizontal plane.

The drawing below shows the elevation of a right clinder A and a frustum of a right cone B which are in contact with each other.

**(a)** Project a plan of the solids in contact.

**(b)** Draw the projections of a sphere C of radius 25mm which rests on the horizontal plane and touches the cylinder A and the cone B.
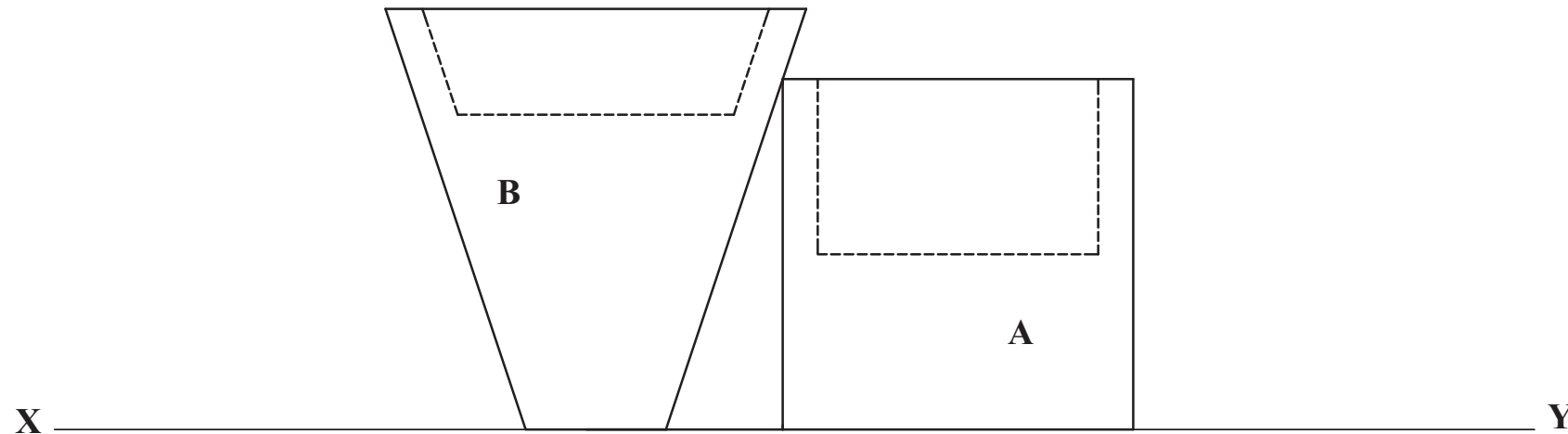
**Key Principles:**

**The cylinder and the inverted cone touch at a point.**

**All horizontal sections of an inverted cone are circles in plan.**

**The cylinder and sphere have a common normal at the point of contact.**
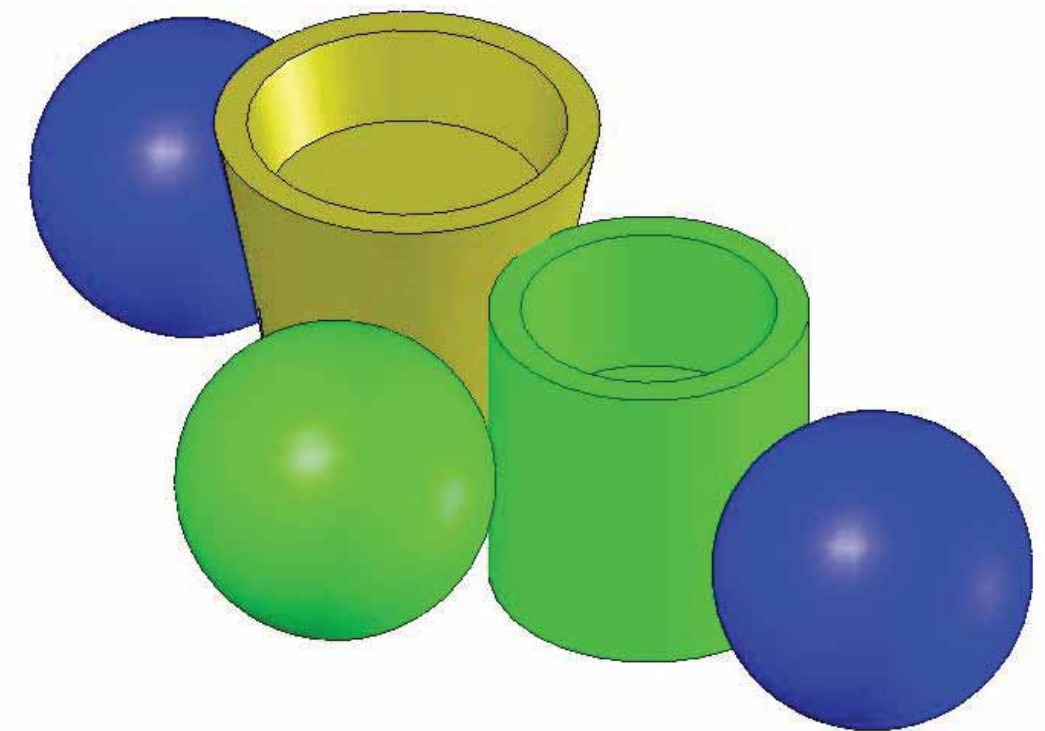
**The line joining the point of contact and the centre of the sphere is perpendicular to the element of the cylinder that contains the point of contact.**

**The cone and sphere have a commmon normal at the point of contact.**

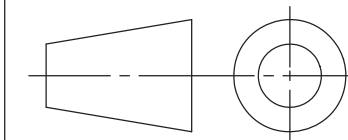**The sphere is tangential to the element containing the point of contact and the H.P.**

**The sphere and cone/cylinder in contact will have a common tangent plane.**

**Links with:** Sectional views, plane geometry, loci, conic sections, tangent planes.

B

A

X

Y



TECHNOLOGY
SUBJECTS
SUPPORT
SERVICE

DESIGN & COMMUNICATION GRAPHICS

TITLE:

**SOLIDS IN CONTACT 6**

DRAWN BY: YOUR NAME HERE

SIZE
A3

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN mm
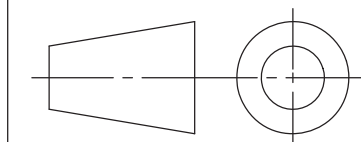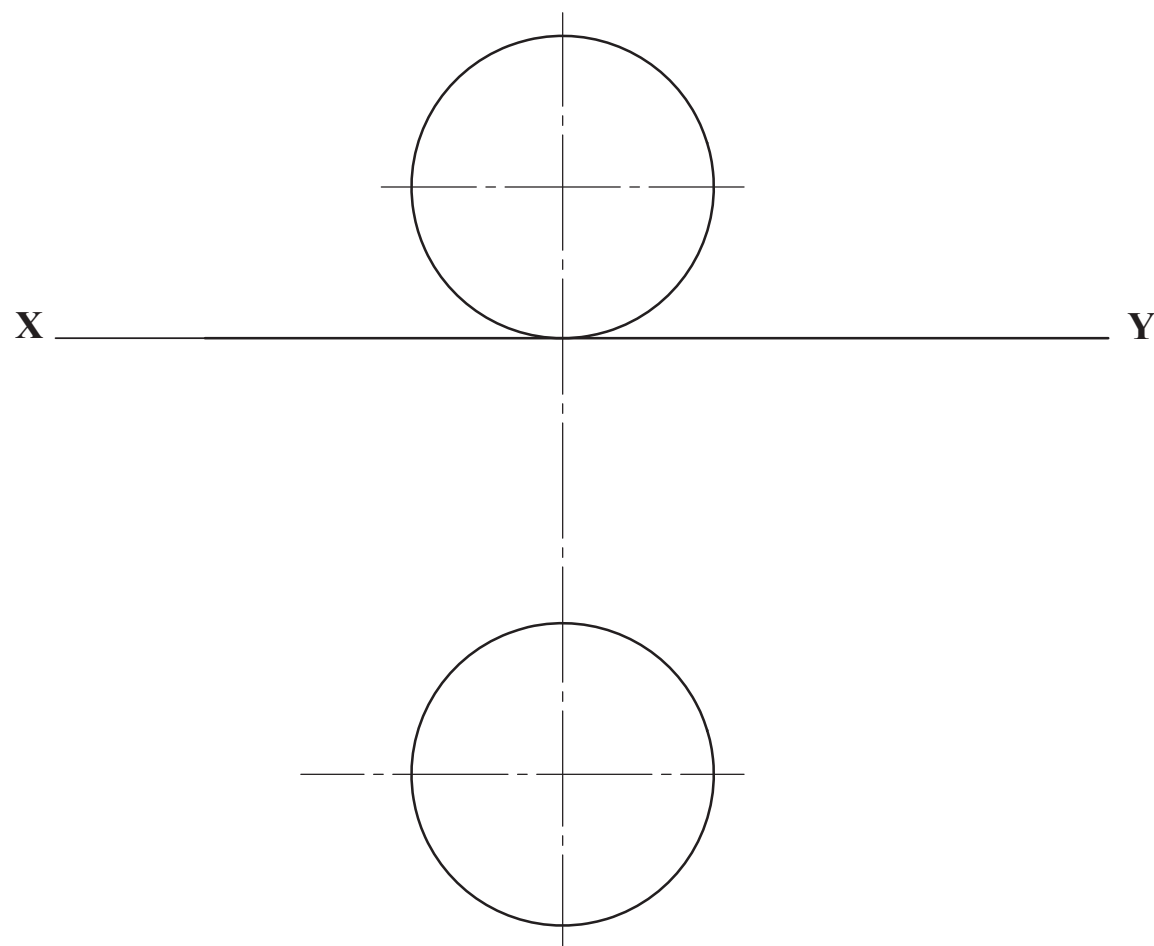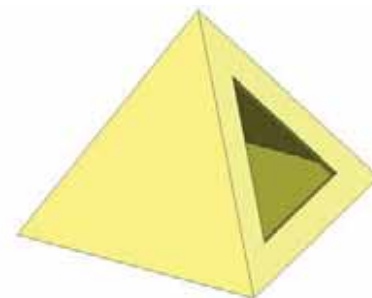
SCALE: 1:1

DATE: 20/11/2009

SHEET 1 OF 1

Terry's Chocolate Orange is to be presented in a new package. One of the designs being considered is based on a square pyramid, in which the faces of the box are to be inclined at 60 degrees to the base.

The drawing below shows the projections of a Terry's Chocolate Orange based on a sphere. The sphere is to be insccribed in a square pyramid. The faces of the pyramid are to be inclined at 60 degrees to the H.P. and the horizontal edge of the face containing the opening is to be inclined at 60 degrees to the V.P.

**(a)** Draw the projections of the pyramid in this position.

**(b)** Draw the traces of the plane which passes through the face containing the opening.

X ———————————————————— Y

DESIGN & COMMUNICATION GRAPHICS

TITLE:
**TANGENT PLANES 1**

DRAWN BY: YOUR NAME HERE

SIZE A3

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN mm

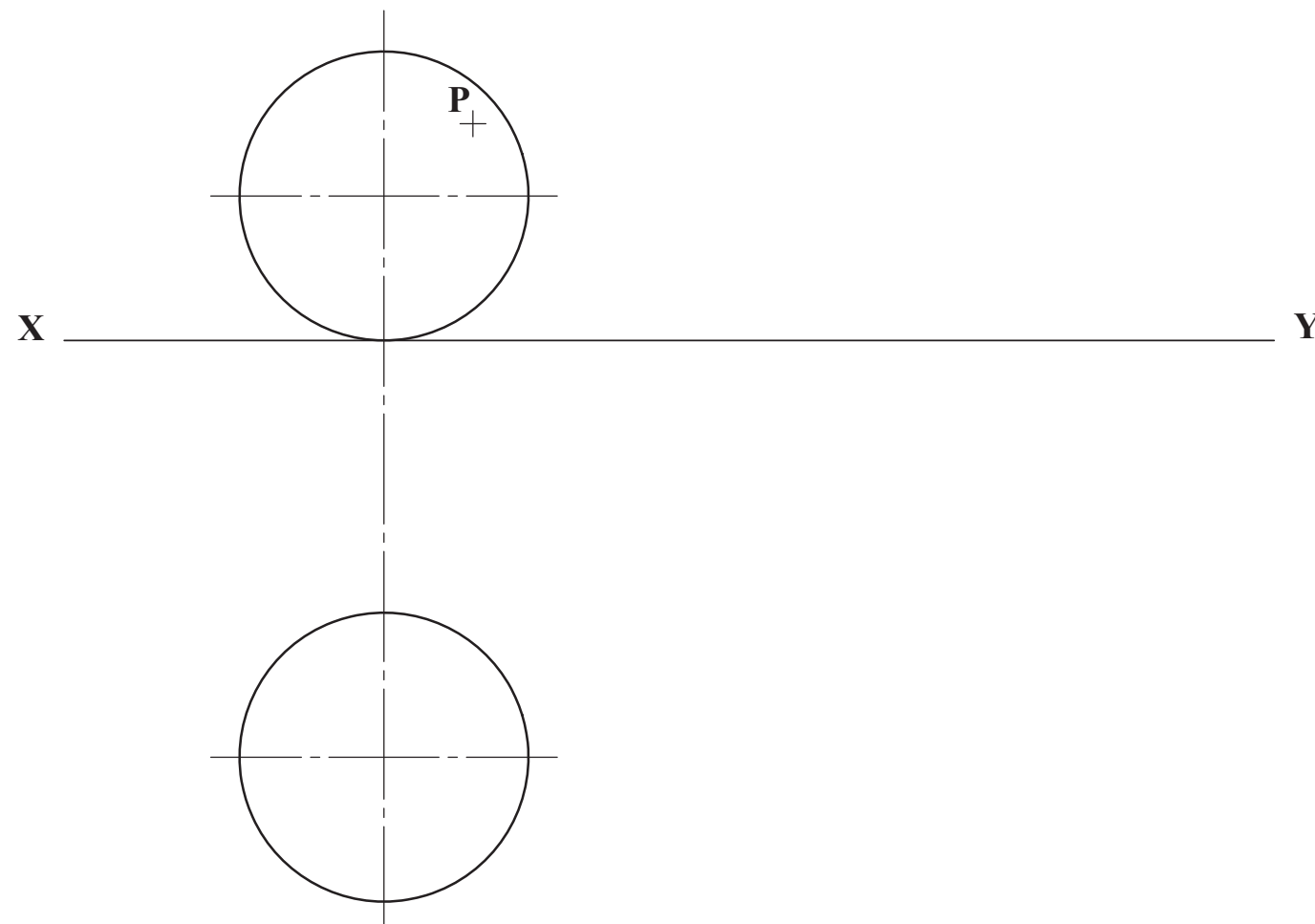SCALE: 1:1    DATE: 20/11/2009    SHEET 1 OF 1

Terry's Chocolate Orange is to be presented in a new package. One of the designs being considered is based on a square pyramid.

The drawing below shows the projections of a Terry's Chocolate Orange based on a sphere. The sphere is to be inscribed in a square pyramid. The face A of the pyramid are to be tangential to the sphere at the point P.
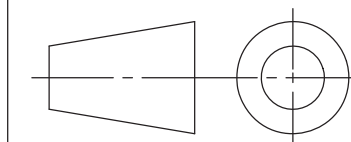
**(a)** Determine the traces of the plane which shall be tangential to the sphere at the point P. The point P is at the front of the sphere.

**(b)** Determine, and indicate in degrees, the inclination of this plane to the H.P.

P

X ——————————————————————————————— Y