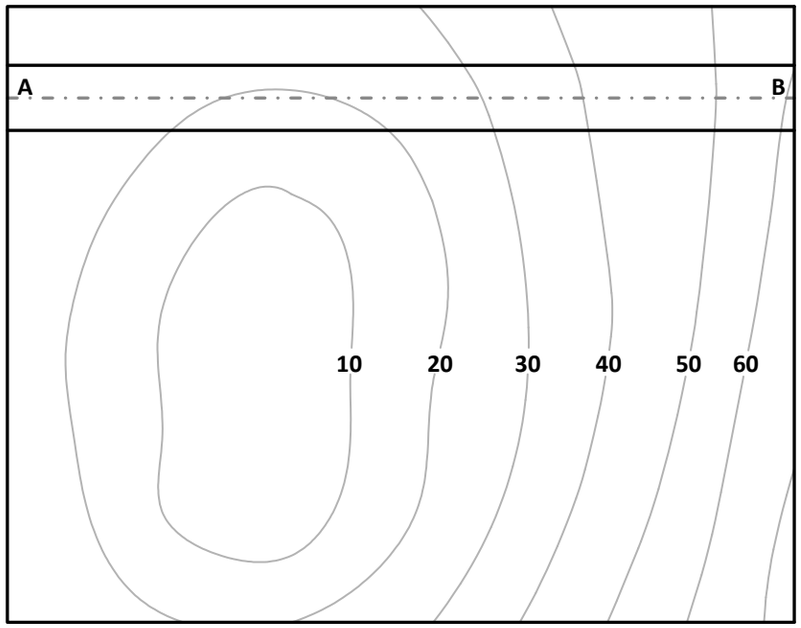
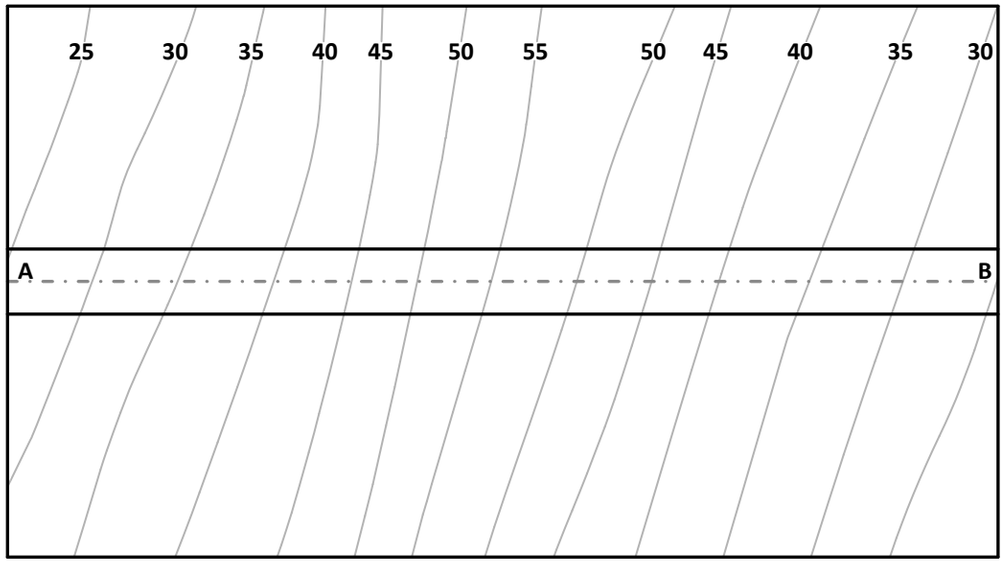
1) The map shows ground contours at 10m vertical intervals.
- **AB** is the centreline of a proposed roadway which is level at an altitude of 60m.
- Using side slopes of 1 in 1 for the embankment (fill ratio = 1:1), complete the earthworks, on the southern side of the road, necessary to accommodate the roadway. (Slide 24)

Scale 1:1000



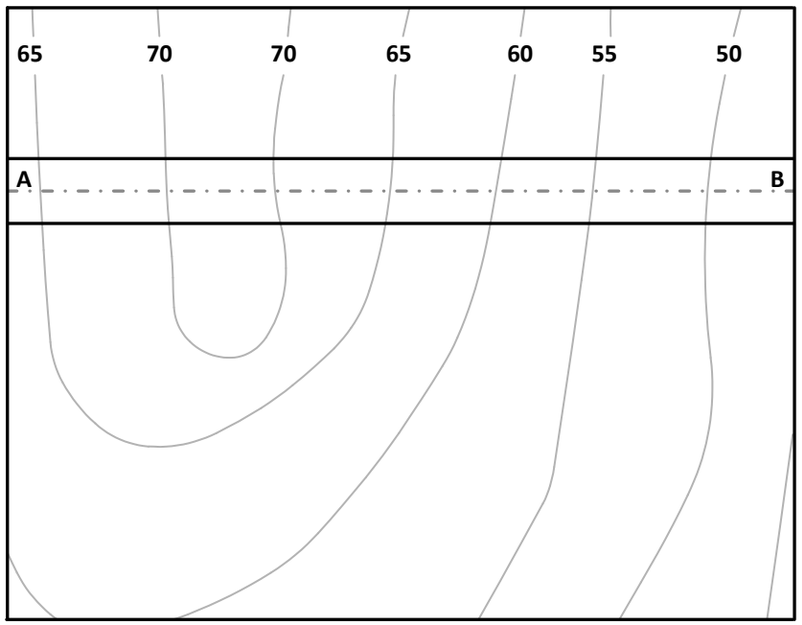
2) The map shows ground contours at 5m vertical intervals.
- **AB** is the centreline of a proposed roadway which is level at an altitude of 55m.
- Using side slopes of 1 in 1 for the embankments, complete the earthworks necessary to accommodate the roadway. (Slide 25)

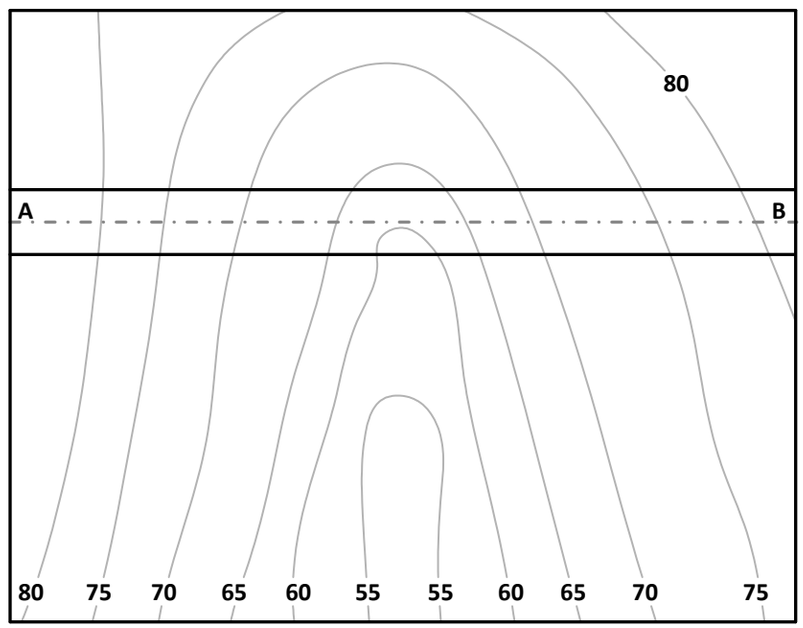
Scale 1:1000



3) The map shows ground contours at 5m vertical intervals.
- **AB** is the centreline of a proposed roadway which is level at an altitude of 75m.
- Using side slopes of 1 in 2 for the embankments, complete the earthworks necessary to accommodate the roadway. (Slide 26)

Scale 1:1000





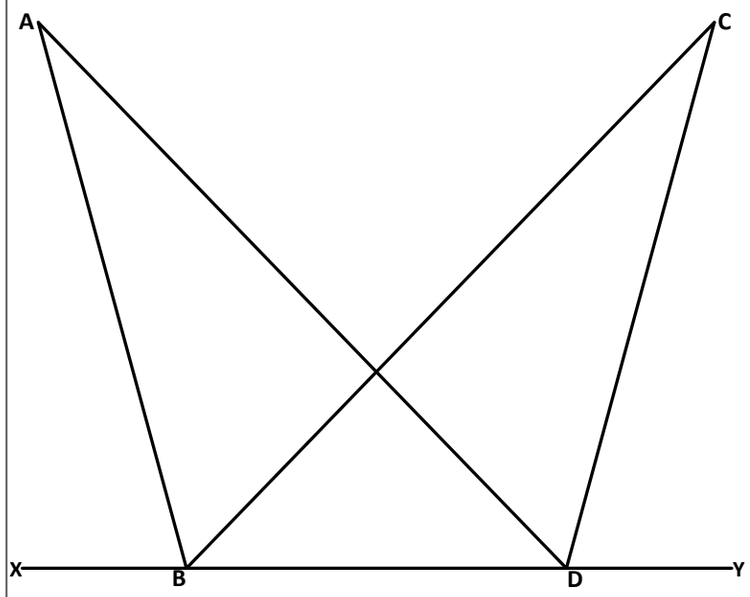
4) The map shows ground contours at 5m vertical intervals.
- **AB** is the centreline of a proposed roadway which is level at an altitude of 80m.
- Using side slopes of 1 in 1.5 for the embankments, complete the earthworks necessary to accommodate the roadway.
(Slide 27)

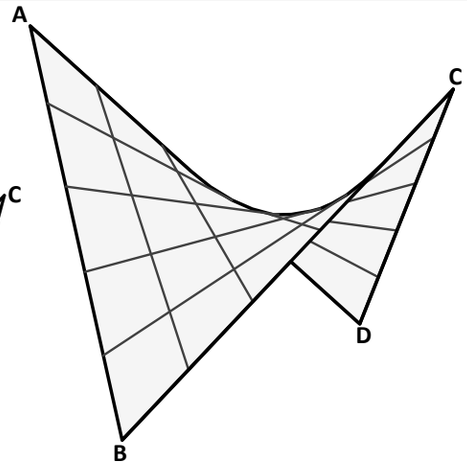
Scale 1:1000

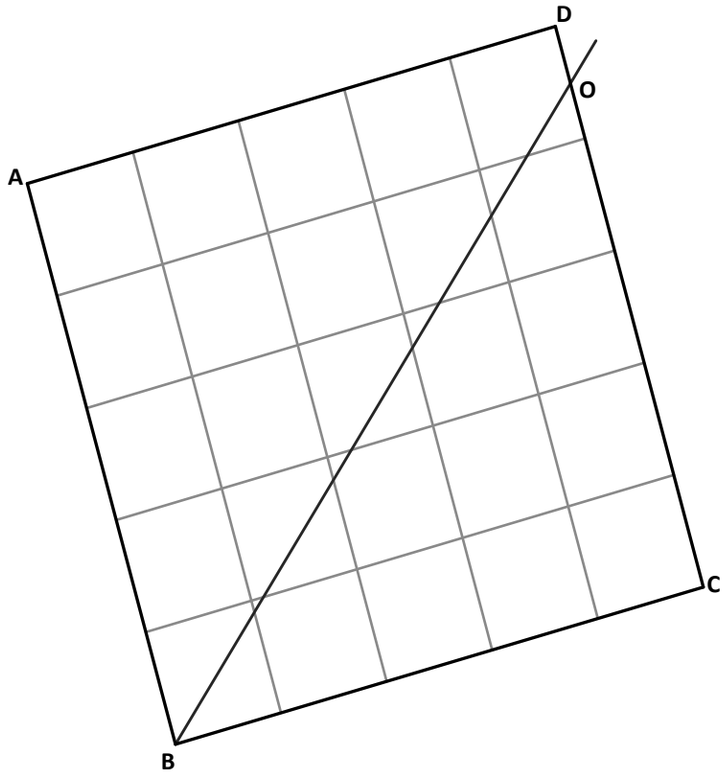
DCG Solutions Student Package
Applied Graphics
Sample Pages

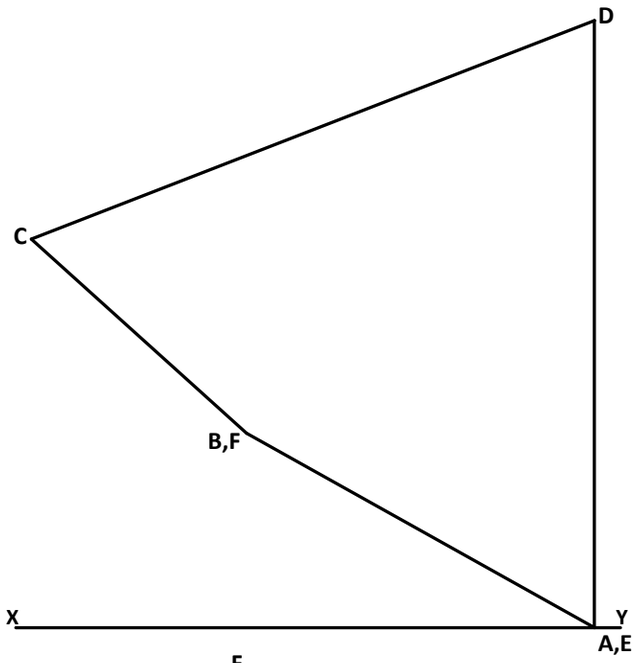
DCG Solutions		
Name		Geological Geometry 1 Sheet 6 Earthworks -Embankment
Date		

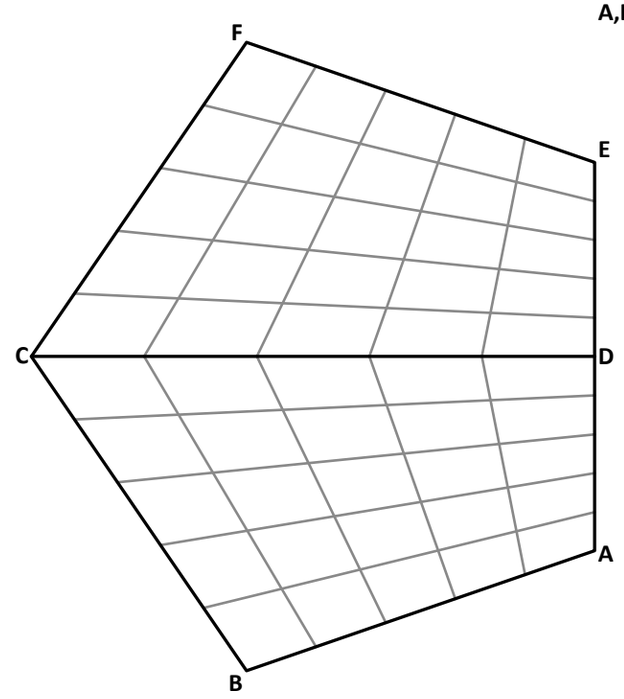
1) Shown is the outline plan and elevation of a hyperbolic paraboloid surface, **ABCD**. Straight line elements on the surface of the structure are given in plan.
- Complete the given elevation.
- Show the curvature of the hyperbolic paraboloid surface along the line **B**-**O**. (Slide 122)



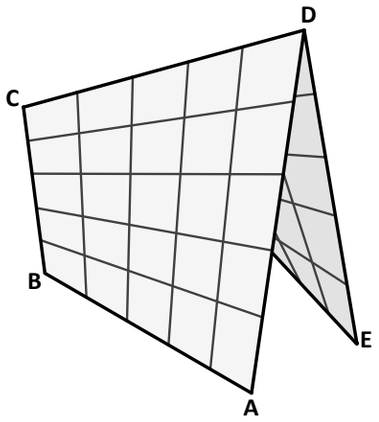








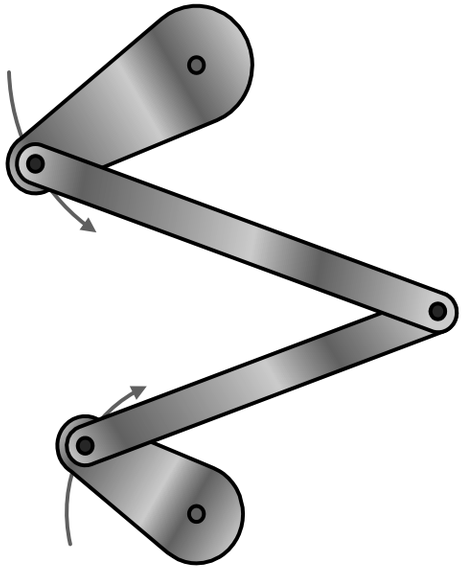
2) Shown is the outline plan and elevation of two adjoining hyperbolic paraboloid surface, **ABCD** & **CDEF**. A number of elements on the surface are given in plan.
- Complete the given elevation.
- Show the curvature of the hyperbolic paraboloid surface along a line joining **B**-**E**. (Slide 123)

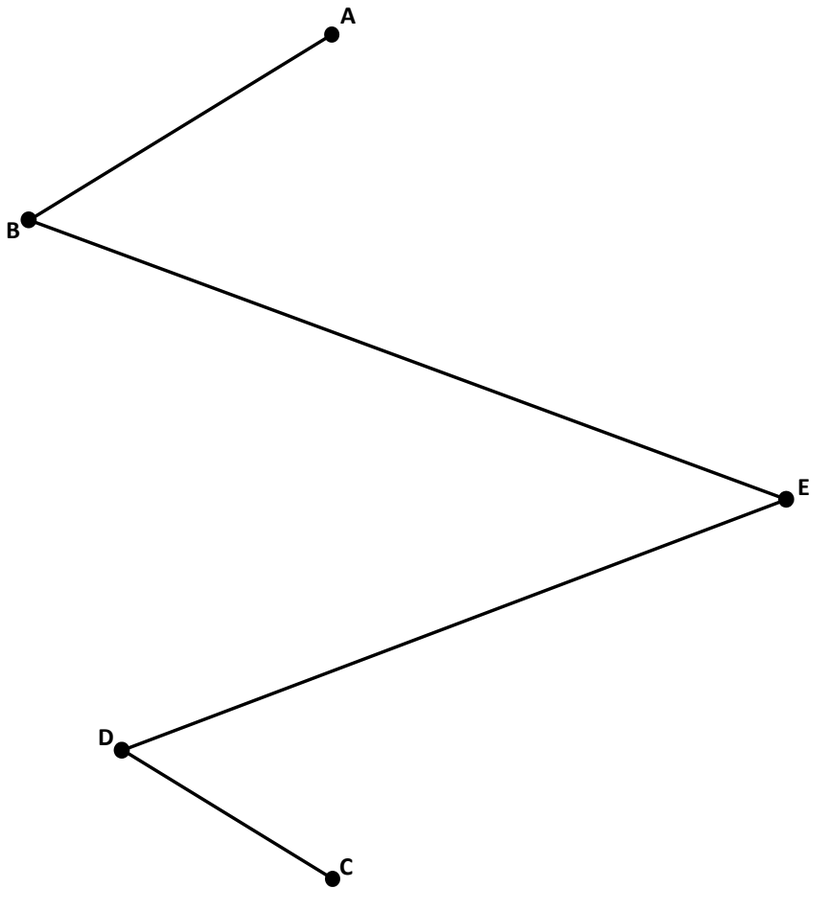


DCG Solutions Student Package
Applied Graphics
Sample Pages

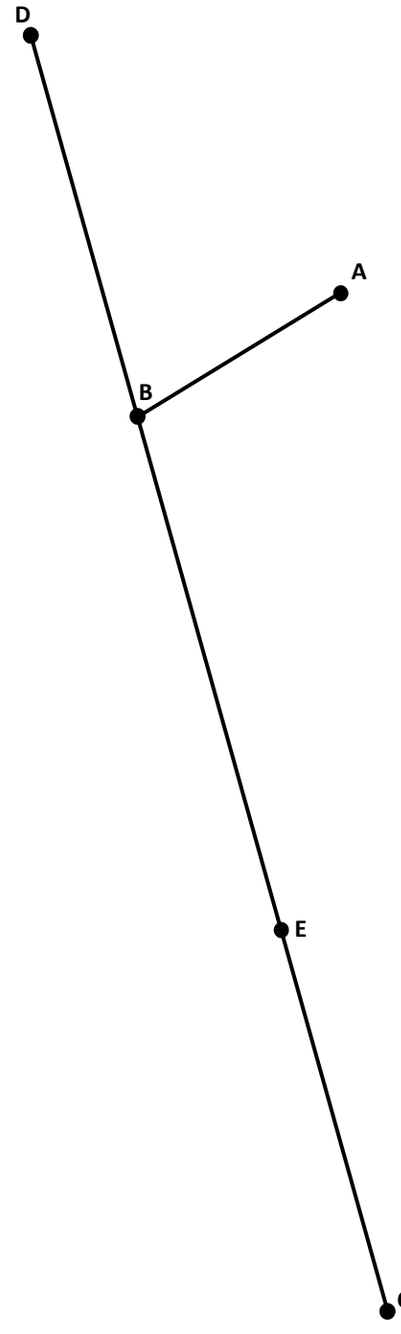
DCG Solutions		
Name		Structural Forms – Hyperbolic Paraboloid 1 Sheet 4 Sections & Curvature
Date		

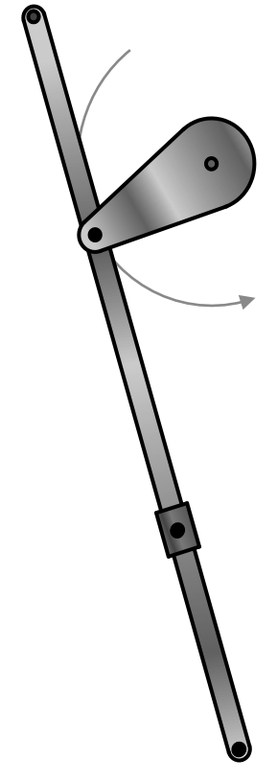
1) The graphic shows a link mechanism. The drawing supplied is a line diagram of the mechanism. The crank **AB** rotates about **A** in an anticlockwise direction. The crank **DC** rotates about **C** in a clockwise direction. The link **BE** is pin jointed at **B**, the link **DE** is pin jointed at **D**.
- On the line diagram provided plot the locus of point **E** when both cranks move at the same speed. (Slide 214)





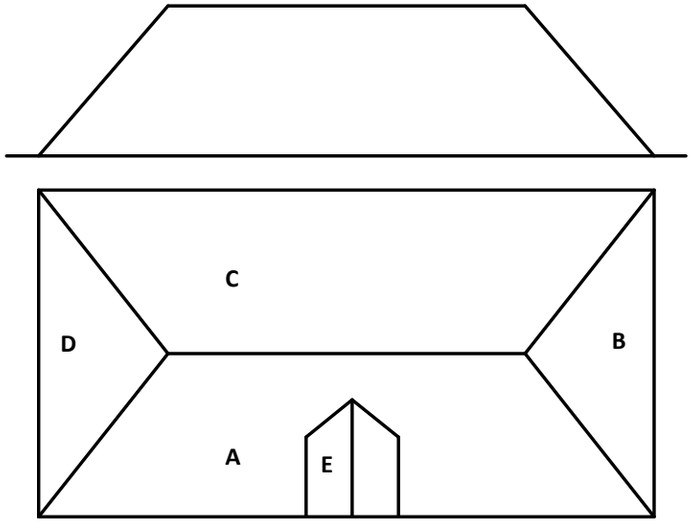
2) The graphic shows a combination of linkages which form a link mechanism. The given line diagram of the mechanism shows the crank arm **AB** which rotates about **A** in an anticlockwise direction. The link **DBC** must pass through point **E** and is pin jointed at **B**.
- On the line diagram provided plot the locus of point **C** and **D** for half a revolution of the crank. (Slide 215)





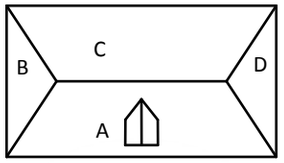
DCG Solutions Student Package
Applied Graphics
Sample Pages

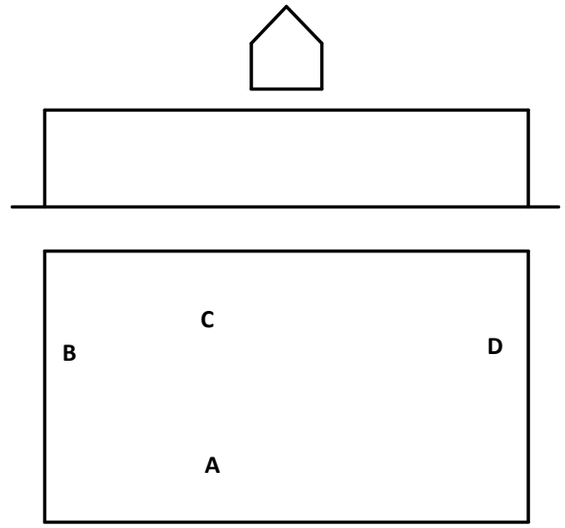
DCG Solutions		
Name		Dynamic Mechanisms 1 Sheet 16 Linkages
Date		



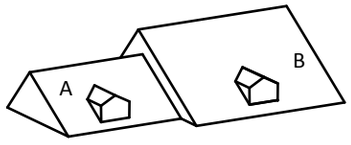
1) The graphic shows a dormer window.
The partial projections of a similar roof and dormer window are shown above.
- Complete the elevation of the solid.
- Determine the dihedral angle between surfaces **A**&**B.**
- Construct a true shape of **E**, the top surface of the dormer window. (Slide 420)

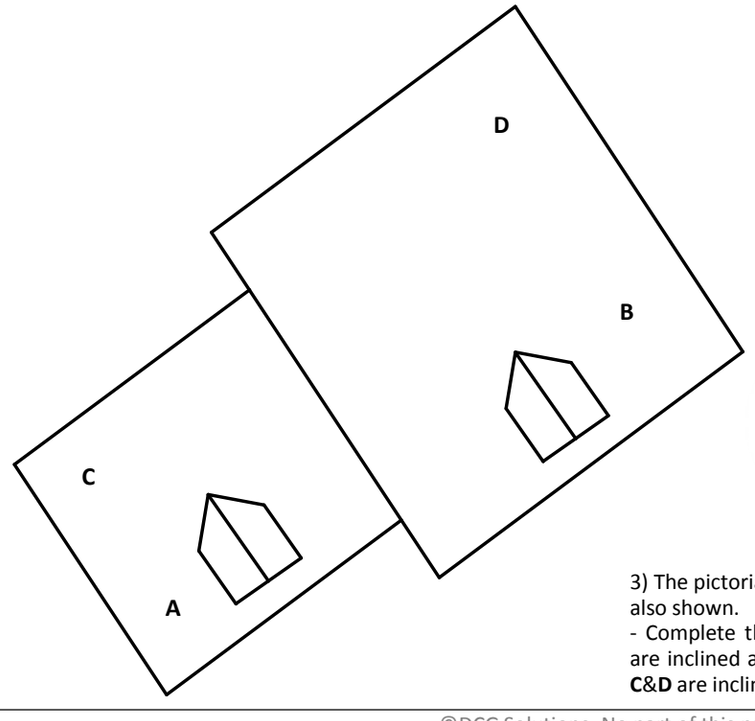
DCG Solutions Student Package
Applied Graphics -Sample Pages



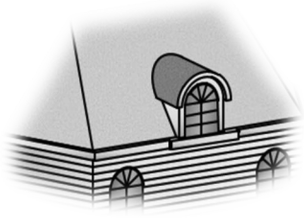


2) The graphic shows a roof and dormer window from a bungalow. The partial projections of the house are also shown.
- Complete the projections given that; the surfaces **A**&**C** are inclined a 45º to the horizontal plane and the surfaces **B**&**D** are inclined at 55º to the horizontal plane.
- A dormer window can be seen on the graphic and is given in the elevation, complete the projections of the window.
- Determine the dihedral angle between surface **A**&**B**. (Slide 421)

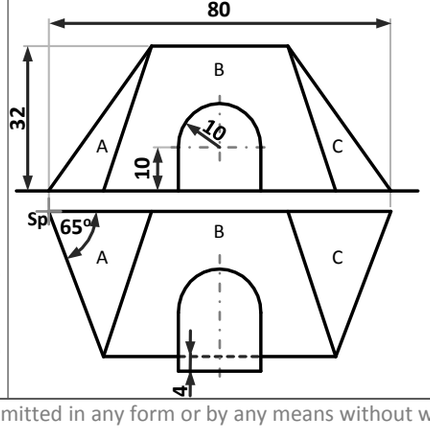




3) The pictorial shows a roof surface. The plan of the roof is also shown.
- Complete the projections, given that; the surfaces **A**&**B** are inclined a 30º to the horizontal plane and the surfaces **C**&**D** are inclined at 45º to the horizontal plane. (Slide 422)



Sp

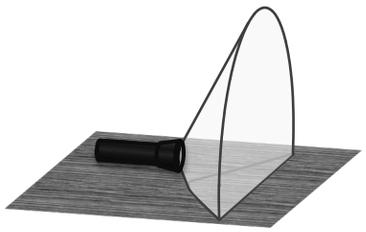


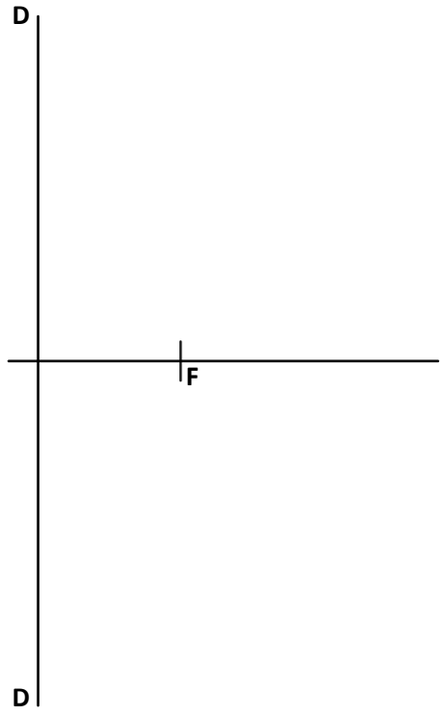
4) The dormer window of this house is based on a semi circle as shown in the pictorial.
The surface **B** is inclined at 45º to the horizontal plane and **A**&**C** are inclined at 55º.
- Redraw the given plan and elevation in the space provided. (Slide 423)

DCG Solutions		
Name		Surface Geometry Sheet 3 Roof Geometry Dormer Windows
Date		

1) 2009 Section A Higher Level
The 3D graphic below shows a beam of light shining across a table top and generating a hyperbolic curve.
The drawing on the right shows the axis, directrix and focus of such a hyperbola. The eccentricity for the curve is 1.2.

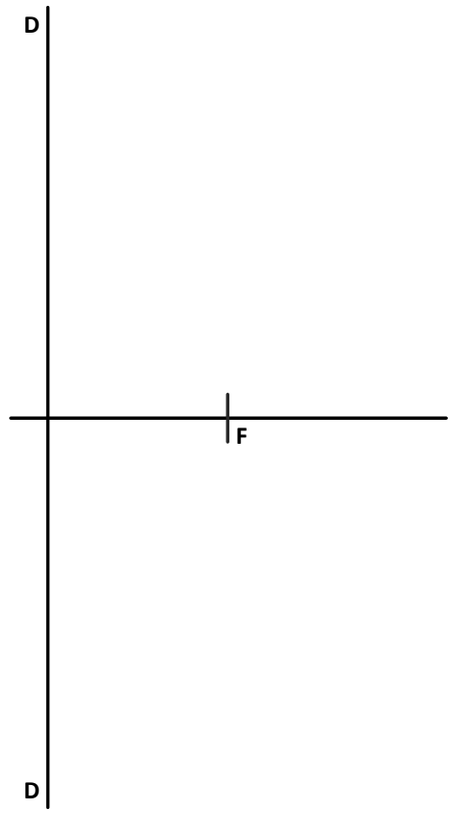
(a) Locate the vertex and draw a portion of the curve.
(b) Determine the centre of curvature for a point on the curve which is located vertically above the focus. (Slide 314)



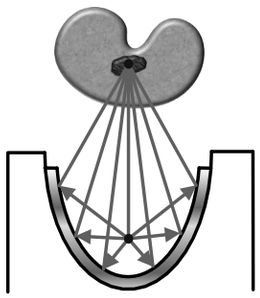


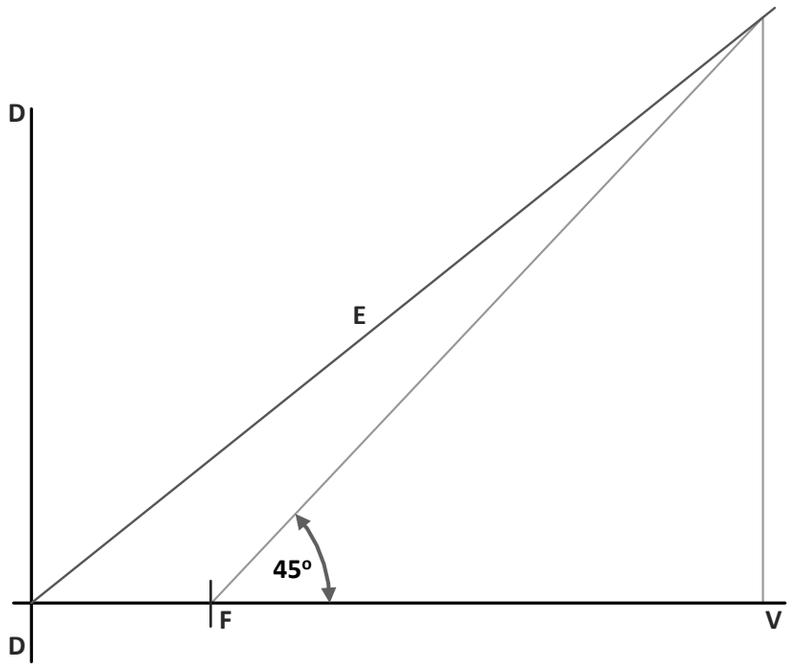
2) 2010 Section A Higher Level
A parabolic curve is often used in the design of racing tracks.
The drawing on the right shows the axis, directrix and focus of a parabola.

(a) Locate the vertex and draw a portion of the curve.
(b) Draw a tangent to the curve at a point 45mm from the focus. (Slide 315)

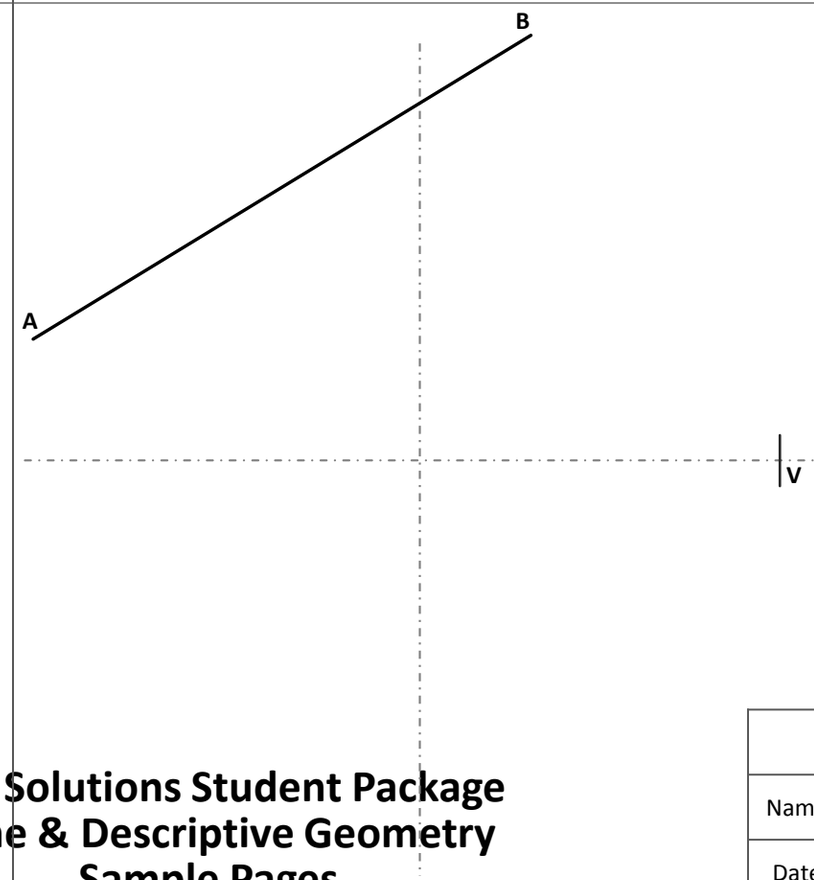


3) 2011 Section A Higher Level
A bio-medical device, as shown in the graphic below, generates sound waves at one focus of an ellipse. The waves are then reflected to the other focus to shatter a patient's kidney stones.





The drawing on the right above shows the directrix (**DD**), focus (**F**), vertex (**V**) and eccentricity line (**E**) of an ellipse.
(a) Locate the second vertex and the second focus and draw the top half of the curve.
(b) Draw a tangent at a point on the curve which is 70mm from **F**. (Slide 316)

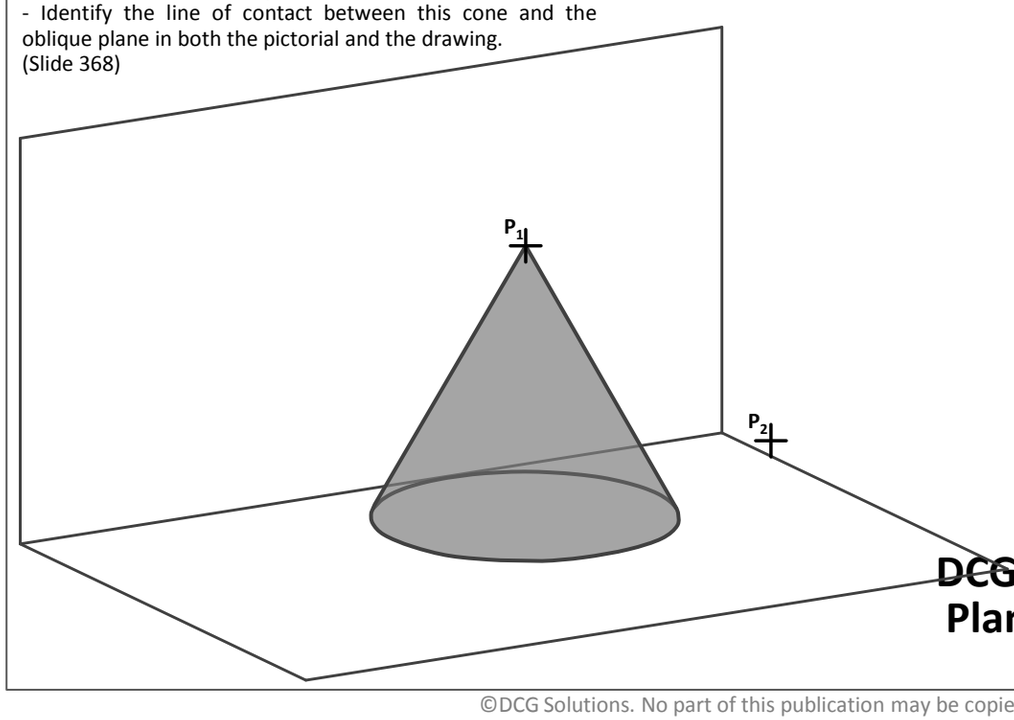


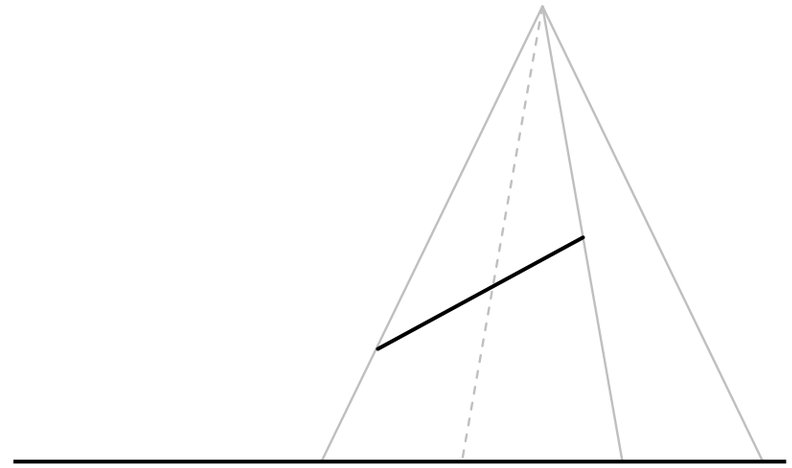
4) A graphic shows an elliptical jewel encased in a gold band. Parts of the band are tangential to the ellipse.
The drawing on the left shows the axis and vertex of an ellipse. The line **AB** is a tangent to the ellipse.
(a) Locate the focal points of the ellipse and draw a portion of the curve. (Slide 317)

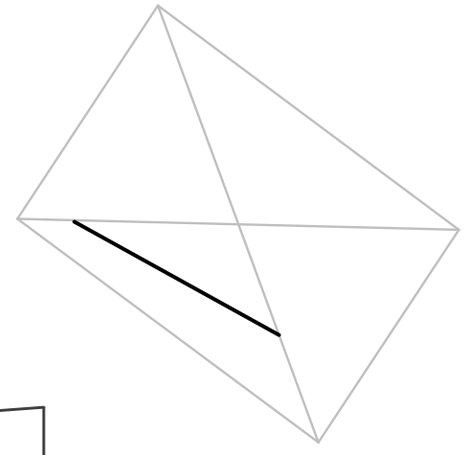
DCG Solutions Student Package
Plane & Descriptive Geometry
Sample Pages

DCG Solutions		
Name		Conic Sections Sheet 26 Sample & Exam Questions HL
Date		

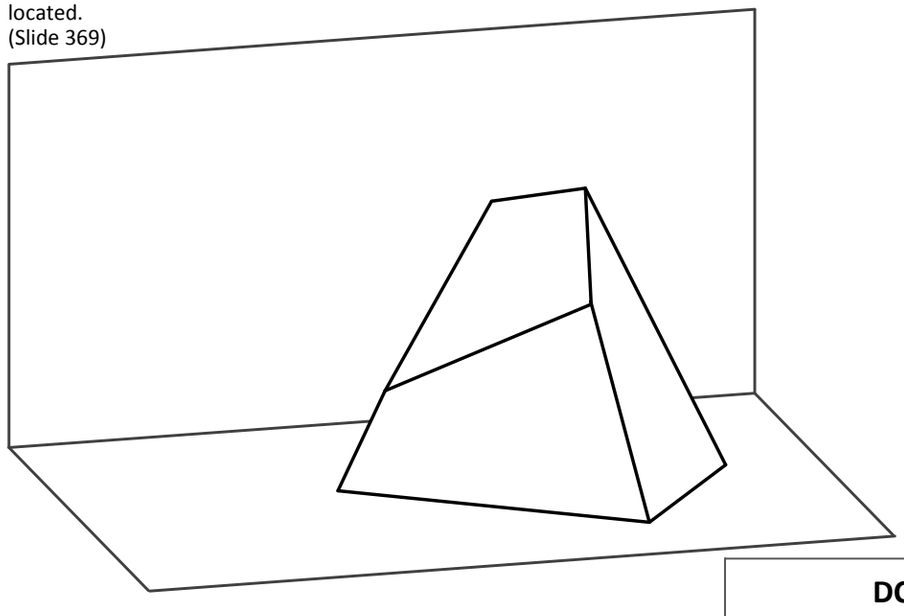
1) The plan and elevation of two points are given, these points are on an oblique plane **VTH** which is inclined at 60° to the horizontal plane.
- Locate the traces of the plane.
- On the pictorial below illustrate how the traces of the plane are located, one of the required cones is already shown.
- Identify the line of contact between this cone and the oblique plane in both the pictorial and the drawing.
(Slide 368)







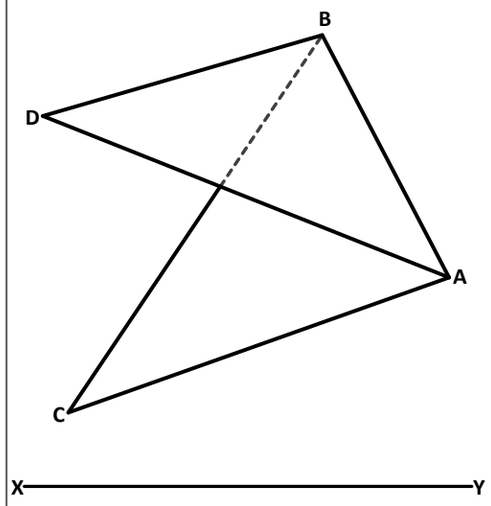
2) The pictorial shows a pyramid that has been cut by an oblique plane **VTH**. A partial plan and elevation of the solid is given, this shows one edge of the cut surface. The oblique plane is inclined at 50° to the horizontal plane.
- Locate the traces of the plane and complete the projections of the cut surface.
- On the pictorial below illustrate how the traces of the plane are located.
(Slide 369)

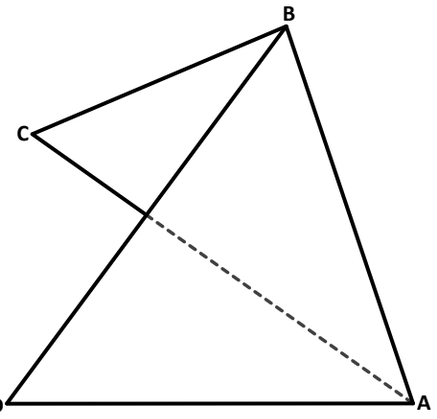


DCG Solutions Student Package
Plane & Descriptive Geometry
Sample Pages

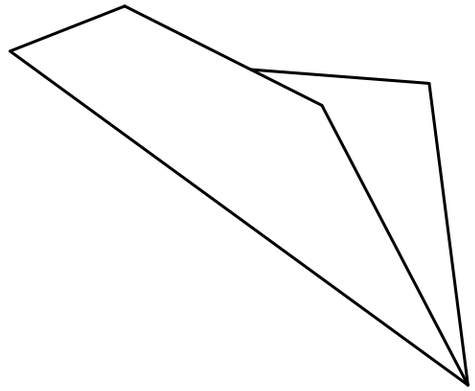
DCG Solutions		
Name		Oblique Plane HL Sheet 19 Tangential Planes
Date		

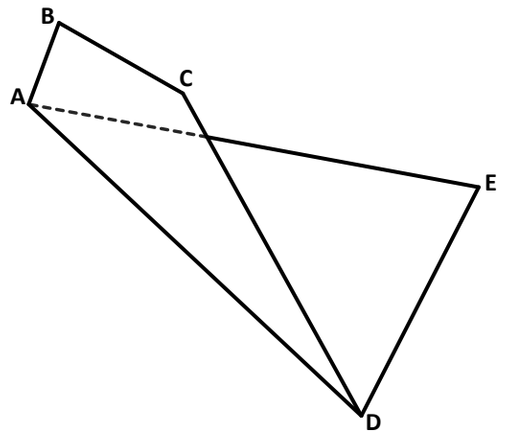
1) Given are the projections of two planes **ABC** and **ABD**. These planes intersect along the line **AB**.
- Produce a true length of the line **AB**.
- Determine the dihedral angle between the planes.
(Slide 400)

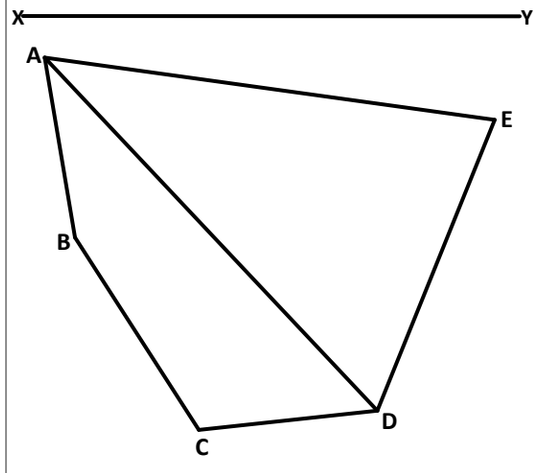




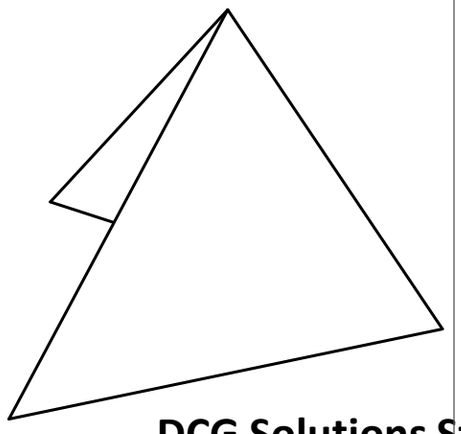
2) Given are the projections of two planes **ABCD** and **ADE**. These planes intersect along the line **AD**.
- Produce a true length of the line **AD**.
- Determine the dihedral angle between the planes.
(Slide 401)







Key Concepts

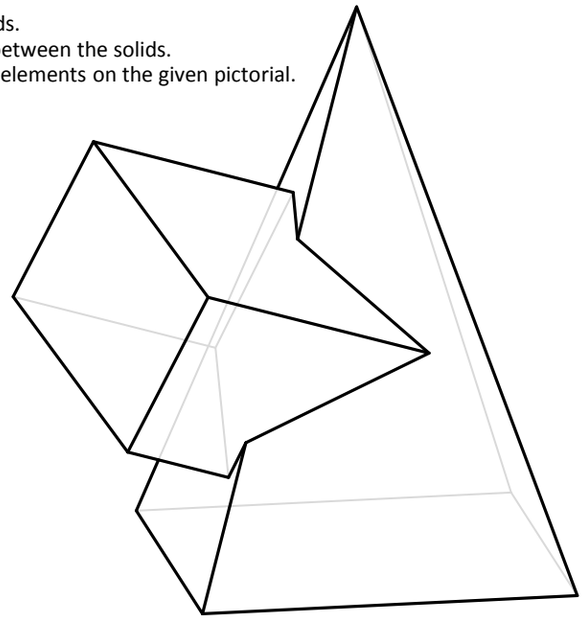


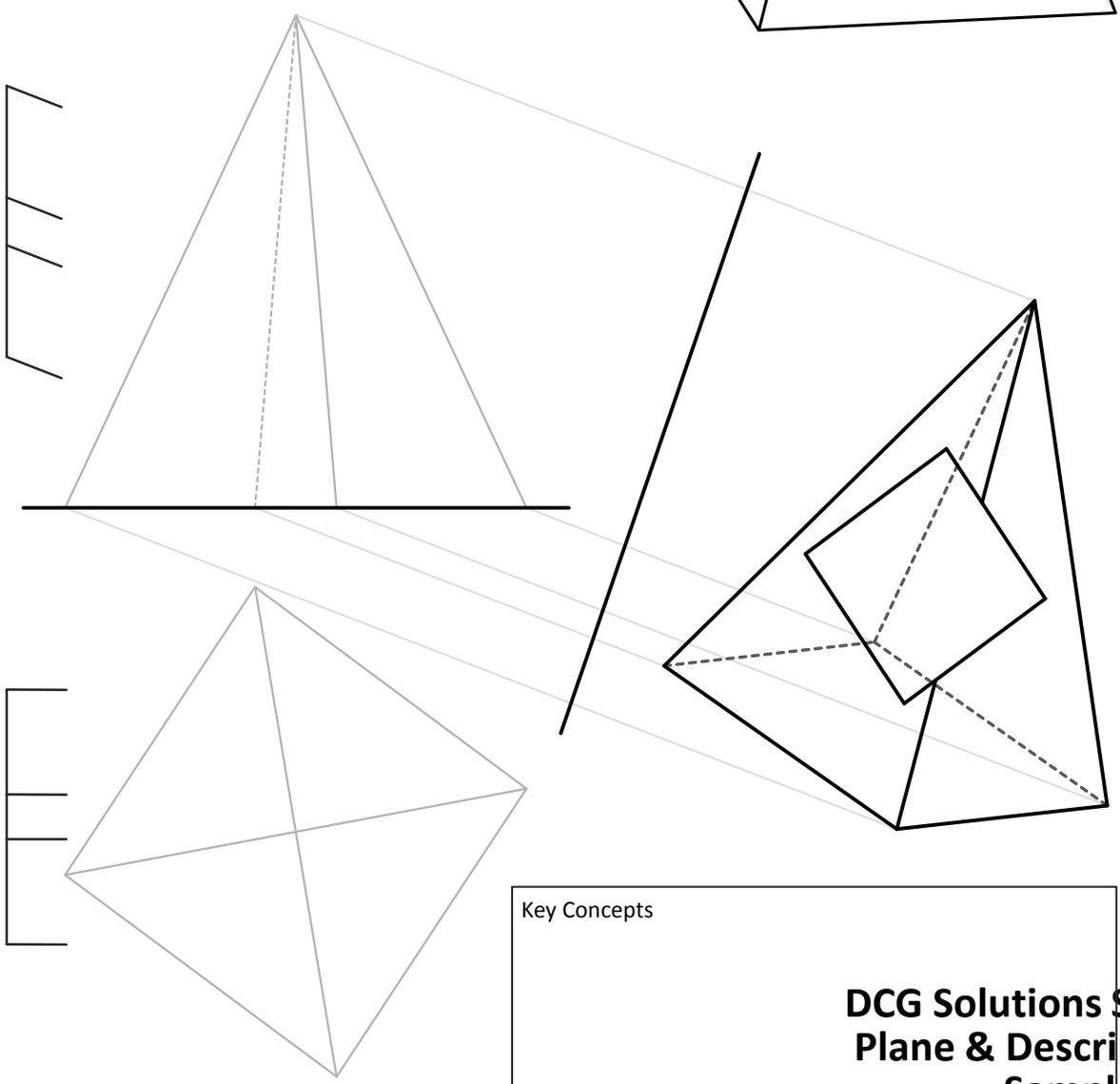
DCG Solutions Student Package
Plane & Descriptive Geometry
Sample Pages

DCG Solutions		
Name		Intersecting Planes Sheet 3 Dihedral Angles
Date		

1) A square based prism intersects a pyramid as shown. An auxiliary looking along the axis of the prism is given.
- On the auxiliary identify the intersection points between the solids.
- Complete the given projections showing all lines of intersection between the solids.

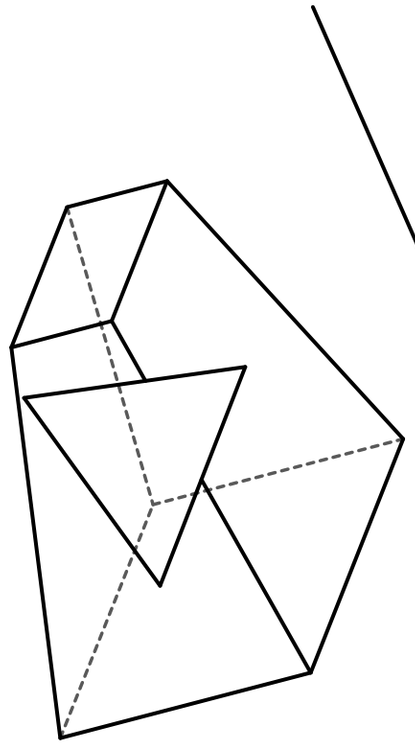
Use surface elements where required, illustrate the use of surface elements on the given pictorial.
(Slide 449)

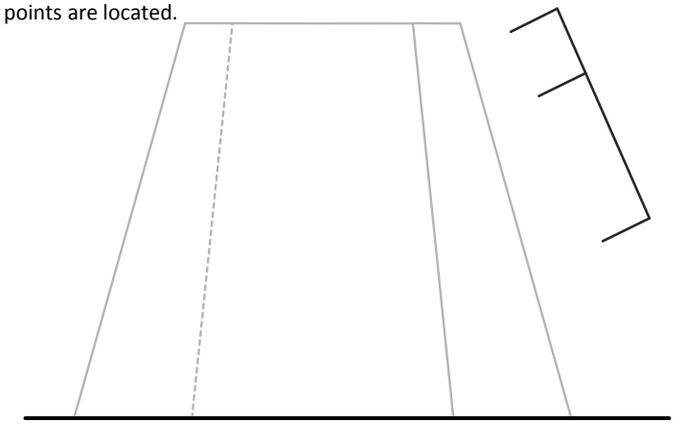


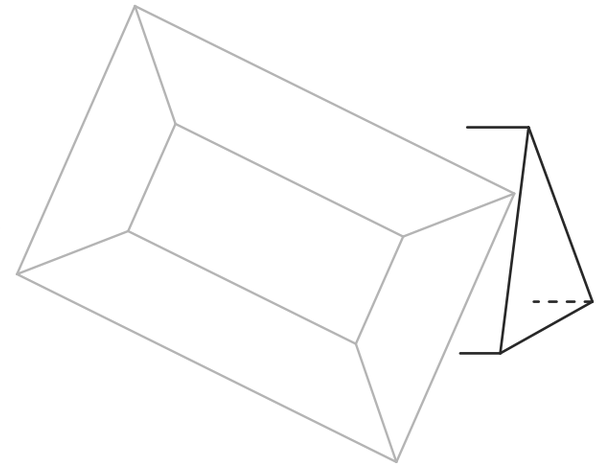


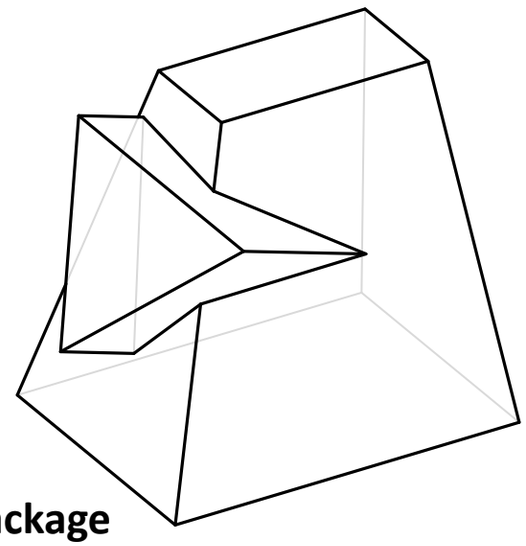
2) The partial projections of two intersecting solids are given below. The triangle based prism is inclined to the horizontal plane. An auxiliary looking along the axis of the prism is also shown.
- Identify the intersection points between the solids on the auxiliary and hence complete the projections of the solids.
- On the pictorial shown illustrate how the intersection points are located.

(Slide 450)









Key Concepts

DCG Solutions Student Package
Plane & Descriptive Geometry
Sample Pages

DCG Solutions		
Name		Intersection of Solids HL Sheet 14 Surface Elements
Date		