



Leaving Certificate Design and Communication Graphics

DRAFT Sample questions

Higher Level

Structure of the examination paper

Recommended total marks: 240 marks

Recommended duration of examination: 3 hours

Section A [60 marks]

Candidates will be expected to answer any four questions in this section (15 marks per question).

Section B [90 marks]

Candidates will be expected to answer any two questions in this section (45 marks per question).

Section C [90 marks]

Candidates will be expected to answer any two questions in this section (45 marks per question).

Instructions to candidates

- (a) *Construction lines must be clearly shown for all questions.*
- (b) *Write the number of the question distinctly on the answer paper.*
- (c) *Work on one side of the paper only.*
- (d) *All dimensions on the question paper are given in metres and millimetres.*
- (e) *First or third angle projection may be used.*

Core

Section A

Answer any 4 Questions from this section

Question 1

Fig.1 Shows the elevation and plan of a rectangular based pyramid and a section plane.

(a) Make a well proportioned freehand pictorial sketch of the pyramid and the section plane, including its traces, showing the lines of intersection between them.

Choose the orientation which you feel will convey the maximum amount of information.

Use colour and/or shade to enhance the clarity of your sketch.

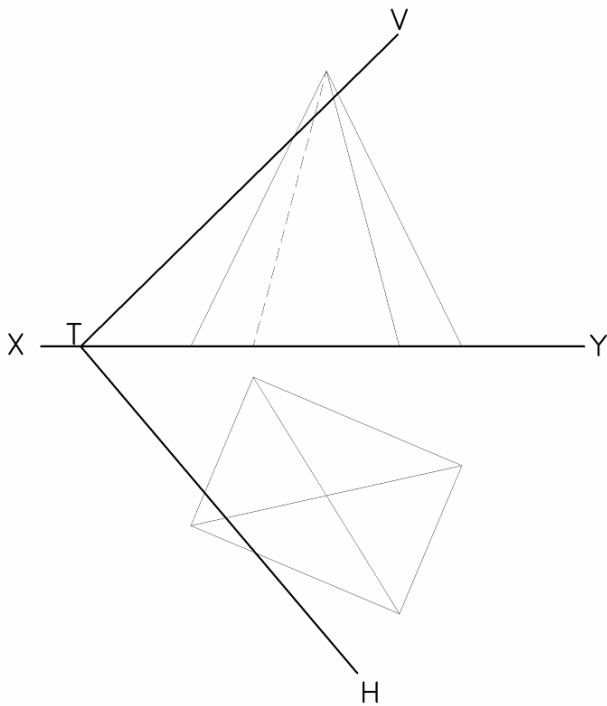


Fig. 1

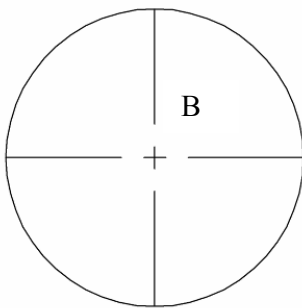
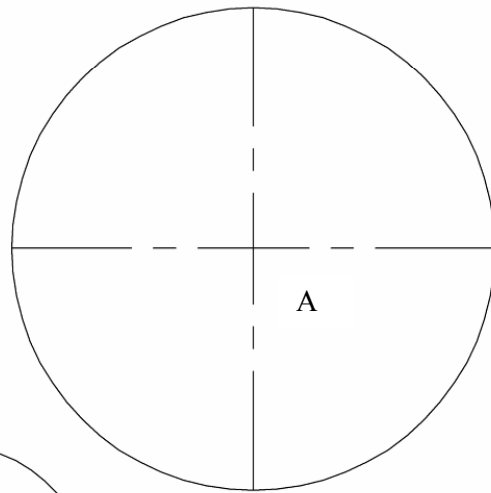
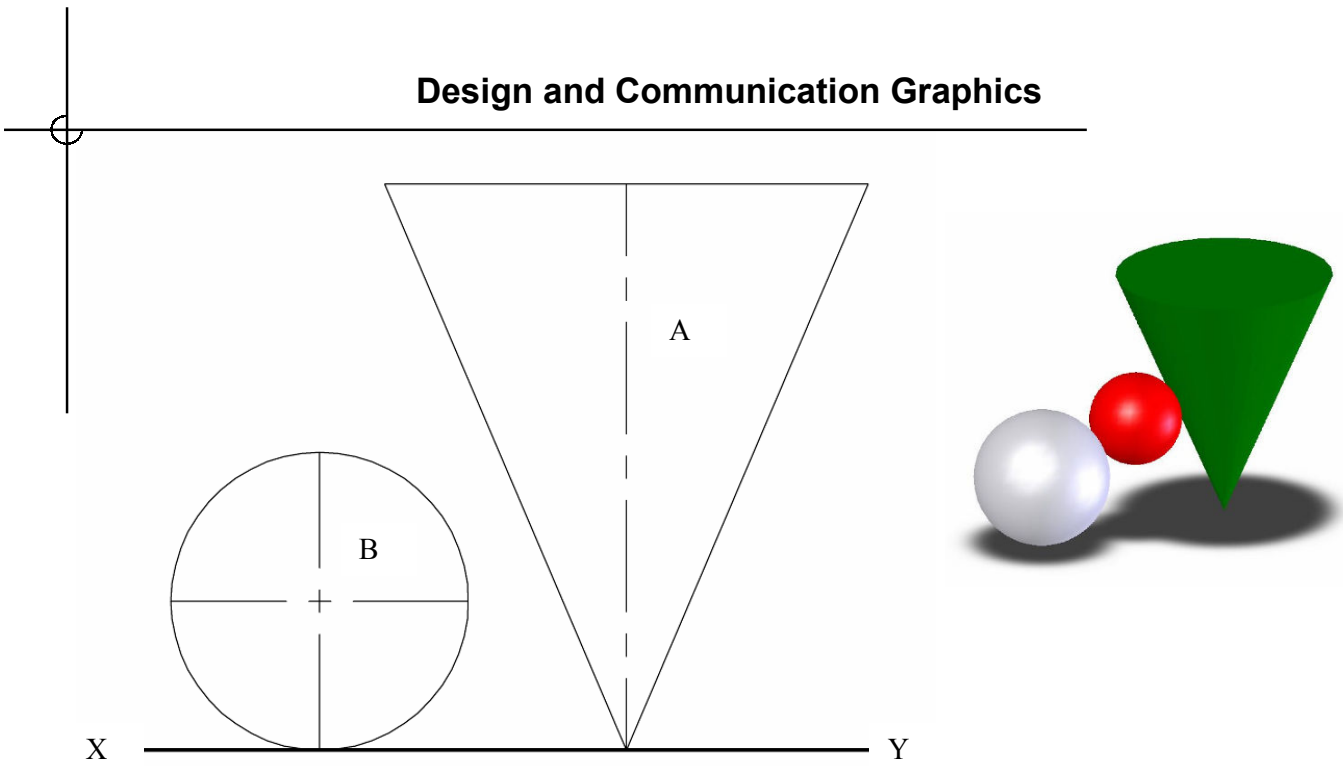


Fig. 2

Question 2

Fig. 2. shows the plan and elevation of Cone A and Sphere B.

- (a) Determine the projections of the smallest sphere C, which touches the Sphere B at a point 30mm above the horizontal plane and touches the Cone A. (shading of sphere is not required)
- (b) Determine the projections of the point of contact between sphere C and the Cone A.

Question 3

The pictorial view of a conical scoop is shown in **Fig.3**. The plan and elevation of the conical portion of the scoop are shown in **Fig. 3(a)**

- (a) Determine the true shape of the Section ABC and name the Curve
- (b) Using the focal sphere for this curve, or otherwise locate the focus on the true shape of the section.

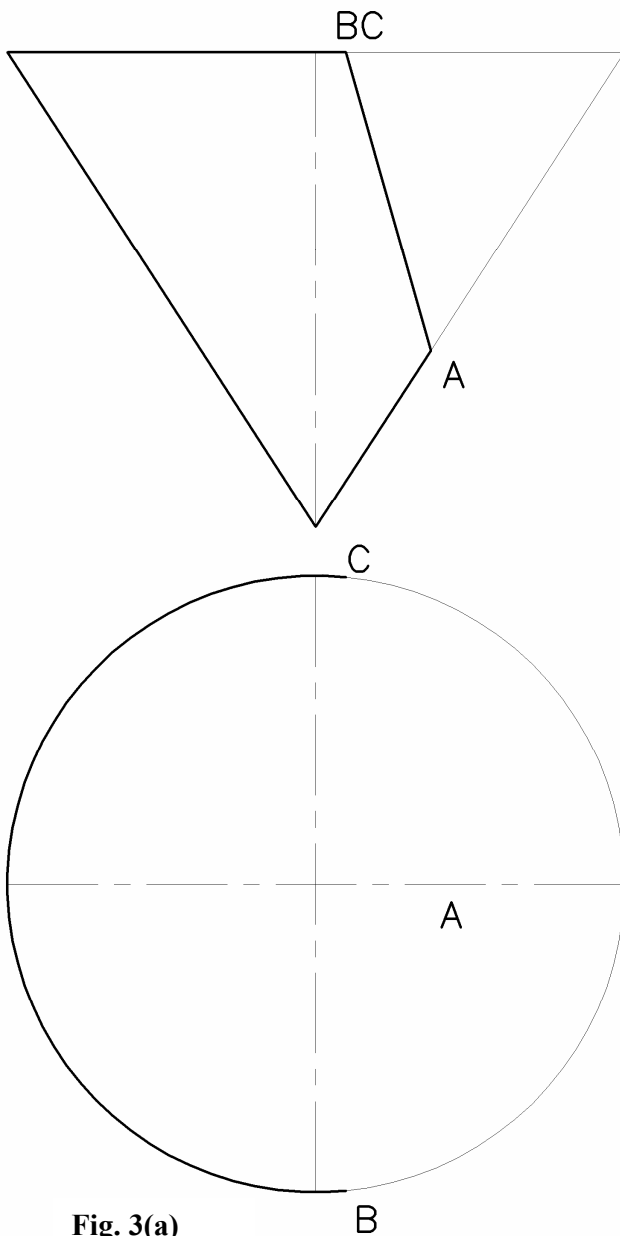


Fig. 3(a)

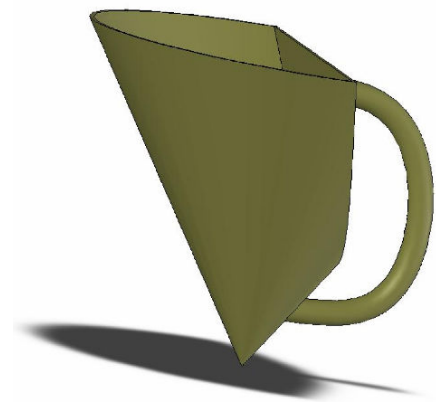


Fig. 3

Question 4

Fig 4. Shows the projections of the planes ABC and DEF.

- (a) Determine the projections of the line of intersection between the planes.
- (b) Determine the visibility of the planes.

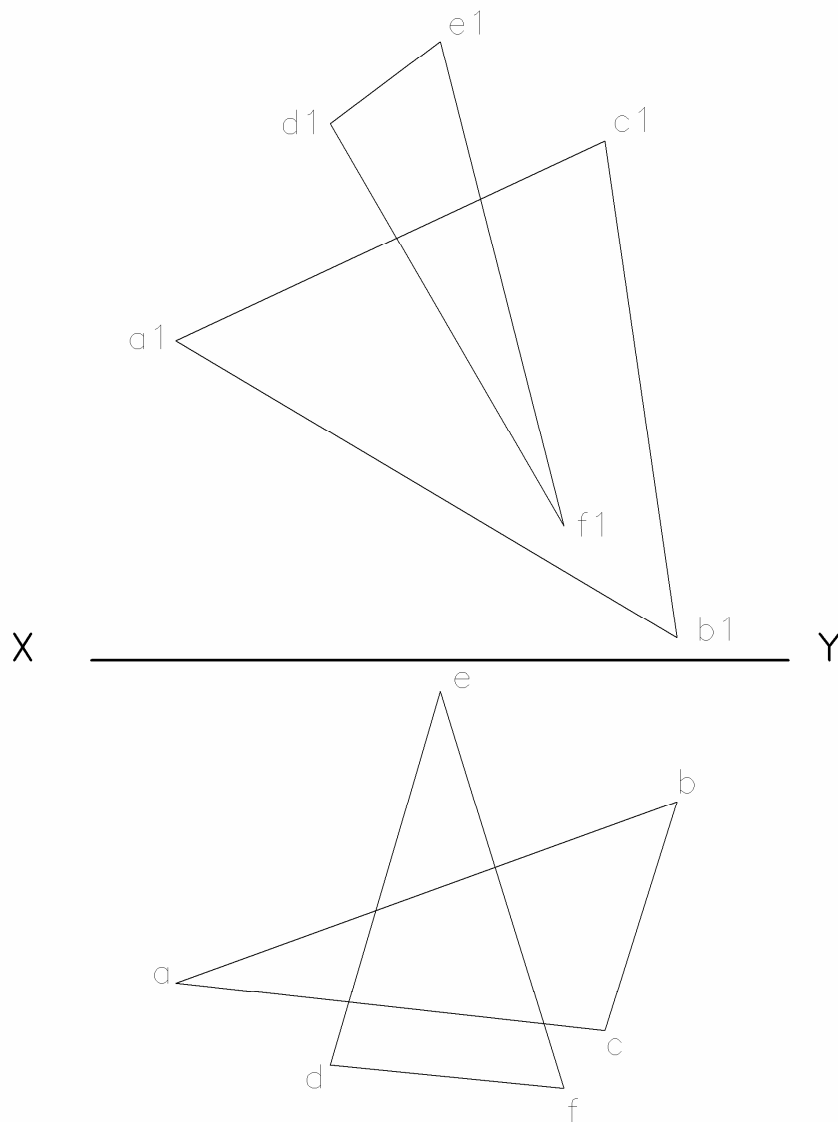


Fig. 4

Question 5

Fig 5(a) shows the elevation, plan and end elevation of a shaped block (not to scale), Fig 5 shows the complete perspective view of surface A and the incomplete view of surface B of the block.

Locate the vanishing point for the sloping lines and complete the perspective projection of the block

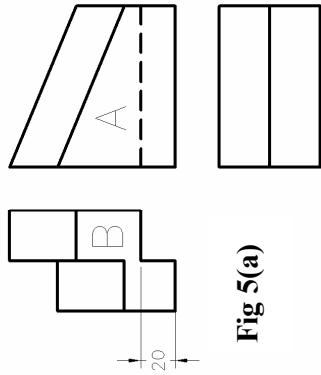


Fig 5(a)

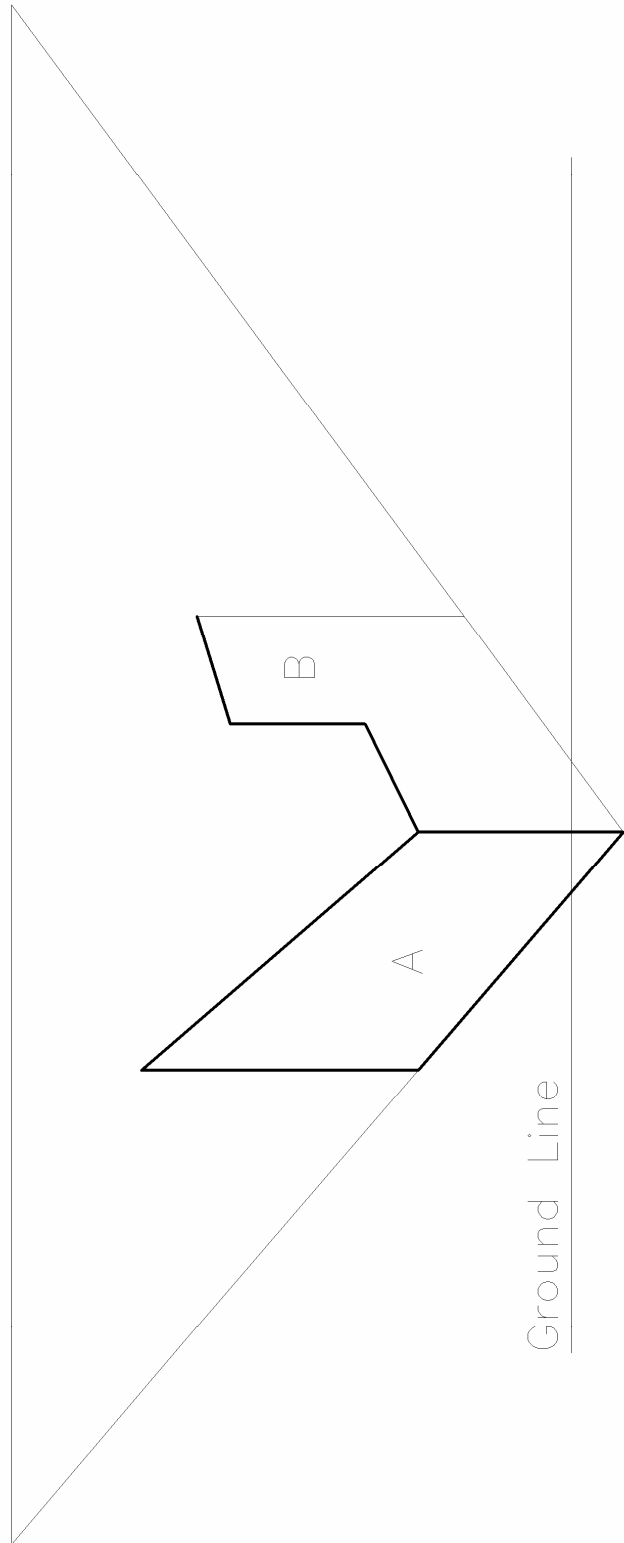


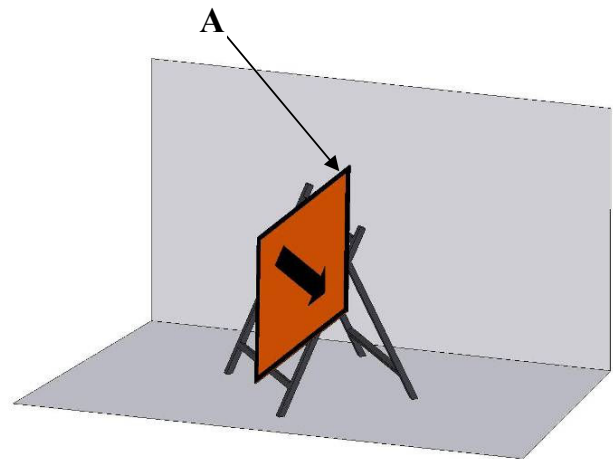
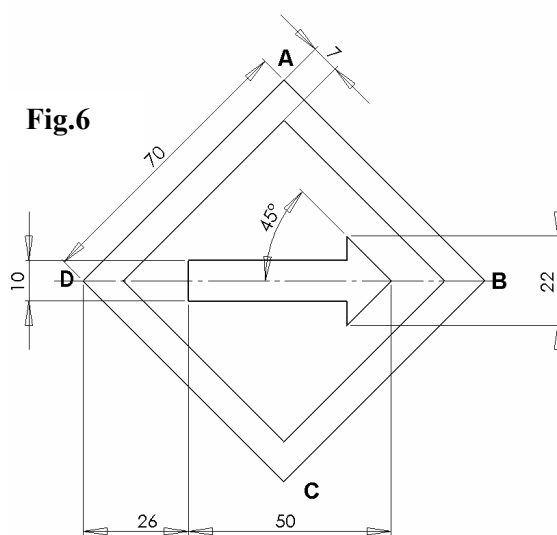
Fig. 5

SECTION B

Answer any 2 Questions from this section

Question 6

The true shape of a square road sign is shown in **figure 6**. The sign is supported by a frame so that the sign's true inclination to the Horizontal Plane is 65° . The horizontal trace of this plane makes an angle of 40° to the XY line. Vertex A is 95mm above the Horizontal Plane and 30mm from the Vertical Plane. The diagonal BD is Horizontal.



- (a) Draw the traces of the plane which contains the sign.
- (b) Draw the elevation and plan of the sign in its inclined position (ignoring its thickness).
- (c) Find the true angle of inclination of the edge DC to the Vertical Plane.

Question 7

The incomplete plan and elevation of a square based oblique pyramid, side 80mm, and an equilateral triangular prism of side 60mm which penetrates the pyramid is shown in **Fig 7**.

- (a) Draw the projections of the solids showing all lines of interpenetration.
- (b) Develop the surface A after the triangular prism has intersected the pyramid.

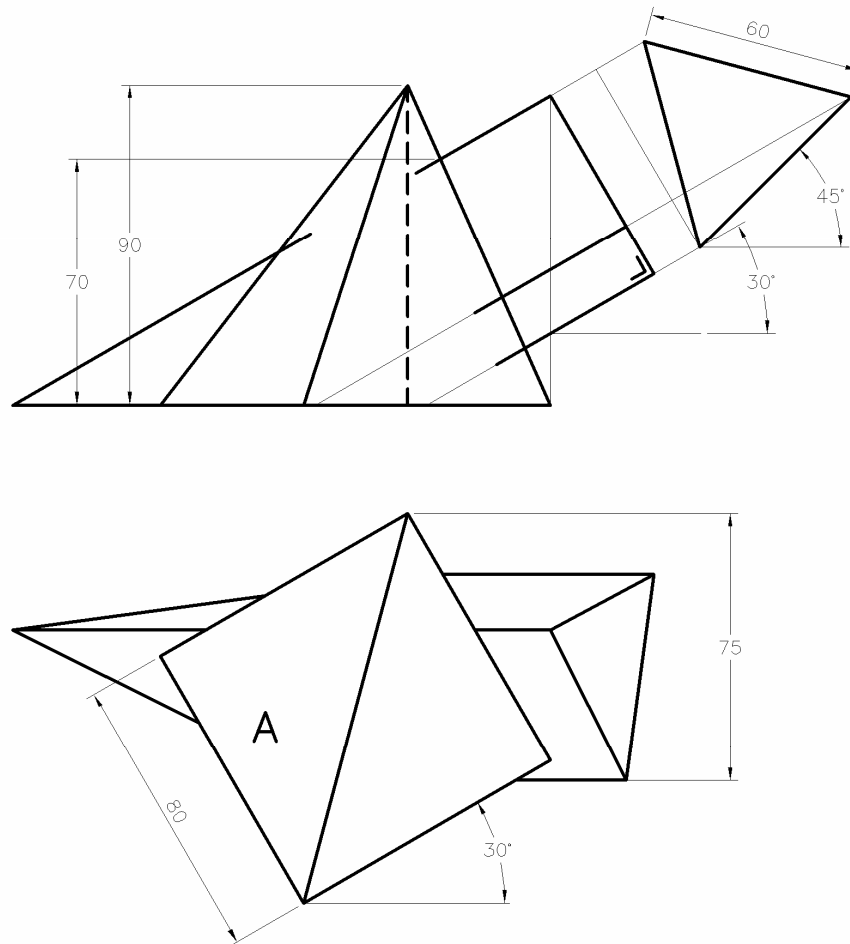


Fig 7

Question 8

- (a) The Plan, Elevation and End-Elevation of a solid are shown in **Fig.8**.
Determine the trimetric projection of the solid when the axes are orientated as in **Fig.8(a)**
- (b) In this Axonometric view determine the traces of a plane which contains the points A,B and C on the solid.
- (c) Indicate the line of intersection between the surface D and the Plane containing A,B and C.

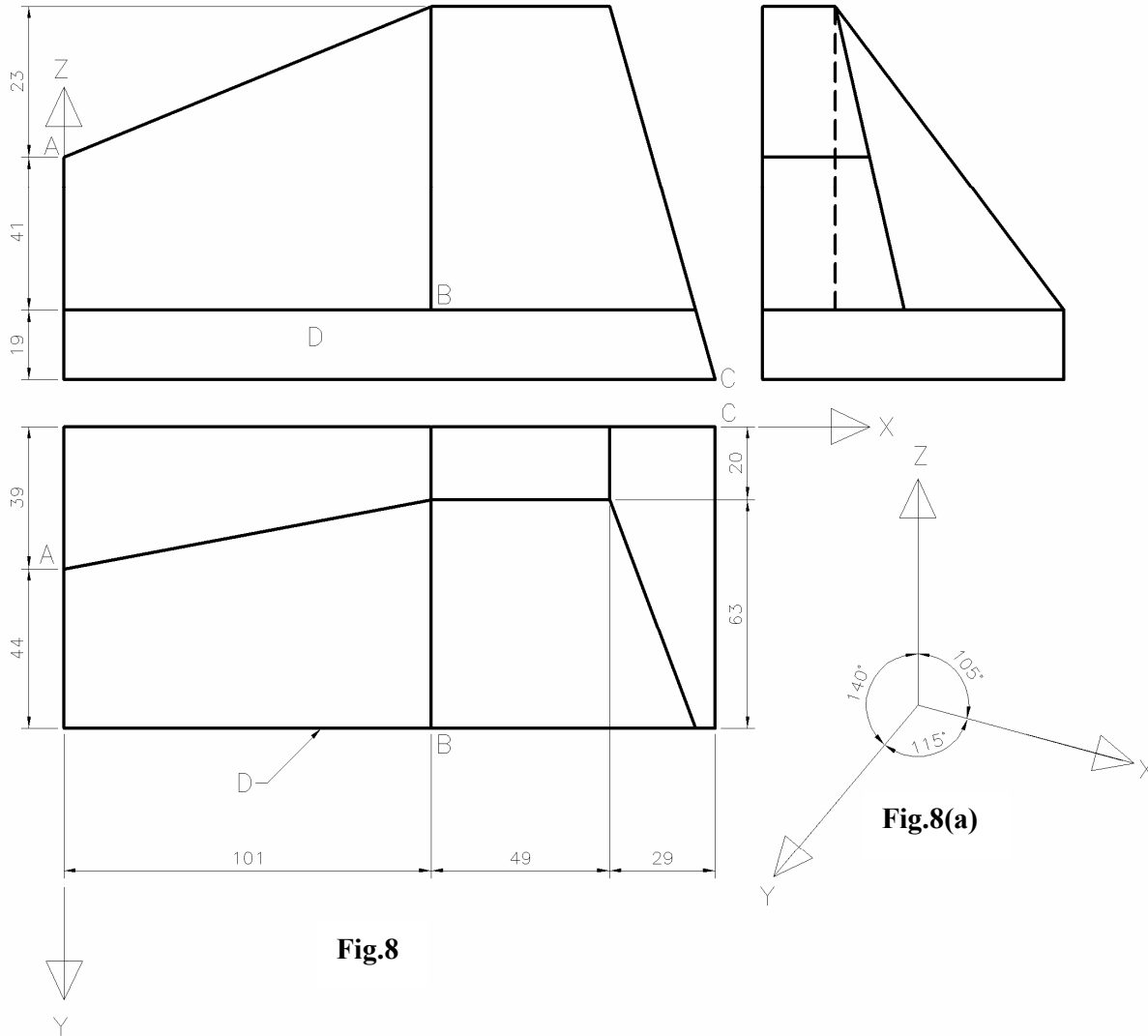


Fig.8

Fig.8(a)

SECTION C

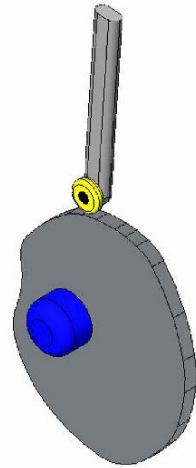
Applied Graphics

Answer Any 2 Questions from this section

Question 9

- (a) Plot the cam profile and displacement diagram for a plate cam, rotating in an anti-clockwise direction at a rate of 1 revolution every 3 seconds, the follower is an in line roller of 12mm diameter and imparts the following motion.

- | | |
|----------|--|
| ½ second | rise 10 mm with uniform velocity. |
| ½ second | rise 20mm with uniform velocity. |
| 1 second | dwell. |
| 1 second | fall 30mm with uniform acceleration and retardation. |



The cam shaft is 20mm diameter and the nearest approach of the centre of the roller is 18mm from the cam shaft.

- (b) The circle in **Fig.9** rolls clockwise along the line BC for ½ of a revolution. During the rolling of the circle the point A moves along the line from A to D. Plot the locus of point A for the combined movement.

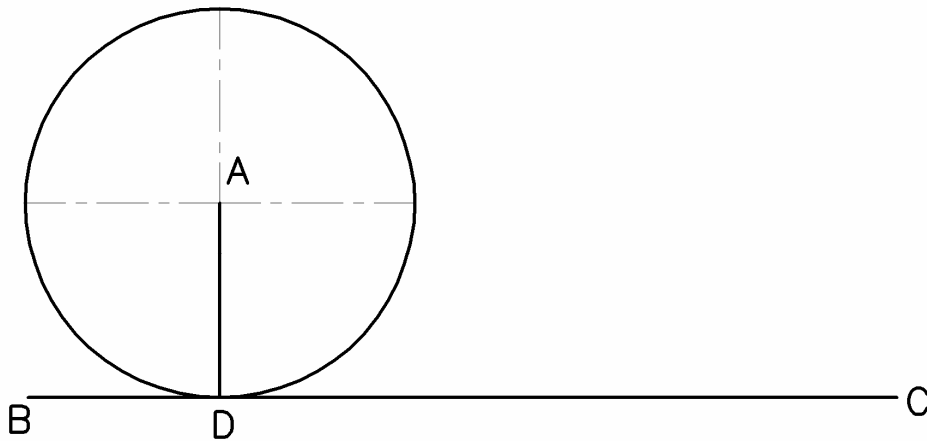
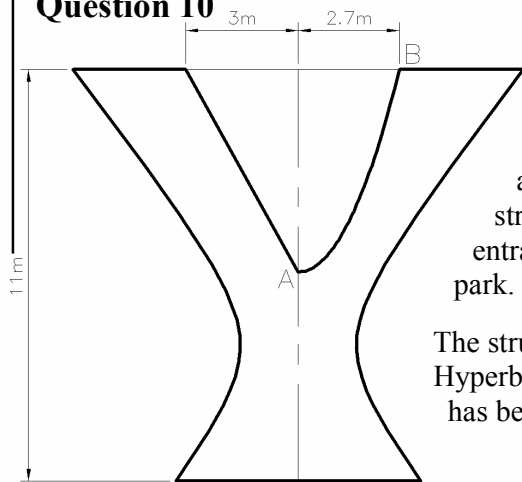


Fig.9

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Question 10



(a) **Fig.10(a)** shows the plan and elevation of a structure at the entrance to a woodland park.

The structure is in the form of a Hyperboloid of revolution which has been shaped as shown.

The curve AB is a Semi-Parabola with its vertex at A.

The true length of all the straight line elements on the curved surface of the structure is 14m.

Draw the plan and elevation.

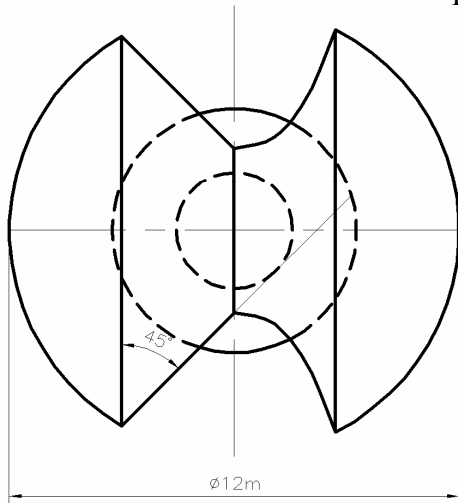
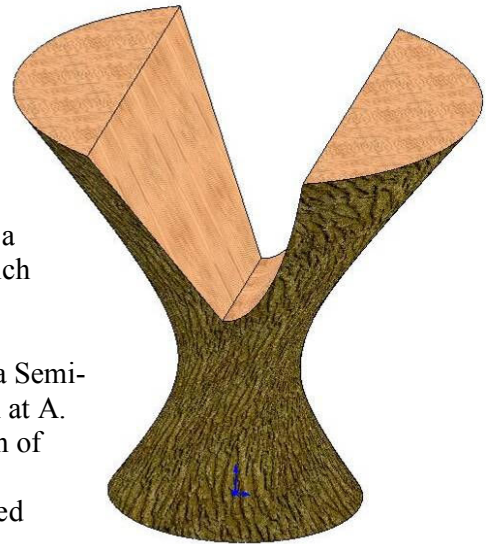
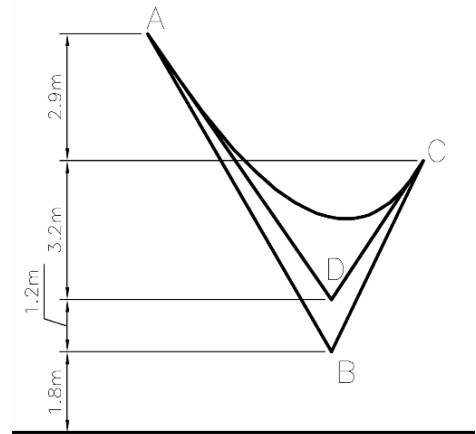


Fig.10(a)



(b) **Fig. 10(b)** shows the plan and elevation of a Hyperbolic Paraboloid. Determine the traces of the plane director for the edges of BC and AD which passes through point A.

Scale 1:100

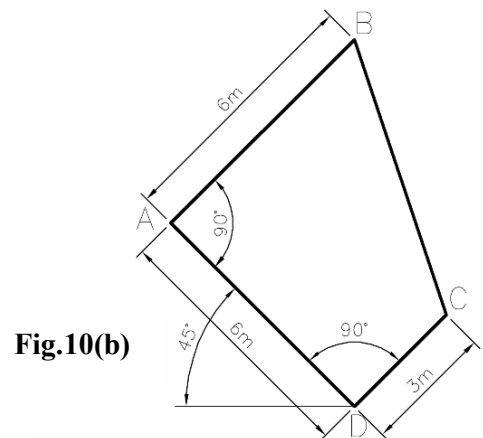


Fig.10(b)

Question 11

Fig 11(a) shows the plan and elevation of a Transition Piece which connects a cylindrical pipe of 100mm diameter and a square duct side 60mm.

Develop a one piece surface development of the transition piece A using the line SS as the seam.

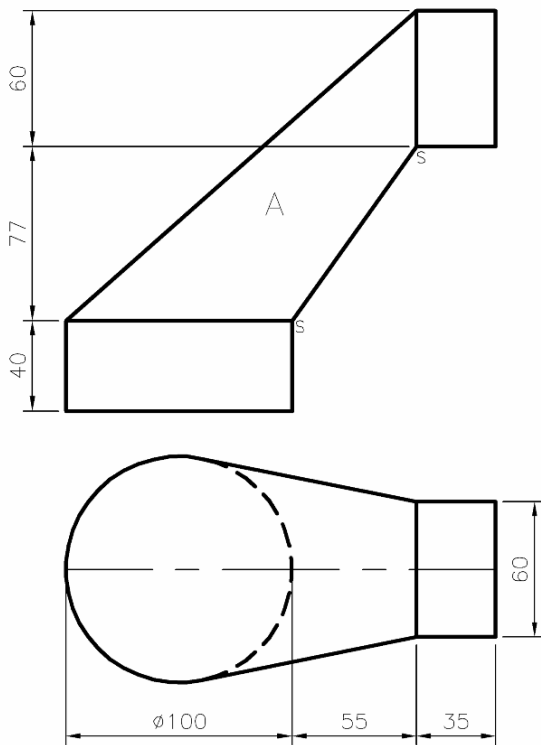


Fig.11(a)

Fig 11(b) shows the plan and elevation of a truck cab wind deflector. The **Dihedral** angle between surfaces A and B is 130° . Complete the plan and elevation.

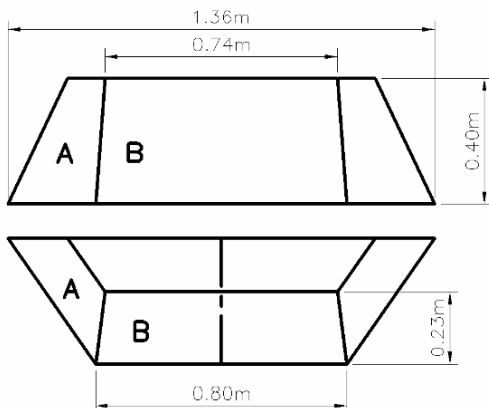


Fig.11 (b) Scale 1:10

Question 12

The details of a Candle Holder are given in **Fig.12** with the parts listed as follows.

Index	Part	Material	Required
1	Base	Pine	1
2	Fitting	Cast Iron	1
3	Holder	Glass	1
4	Fitting	Cast Iron	1
5	Dowel	Beech	4
6	Fitting	Cast Iron	1
7	Foot	Walnut	4

- (a) Draw a sectional elevation of the assembled parts when viewed in the direction of the arrows A-A.
- (b) Make a freehand pictorial sketch showing the exploded assembly between any **2** parts.

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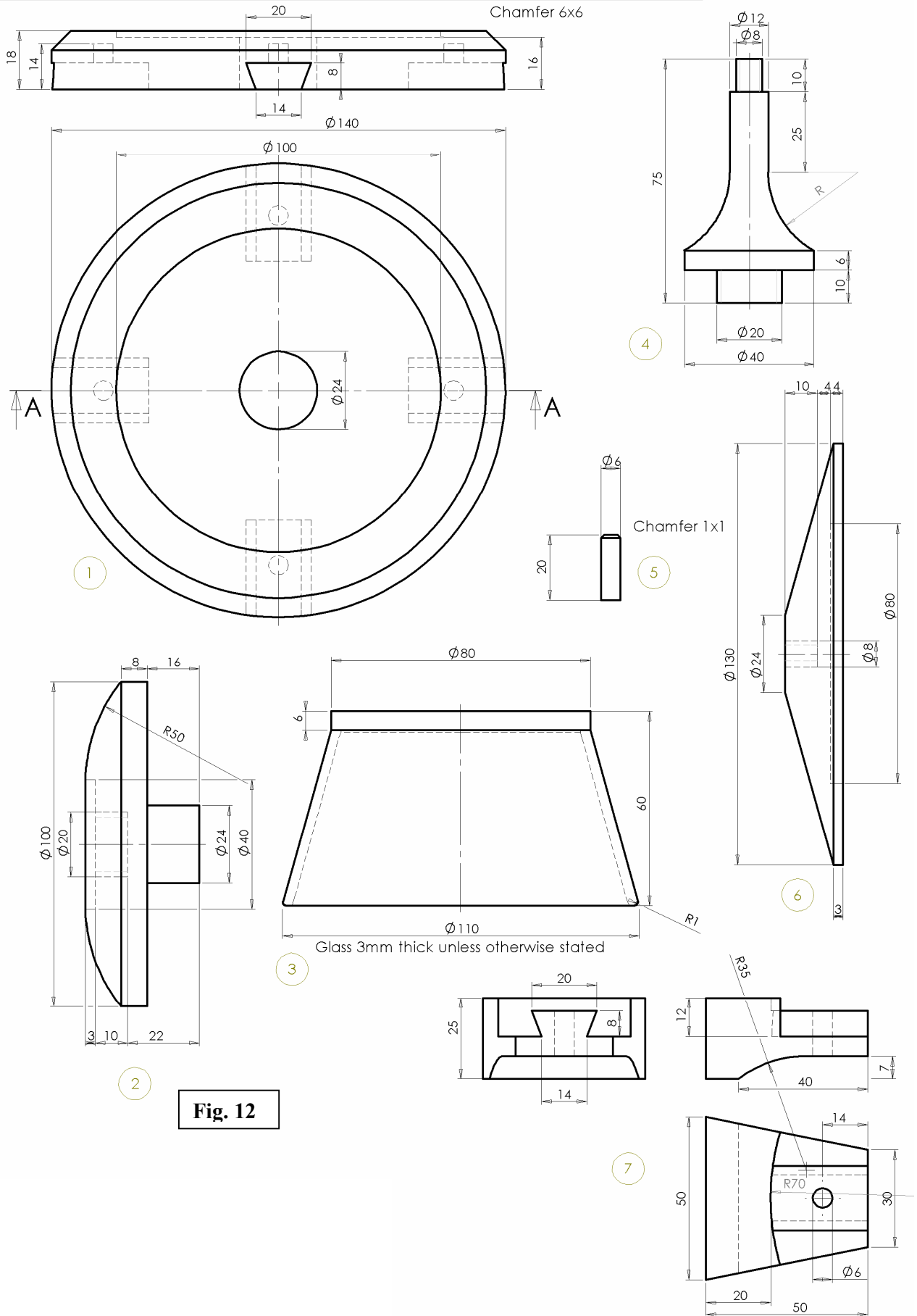


Fig. 12

Question 13

- (a) The accompanying map showing ground contours at 5m vertical intervals. AB is the edge of a proposed roadway of continuous gradient. The formation levels at C, D and E are 58m, 56m and 63m respectively. Determine the outline of earthworks necessary to accommodate this car park and roadway.

Cuttings have a gradient of 1:2 and Embankments have a gradient of 1:1.

Scale 1:1000

- (b) **Fig 13** shows the plan and elevation of a vertical borehole AB and a skew borehole CD. The borehole AB reveals the top and bottom surfaces of the stratum at heights 39m and 21m respectively, CD reveals the top and bottom surfaces at heights 46m and 14m respectively. Determine the dip and strike of the stratum.

Scale 1:1000

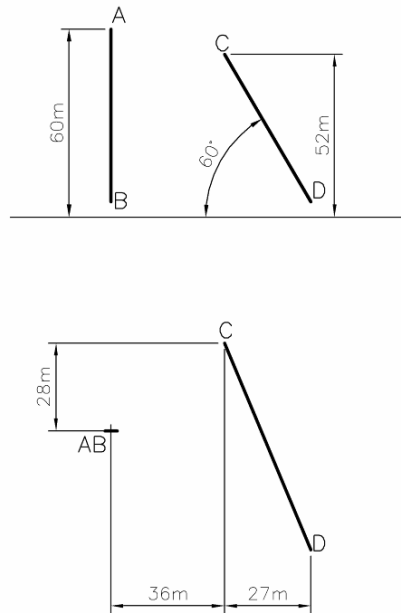


Fig 13

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