



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate 2012

Marking Scheme

Design and Communication Graphics

Higher Level



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Graphics
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***Marking Scheme
and Sample Solutions***

(Other valid solutions are acceptable and are marked accordingly)

QUESTION A-1

MARKS

- (a) **Axonometric projection (16)**
- (i) Projections from elevation and end view2
 - (ii) Determining remaining 2 edges on sloping top (2 x 2).....4
 - (iii) Determine points on curves (5 x 1)5
 - (iv) Draw correct curves3
 - (v) Draw horizontal brace1
 - (vi) Draw right hand side of base1
- (b) **Diagonal length (4)**
- (vii) Understanding of “diagonal” concept1
 - (viii) Establish true shape of rectangular top2
 - (ix) Identify required true length1

Total = 20

QUESTION A-2

MARKS

- (a) **Complete Elevation (16)**
- (i) Elevation of parallelogram shaped outline3
 - (ii) Elevation of rear support leg2
 - (iii) Determine points on arrow in elevation(4x2)8
 - (iv) Draw arrow (Any = 1)3
- (b) **True Shape of sign (4)**
- (v) Identify true shape of triangular face2
 - (vi) Determine true shape of parallelogram.....2

Total = 20

QUESTION A-3

MARKS

Location of point on roadway

- (i) Join O to S (or alternative correct method)5
- (ii) Identification of concept of rotation as a solution method5
- (iii) Establish rotation angle (or use of angle at centre & circumference locus).....5
- (iv) Location of required point on roadway5

Total = 20

QUESTION A-4

MARKS

Perspective of bin outline (15)

- (i) Locate required 5 points on outline of bin5
- (ii) Determine edges in perspective (vertical, horizontal and sloping)7
- (iii) Determine and use Auxiliary Vanishing Point... (1,2).....3

Perspective of logo (5)

- (iv) Perspective of horizontal lines2
- (v) Perspective of converging lines2
- (vi) Completion of logo1

Total = 20

QUESTION B-1

MARKS

(a)	End view of structure (19)	
	(i) Construct and draw semi cylinder	8
	(ii) Construct and draw vertical rectangle	8
	(iii) Draw straight line elements and complete end view	3
(b)	Elevation of structure (21)	
	(iv) Outline of rectangular portion of building	4
	(v) Determine major and minor axis for curve ABC ... (1,2)	3
	(vi) Determine additional required points on ellipse ABC (minimum of 6)	4
	(vii) Draw required elliptical curve	2
	(viii) Establish top points on curves on vertical surface	2
	(ix) Determine additional points on curves on vertical surface (minimum 4)	2
	(x) Draw required curves on vertical surface	2
	(xi) Draw top elliptical curve (by translation or otherwise)	2
(c)	Centre of curvature (5)	
	(xii) Locate the two focal points	2
	(xiii) Use of required construction to establish P	3

Total = 45

QUESTION B-2

MARKS

(a)	Elevation and plan of pyramid (4)	
	(i) Draw elevation of given pyramid	2
	(ii) Draw plan of pyramid	2
(b)	Plan and elevation of inclined prism (14)	
	(iii) Position and draw cross-section view	4
	(iv) Draw outline elevation of inclined prism	4
	(v) Draw outline plan of prism, incl. triangular end.....	6
(c)	Interpenetration on left hand side (6)	
	(vi) Determine points a, b & c in elevation and plan	3
	(vii) Draw “intersection triangle”	3
	Interpenetration on right hand side (13)	
	(viii) Determine points d, e & f in elevation and plan.....	9
	(ix) Determine points g & h in elevation and plan	4
	Completion of drawing (8)	
	(x) Joining up of lines in correct order	6
	(xi) Hidden detail	2

Total = 45

QUESTION B-3

MARKS

- (a) **Plan and Outline Elevation (9)**
- (i) Use given coordinates to draw required plan.....5
 - (ii) Establish points A, B, D & F in elevation....(4x1).....4
- (b) **Completion of Elevation (9)**
- (iii) Construction to determine height “h” in elevation4
 - (iv) Completion of elevation.... (5x1).....5
- (c) **Dihedral Angle (24)**
- (v) New XY taken parallel to line of intersection4
 - (vi) Projection of planes and line of intersection on new XY4
 - (vii) Additional XY taken perpendicular to line of intersection8
 - (viii) Projection of ABCD and ABEF as lines and indicating dihedral angle8
- (d) **Determine traces (3)**
- (ix) Identification of H.T.1
 - (x) Construction to determine V.T.1
 - (xi) Drawing of V.T.1

Total = 45

QUESTION C-1

MARKS

(a) Earthworks for roadway (34)

Earthworks between A and B (Level) - Embankment

- (i) Draw parallel lines at 10m intervals2
- (ii) Identify intersections with contours and draw curve4

Earthworks on curved section between B and C (Level Curve) - Cutting

- (iii) Draw arcs at 5m intervals3
- (iv) Identify intersections with contours and draw curve4

Earthworks between C and D (Level) - Embankment

- (v) Draw parallel line at 10m interval2
- (vi) Identify intersections with contours and draw curve4

Earthworks between D and E (Falling) - Cutting

- (vii) Draw required arc6
- (viii) Draw parallel lines at 5m intervals3
- (ix) Identify intersections with contours and draw curve6

(b) Mine Shaft (11)

- (x) Determine vertical section (profile) on PR...(3,2,2)7
- (xi) Draw sloping mineshaft in profile view.....2
- (xii) Draw tangent to profile parallel to mineshaft1
- (xiii) Determine position of vertical borehole in plan1

Total = 45

QUESTION C-2

MARKS

(a) Outline plan and elevation (31)

- (i) Draw base and support pillar in plan and elevation ... (2,2,2,2)8
- (ii) Establish extremities on hyperbolic curves (height and width)... (2,2)4
- (iii) Establish both vertices on double hyperbola3
- (iv) Construction to determine additional points on curves ... (min 8) ... (8,3x1)11
- (v) Draw outline of hyperbolic curves (3,2) (any = 2)5

(b) Sloping Top (7)

- (vi) Draw sloping top in elevation2
- (vii) Determine end points on curve in plan2
- (viii) Determine correct additional points (min 3) in plan and draw curve3

(c) Vertical Opening (7)

- (ix) Draw vertical opening in plan.....3
- (x) Determine end points on curve in elevation2
- (xi) Determine correct additional points (min 4) in elevation and draw curve2

Total = 45

QUESTION C-3

MARKS

- (a) Plan and elevation of surfaces A, B, C & D (12)**
- (i) Draw outline plan.... (6x1)6
 - (ii) Draw elevation and complete plan of surfaces C & D ...(2,1).....3
 - (iii) Draw elevation and complete plan of surfaces A & B ...(2,1).....3
- (b) Window E and dihedral angle (18)**
- (iv) Determine top of surface E in elevation.....2
 - (v) Determine plan of surface E.... (5x1).....5
 - (vi) View showing true length of line of intersection between B and E4
 - (vii) Construction to determine dihedral angle5
 - (viii) Indicating dihedral angle.....2
- (c) Development of surface E (5)**
- (ix) Construction to determine true shape.....3
 - (x) Draw required development2
- (d) Dormer on right hand side (10)**
- (xi) Draw plan of dormer window.... (1, 3x1).....4
 - (xii) View showing true length of line of intersection between D and F2
 - (xiii) Construction to determine height 'h' for dormer window2
 - (xiv) Completion of elevation as required2

Total = 45

QUESTION C-4

MARKS

(a) Link Mechanism (25)

- (i) Draw links and circular paths as given.... (7x1).....7
- (ii) Divide semi-circle into equal parts (min 6)3
- (iii) Divide circle into corresponding no. of equal parts.....3
- (iv) Locate positions for point **D**.... (3,3).....6
- (v) Extend arm **CD** to determine points on required locus (point P)4
- (vi) Draw required locus2

(b) Helical Path (20)

(i) Projections of cylinder

- (vii) Draw outline plan and elevation of cylinder2
- (viii) Locate points **A** and **B** in elevation and plan4

(ii) Development of the front half of cylinder

- (ix) Determine height and width for development ... (1,2)3
- (x) Locate points **A** and **B** on development.2

(iii) Helical Curve

- (xi) Determine points on helix (min 4, incl. “turning” point).... (4x1).....4
- (xii) Draw required helix.... (any = 1)3

(iv) Rotation Angle

- (xiii) Indicate rotation angle as required2

Total = 45

QUESTION C-5**MARKS****(a) Sectional elevation (42)*****Assembly (5)***

(i) Relative positioning of components5

Press Body (10)

(ii) Outline...(2,2,2)6

(iii) Inner detail (recess, rib and holes)(4x1)4

Fixed Bottom Die (3)

(iv) Outline2

(v) Inner detail1

Top Moving Die (4)

(vi) Outline2

(vii) Curved Recess2

Vertical Ram (2)

(viii) Outline of Ram1

(ix) Inner detail (holes)1

Handle (7)

(x) Outline of handle4

(xi) Inner detail (opening, recess and hole)3

Top Hinge (4)

(xii) Outline of hinge3

(xiii) Inner detail (openings)1

Drawing Completion (6)

(xiv) Presentation, Hatching and Centrelines ...(4,1,1)6

(b) Rotation angle for handle (4)

(xv) Determine upper pin centre on handle after vertical movement of ram3

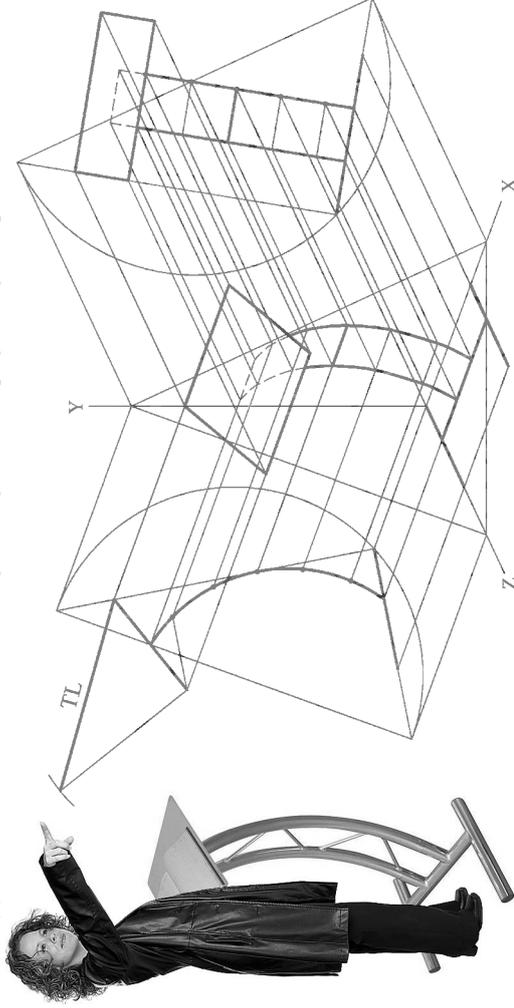
(xvi) Determine and indicate angle of rotation1

Total = 45

SECTION A - Core - Answer Any Three of the questions on this A3 sheet

A-1. The 3D graphic below shows a lectern. The drawing on the right shows an incomplete trimetric projection of a similar lectern using the axonometric axes method.

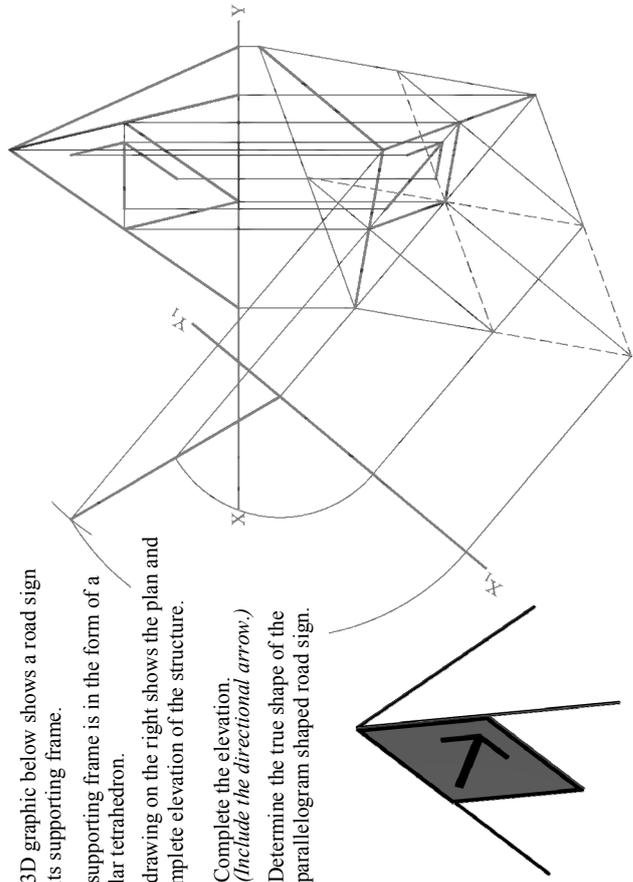
- (a) Complete the axonometric projection of the lectern.
- (b) Determine and indicate the true diagonal length of the sloping rectangular top.



A-2. The 3D graphic below shows a road sign and its supporting frame.

The supporting frame is in the form of a regular tetrahedron.
The drawing on the right shows the plan and incomplete elevation of the structure.

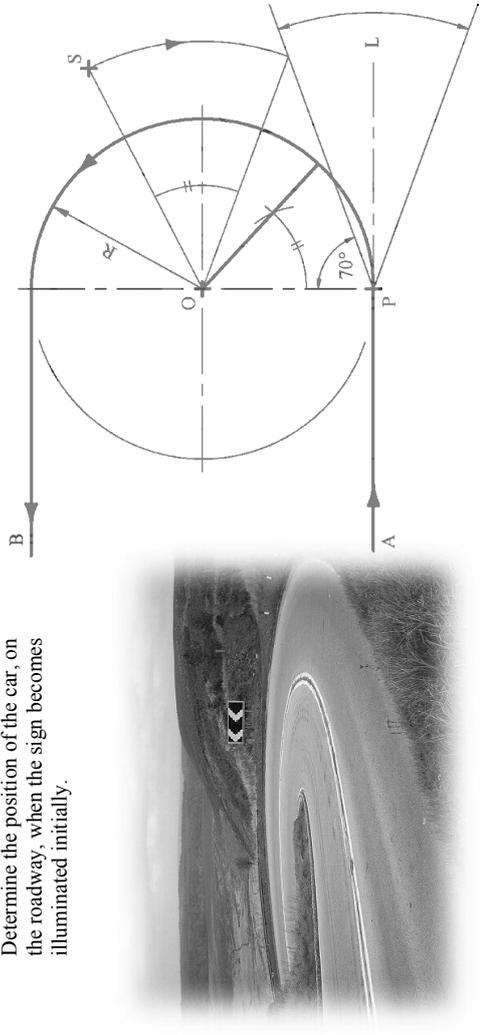
- (a) Complete the elevation.
(*Include the directional arrow.*)
- (b) Determine the true shape of the parallelogram shaped road sign.



A-3. The careful positioning of road signs is of particular importance on dangerous bends, as shown in the image below. This is to ensure that they are clearly visible by day and also by night.

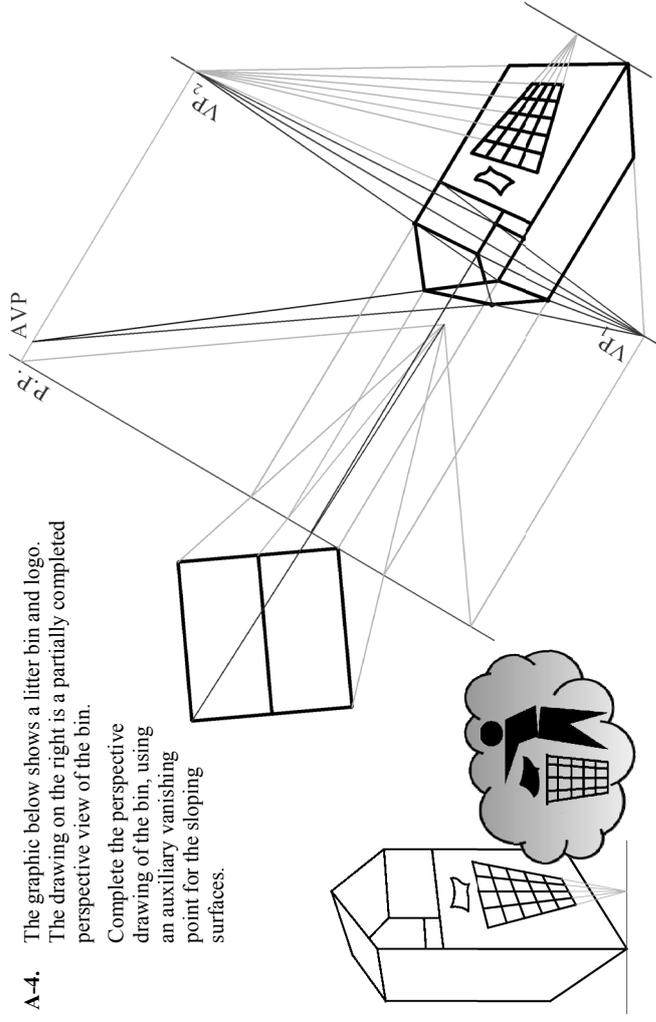
The drawing on the right below shows the plan view of a hairpin (U-shaped) bend. Point **P** shows the position of a car travelling along the road from **A** to **B** at night. The angle **L** represents the beam of light from the headlights and **S** shows the position of a road sign.

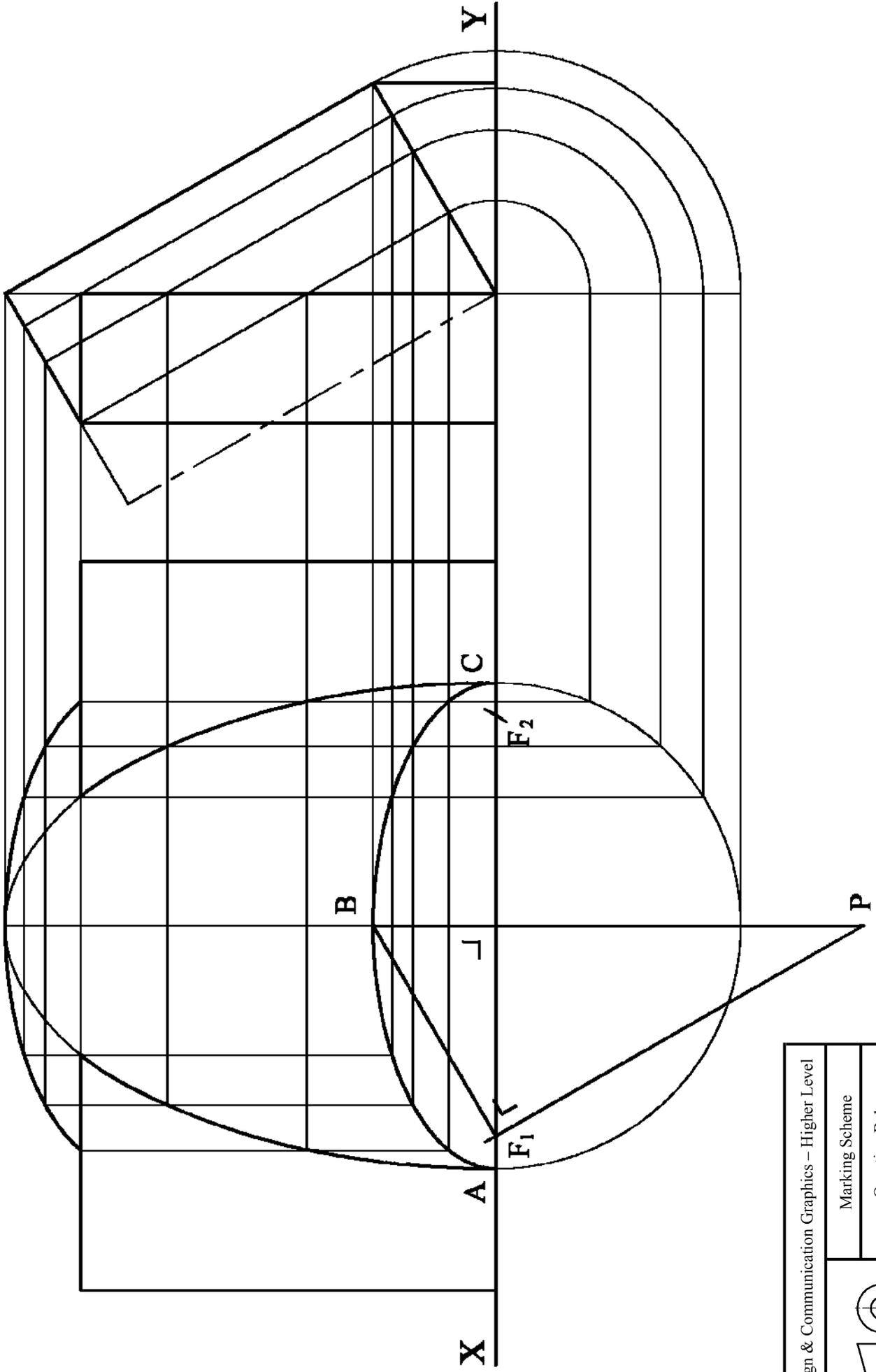
Determine the position of the car, on the roadway, when the sign becomes illuminated initially.



A-4. The graphic below shows a litter bin and logo. The drawing on the right is a partially completed perspective view of the bin.

Complete the perspective drawing of the bin, using an auxiliary vanishing point for the sloping surfaces.



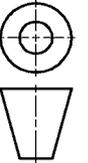


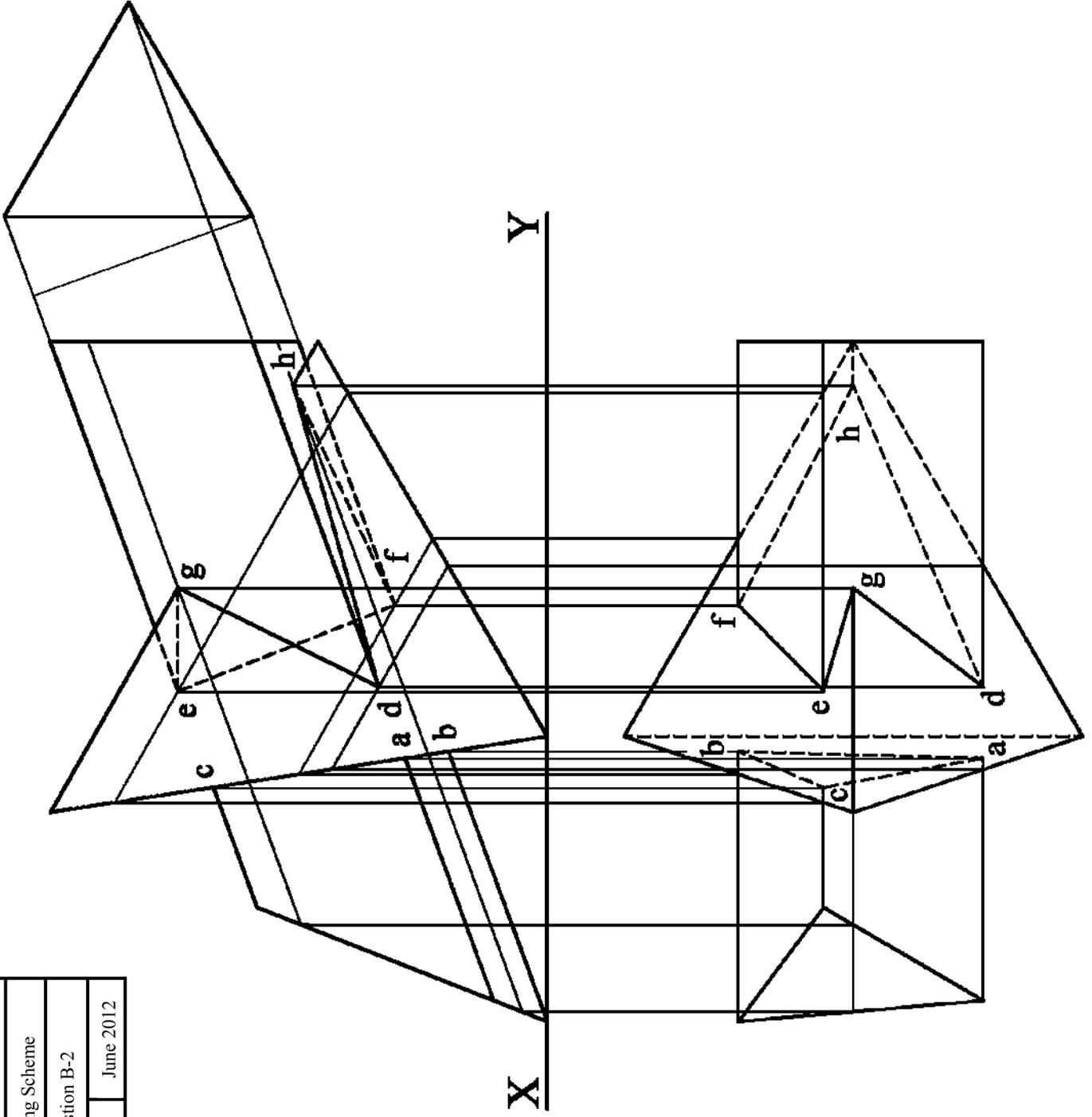
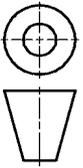
Design & Communication Graphics – Higher Level

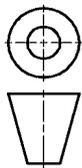
Marking Scheme

Question B-1

Scale: n/a June 2012





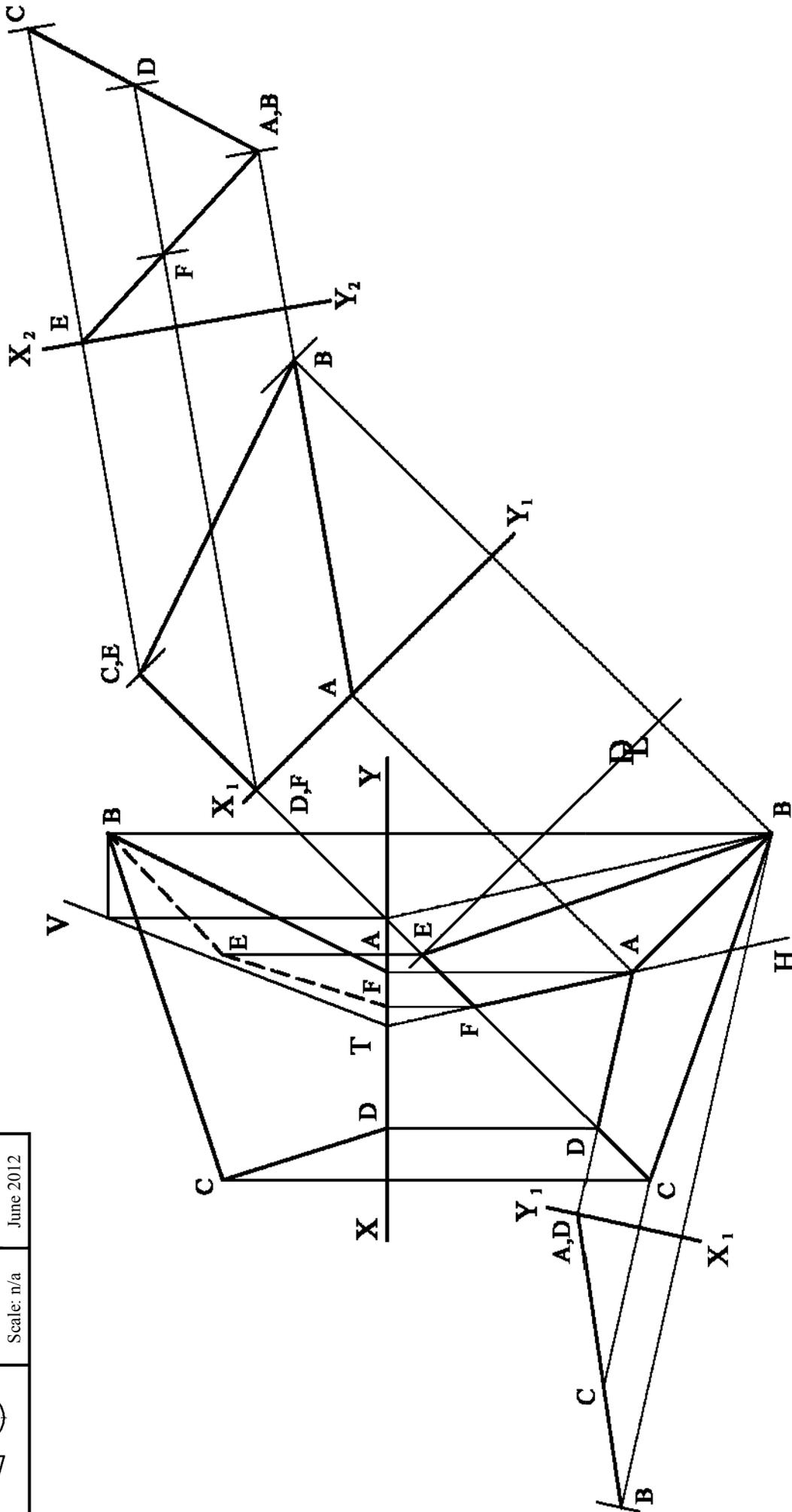


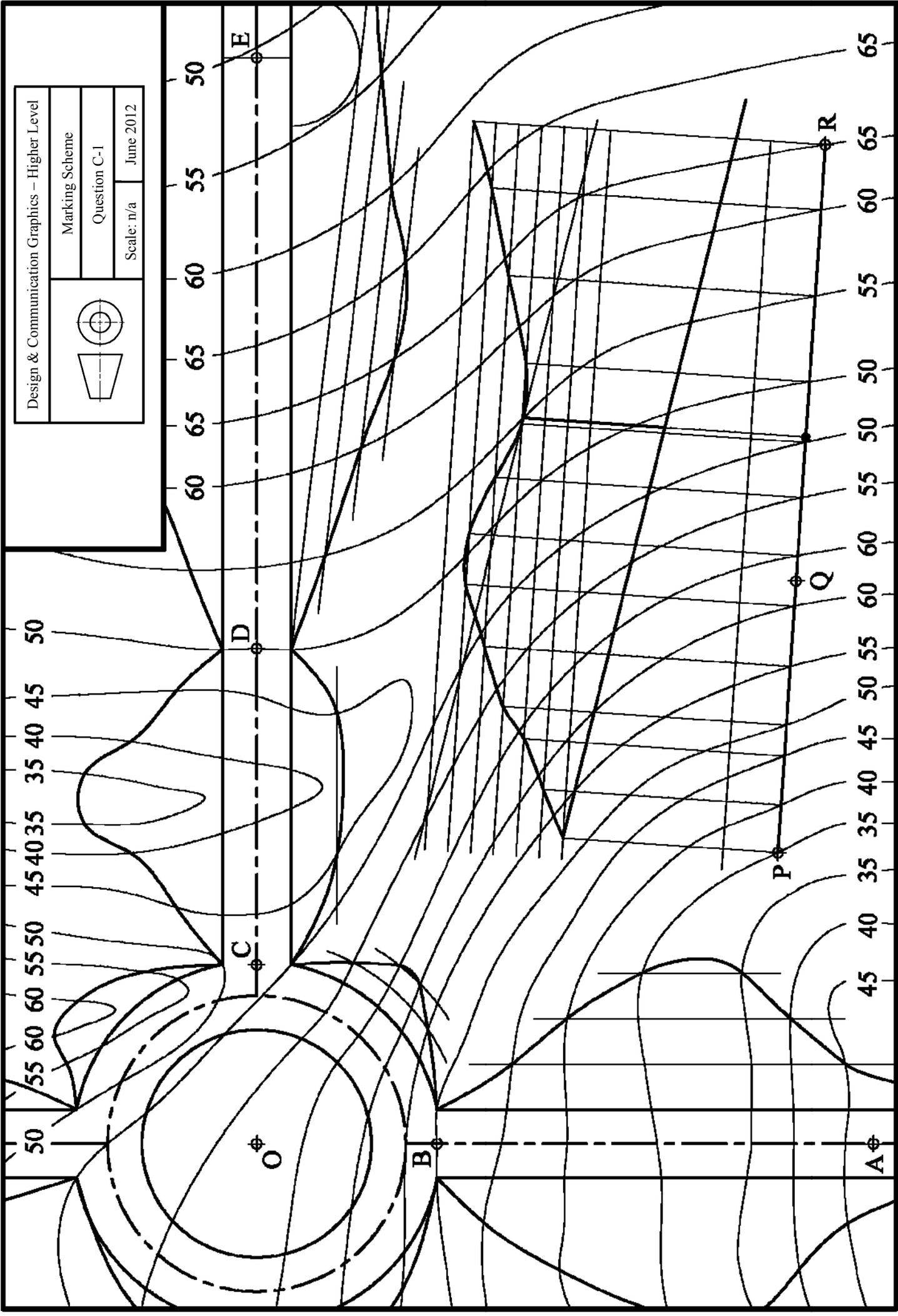
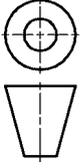
Marking Scheme

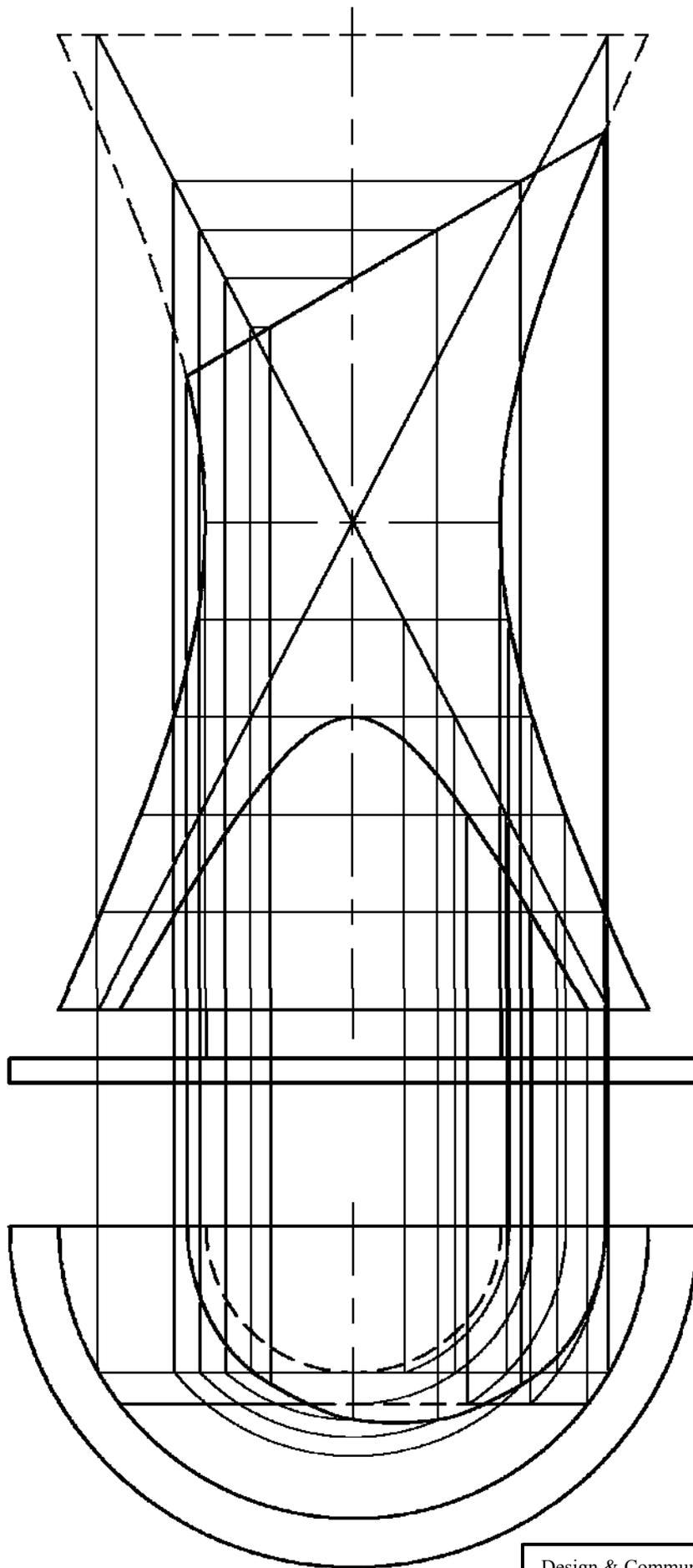
Question B-3

Scale: n/a

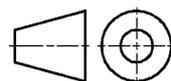
June 2012







Design & Communication Graphics – Higher Level

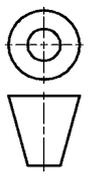
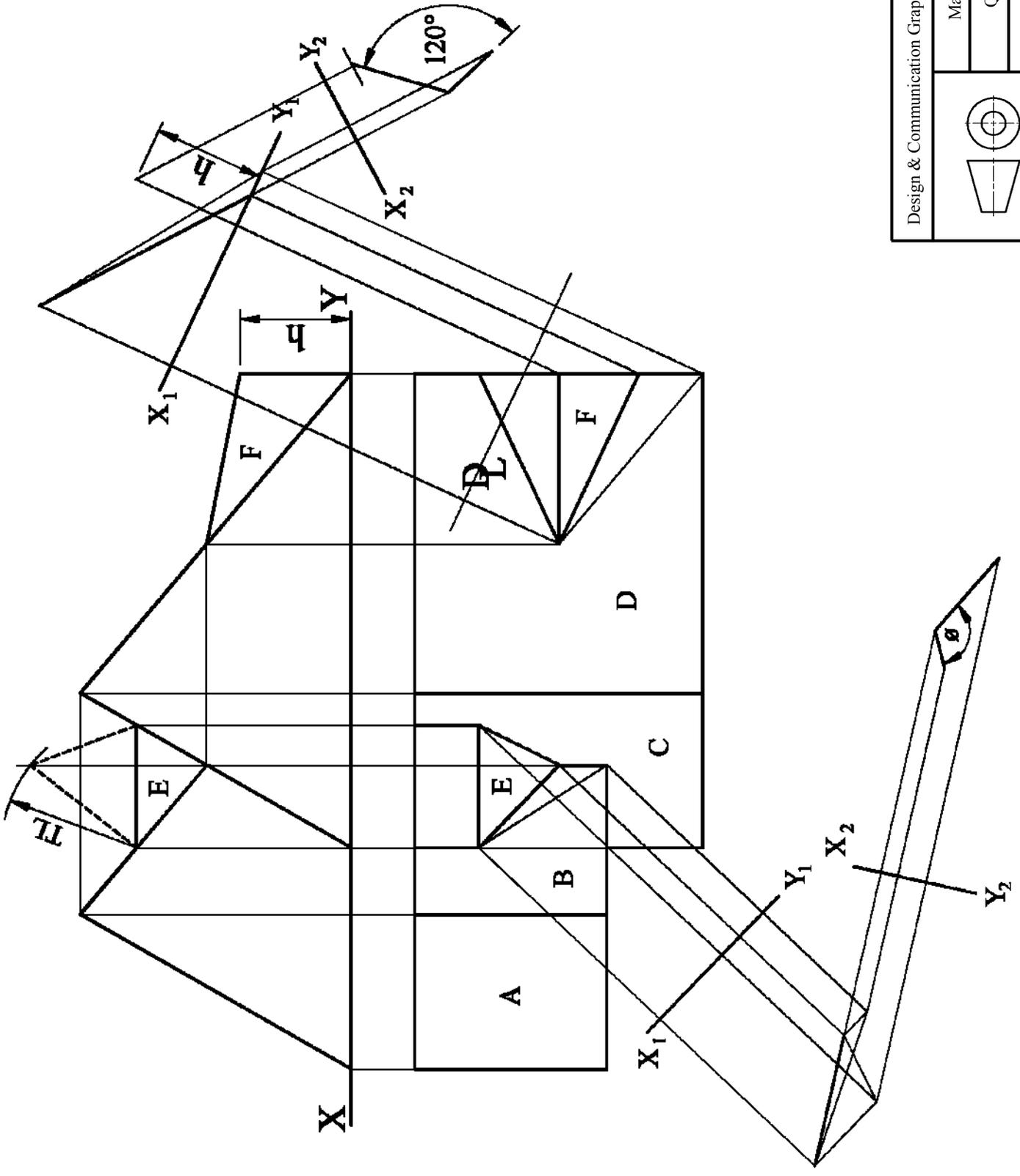


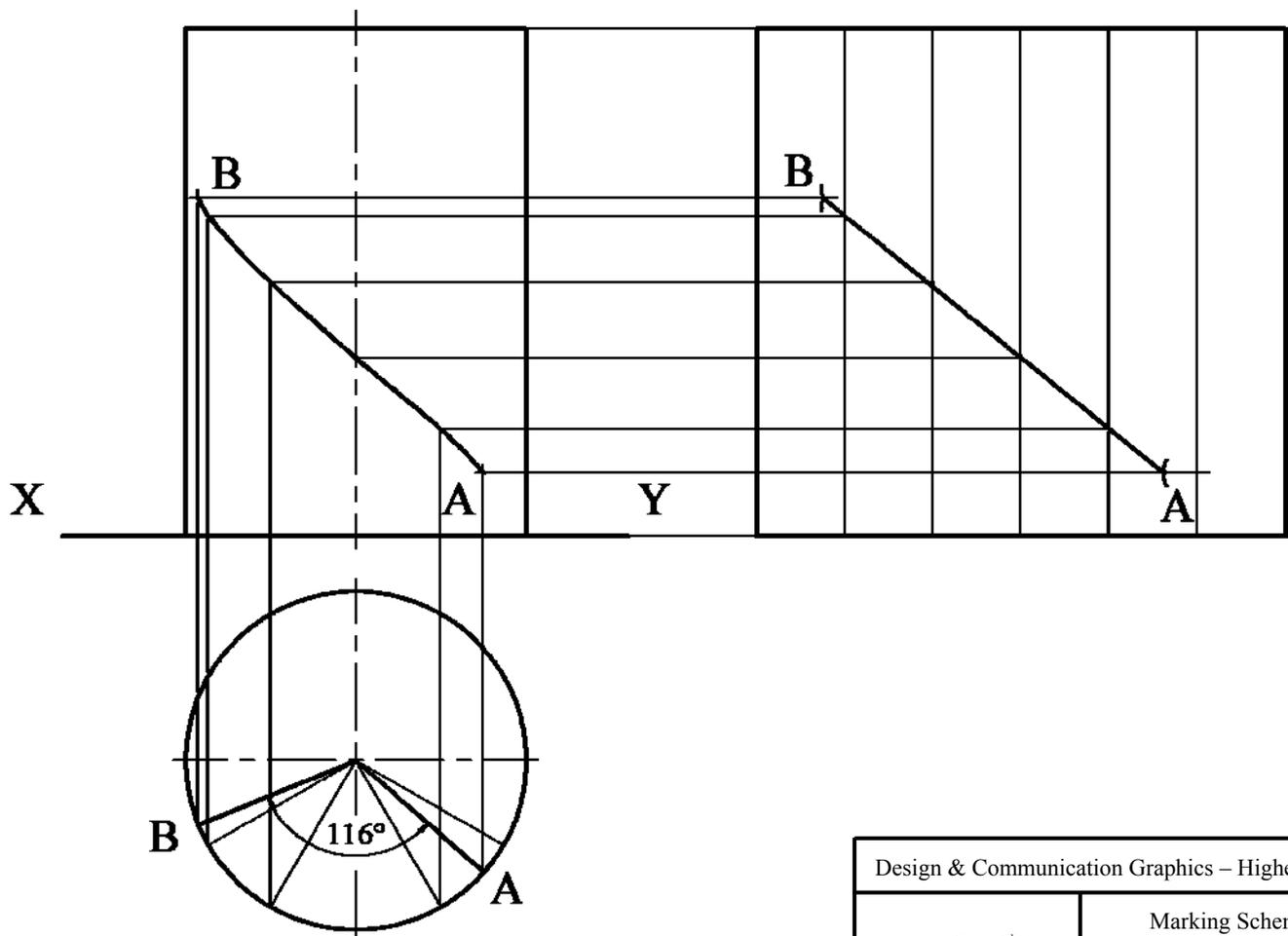
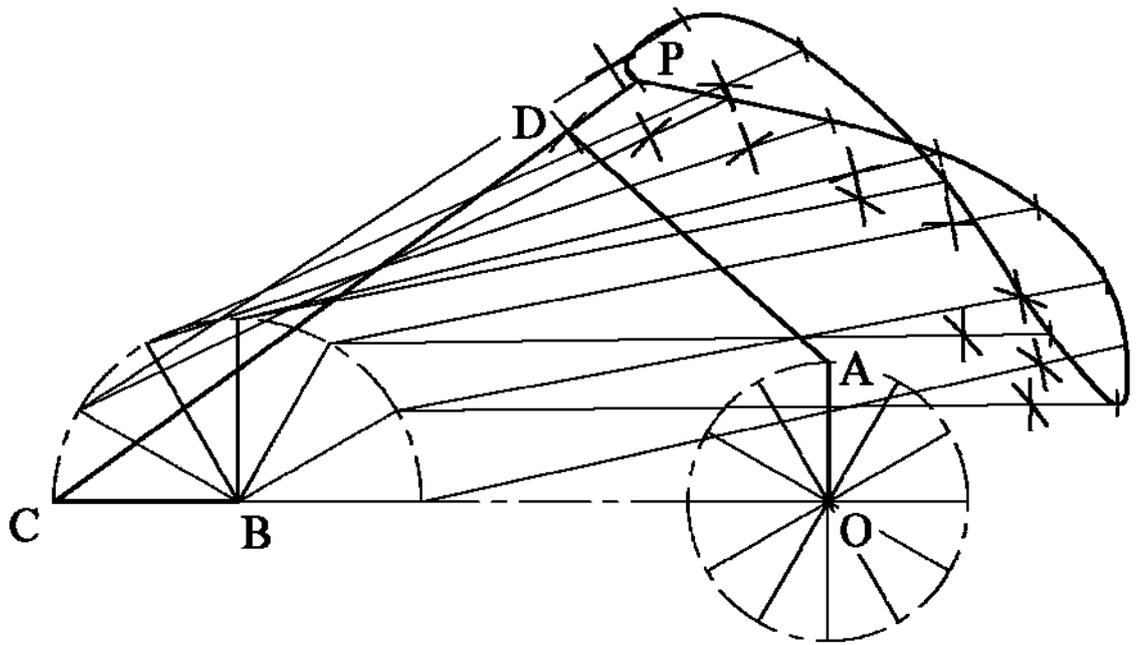
Marking Scheme

Question C-2

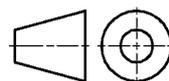
Scale: n/a

June 2012





Design & Communication Graphics – Higher Level

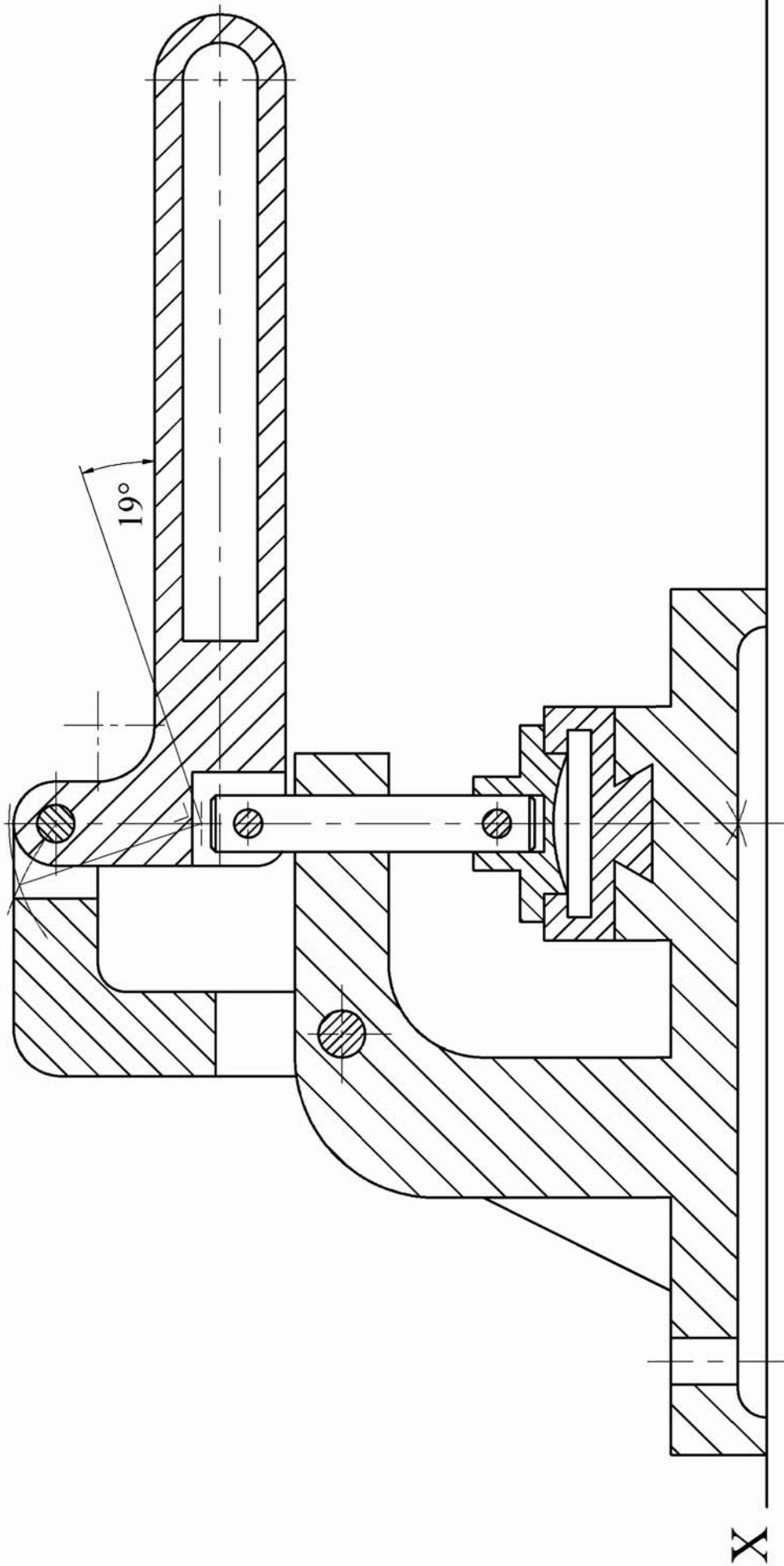


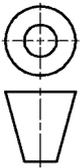
Marking Scheme

Question C-4

Scale: n/a

June 2012



Design & Communication Graphics – Higher Level	
	Marking Scheme
Question C-5	
Scale: n/a	June 2012



Design and Communication Graphics

Student Assignment—Higher Level

Assessment Sheet

Candidate Exam No.

Output	Marking criteria	Marks
1	Design Research - Exploration of main design features using primary & secondary research; Selection of appropriate graphics; Effective layout and presentation of information combining images, sketches & annotations	
	a) Extensive range of relevant criteria considered - excellent presentation	13 - 15
	b) Most relevant criteria considered - very good presentation	10 - 12
	c) Some relevant criteria considered - good presentation	7 - 9
	d) Limited criteria considered - fair presentation	4 - 6
	e) At least one criterion considered - poor presentation	0 - 3
2	Design Feature Comparison - Selection of two appropriate images; Main dimensions inserted; Comparison of main design features; Contrasting of main design features; Effective layout and presentation of information combining images, sketches & annotations	
	a) Extensive range of relevant criteria considered - excellent presentation	13 - 15
	b) Most relevant criteria considered - very good presentation	10 - 12
	c) Some relevant criteria considered - good presentation	7 - 9
	d) Limited criteria considered - fair presentation	4 - 6
	e) At least one criterion considered - poor presentation	0 - 3
3	Freehand Graphical Representation – Proportion; Form/Volume; Use of Tone/Line for effective rendering; Detailed communication of main design features to include 3D presentation quality drawing; Layout & presentation	
	a) Extensive range of relevant criteria considered - excellent presentation	17 - 20
	b) Most relevant criteria considered - very good presentation	13 - 16
	c) Some relevant criteria considered - good presentation	9 - 12
	d) Limited criteria considered - fair presentation	5 - 8
	e) At least one criterion considered - poor presentation	0 - 4
4	SolidWorks Parts, Assembly, Drawing and eDrawing files	
	• Adherence to required filing structure	3
	• Creation of a minimum of 5 Part files	3
	• Part models – Proficiency in Parametric CAD, including economy of design and design intent; Selection of most appropriate profiles; Sketches fully defined; Features renamed; Appropriate type of extrusions/end conditions used	10
	• Assembly – Creation of Assembly environment; Accuracy of parts to facilitate correct assembly; Correct mating of parts; Application of appropriate appearances	5
	• Factor of difficulty	5
5	• eDrawing of CAD model	2
	Hardcopy outputs from SolidWorks - Detailed orthographic views of the selected artefact; Section/Detail views where appropriate; Rendered pictorial view of the Assembly; Exploded view of the CAD model; Inclusion of main dimensions, notes and symbols; Appropriate scaling, layout and presentation to be considered	
	a) Extensive range of relevant criteria considered - excellent presentation	13 - 15
	b) Most relevant criteria considered - very good presentation	10 - 12
	c) Some relevant criteria considered - good presentation	7 - 9
	d) Limited criteria considered - fair presentation	4 - 6
e) At least one criterion considered - poor presentation	0 - 3	
6	Photorealistic Representation	
	Produce photorealistic computer generated images of the artefact	7
7	Graphical exploration of design solutions - Exploration of theme/possible solution(s); Justification of chosen solution(s); Use of appropriate images/graphics; Effective layout and presentation of information combining images, sketches & annotations	
	a) Extensive range of relevant criteria considered - excellent presentation	21 - 25
	b) Most relevant criteria considered - very good presentation	16 - 20
	c) Some relevant criteria considered - good presentation	11 - 15
	d) Limited criteria considered - fair presentation	6 - 10
	e) At least one criterion considered - poor presentation	0 - 5
8	Presentation of Modification/Concept Design – Proportion; Form/Volume; Use of Tone/Line for effective rendering; Detailed communication of modified/concept design features; Layout and presentation	
	a) Extensive range of relevant criteria considered - excellent presentation	9 - 10
	b) Most relevant criteria considered - very good presentation	7 - 8
	c) Some relevant criteria considered - good presentation	5 - 6
	d) Limited criteria considered - fair presentation	3 - 4
	e) At least one criterion considered - poor presentation	0 - 2
9	Hardcopy outputs from SolidWorks – CAD Model; Detailed orthographic views of the proposed solution; Section/Detail views where appropriate; Rendered pictorial view of the CAD model; Photorealistic image; Inclusion of main dimensions, notes and symbols; Appropriate scaling, layout and presentation to be considered	
	• Application of CAD skills	5
	a) Extensive range of relevant criteria considered - excellent presentation	17 - 20
	b) Most relevant criteria considered - very good presentation	13 - 16
	c) Some relevant criteria considered - good presentation	9 - 12
	d) Limited criteria considered - fair presentation	5 - 8
e) At least one criterion considered - poor presentation	0 - 4	
Sub-total	Marks deducted for pages in excess of maximum	Total

