



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate 2014

Marking Scheme

Design and Communication Graphics

Higher Level

Note to teachers and students on the use of published marking schemes

Marking schemes published by the State Examinations Commission are not intended to be standalone documents. They are an essential resource for examiners who receive training in the correct interpretation and application of the scheme. This training involves, among other things, marking samples of student work and discussing the marks awarded, so as to clarify the correct application of the scheme. The work of examiners is subsequently monitored by Advising Examiners to ensure consistent and accurate application of the marking scheme. This process is overseen by the Chief Examiner, usually assisted by a Chief Advising Examiner. The Chief Examiner is the final authority regarding whether or not the marking scheme has been correctly applied to any piece of candidate work.

Marking schemes are working documents. While a draft marking scheme is prepared in advance of the examination, the scheme is not finalised until examiners have applied it to candidates' work and the feedback from all examiners has been collated and considered in light of the full range of responses of candidates, the overall level of difficulty of the examination and the need to maintain consistency in standards from year to year. This published document contains the finalised scheme, as it was applied to all candidates' work.

In the case of marking schemes that include model solutions or answers, it should be noted that these are not intended to be exhaustive. Variations and alternatives may also be acceptable. Examiners must consider all answers on their merits, and will have consulted with their Advising Examiners when in doubt.

Future Marking Schemes

Assumptions about future marking schemes on the basis of past schemes should be avoided. While the underlying assessment principles remain the same, the details of the marking of a particular type of question may change in the context of the contribution of that question to the overall examination in a given year. The Chief Examiner in any given year has the responsibility to determine how best to ensure the fair and accurate assessment of candidates' work and to ensure consistency in the standard of the assessment from year to year. Accordingly, aspects of the structure, detail and application of the marking scheme for a particular examination are subject to change from one year to the next without notice.



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2014

***Design and Communication
Graphics
Higher Level***



***Marking Scheme
and Sample Solutions***

(Other valid solutions are acceptable and are marked accordingly)

QUESTION A-1

MARKS

(a) First Flight Path (13)	
(i) Extend line PS in plan	2
(ii) Locate entry point at correct height in end view (or auxiliary view).....	2
(iii) Location of impact point on net in end view (or auxiliary view).....	5
(iv) Complete projections of path in plan and elevation ... (2,2).....	4
(b) Second Flight Path (7)	
(v) Extend line PT in plan	2
(vi) Correct use of 15° angle in auxiliary view (or rotated view).....	2
(vii) Location of impact point on net in elevation.....	1
(viii) Complete projections of line	2
	<hr/>
	Total = 20

QUESTION A-2

MARKS

(a) Completion of Plan and Elevation (14)	
(i) Project required two points on top surface from auxiliary to plan(1,1).....	2
(ii) Complete outline of cut surface in plan(1x3).....	3
(iii) Complete plan incl. hidden detail(2,1)	3
(iv) Projection of required points to elevation	1
(v) Complete outline of cut surface in elevation(1x3).....	3
(vi) Complete elevation.....	2
(b) True Shape of Cut Surface (6)	
(vii) Rotation of cut surface in auxiliary view (or correct use of 2 nd auxiliary view)	2
(viii) Projection to plan (or auxiliary view)	1
(ix) Projections perp. to HT in plan (or widths in auxiliary)	1
(x) Draw required True Shape	2
	<hr/>
	Total = 20

QUESTION A-3

MARKS

(a)	Completion of Elevation (14)	
	(i) Draw remaining horizontal division lines	1
	(ii) Draw division lines radiating from V_2	1
	(iii) Locate points and draw curve ... (Any = 1).....	3
	(iv) Draw second parabola (mirror or otherwise)	2
	(v) Locate additional points on ellipse (min. 3).....	2
	(vi) Draw elliptical curve(s) ...(Any = 1)	3
	(vii) Construction to accurately establish extremities of base	2
(b)	Tangent at Point P (6)	
	(viii) Locate focal points	2
	(ix) Draw lines from P to foci and bisect angle	2
	(x) Draw required tangent	2
	Total =	20

QUESTION A-4

MARKS

(a)	Determine second Vanishing Point (3)	
	(i) Vertical line from S to establish VP_1 in plan	2
	(ii) Locate VP_1 on Horizon Line in perspective view	1
(b)	Perspective of Tennis Court (14)	
	(iii) Establish directions for Left and Right sides of court	2
	(iv) Join points to spectator in plan (min 4 required points)	4
	(v) Project to perspective view (min 4 required projectors)	4
	(vi) Completion of 3 required lines to VP_2	3
	(vii) Completion of remaining line to VP_1	1
(c)	True Height of Net (3)	
	(viii) Determination of true height of net..... (1x3)	3
	Total =	20

QUESTION B-1

MARKS

- (a) Plan and Elevation of Planes (10)**
- (i) Use given coordinates to draw required elevation(5x1)5
- (ii) Use given coordinates to draw required plan(5x1)5
- (b) Dihedral Angle (22)**
- (iii) X_1Y_1 parallel to line of intersection in plan (or elevation)5
- (iv) Projection of planes onto auxiliary view5
- (v) X_2Y_2 perp. to true length of line of intersection.....5
- (vi) Projection of planes onto 2nd auxiliary view3
- (vii) Indication of dihedral angle4
- (c) True shape of surface ABCD (8)**
- (viii) Establish edge view of surface ABCD2
- (ix) Rabattment of edge view of surface ABCD2
- (x) Draw required true shape4
- (d) True shape of Hexagon S (5)**
- (xi) Establish true length of side EF3
- (xii) Draw required hexagon2

Total = 45

QUESTION B-2**MARKS**

- (a) **Axonometric axes and scalene triangle (6)**
- (i) Draw axonometric axes Y and Z orientated as shown(1,1).....2
- (ii) Draw scalene triangle 'abc'(1,1,1).....3
- (iii) Draw X axis1
- (b) **Elevation and End view orientated as shown (15)**
- (iv) Correct development of XY plane in required orientation3
- (v) Correct development of YZ plane in required orientation3
- (vi) Draw top arc in elevation (on XY plane)(1,1).....2
- (vii) Establish widths and heights in elevation3
- (viii) Complete elevation2
- (ix) Establish heights in end view2
- Complete axonometric projection (15)**
- (x) Projections from elevation and end view2
- (xi) Draw given axonometric projection (as presented)2
- (xii) Draw square 'target area' in axonometric view1
- (xiii) Determine points on curve in axonometric view ...(min 5 points, incl. top)5
- (xiv) Draw curve5
- (c) **Tangential Sphere (9)**
- (xv) Locate centre of sphere in axonometric view(1,1,3).....5
- (xvi) Draw correct radius sphere..(2,2).....4

Total = 45

QUESTION B-3

MARKS

(a)	Plan and Elevation (8)	
	(i) Draw the plan and elevation of sphere(2x2).....	4
	(ii) Projections of inclined ‘stick’	4
(b)	Auxiliary Elevation (8)	
	(iii) Draw X_1Y_1 parallel to ‘stick’	1
	(iv) Projections perp. to X_1Y_1	1
	(v) Complete auxiliary elevation of lollypop	3
	(vi) Cube-shaped packaging tangential to sphere and correctly orientated	3
(c)	Plan and elevation of cube-shaped packaging (29)	
	(vii) Projection from auxiliary elevation to plan	2
	(viii) Establishment of correct widths in plan	2
	(ix) Completion of correct plan of cube to include hidden detail	3
	(x) Projections from plan to elevation	2
	(xi) Transfer of heights to elevation (1x4)	4
	(xii) Completion of correct elevation of cube to include hidden detail(9,3)	12
	(xiii) Hidden detail of stick in plan and elevation(2,2).....	4
—		
Total =		45

QUESTION C-1

MARKS

(a)	Earthworks for Fairway and Putting Green (30)	
	<i>Earthworks between A and B (Level) - Embankment</i>	
	(i) Draw parallel lines at 7.5mm intervals	3
	(ii) Identify intersections with contours and draw curve	4
	<i>Earthworks between A and B (Level) - Cutting</i>	
	(iii) Draw parallel lines at 5mm intervals	3
	(iv) Identify intersections with contours and draw curve	4
	<i>Earthworks for Putting Green (Level) - Embankment</i>	
	(v) Draw parallel curves at 7.5mm intervals	2
	(vi) Identify intersections with contours and draw curve	2
	<i>Intersection between earthworks for Fairway and Putting Green</i>	
	(vii) Extend curves to establish correct intersection point(2,1)	3
	<i>Earthworks between B and C (Rising) - Embankment</i>	
	(viii) Draw required arc	4
	(ix) Draw parallel lines at 7.5mm intervals	2
	(x) Identify intersections with contours and draw curve	3
(b)	Profile on DE (9)	
	(xi) Measure and draw height lines at 5mm intervals.....	2
	(xii) Projections from intersections between line DE and contours	2
	(xiii) Draw main right hand portion of profile	3
	(xiv) Draw level left hand portion of profile	1
	(xv) Draw middle hyperbolic portion of profile	1
(c)	Parabolic Flight Path (6)	
	(xvi) Establish highest point of ball on flight path	2
	(xvii) Construction to determine points on parabola	2
	(xviii) Draw parabola and identify impact point	2

Total = 45

QUESTION C-2

MARKS

(a) Elevation of Structure (13)	
(i) Draw rectangular outline of parabola	4
(ii) Construction to determine points on parabola on RHS (or LHS)	3
(iii) Mirror points to other side	2
(iv) Draw parabolic curve in elevation (any curve = 1).....	3
(v) Complete elevation	1
(b) Outline End View (8)	
(vi) Draw rectangular outline of parabola	2
(vii) Construction to determine points on parabola ABC	3
(viii) Draw parabolic curve(any = 1)	3
(c) Plan of Structure (18)	
(ix) Locate points A, C, E & D	4
(x) Establish widths on curve on RHS in plan.....	4
(xi) Draw curve on RHS in plan(any = 1)	3
(xii) Establish widths on curve on LHS in plan.....	4
(xiii) Draw curve on LHS in plan(any = 1)	3
(d) True Shape of Surface AEC (6)	
(xiv) Establish widths on true shape (by rabattment or auxiliary view)	2
(xv) Locate points on true shape of curve AEC	3
(xvi) Draw true shape curve	1

Total = 45

QUESTION C-3**MARKS**

- (a) **Plan and Elevation of surfaces A and B (9)**
- (i) Draw outline of pentagon in plan.....5
- (ii) Identify surfaces A and B in plan2
- (iii) Determine surfaces A and B in elevation2
- (b) **Dihedral angle between surfaces A and B (16)**
- (iv) X_1Y_1 parallel to line of intersection3
- (v) View of surfaces showing true length of line of intersection4
- (vi) X_2Y_2 perpendicular to line of intersection4
- (vii) Determination of dihedral angle5
- (c) **Traces of plane containing surface B (8)**
- (viii) Construction to determine point on HT (or VT)3
- (ix) Draw HT (by establishing 2nd point or identifying parallel relationship)3
- (x) Draw VT (by establishing 2nd point or identifying parallel relationship)2
- (d) **Projections of surface C (12)**
- (xi) X_1Y_1 parallel to line of intersection2
- (xii) View of surface B showing true length of line of intersection3
- (xiii) X_2Y_2 perpendicular to line of intersection2
- (xiv) Edge view of surface B1
- (xv) Draw surface C in 2nd auxiliary view (160° angle)2
- (xvi) Complete surface C in plan and elevation2

Total = 45

QUESTION C-4

MARKS

(a) Link Mechanism (23)

- (i) Draw circular path, link OA, point S and link AB as given....(5x1)5
- (ii) Divide circle into equal parts (min 12)4
- (iii) Draw arm AB in all positions...11
- (iv) Draw required locus (incl. turning points)(any = 1)3

(b) Cam and Displacement Diagram (22)

- (v) Draw camshaft1
- (vi) Draw line AB1
- (vii) Divide circle into 12 equal parts4
- (viii) Construction to determine points on archimedian spiral6
- (ix) Draw spiral (any = 1)3

- (x) Horizontal divisions on displacement diagram.....2
- (xi) Transfer of heights to displacement diagram2
- (xii) Complete displacement diagram3

Total = 45

QUESTION C-5**MARKS****(a) Sectional elevation (42)*****Assembly (7)***

(i) Relative positioning of components7

Base (8)

(ii) Outline of section4

(iii) Inner detail (holes x 2, shell, chamfers and fillets)(4x1)4

Swivel Shaft (3)

(iv) Outline of spherical base and upright bar2

(v) Threads1

Clamping Nut (6)

(vi) Outline2

(vii) Inner detail, External chamfers and Internal chamfers ...(1,1,2)4

Fixed Jaw (3)

(viii) Outline of Rectangular portion1

(ix) Outline of Jaw portion2

Moving Jaw and Crossbar Nut (6)

(x) Outline of Rectangular portion1

(xi) Outline of Jaw portion1

(xii) Inner detail (Slot, two Holes & Crossbar Nut)4

Adjusting Screw (3)

(xiii) Right hand end, Middle portion and threaded bar(1,1,1).....3

Retaining Screw (3)

(xiv) Screw head, threaded portion & cylindrical end(1,1,1).....3

Drawing Completion (3)

(xv) Presentation, Hatching and Centrelines ...(1,1,1)3

(b) Position of P after Closing and Rotation (3)

(xvi) Establish P in Closed position1

(xvii) Location of P after rotation (rotation arc and final position) ...(1,1)2

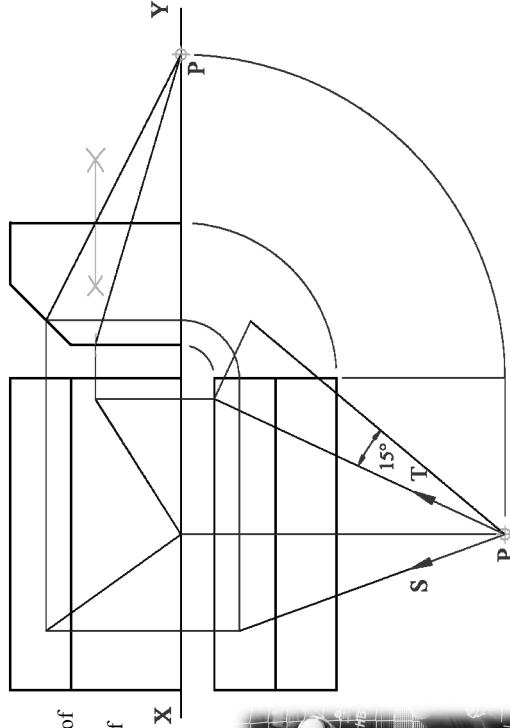
Total = 45

SECTION A - Core - Answer any three of the questions on this A3 sheet.

A-1. The drawing shows the projections of a set of soccer goal posts. A ball is positioned at **P** for two penalty kicks during a World Cup match. The ball travels in a straight line and hits the net each time.

(a) The line **PS**, in plan, shows the start of the flight path of the ball for the 1st penalty kick. The ball crosses the goal line at a height that is halfway between the ground and the crossbar. Draw the projections of the full flight path.

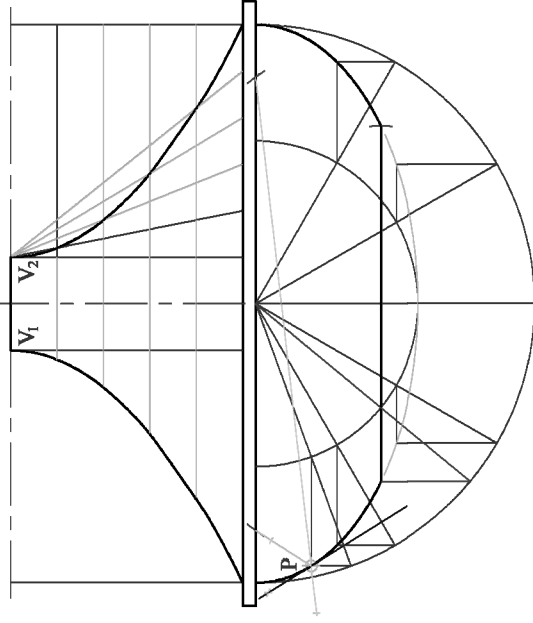
(b) Similarly, the line **PT**, which makes an angle of 15° with the ground, shows the flight path of the ball for the 2nd penalty kick. Draw the projections of the full flight path.



A-3. The 3D graphic below shows a *tagine*, which is a type of clay oven frequently used in North African cooking. The drawing on the right shows the incomplete elevation of the *tagine*. The upper “lid” is based on two semi-parabolas which are inscribed in rectangles and the lower dish is based on a semi-ellipse.

(a) V_1 and V_2 are the vertices of the semi-parabolas. **P** is a point on the semi-ellipse. Small portions of two of the curves have already been drawn. Complete the elevation of the *tagine*. Show clearly how the length of the base is obtained.

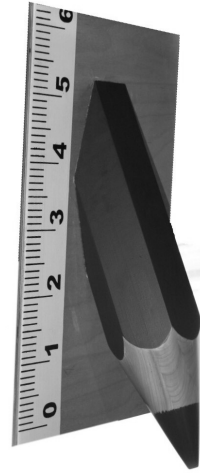
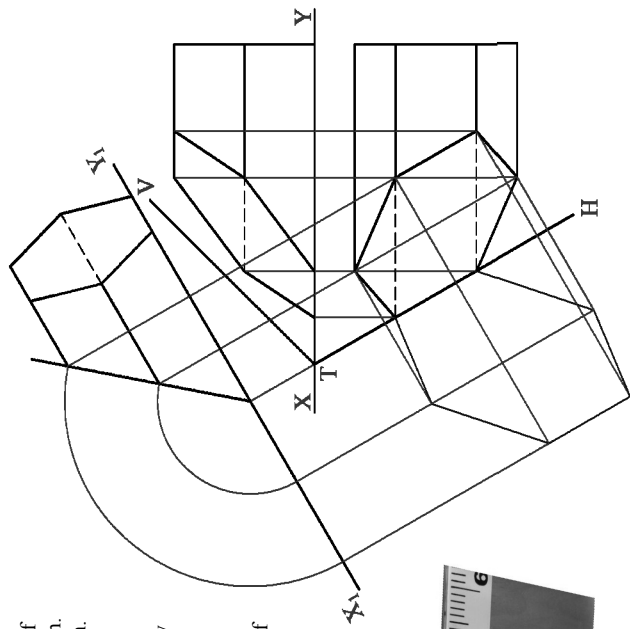
(b) Draw a tangent to the curve at the point **P**.



A-2. The 3D graphic below shows a piece of play equipment from a science museum. It includes a truncated hexagonal prism. The drawing on the right shows the incomplete projections of a similar hexagonal prism which has been cut by the oblique plane **VTH**. An auxiliary elevation is also given.

(a) Complete the plan and elevation of the cut prism.

(b) Determine the true shape of the cut surface.

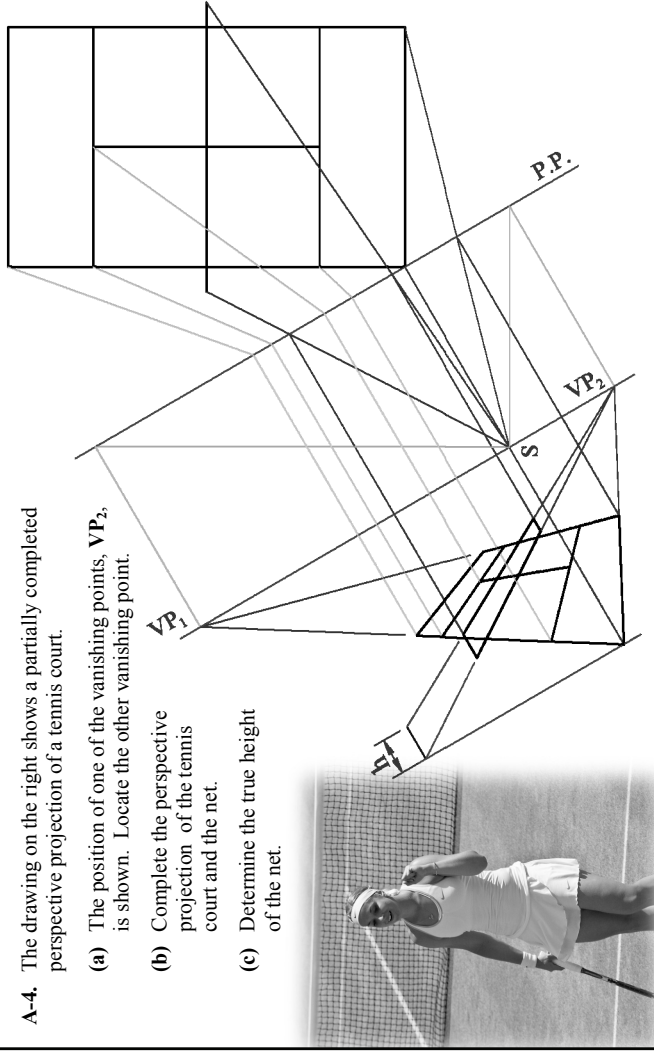


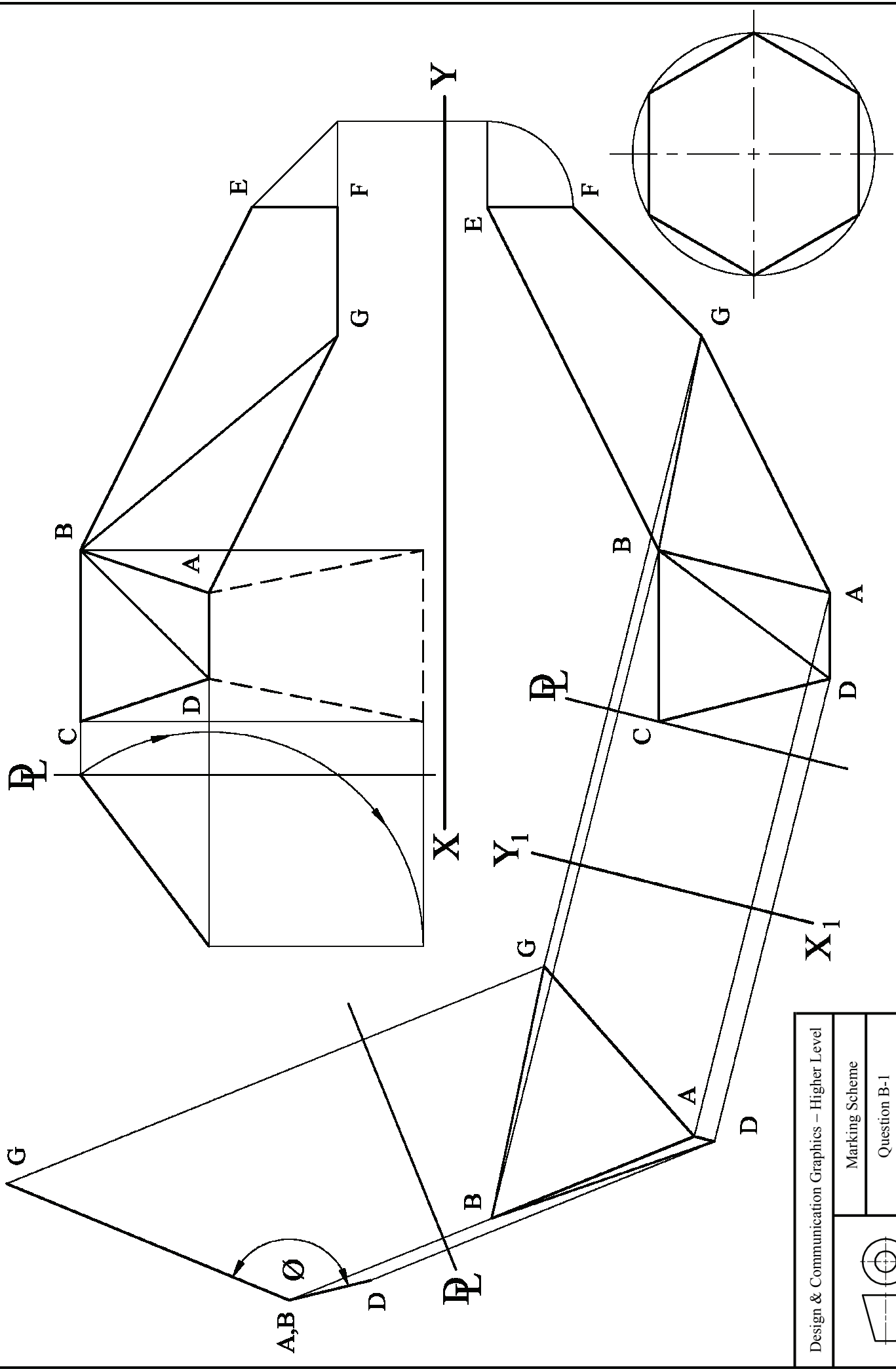
A-4. The drawing on the right shows a partially completed perspective projection of a tennis court.

(a) The position of one of the vanishing points, VP_2 , is shown. Locate the other vanishing point.

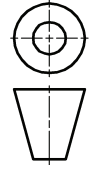
(b) Complete the perspective projection of the tennis court and the net.

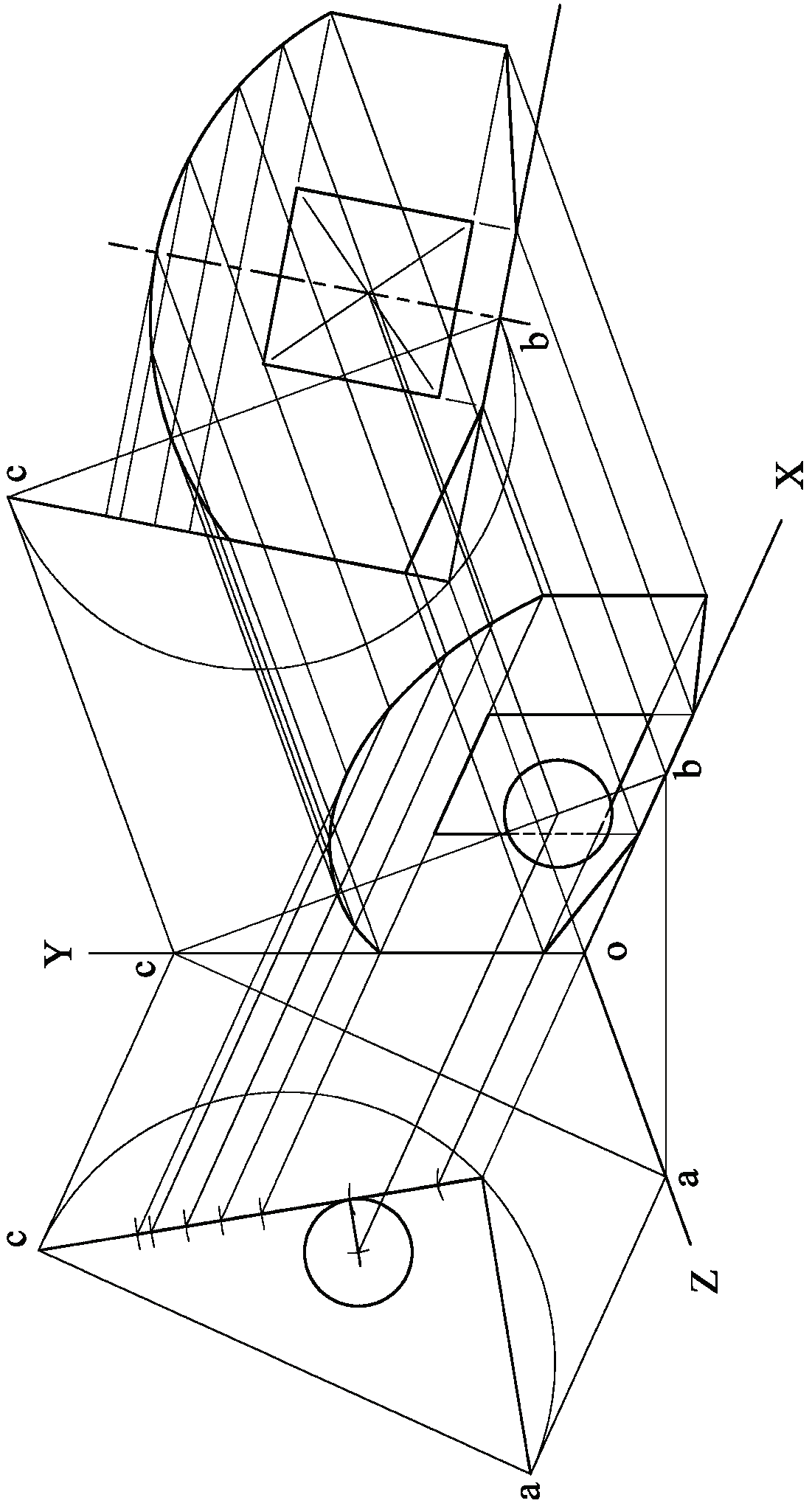
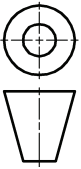
(c) Determine the true height of the net.

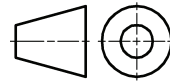




Design & Communication Graphics – Higher Level	
Marking Scheme	
Question B-1	
Scale: n/a	June 2014





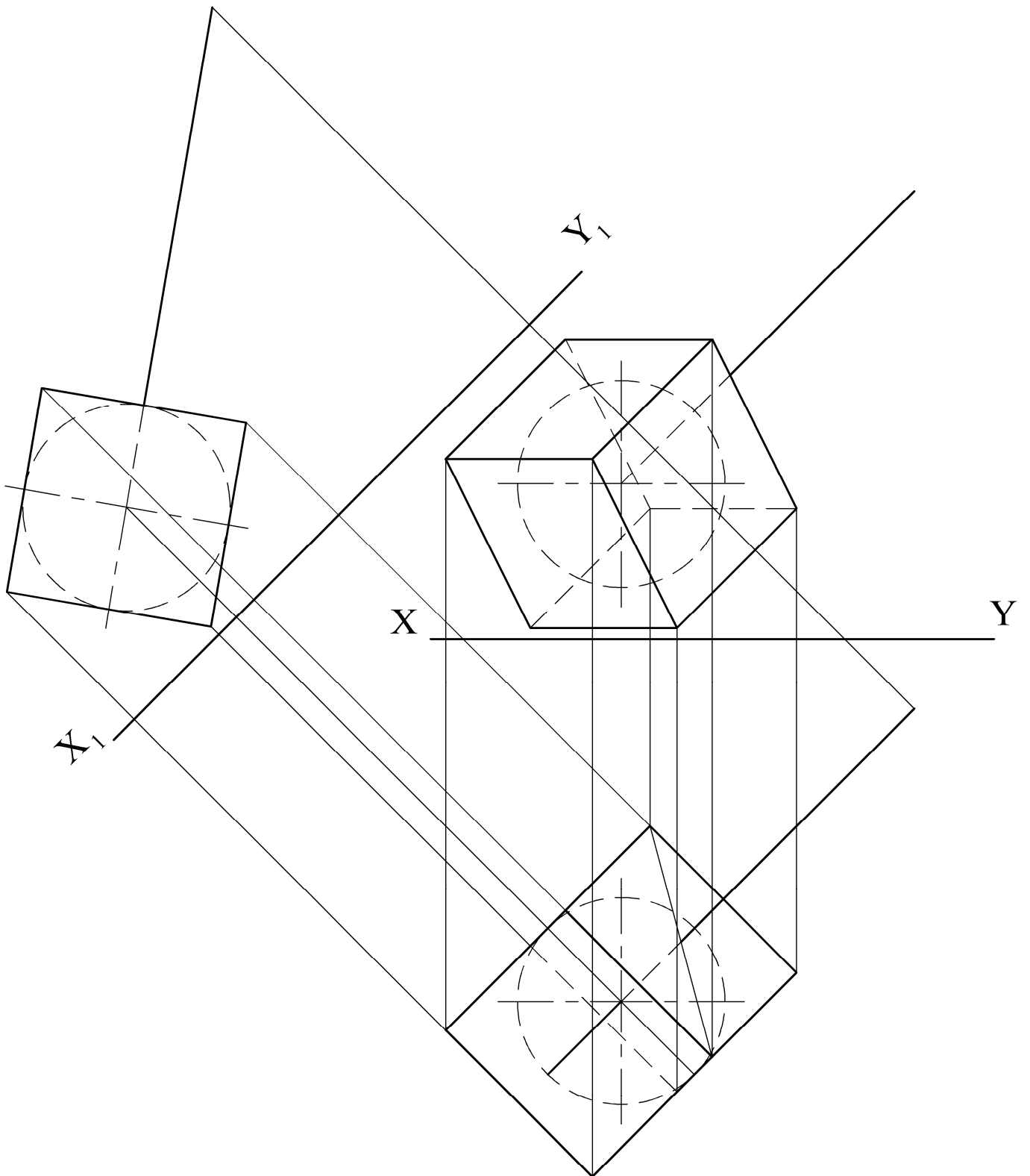


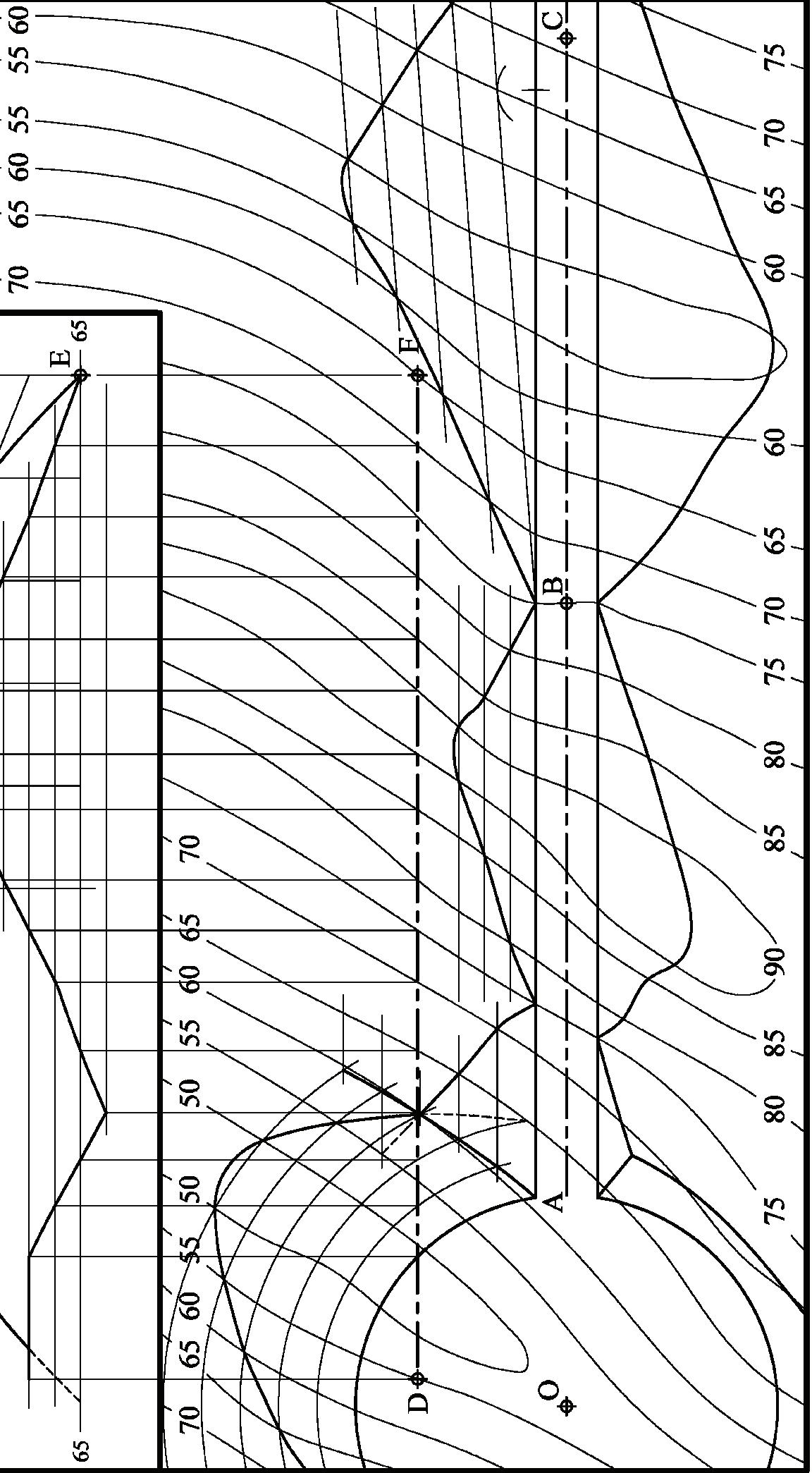
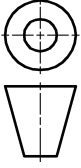
Marking Scheme

Question B-3

Scale: n/a

June 2014





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70 65 60 55 50 55 60 65 70

75 80 85 90 95 100 60 65 70 75

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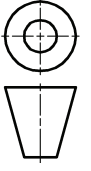
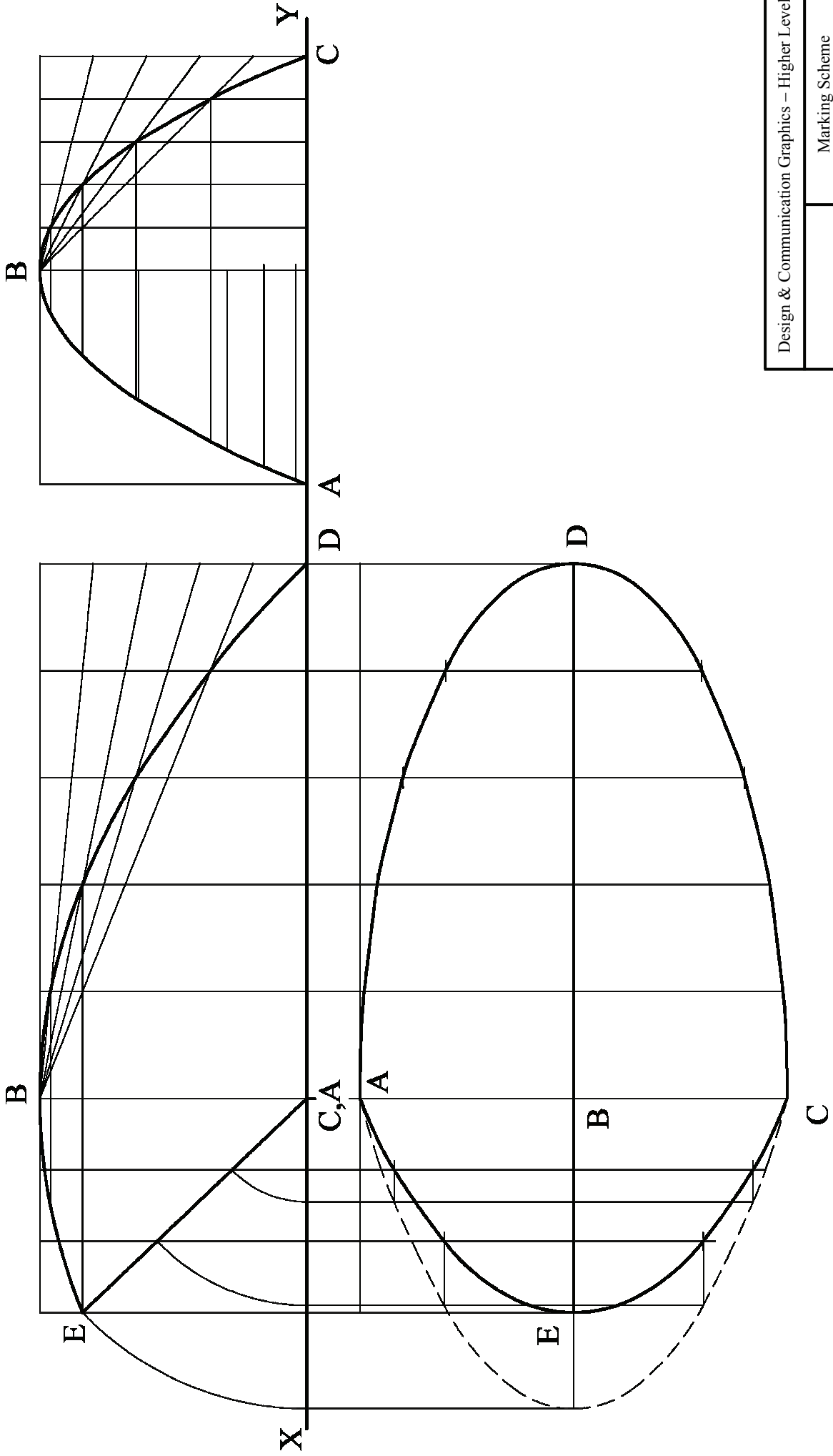
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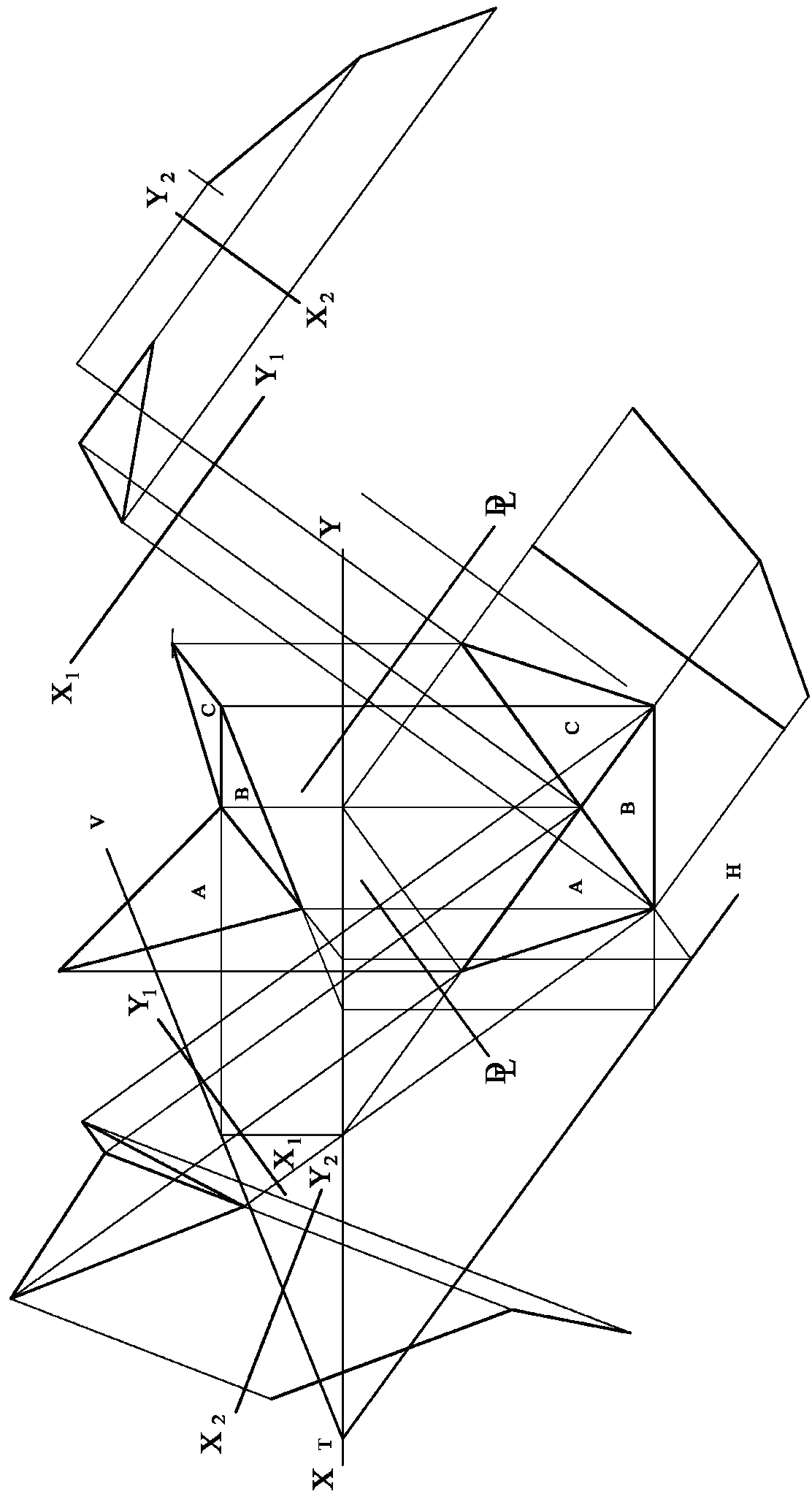
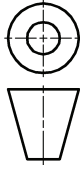
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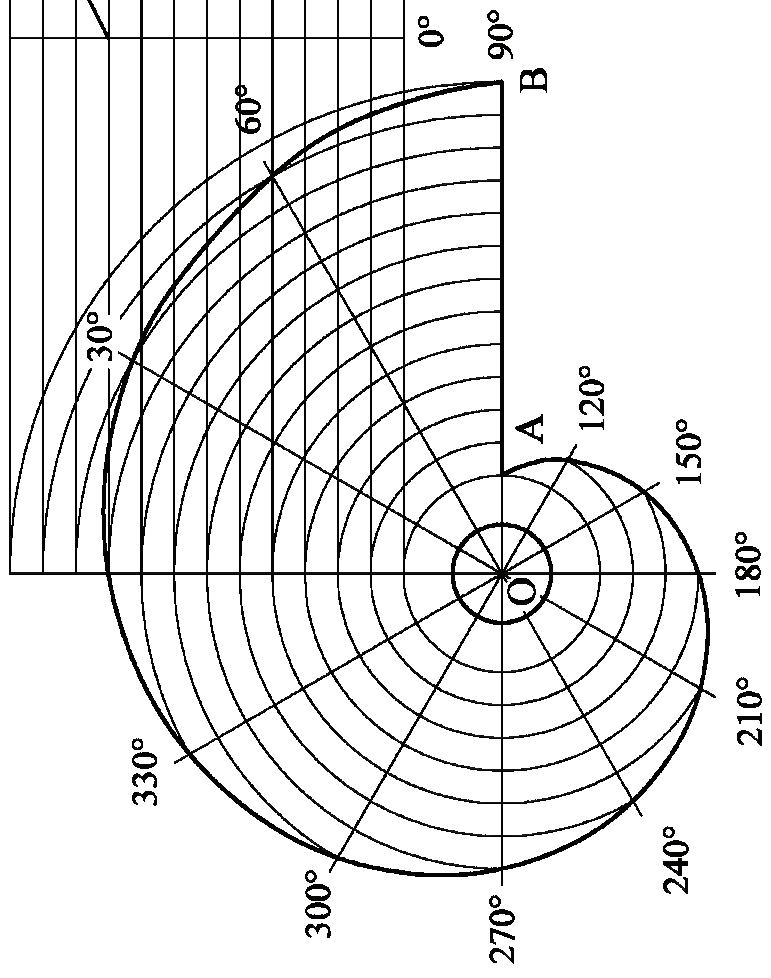
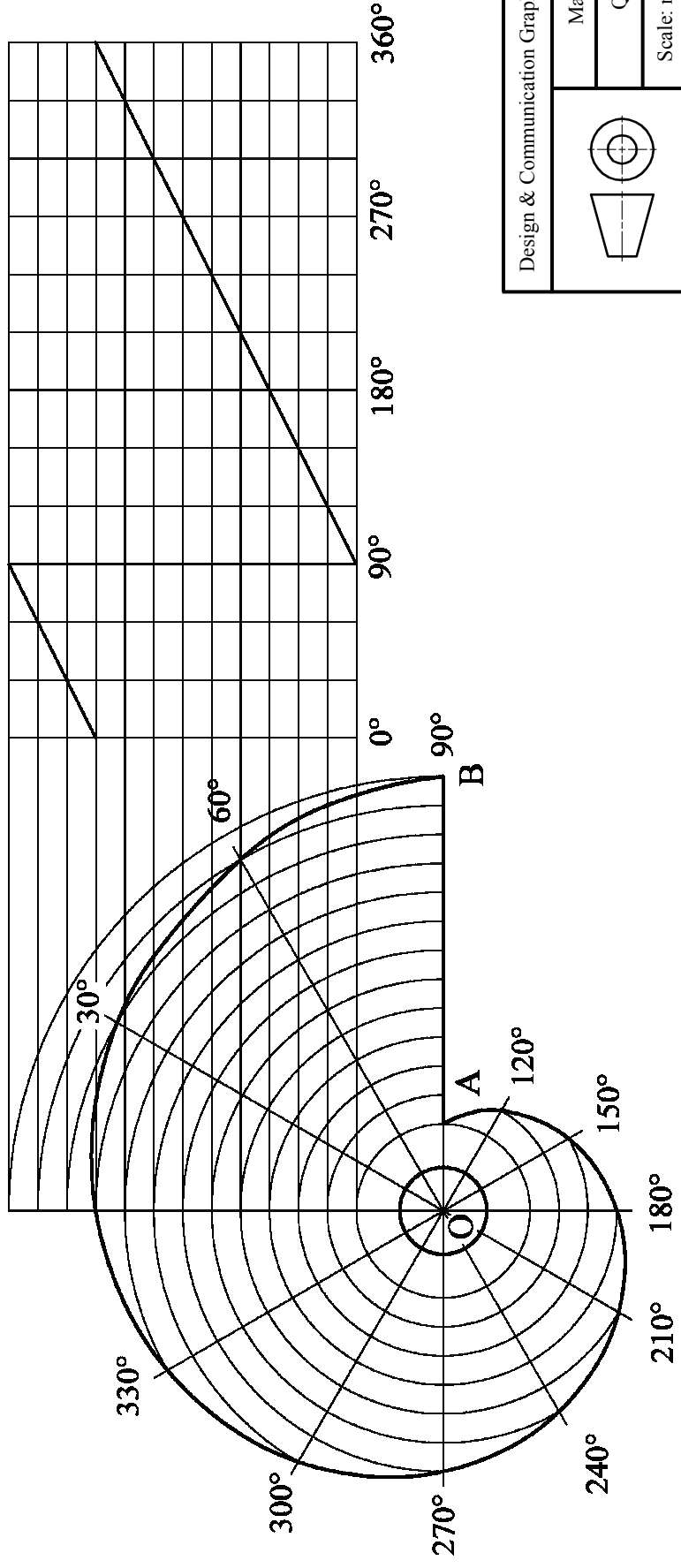
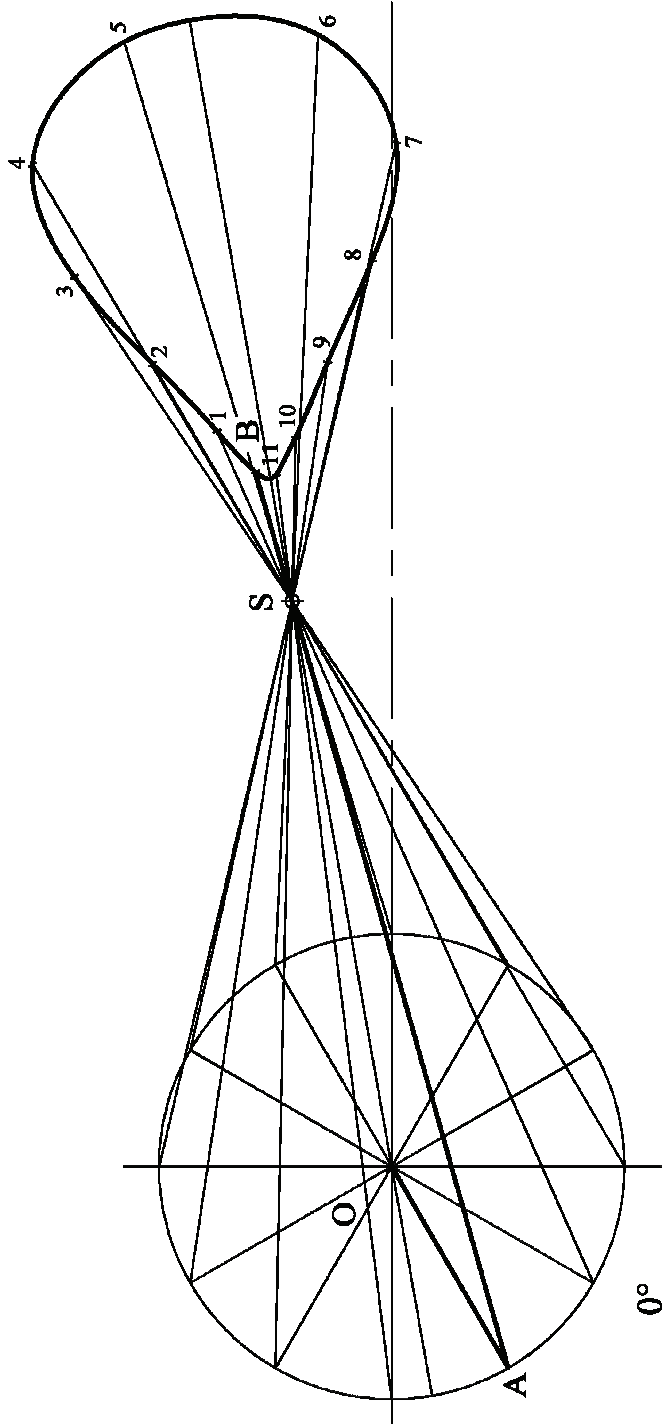
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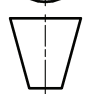

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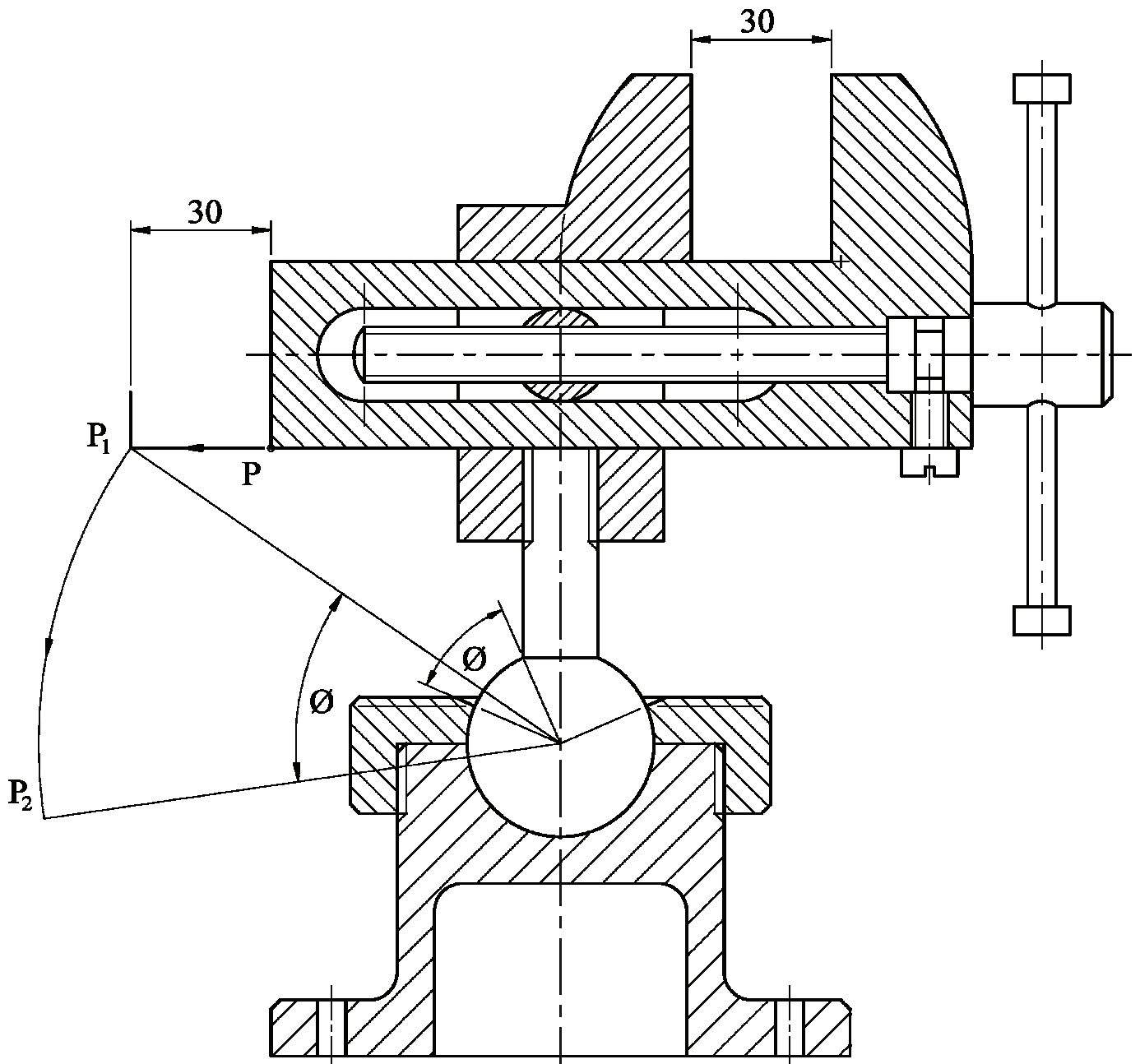
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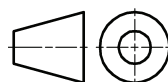




Design & Communication Graphics – Higher Level	
	Marking Scheme
	Question C-4
Scale: n/a	June 2014



Design & Communication Graphics – Higher Level



Marking Scheme

Question C-5

Scale: n/a

June 2014



Design and Communication Graphics

Student Assignment - Higher Level

Assessment Sheet 2014

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	4
	• Creation of a minimum of 5 Part files	2
	• 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

