



Coimisiún na Scrúduithe Stáit  
State Examinations Commission

**LEAVING CERTIFICATE 2009**

**MARKING SCHEME**

**DESIGN & COMMUNICATION  
GRAPHICS**

**HIGHER LEVEL**



**QUESTION A-1**

**MARKS**

<b>(a)</b>	<b>Vertex and Curve (14)</b>	
	(i) Draw eccentricity line @ Slope 12/10 (Any = 2) .....	3
	(ii) Locate vertex (1,1) .....	2
	(iii) Locate points outside latus rectum (1,4) .....	5
	(iv) Locate point inside latus rectum .....	1
	(v) Draw curve (Any = 1) .....	3
<b>(b)</b>	<b>Centre of Curvature (6)</b>	
	(vi) Draw latus rectum .....	2
	(vii) Draw normal to eccentricity line from end of latus rectum .....	2
	(viii) Determine centre of curvature (1,1) .....	2
		20
	<b>Total =</b>	<b>20</b>

**QUESTION A-2**

**MARKS**

<b>(a)</b>	<b>Base block (10)</b>	
	(i) Perspective of bottom edges of base block (4 x 1) .....	4
	(ii) Establish height of base block .....	2
	(iii) Completion of base block (2,2) .....	4
	<b>Underside of triangular top (5)</b>	
	(iv) Extend top edge of yellow block (correct length) .....	3
	(v) Left hand underside .....	1
	(vi) Right hand underside .....	1
<b>(b)</b>	<b>Sloping faces of triangular block (5)</b>	
	(vii) Determine and apply height for AVP (1,1) .....	2
	(viii) Draw one sloping edge .....	2
	(ix) Draw 2 <sup>nd</sup> sloping edge .....	1
		20
	<b>Total =</b>	<b>20</b>

**QUESTION A-3**

	<b><u>MARKS</u></b>
<b>(a) Elevation on XY Plane (17)</b>	
(i) Establish orientation of X and Y axes (1,3,1) .....	5
(ii) Draw elevation of lower block (3 x 2).....	6
(iii) Draw elevation of upper block (6 x 1).....	6
 <b>(b) True shape of cut surface (3)</b>	
(iv) Line perp. to rebattment line.....	1
(v) Use of true length line .....	1
(vi) Completion of correct true shape.....	1
	Total = 20

**QUESTION A-4**

	<b><u>MARKS</u></b>
<b>(a) Elevation of point P and projections of sphere (17)</b>	
(i) Generator through P in plan and elevation (2,1) .....	3
(ii) Elevation of P .....	1
(iii) Determine centre of sphere at edge of cone in elevation (1,1,1).....	3
(iv) Plan of required sphere (1,2,2,1).....	6
(v) Locating centre in elevation and drawing correct sphere (2,1,1) .....	4
 <b>(b) Traces of tangent plane (3)</b>	
(vi) Elevation and plan of circumscribing cone .....	1
(vii) Horizontal trace .....	1
(viii) Vertical trace .....	1
	Total = 20

**QUESTION B-1**

**MARKS**

<b>(a) Plan and elevation of easel (incl. rear support) (23)</b>	
(i) Draw grid in plan .....	4
(ii) Draw plan of easel .....	3
(iii) Draw elevation of easel (14 points) (14 x 1) .....	14
(iv) Hidden detail .....	2
<b>(b) Plan and elevation of necklace (14)</b>	
(v) Identify points on parabola in plan (5 x 1) .....	5
(vi) Draw parabola in plan (Any = 1) .....	2
(vii) Determine points on parabola in elevation .....	5
(viii) Draw curve in elevation (Any = 1) .....	2
<b>(c) Traces of oblique planes (8)</b>	
(ix) Draw horizontal trace of front stand .....	1
(x) Draw vertical trace of front stand (Any = 1) .....	3
(xi) Draw horizontal trace of rear support .....	1
(xii) Draw vertical trace of rear support (Any = 1).....	3

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**Total = 45**

**QUESTION B-2**

**MARKS**

<b>(a) Plan and elevation of planes ABC and DEF (8)</b>	
(i) Interpretation of co-ordinates .....	4
(ii) Drawing outline of planes .....	4
<b>(b) Line of intersection (12)</b>	
(iii) Horizontal lines in elevation (or lines parallel to V.P.) .....	4
(iv) Projections in plan (or elevation) .....	4
(v) Drawing line of intersection in plan and elevation .....	4
<b><u>or</u></b>	
(iii) Edge view of one plane in auxiliary view (2,2) .....	4
(iv) Projection of other plane .....	4
(v) Determining projections of line of intersection.....	4
<b>(c) Dihedral angle (22)</b>	
(vi) New XY taken parallel to line of intersection .....	4
(vii) Projection of planes and line of intersection on new XY .....	4
(viii) Additional XY taken perpendicular to line of intersection .....	5
(ix) Projection of ABC and DEF as lines and indicating dihedral angle.....	9
<b>(d) Inner triangle (3)</b>	
(x) Establish true shape of triangle .....	1
(xi) Draw inner triangle on true shape .....	1
(xii) Plan and elevation of required triangle .....	1

**Total = 45**

**QUESTION B-3**

**MARKS**

**Outline plan and elevation (19)**

- (i) Draw outline plan of square based shaped solid .....3
- (ii) Draw outline elevation of square based shaped solid .....5
- (iii) Draw outline elevation of inclined prism (1,4) .....5
- (iv) Transfer of widths to plan (1,4) .....5
- (v) Use of relevant solution method .....1

**Interpenetration on left hand side (4)**

- (vi) Determine points **A & B** in elevation .....2
- (vii) Determine point **C** in elevation and plan .....2

**Interpenetration on right hand side (10)**

- (viii) Determine points **D, E & F** in elevation .....3
- (ix) Determine point **G** in elevation and plan .....3
- (x) Determine points **M, N, O & P** in elevation and plan .....4

**Completion (12)**

- (xi) Determine points on shaped ends .....5
- (xii) Completion of drawing (incl. hidden detail) .....7

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**Total = 45**

**QUESTION C-1**

**MARKS**

**(a) Earthworks for roadway (30)**

***Earthworks between A and B (Level) – Cutting (11)***

- (i) Draw parallel lines at 5m intervals (1,4).....5
- (ii) Identify intersections with contours and draw curve .....6

***Earthworks between B and C (Rising) – Embankment (19)***

- (iii) Draw required arc .....7
- (iv) Draw parallel lines at 7.5m intervals (1,5).....6
- (v) Identify intersections with contours and draw curve .....6

**(b) (i) Strike and dip of stratum (11)**

- (vi) Draw **DF** and establish point on **DF** at altitude of **E** (3,2).....5
- (vii) Draw correct strike line in plan .....2
- (viii) Draw  $X_1Y_1$  perp. to strike line .....2
- (ix) Determine dip .....2

**(ii) Thickness of stratum (4)**

- (x) Direction of borehole in plan and XY line (1,1) .....2
- (xi) Draw borehole in auxiliary view .....1
- (xii) Determine thickness .....1

**Total = 45**



**QUESTION C-2**

**MARKS**

**(a) Plan and elevation of trophy (40)**

***Elliptical deck***

- (i) Establish points on ellipse in plan (1,1,1,1).....4
- (ii) Draw ellipse (Any ellipse = 2).....4
- (iii) Draw deck in elevation .....4

***Hyperboloid of revolution***

- (iv) Draw circles in plan .....2
- (v) Establish points on hyperbolae in elevation (2,1,1,1).....5
- (vi) Draw hyperbolic curves (Any = 1) .....2

***Hyperbolic paraboloid***

- (vii) Draw plan and elevation of edges ABCD (4,4).....8
- (viii) Draw elements on ABCD in plan and draw curve (6,4,1).....11

**(b) Plane director (5)**

- (ix) Draw plane parallel to element in elevation .....1
- (x) Draw plane parallel to element in plan .....1
- (xi) Determine direction of HT .....1
- (xii) Identify direction of VT .....1
- (xiii) Draw correct traces in required position .....1

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**Total = 45**

**QUESTION C-3**

**MARKS**

**(a) Plan and elevation (22)**

- (i) Draw 2 circles in plan .....4
- (ii) Draw outline elevation.....5
- (iii) Locate centre and draw sphere in elevation and plan (3,1,1) .....5
- (iv) Establish points on curve in plan .....5
- (v) Draw curve in plan (Any = 1).....3

**(b) Development of conical surface (18)**

- (vi) Location of apex on development (to ensure accuracy) .....3
- (vii) Transfer longest generator length to development .....3
- (viii) Transfer shortest generator length to development.....3
- (ix) Establish 12 elements on development.....4
- (x) Determine intermediate distances for cut section .....2
- (xi) Complete development .....2
- (xii) Seam on shortest line .....1

**(c) True shape of semi parabola (5)**

- (xiii) Establish correct lengths and widths (1,1) .....2
- (xiv) Draw true shape (Any = 1).....2
- (xv) Indicate axis and focus .....1

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**Total = 45**

**QUESTION C-4****MARKS****(a) Link Mechanism (27)**

- (i) Draw circle and lines (1,1,3).....5
- (ii) Divide semi-circle into 6 parts.....3
- (iii) Step corresponding distances along AB and locate centres (2,2) .....4
- (iv) Draw 1<sup>st</sup> set of arcs .....4
- (v) Draw 2<sup>nd</sup> set of arcs to locate positions for Q .....4
- (vi) Draw lines 125mm long through S (2,2) .....4
- (vii) Draw required locus (Any = 1) .....3

**(b) Helical Stent (18)**

- (viii) Draw plan and elevation of cylinder .....3
- (ix) Locate A and B in plan and elevation (1,1) .....2
- (x) Divide semi-circle into 6 parts.....3
- (xi) Corresponding division of cylinder height .....2
- (xii) Locate points on helix .....2
- (xiii) Locate turning point .....3
- (xiv) Draw curve (Any = 1) .....3

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**Total = 45**

**QUESTION C-5****MARKS****(a) Sectional elevation (38)*****Assembly (6)***

(i) Relative positioning of components .....6

***Base (6)***

(ii) Outline.....4

(iii) Inner detail .....2

***Juice Cup & Juice Strainer (4)***

(iv) Outline.....2

(v) Inner detail .....2

***Vertical Bar & Hinge Cap (4)***

(vi) Outline.....2

(vii) Inner detail .....1

(viii) Thread .....1

***Press Lever & Plunger (9)***

(ix) Outline .....3

(x) Inner detail .....2

(xi) Correct construction for 6mm arc .....4

***Drawing Completion (9)***

(xii) Fillets and Chamfers and Rounds .....3

(xiii) Hatching and Centrelines ... (3,3) .....6

**(b) Distance between centre of circle O and HP (7)**

(xiv) Identify centre for rotation .....1

(xv) Determine centre of circle C in rotated position .....3

(xvi) Determine correct location of centre of circle O .....3

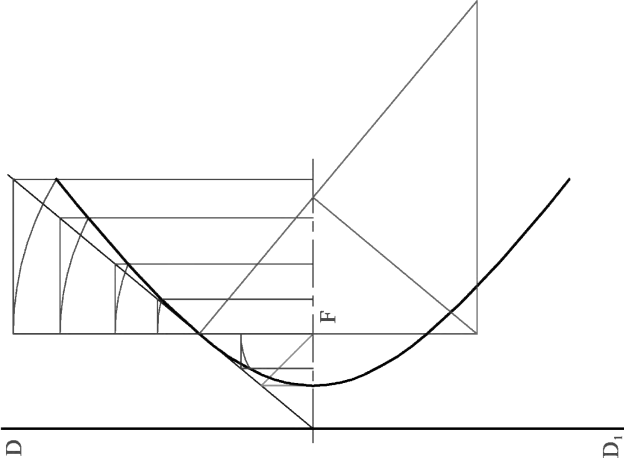
**Total = 45**

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

**A-1.** 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.

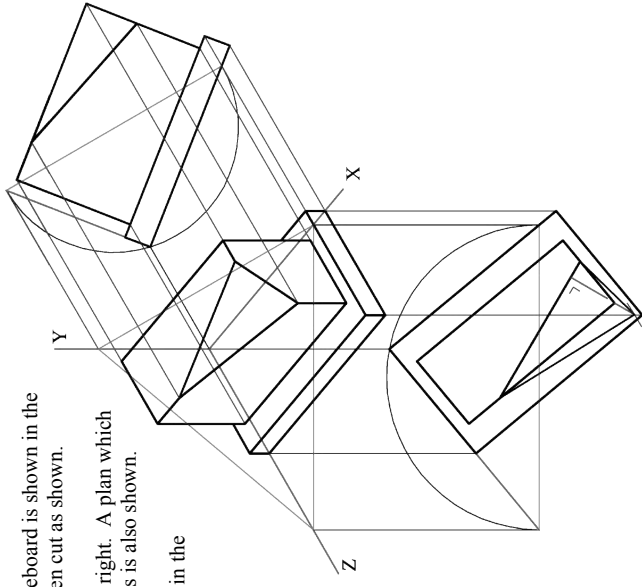
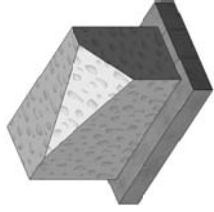
- (a) Locate the vertex and draw a portion of the curve.
- (b) Determine the centre of curvature for a point on the curve which is located vertically above the focus.



**A-3.** A block of cheese standing on a cheeseboard is shown in the 3D graphic below. The cheese has been cut as shown.

An axonometric view is shown on the right. A plan which has been positioned relative to the axes is also shown.

- (a) Draw the elevation of the objects in the correct position on the XY plane.
- (b) Determine the true shape of the triangular cut surface.

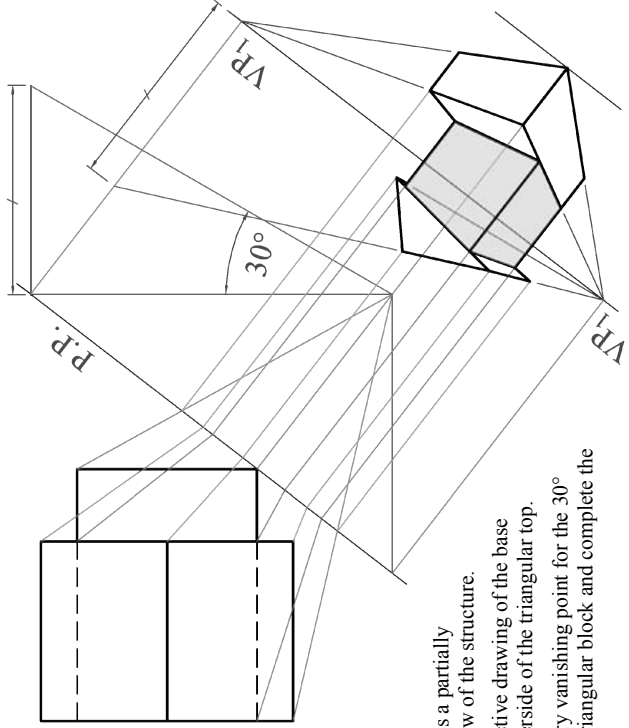


**A-2.** The 3D graphic below shows an arrangement of playing blocks.



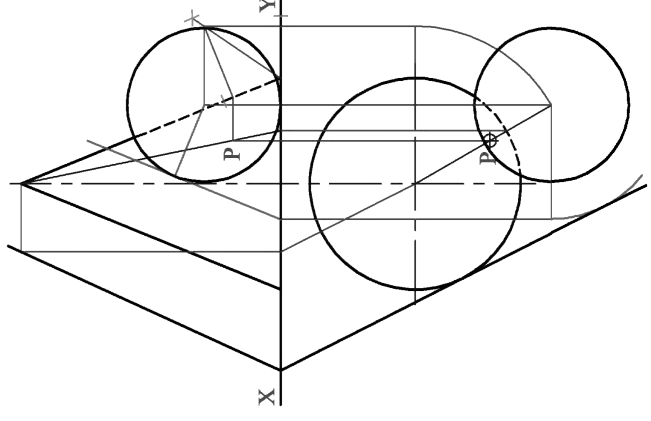
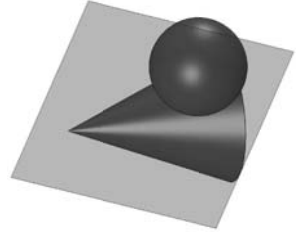
The drawing on the right is a partially completed perspective view of the structure.

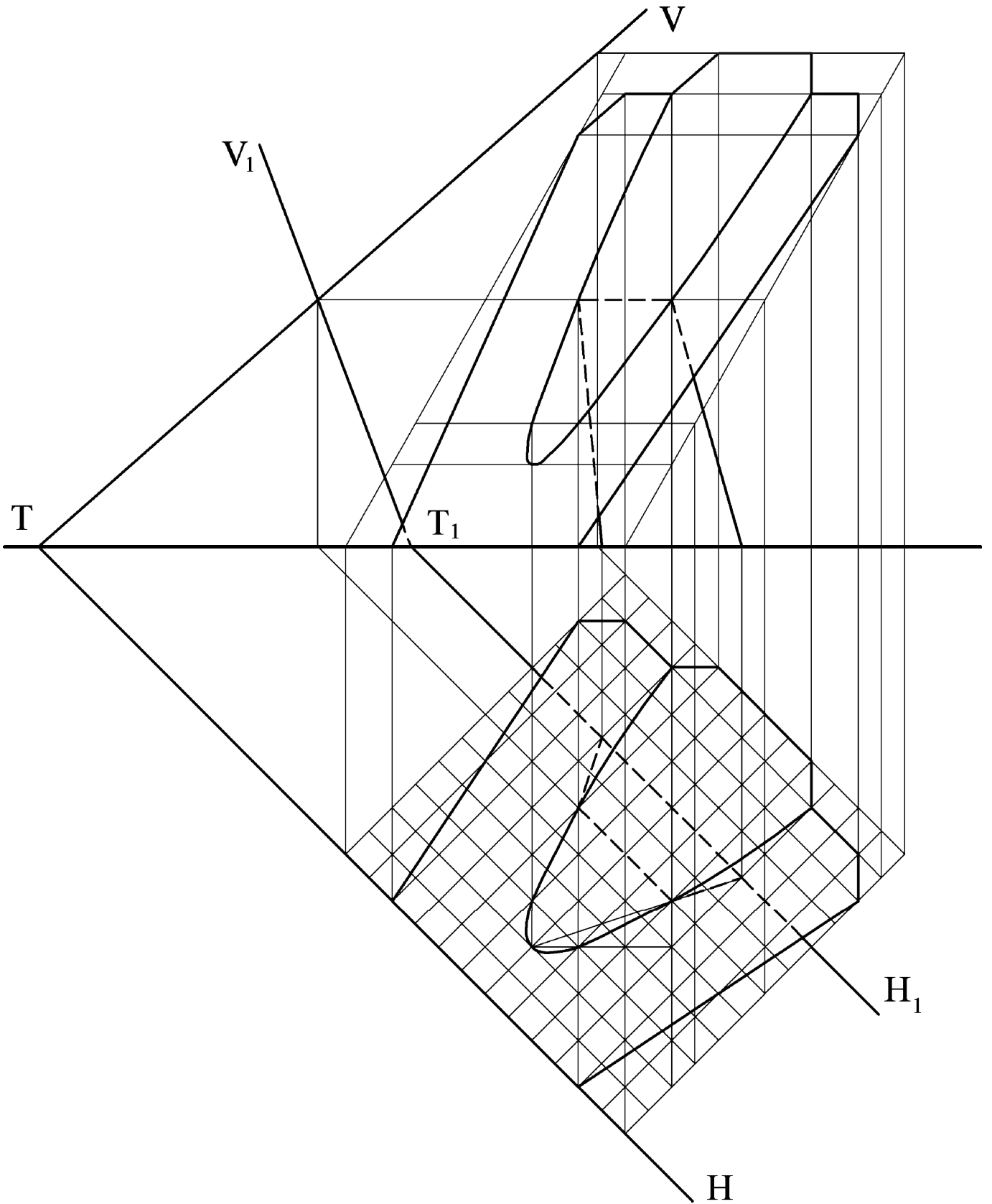
- (a) Complete the perspective drawing of the base block and of the underside of the triangular top.
- (b) Determine an auxiliary vanishing point for the 30° sloping faces of the triangular block and complete the drawing.

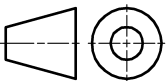


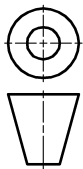
**A-4.** The drawing on the right shows the plan and elevation of a right cone. A 3D graphic is also given below. A point P on the curved surface is shown in the plan.

- (a) Locate point P in elevation and draw the projections of a sphere which rests on the horizontal plane and which touches the cone at point P.
- (b) Determine the traces of a plane which is tangential to the cone and the sphere as shown in the 3D graphic.





Design & Communication Graphics – Higher Level	
	Marking Scheme
	Question B-1
	Scale: n/a
	June 2009

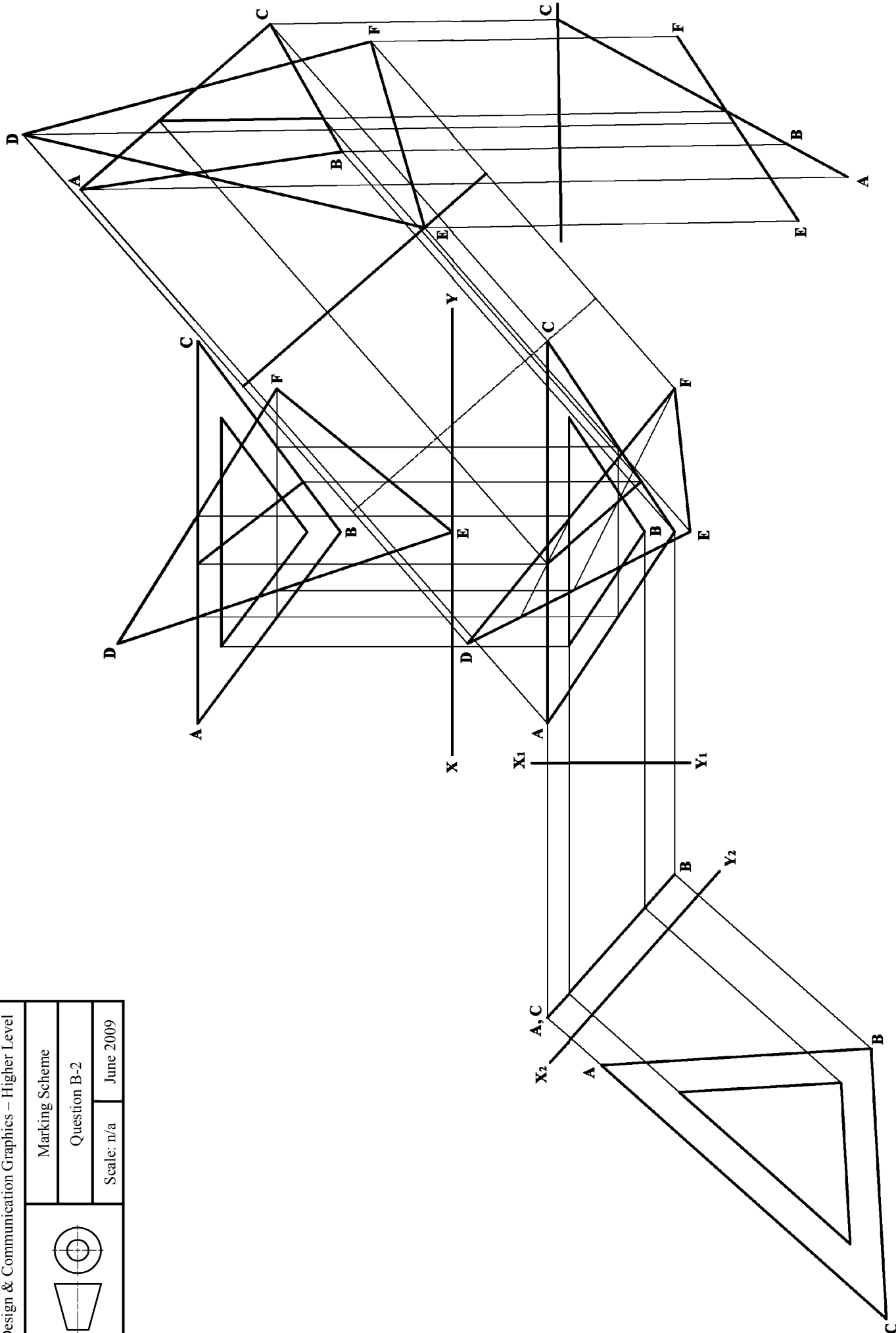


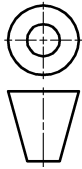
Marking Scheme

Question B-2

Scale: n/a

June 2009

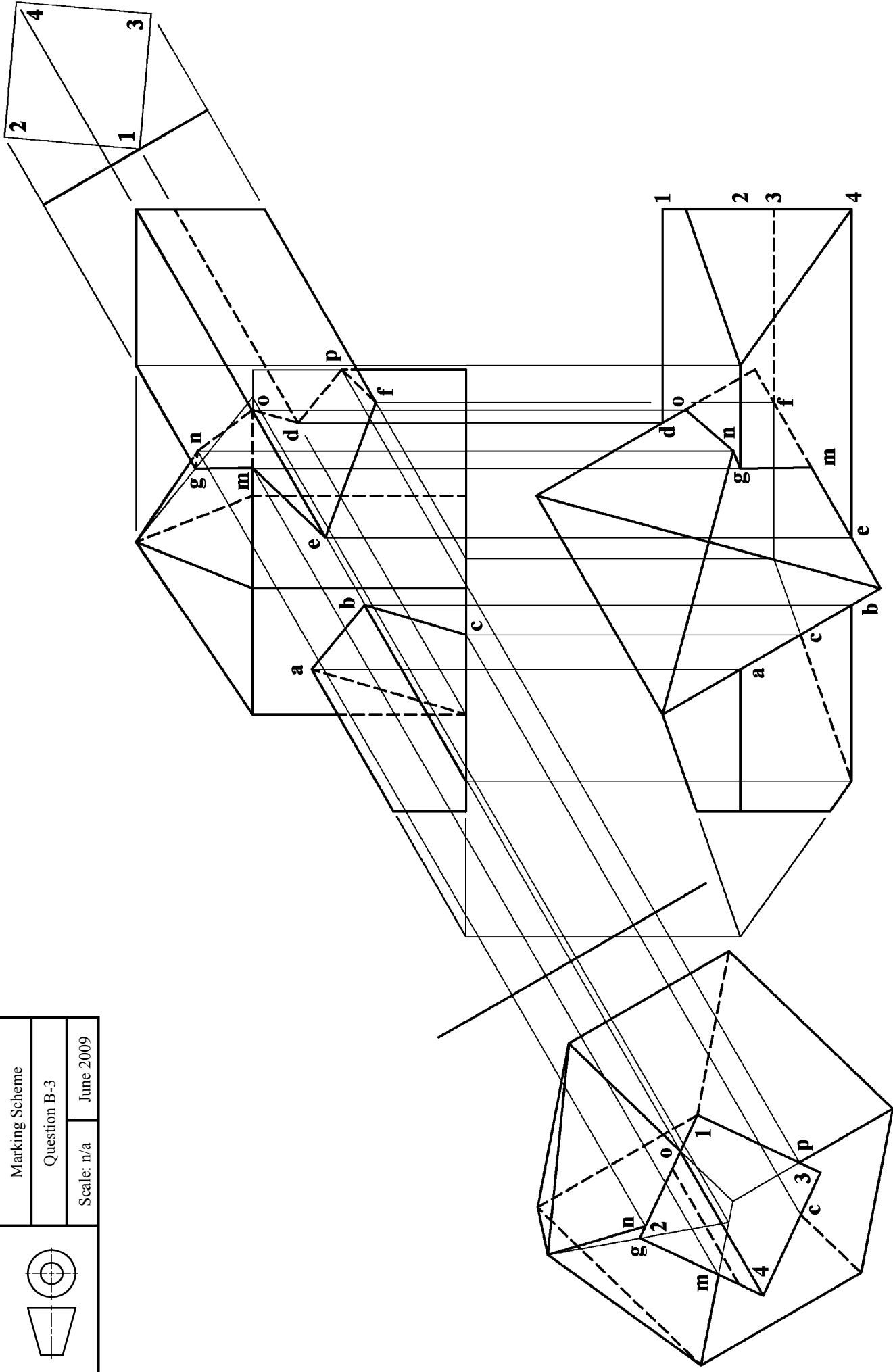




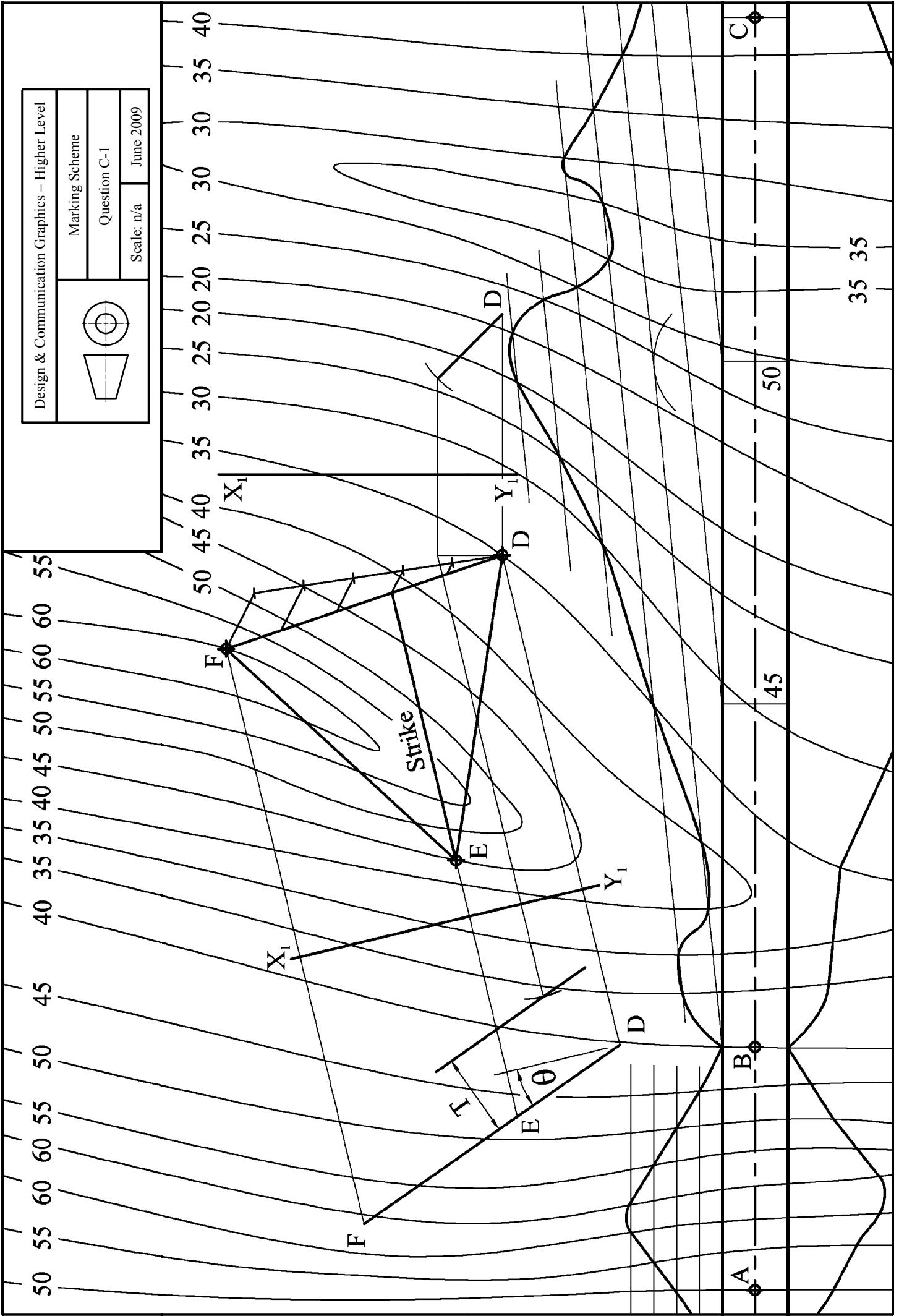
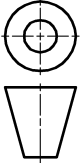
Marking Scheme

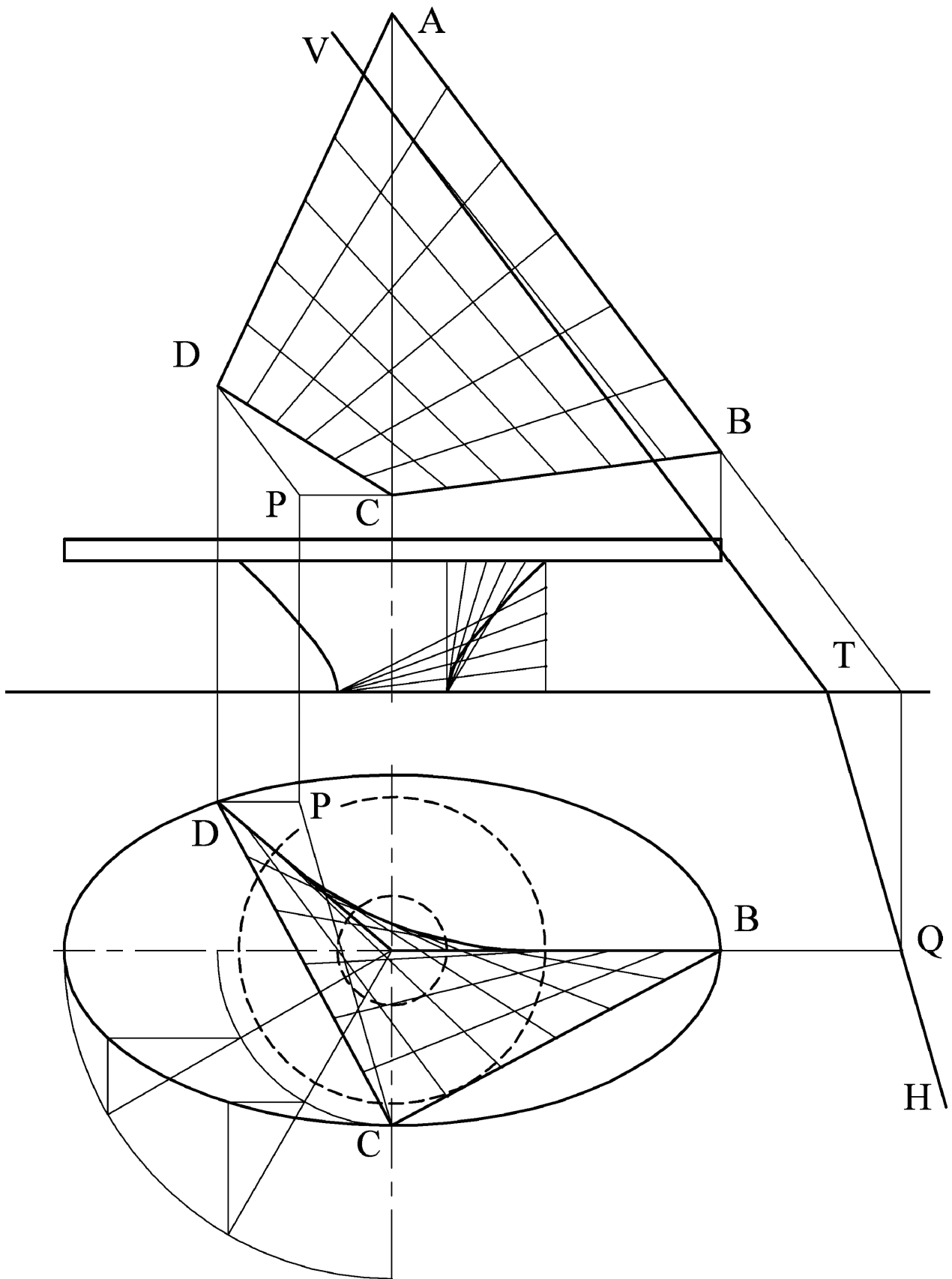
Question B-3

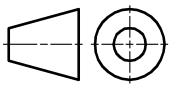
Scale: n/a June 2009

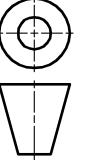
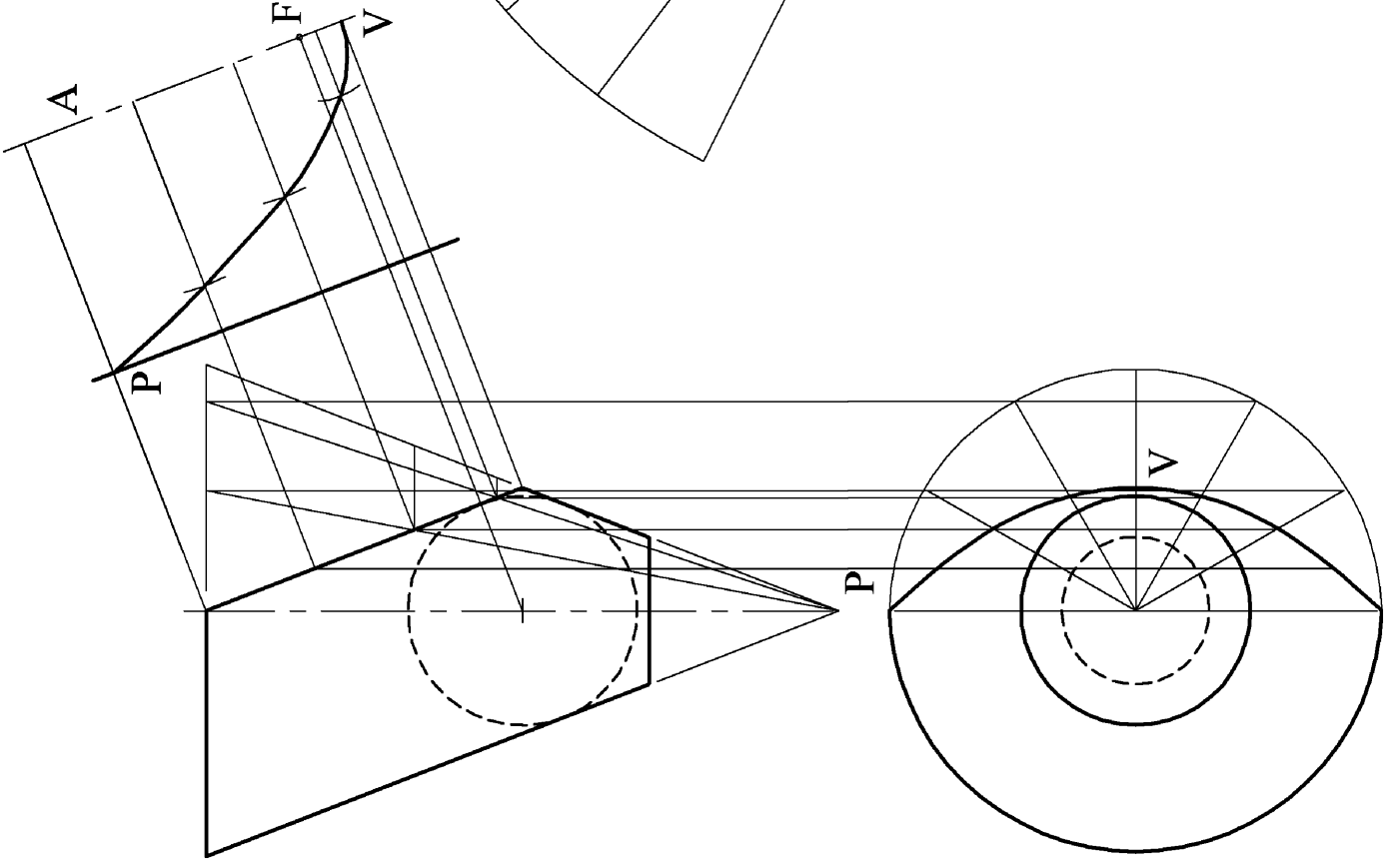


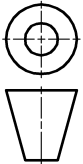






Design & Communication Graphics – Higher Level	
	Marking Scheme
	Question C-2
	Scale: n/a   June 2009

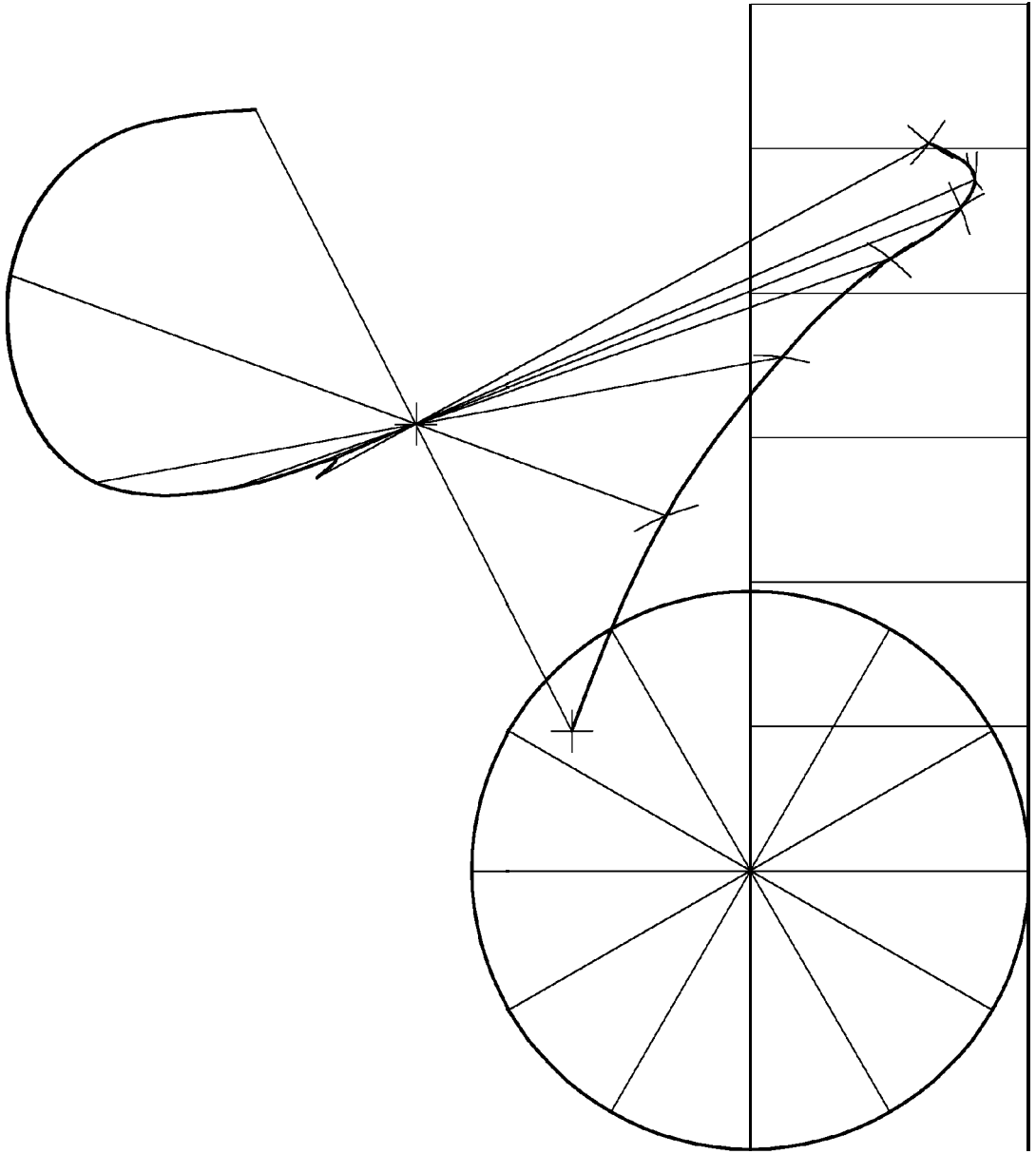
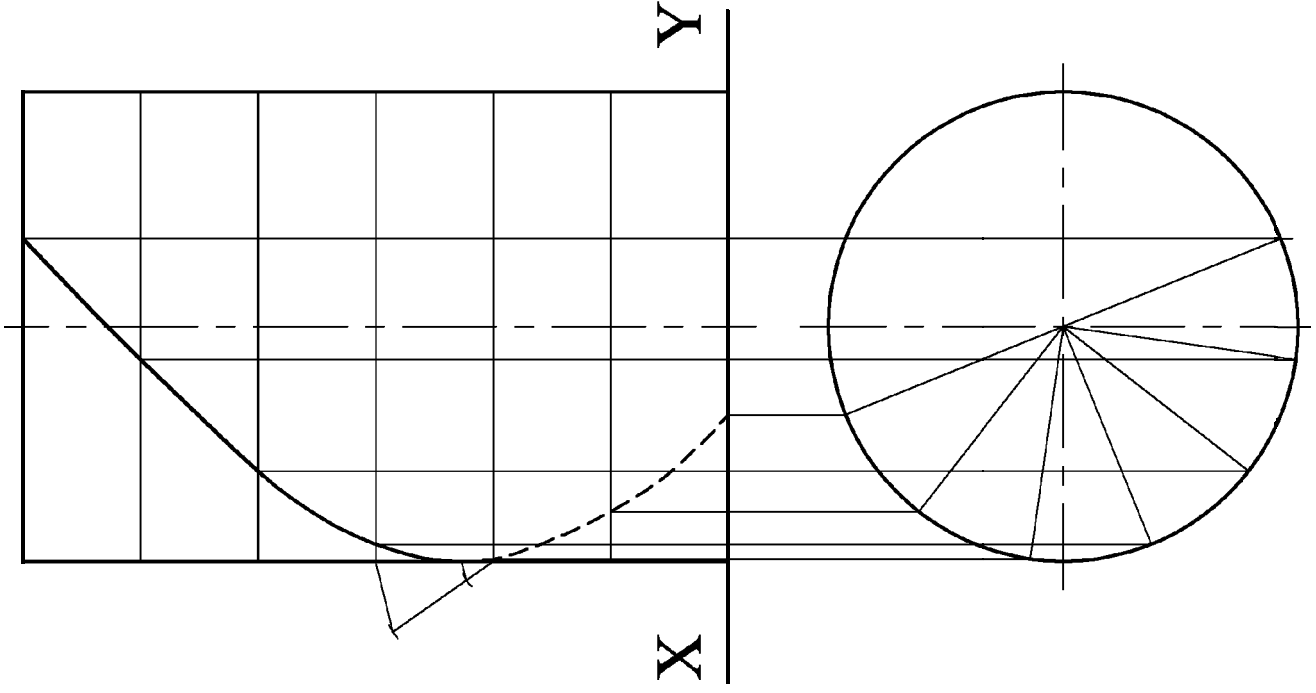


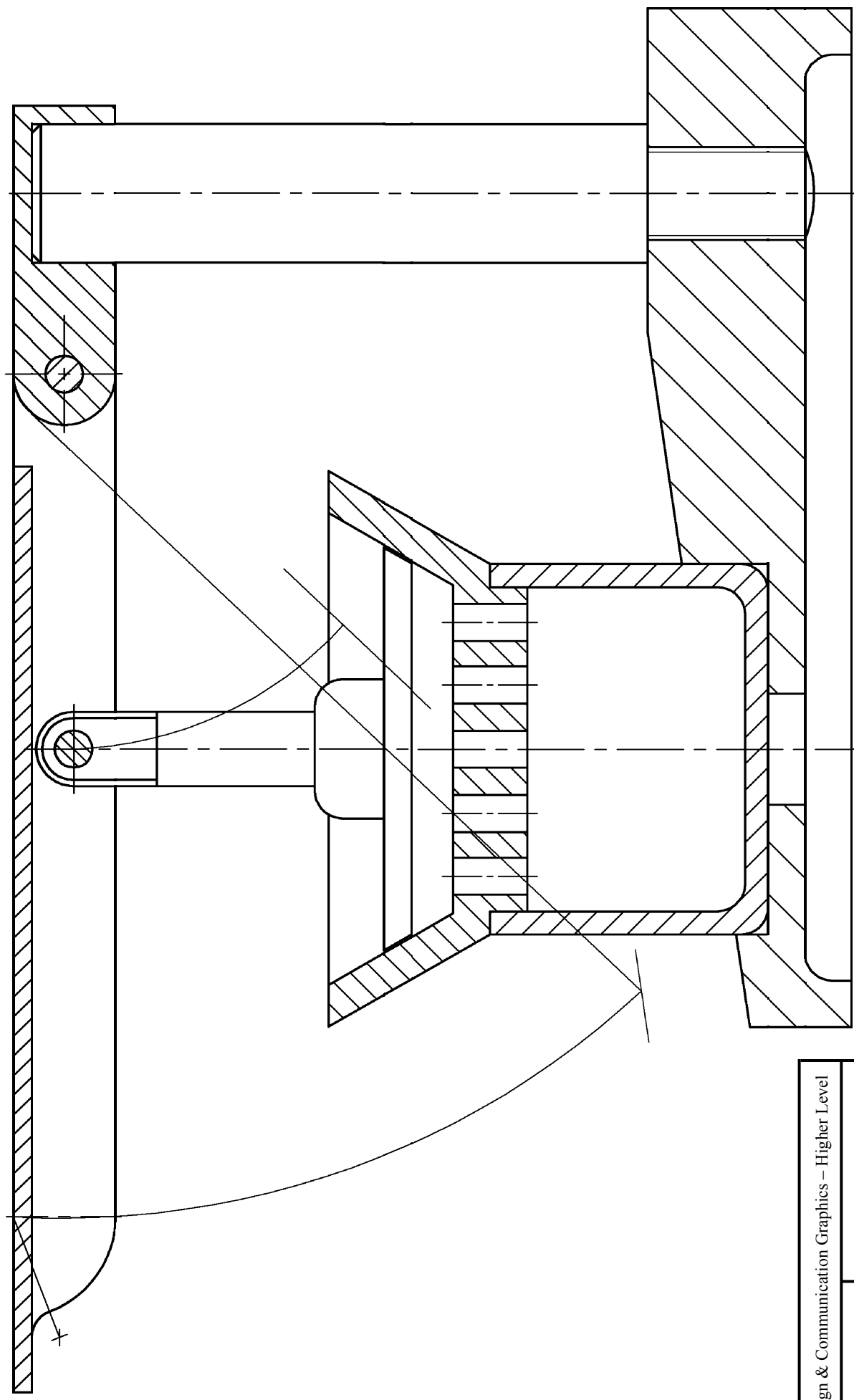


Marking Scheme

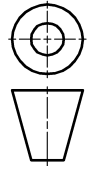
Question C-4

Scale: n/a June 2009





Design & Communication Graphics – Higher Level	
Marking Scheme	
Question C-5	
Scale: n/a	June 2009





# Design and Communication Graphics

## Student Assignment—Higher Level

### Assessment Sheet

<b>Candidate Exam No.</b>

<b>Part (A) – 100 Marks</b>			
Output	Marking criteria	Marks	
1	<b>Design Research</b> - Exploration of main design features using primary & secondary research; Selection of appropriate graphics; Effective layout and presentation of information combining images, sketches & annotations		
	a) All 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	<b>Design Feature Comparison</b> - 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) All 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	<b>Freehand Graphical Representation</b> – Proportion; Form/Volume; Use of Tone/Line for effective rendering; Detailed treatment of main design features; Layout and presentation		
	a) All 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	<b>SolidWorks Parts, Assembly and eDrawing</b>		
	• Minimum of 5 parts	5	
	• <b>Part models</b> – Proficiency in Parametric CAD, including economy of design and design intent; Selection of most appropriate profile; Sketches fully defined; All features renamed; Use of linked values/equations where appropriate; Appropriate type of extrusions used; Appropriate End Conditions used	10	
	• <b>Assembly</b> - Accuracy of parts to facilitate correct assembly, Correct mating of parts, Application of materials/textures/colour	5	
	• <b>eDrawing</b> of CAD model	5	
5	<b>Hardcopy outputs from SolidWorks</b> - Detailed orthographic views of the selected artefact; Section and Detail views where appropriate; Rendered pictorial view of the Assembly; Exploded view of the CAD model; Inclusion of main dimensions, notes and symbols; Layout and presentation		
	a) All 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	<b>Photorealistic Image</b>		
	Produce a photorealistic computer generated image of the artefact	10	
<b>Part (B) – 60 Marks</b>			
7	<b>Graphical exploration of design solutions</b> - 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) All 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	<b>Presentation of Modification/Concept Design</b> – Proportion; Form/Volume; Use of Tone/Line for effective rendering; Detailed treatment of modified/concept design features; Layout and presentation		
	a) All 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	<b>Hardcopy outputs from SolidWorks</b> - Detailed orthographic views of the proposed solution; Section and Detail views where appropriate; Rendered pictorial view of the CAD model; Inclusion of main dimensions, notes and symbols; Layout and presentation		
	a) All 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	
<b>Total</b>			



