



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate 2021

Marking Scheme

Design and Communication Graphics

Ordinary 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.



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Leaving Certificate Examination 2021

Design and Communication Graphics Ordinary Level



Marking Scheme and Sample Solutions

(Other valid solutions are acceptable and are marked accordingly)

QUESTION A-1**MARKS****(a) Points on right hand side (11)**

- (i) Complete division of line CD 4
- (ii) Complete division of line VC 3
- (iii) Construction lines (2 sets) 2
- (iv) Identify remaining points on RHS 2

(b) Points on left hand side (3)

- (v) Locate points on LHS curve 3

(c) Parabolic curve (4)

- (vi) Complete curve on RHS 2
- (vii) Draw curve on LHS 2

- (viii) *Presentation* 2

Total = 20

QUESTION A-2**MARKS****(a) Top arc (12)**

- (i) Locate centre for arc C 6
- (ii) Draw tangential arc C 6

(b) Contact points (6)

- (iii) Locate top contact points 3
- (iv) Locate bottom contact points 3

- (v) *Presentation* 2

Total = 20

QUESTION A-3**MARKS****Perspective (18)**

- | | | |
|----------------|---|-----------|
| (i) | Radiate lines to correct vanishing points (5 lines) | 5 |
| (ii) | Projections from plan or radiated lines | 2 |
| (iii) | Complete the front face | 3 |
| (iv) | Complete the legs | 2 |
| (v) | Complete top of bench | 6 |
| (vi) | Presentation | <u>2</u> |
| Total = | | 20 |

QUESTION A-4**MARKS****(a) Cylinder B in elevation (10)**

- | | | |
|-------|--------------------------------------|---|
| (i) | Projection from centre in plan | 2 |
| (ii) | Locate centre in elevation | 4 |
| (iii) | Draw elevation of cylinder | 4 |

(b) Hemisphere C in plan (8)

- | | | |
|-------|---|----------|
| (iv) | Projection from centre of hemisphere in elevation | 2 |
| (v) | Locate centre in plan | 2 |
| (vi) | Draw hemisphere C | 4 |
| (vii) | Presentation | <u>2</u> |

Total = 20

QUESTION B-1**MARKS****(a) Elevation and plan of kennel (22)**

- (i) Draw the outline elevation of main structure 9
- (ii) Draw the square door opening 5
- (iii) Draw the plan of the main structure 8

(b) Door (14)

- (iv) Draw plan of door in open position..... 7
- (v) Draw elevation of door in open position..... 7

(c) Auxiliary elevation (19)

- (vi) X_1Y_1 line parallel to plan of surface A..... 1
- (vii) Projections from plan 1
- (viii) Transfer of heights from elevation 4
- (ix) Draw surface A 4
- (x) Complete auxiliary elevation 9

- (xi) **Presentation** 5

Total = 60

QUESTION B-2**MARKS****(a) Initial setup (7)**

- (i) Draw equilateral triangle 4
- (ii) Draw X, Y and Z axes 3

(b) Elevation and Plan (13)

- (iii) Projections to set up elevation..... 3
- (iv) Semicircle in elevation 1
- (v) Draw elevation in the correct position 3
- (vi) Projections to set up plan 3
- (vii) Semicircle in plan (or 45° lines)..... 1
- (viii) Draw plan in the correct position 2

(c) Axonometric Projection of lower rectangular section (13)

- (ix) Projections from elevation 3
- (x) Projections from plan 2
- (xi) Axonometric projection of rectangular front surface..... 3
- (xii) Axonometric projection right hand flat surface 2
- (xiii) Axonometric projection of left flat surface 3

(d) Axonometric Projection of upper semi-circular section (22)

- (xiv) Divisions on semi-circle in elevation 5
- (xv) Corresponding divisions in plan 6
- (xvi) Projections from elevation 3
- (xvii) Projections from plan 2
- (xviii) Draw axonometric projection of the semi-circular curves..... 4
- (xix) Complete the axonometric projection 2
- (xx) **Presentation** 5

Total = 60

QUESTION B-3**MARKS****(a) Given Elevation and Plan (25)**

- (i) Draw the outline elevation as given 10
- (ii) Complete the elevation 4
- (iii) Draw the outline plan as given 6
- (iv) Complete the plan as given 5

Interpenetration***Interpenetration on Left Hand Side (8)***

- (v) Projection from LHS of elevation 2
- (vi) Locate points on LHS in plan 3
- (vii) Complete LHS of plan 3

Interpenetration on Right Hand Side (8)

- (viii) Projection from RHS of elevation 2
- (ix) Locate points RHS of plan 3
- (x) Complete RHS of plan 3

(b) End View (14)

- (xi) Transfer of widths from plan..... 3
- (xii) Projection of heights from elevation 2
- (xiii) End view of main structure (incl. hidden detail)..... 5
- (xiv) End view of tunnel 4
- (xv) ***Presentation*** 5

Total = 60

QUESTION C-1**MARKS****(a) Profile (37)**

- (i) Measure heights and draw horizontal lines 13
- (ii) Projections from intersections between line AB and contours 11
- (iii) Draw the profile 13

(b) Triangle CDE (8)

- (iv) Plan of triangle CDE 5
- (v) Elevation of triangle CDE 3

(c) Strike and dip (10)

- (vi) Horizontal line in elevation 1
- (vii) Strike in plan 3
- (viii) Viewing direction for dip 3
- (ix) Determine dip (2 heights, edge view) 3

- (x) *Presentation* 5

Total = 60

QUESTION C-2**MARKS****(a) Elevation and Plan (33)**

- (i) Outline of surface ABCD in elevation 8
- (ii) Elements in elevation (incl. division) 7
- (iii) Outline of surface in plan 8
- (iv) Elements in plan (incl. division or proj.) 7
- (v) Completion of plan (curve and hidden detail)..... 3

(b) End view of Hyperbolic Paraboloid (22)

- (vi) Determine heights and widths for surface ABCD 8
- (vii) Draw the outline of hyperbolic paraboloid surface 6
- (viii) Draw elements 5
- (ix) Completion of end view (curve and hidden detail)..... 3
- (x) *Presentation* 5

Total = 60

QUESTION C-3**MARKS****(a) Elevation and plan (26)**

- (i) Draw the elevation..... 12
- (ii) Show contact points 3
- (iii) Draw outline plan 7
- (iv) Complete plan 4

(b) End view (11)

- (v) Correct heights and widths for end view..... 5
- (vi) Draw the end view..... 6

(c) Surface Development (18)

- (vii) Appropriate layout of surface development 1
- (viii) Development of bottom surface 1
- (ix) Development of vertical surfaces 3
- (x) Development of horizontal surfaces..... 3
- (xi) Development of inclined surfaces 3
- (xii) Development of front and back surfaces..... 3
- (xiii) Division of arc 2
- (xiv) Development of curved surface..... 2

- (xv) *Presentation* 5

Total = 60

QUESTION C-4**MARKS****(a) Displacement Diagram (29)**

- (i) 360° division (widths on displacement diagram) 5
- (ii) Correct use of 60mm height 1
- (iii) Establish follower position at 0°, 90°, 180° and 360° 7
- (iv) 0° to 90°, Rise 60mm with Uniform Velocity 4
- (v) 90° to 180°, Dwell 4
- (vi) 180° to 360°, Fall 60mm with UAR construction 4
- (vii) Complete Displacement Diagram 4

(b) Link Mechanism (26)

- (viii) Set up line diagram (O, A, B & C.) 10
- (ix) Draw circle about O 3
- (x) Division of circle 3
- (xi) Arm AC in rotated positions 3
- (xii) Points on locus..... 3
- (xiii) Draw locus 4
- (xiv) *Presentation* 5

Total = 60

QUESTION C-5**MARKS*****Assembly (15)***

- (i) Relative positioning of components 11
- (ii) Draw a Section View 4

Main body (12)

- (iii) Roller insert 4
- (iv) Handle insert 4
- (v) Completion 4

Handle (16)

- (vi) Four circles 10R 5
- (vii) Centres for 160R arcs 3
- (viii) Complete outline 5
- (ix) Hole for handle 3

Roller (8)

- (x) Outline 5
- (xi) Hole for handle 3

Drawing Completion (4)

- (xii) Hatching and Centrelines ... (3,1) 4
- (xiii) ***Presentation*** 5

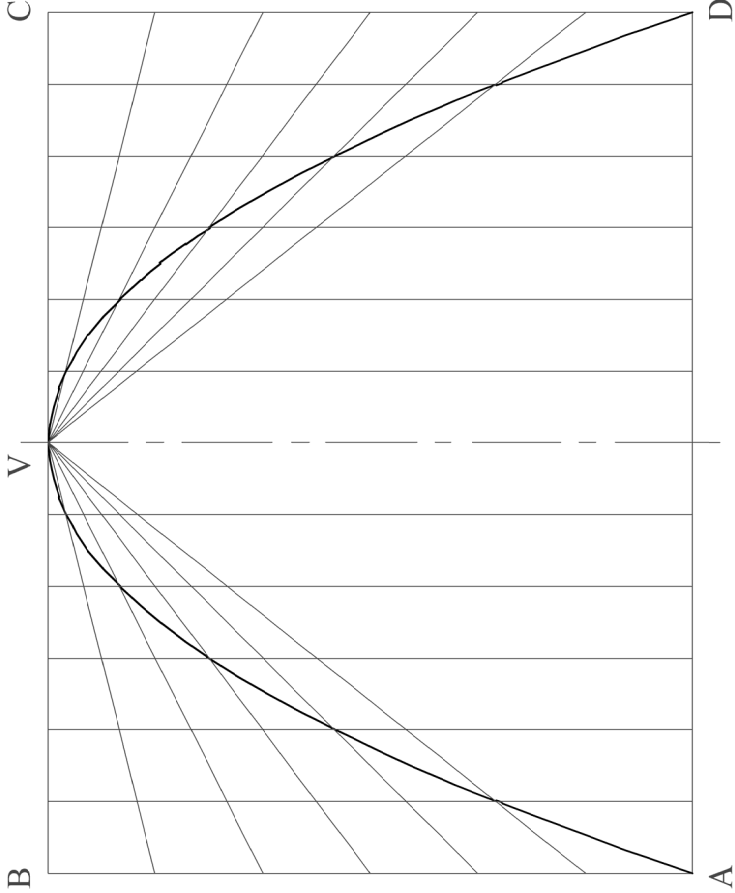
Total = 60

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

A-1. The image below shows a bee hive hut which is situated on the side of the M1 motorway near Drogheda, Co. Louth. The outline of the structure is a parabola.

The drawing on the right shows a portion of a similar parabola, which is inscribed in rectangle **ABCD**. **V** is the vertex of the curve.

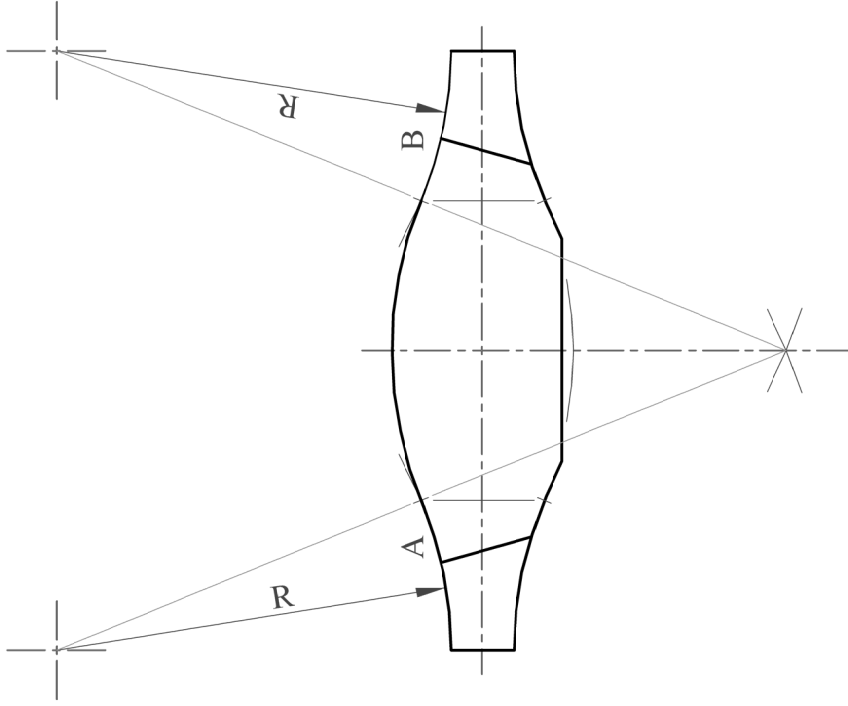
- (a) Locate the remaining points on the right hand side of the parabola.
- (b) Locate the points on the left hand side of the parabola.
- (c) Complete the parabola in the rectangle **ABCD**.



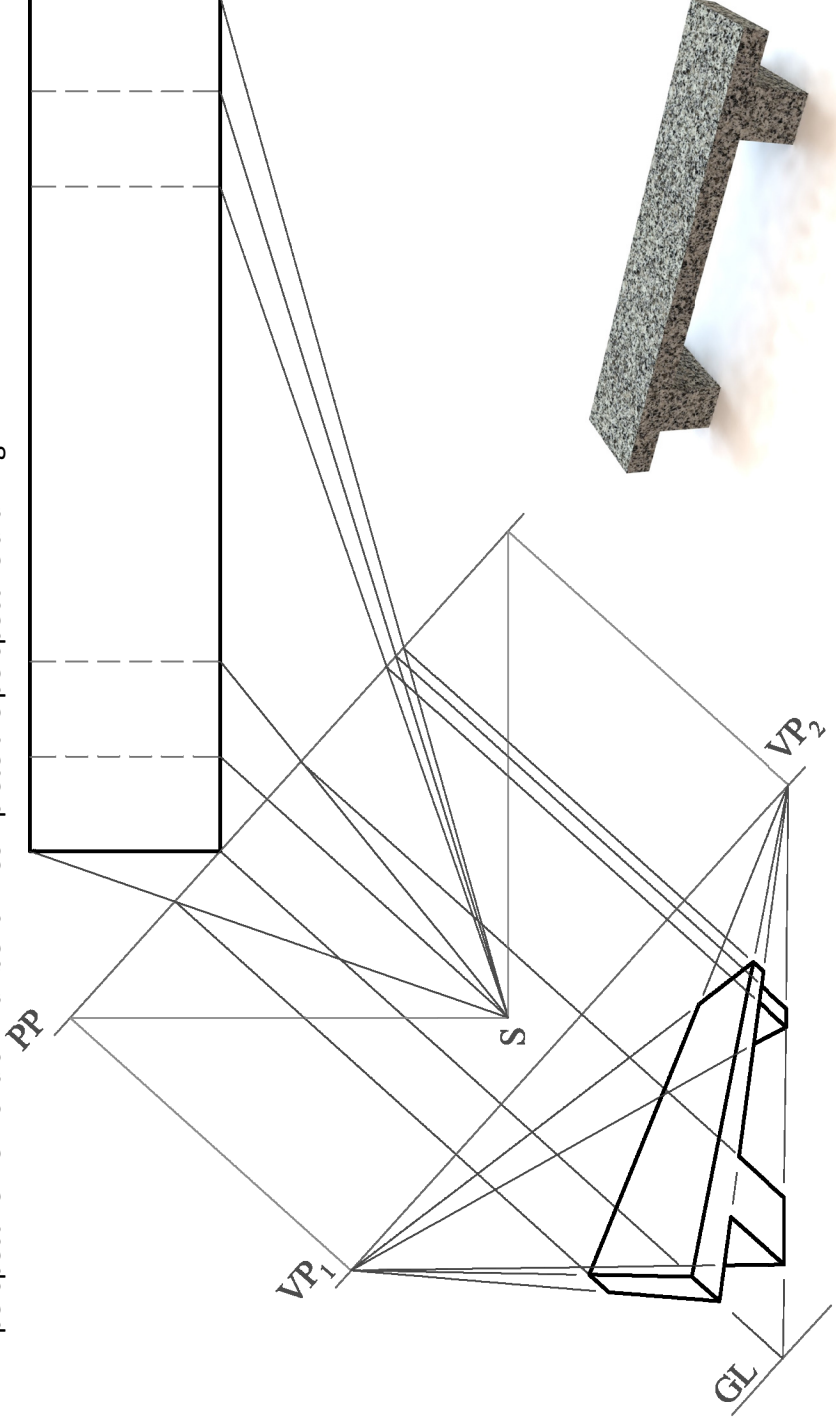
A-2. The image below shows a bridge in Fitzgerald Park, Cork. The symmetrically designed structure includes tangential arcs **A**, **B**, and **C** which have the same radius.

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

- (a) Complete the upper section of the bridge by drawing arc **C** tangential to the given arcs **A** and **B**. Show clearly how the centre point for arc **C** is located.
- (b) Show all points of contact.



A-3. The image below shows a garden bench. The drawing shows the plan and a partially completed perspective view of a similar bench. Complete the perspective drawing.

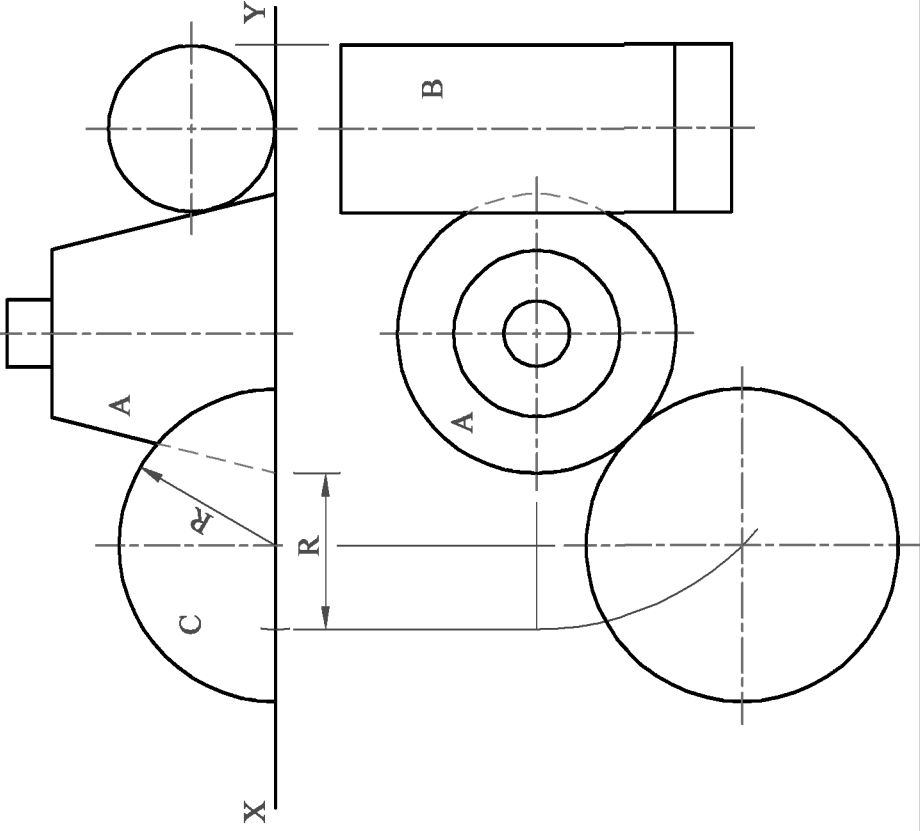
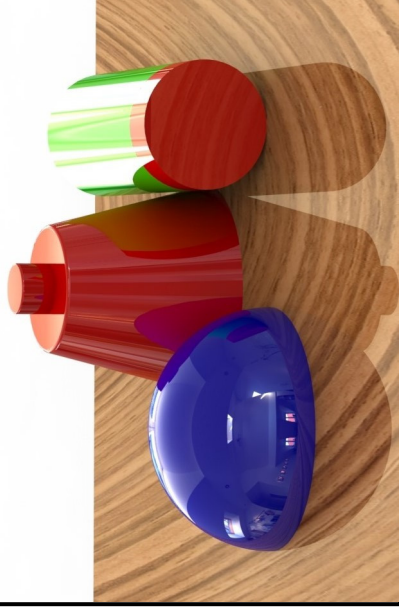


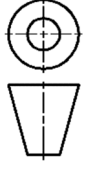
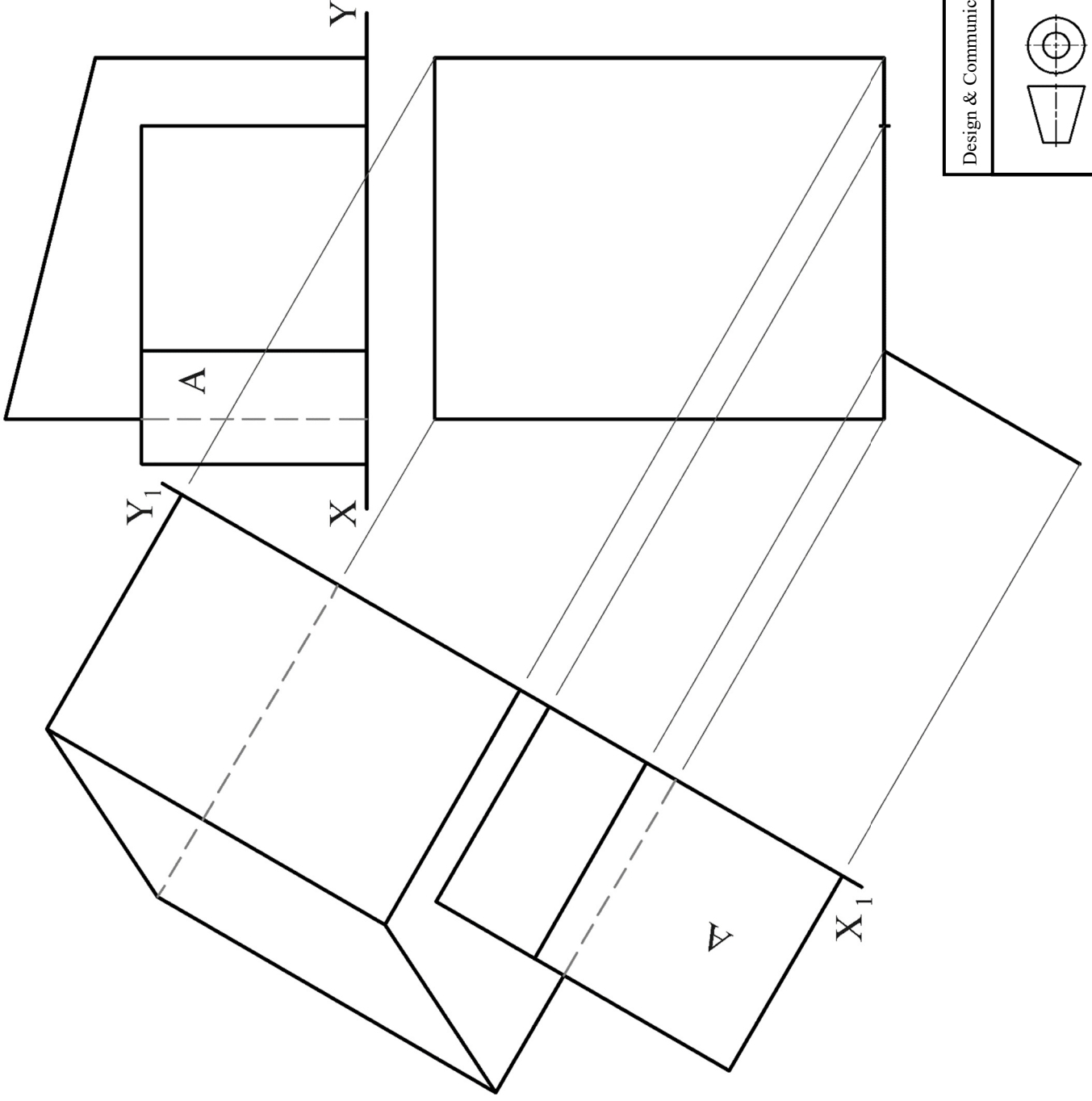
A-4. The 3D graphic below shows a selection of personal care products in geometrical form. The objects rest on a dressing table and are in contact as shown.

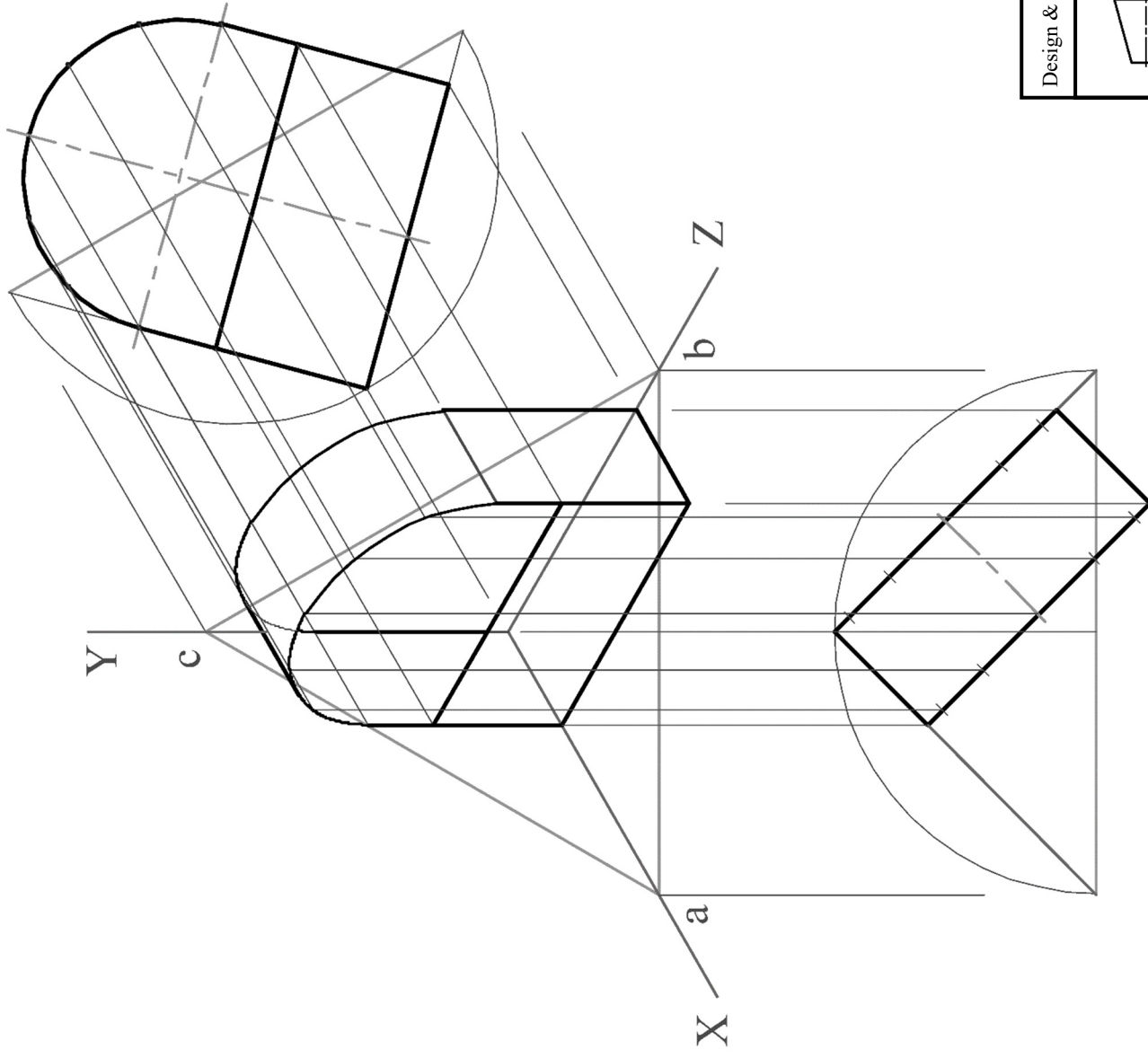
The arrangement consists of a truncated cone **A**, a cylinder **B** and a hemisphere **C**.

The drawing on the right shows the partially completed elevation and plan of the objects.

- (a) Draw the elevation of the cylinder **B**.
- (b) Draw the plan of the hemisphere **C**.







Design & Communication Graphics – Ordinary Level

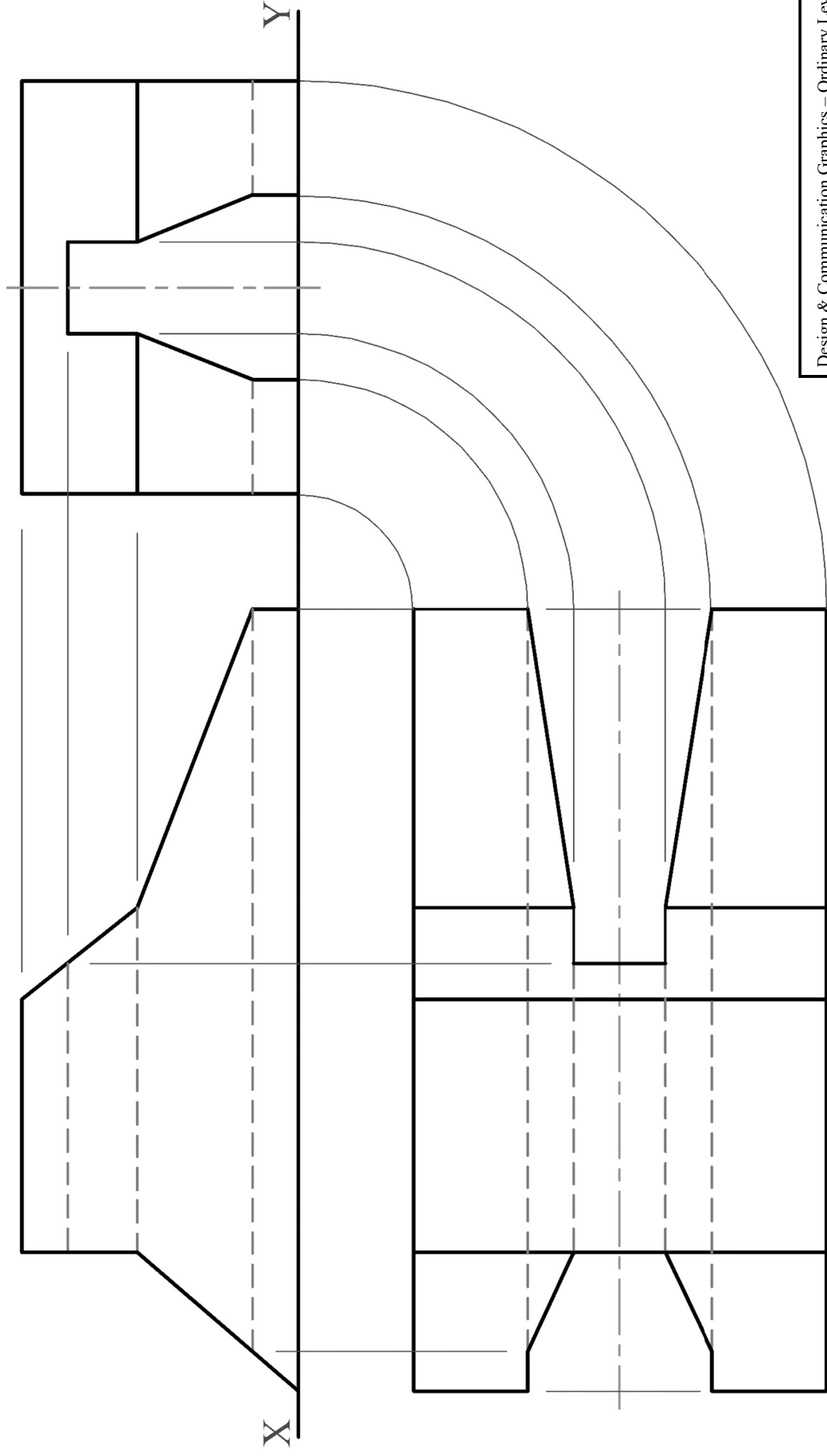
Marking Scheme

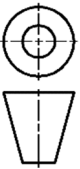
Question B-2

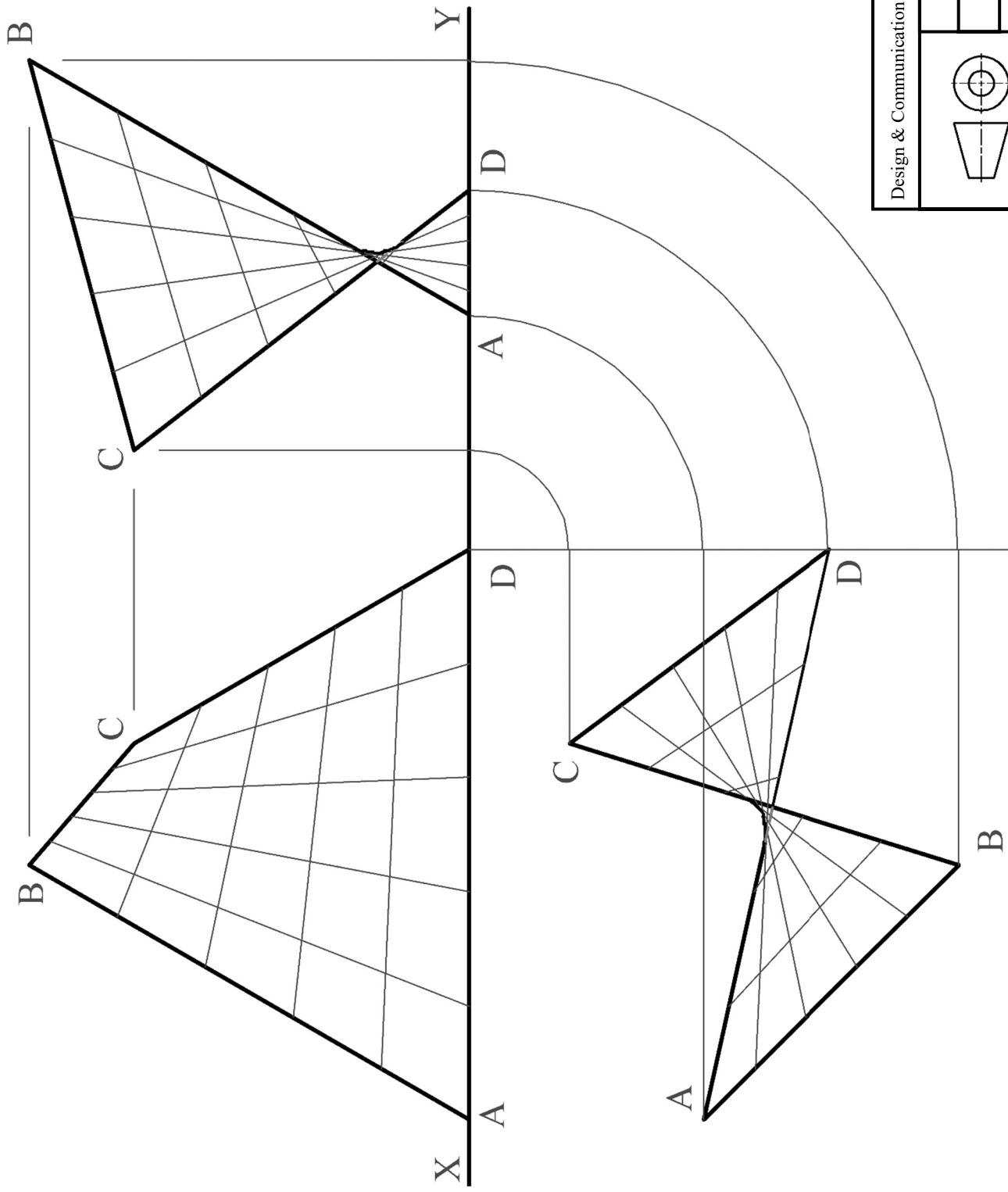
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Design & Communication Graphics – Ordinary Level		
		Marking Scheme
		Question B-3
		Scale: n/a
		June 2021



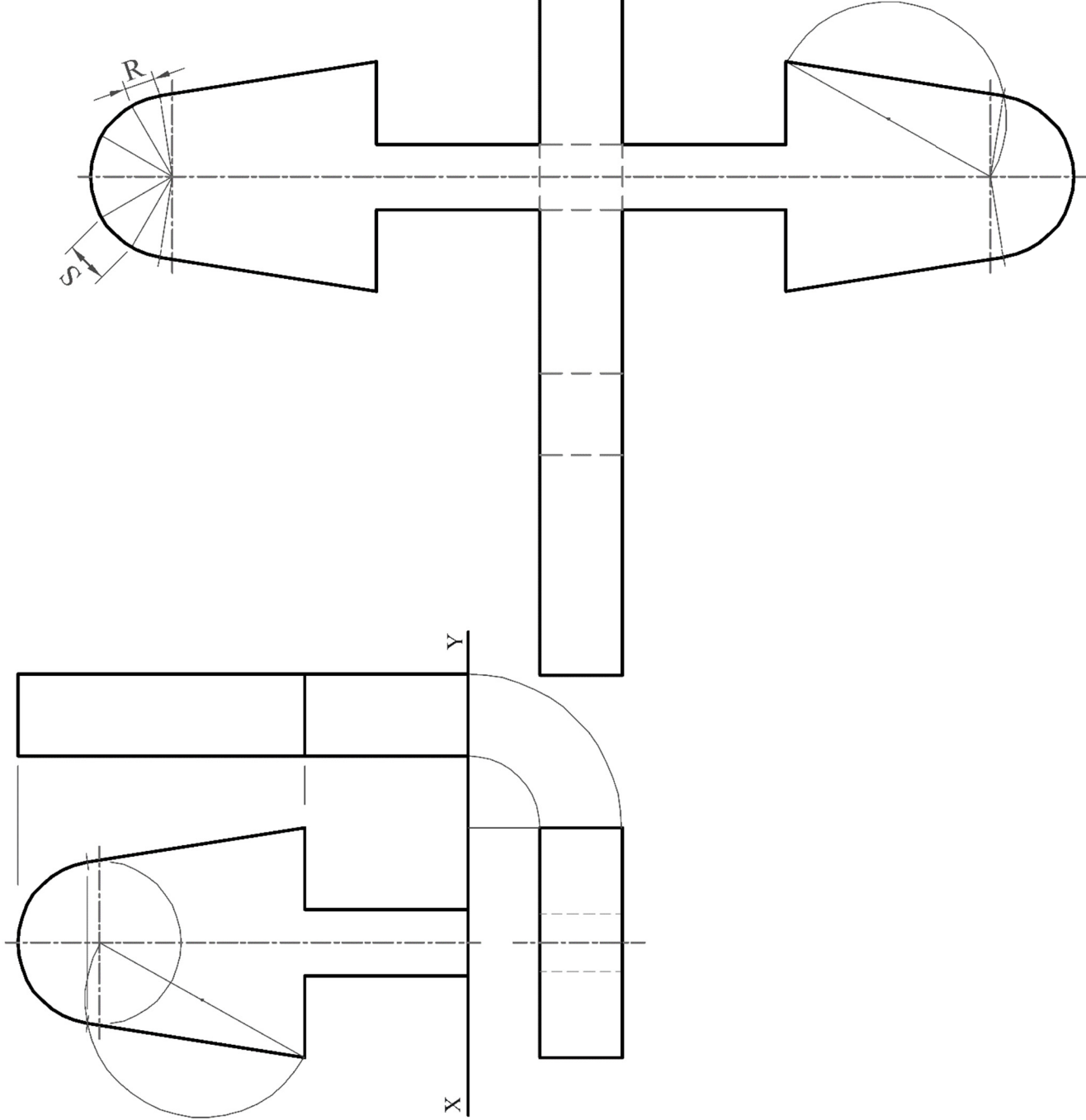
Design & Communication Graphics – Ordinary Level

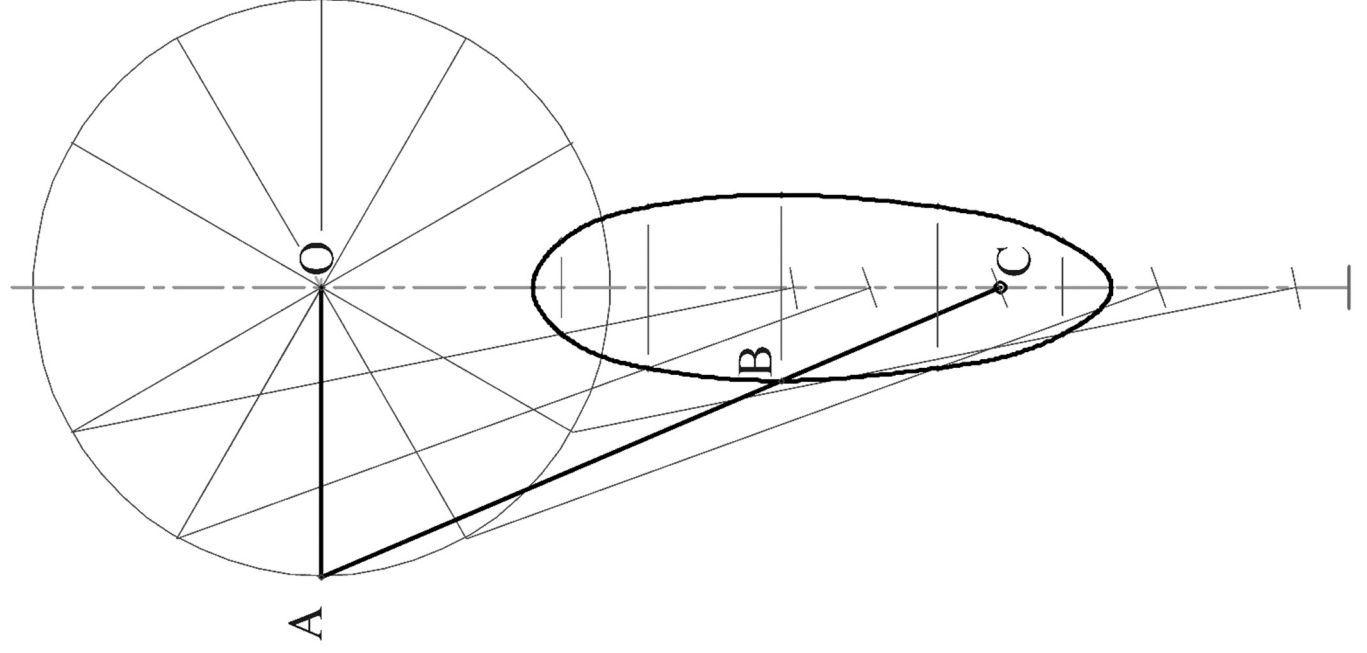
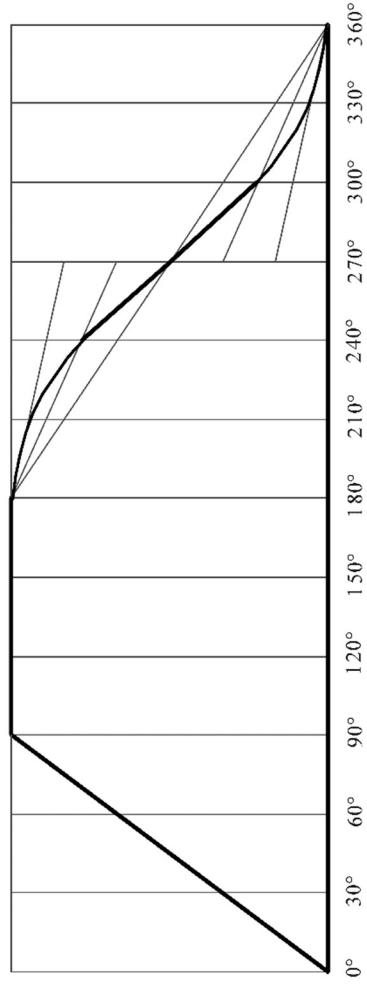
Marking Scheme

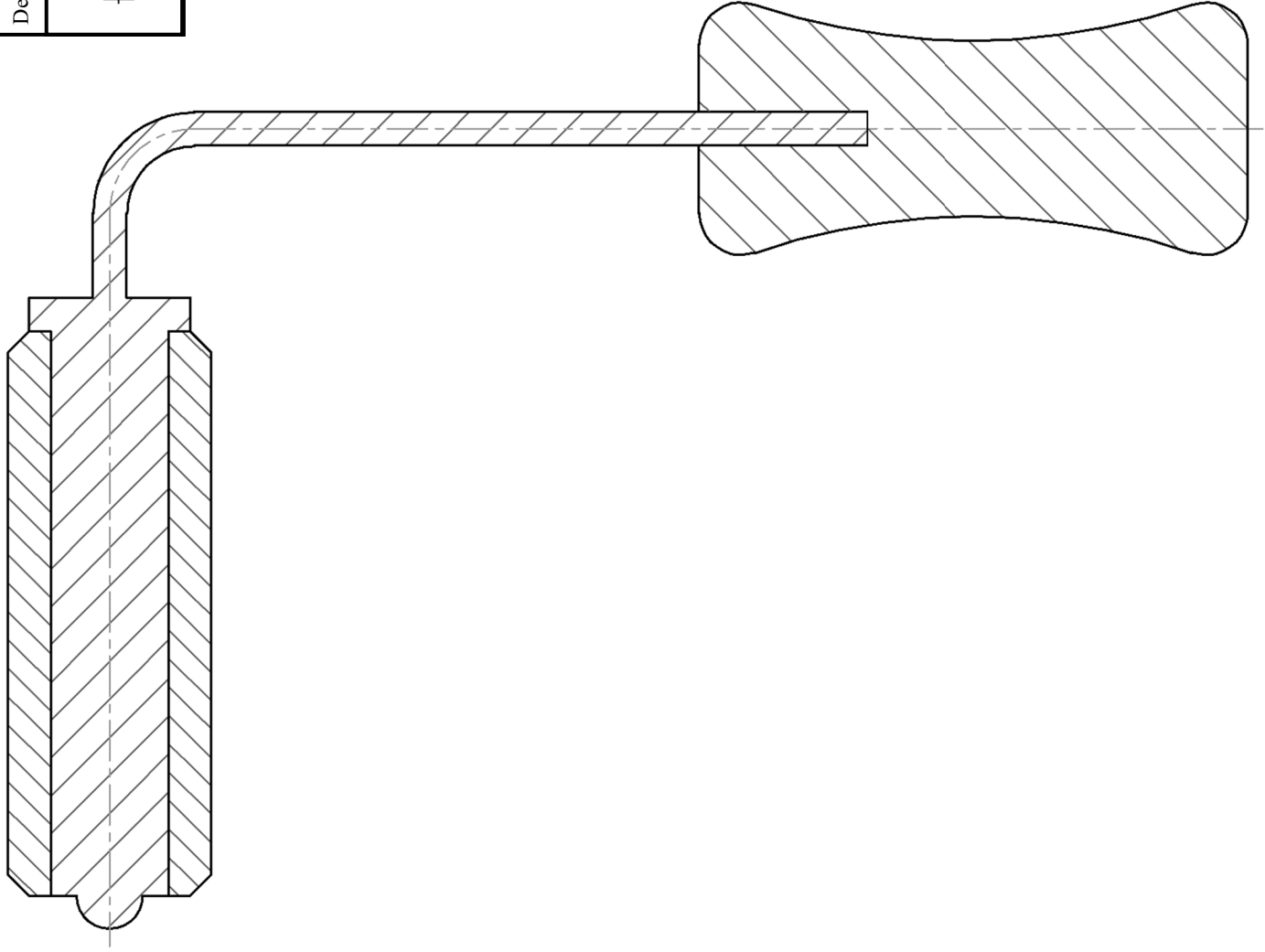
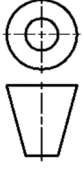
Question C-2

Scale: n/a

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Design and Communication Graphics
Student Assignment - Ordinary Level
Assessment Sheet 2021



Coimisiún na Scrúduithe Stáit
 State Examinations Commission

Candidate Examination No.

Output	Marking criteria				Marks
1	Design Research & Design Feature Comparison				
	Exploration of brief and presentation of existing artefacts in graphic format. Select 2 images and illustrate/explain the main design features. Insert the main dimensions. Compare and contrast the main design features of both using suitable freehand sketches and other presentation techniques.	30			
2	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	20			
3	SolidWorks Parts, Assembly, Drawing and eDrawing files				
	Adherence to required filing structure	35	4		
	Creation of a minimum of 3 Part files		6		
	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		14		
	Factor of difficulty/Design intent		3		
	Assembly - Creation of Assembly; Accuracy of parts to facilitate correct assembly; Correct mating of parts; Application of appropriate appearances		6		
	eDrawing of CAD model		2		
4	Hard Copy outputs from SolidWorks				
	Detailed orthographic views of the selected artefact; Section/Detail views where appropriate; 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	25			
5	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	20			
6	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	10			
7	Hard copy outputs from SolidWorks				
	CAD Model, factor of difficulty/design intent	20	7		
	Detailed orthographic views of the proposed solution; Section/Detail views where appropriate; Rendered pictorial view of the CAD model; Photorealistic images; Inclusion of main dimensions, notes and symbols; Appropriate scaling, layout and presentation to be considered		13		
Sub-total					
Marks deducted for pages in excess of maximum					
Assignment Total					

