**2013. M80BC**

**Coimisiún na Scrúduithe Stáit**

***State Examinations Commission***

***Leaving Certificate Examination, 2013***

***Design & Communication Graphics***

***Ordinary Level***

***Sections B and C (180 marks)***

**Wednesday, 19 June**

**Afternoon, 2:00 - 5:00**

**This examination is divided into three sections:**

SECTION A (Core - Short Questions) SECTION B (Core - Long Questions)

SECTION C (Applied Graphics - Long Questions)

* Four questions are presented.

**SECTION A**  Answer **any three** on the accompanying A3 examination paper.

* All questions in Section A carry **20 marks** each.
* Three questions are presented.

**SECTION B**  Answer **any two** on drawing paper.

* All questions in Section B carry **45 marks** each.
* Five questions are presented.

**SECTION C**  Answer **any two** (i.e. the options you have studied) on drawing paper.

* All questions in Section C carry **45 marks** each.

**General Instructions:**

* *Construction lines must be shown on all solutions.*
* *Write the question number distinctly on the answer paper in Sections B and C.*
* *Work on one side of the drawing paper only.*
* *All dimensions are given in metres or millimetres.*
* *Write your Examination number in the box provided on section A and on all other sheets used.*

**B-1.** The 3D graphic on the right shows a music stand and conductor.

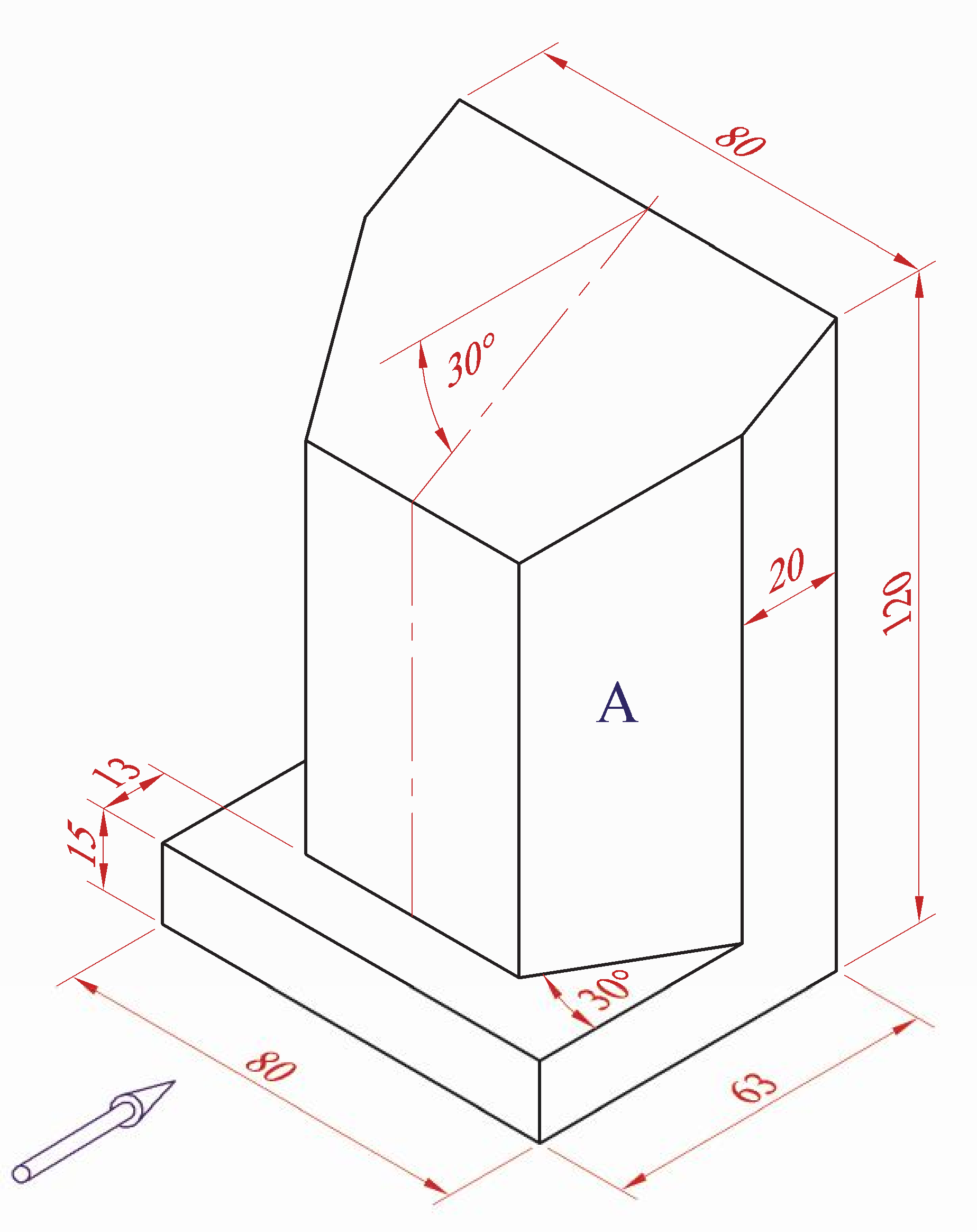
**SECTION B - Core**

Answer **any two** questions from this section on drawing paper

Fig. B-1 shows an isometric view of a model of the stand.

1. Draw an elevation of the stand looking in the direction of the arrow.
2. Draw a plan projected from the elevation.
3. Draw an end view of the stand.
4. Draw an auxiliary elevation of the ***stand***, projected from the plan, which will include the true shape of surface **A**.

# Scale 1:1



**Fig. B-1**

**B-2.** The 3D graphic on the right shows a unit for holding and charging a cordless phone.

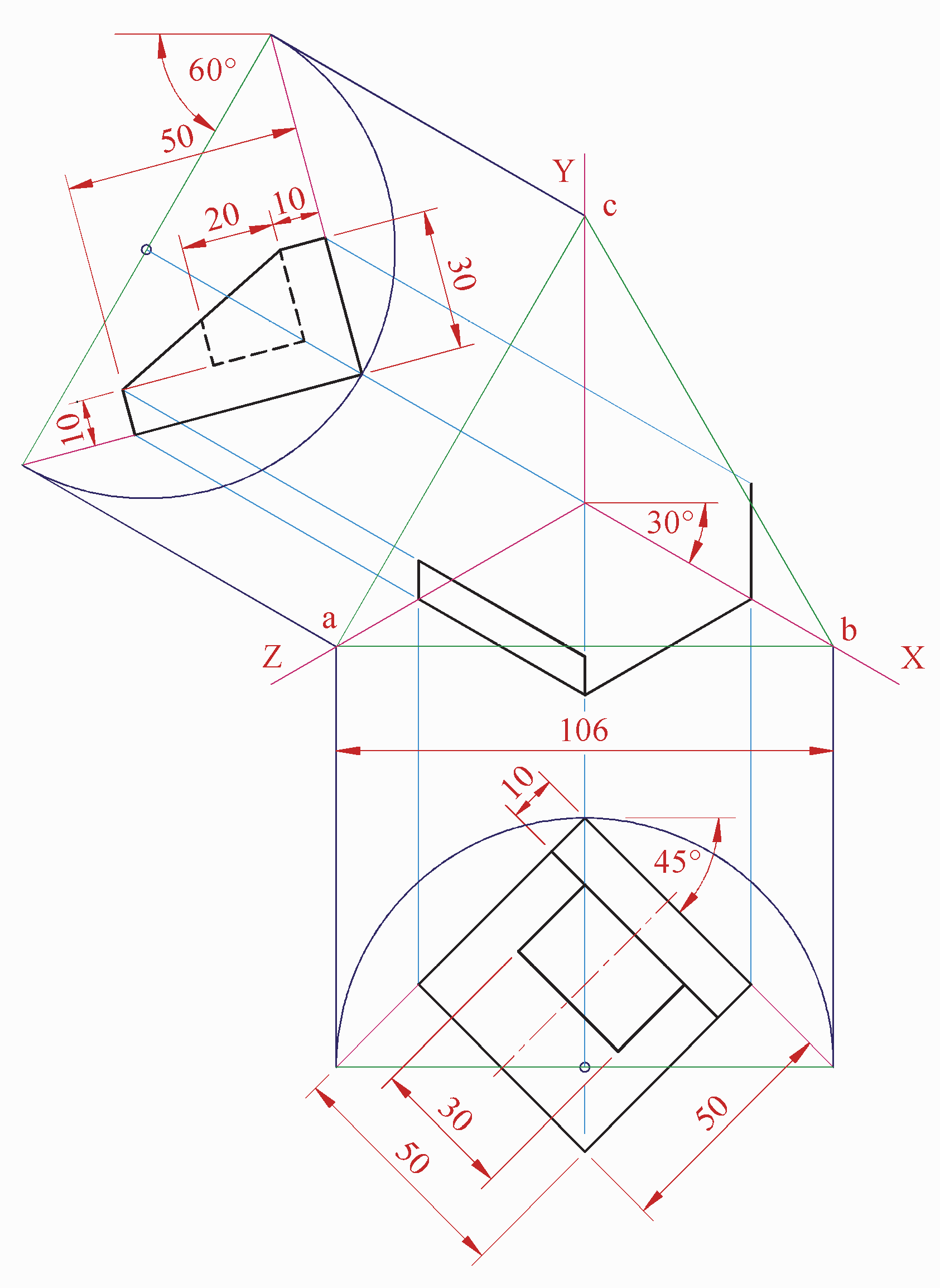


Fig. B-2 shows an incomplete isometric projection of the unit.

The end view and plan of the unit are also shown in their required positions.

1. Draw the given equilateral triangle **abc** and the axonometric axes **X, Y,** and **Z**.
2. Draw the end view and plan, positioned as shown.
3. Draw the complete axonometric projection.

# Scale 1:1

**Fig. B-2**

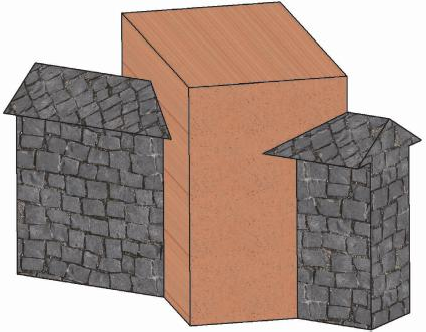
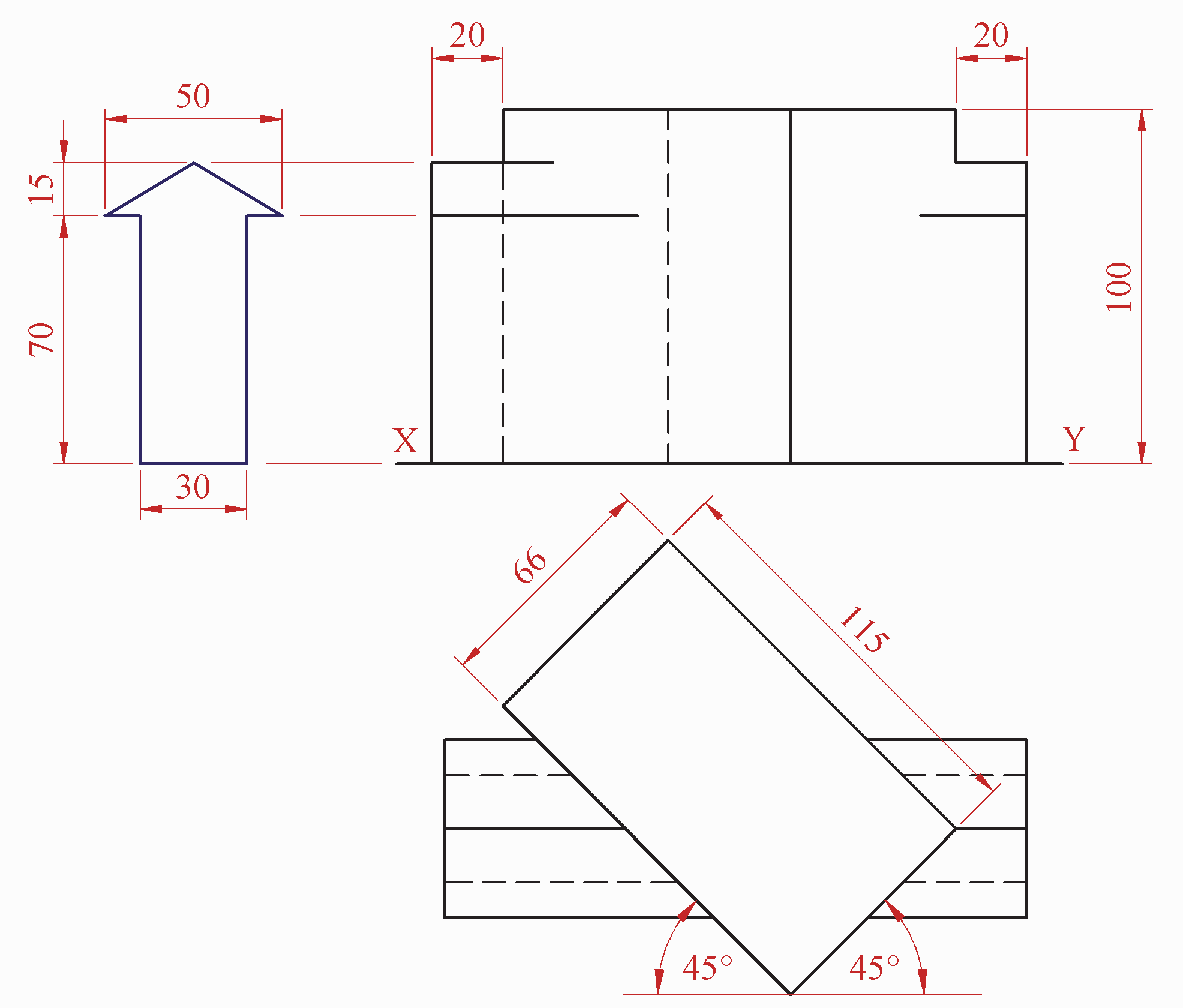
**B-3.** The 3D graphic on the right shows the intersection of a wall and a pillar.

Fig. B-3 shows the plan and incomplete elevation of the arrangement.

1. Draw the given plan and elevation of the structure and show all lines of interpenetration.
2. Draw an end view of the structure.

# Scale 1:1



**Fig. B-3**

**Geologic Geometry**

**C-1.** The accompanying map, located on the back page of Section A, shows ground contours at 5 metre vertical intervals.

**SECTION C - Applied Graphics**

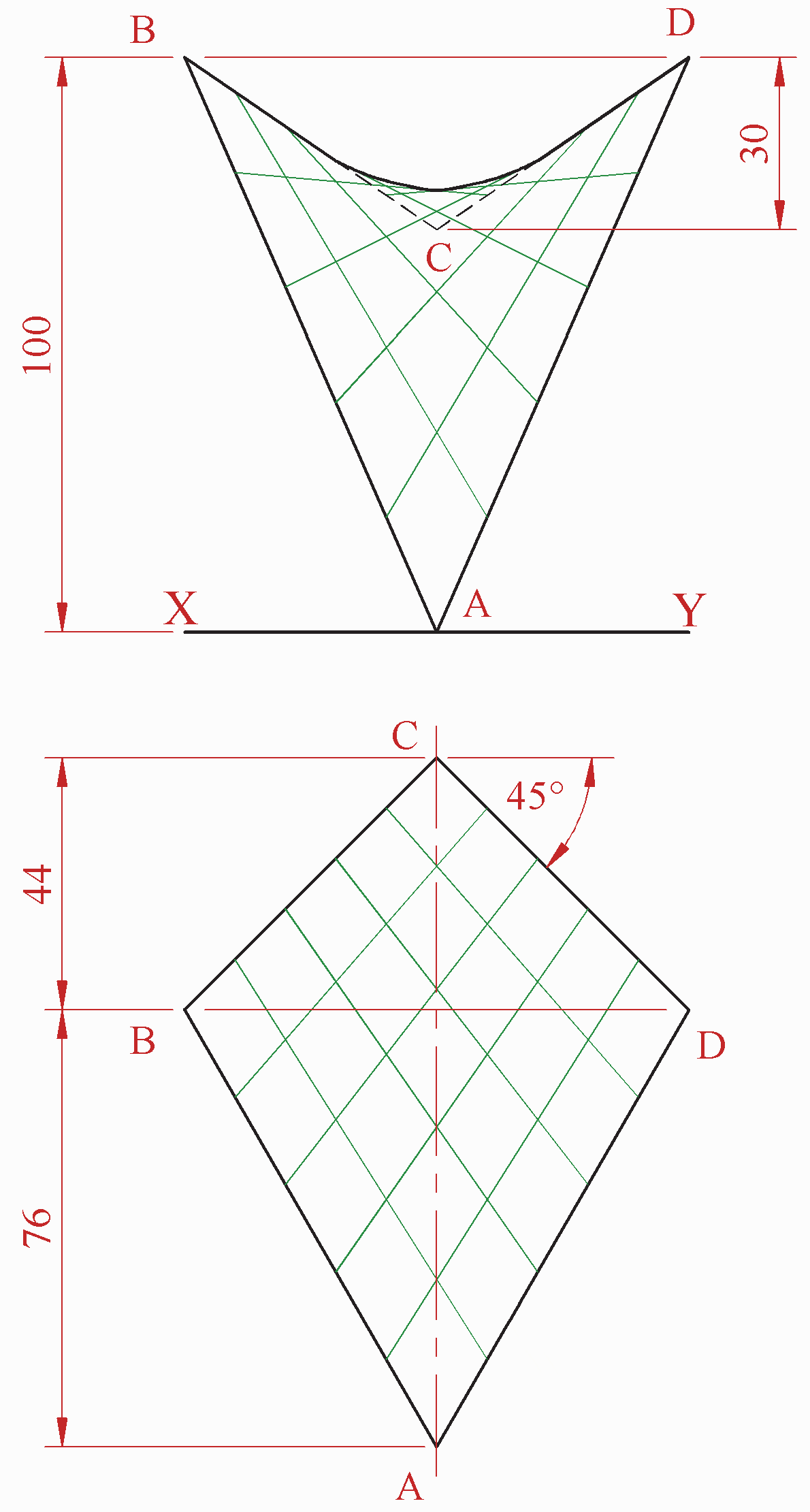
Answer **any two** questions (i.e. the options you have studied) from this section on drawing paper

* 1. On the drawing supplied, draw a vertical section (profile) on the line **AB**.
  2. The line **CD** is the centreline of a proposed level roadway which is at an altitude of 55m.

Using side slopes of 1 in 1 for both cuttings and embankments, complete the earthworks on the northern side necessary to accommodate the roadway.

*(****Note:*** *The earthworks on the southern side of the roadway have already been completed.)*

# Scale 1:1000



**C-2.** The 3D graphic on the right shows a cufflink which includes a hyperbolic paraboloid surface.

**Structural Forms**

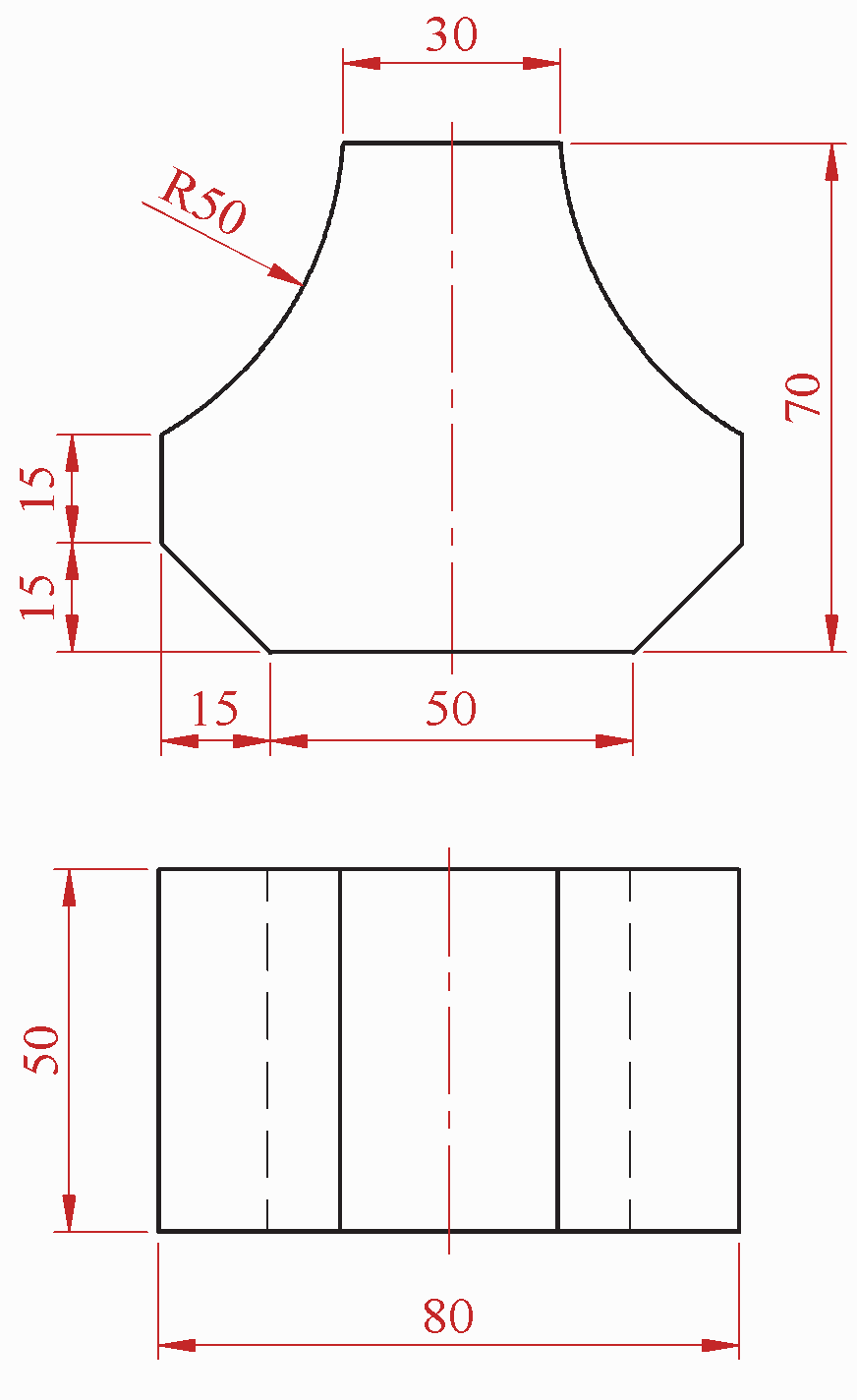
Fig. C-2 shows the plan and elevation of a typical hyperbolic paraboloid surface, **ABCD**.

1. Draw the given plan and elevation of the hyperbolic paraboloid surface.
2. Project an end view of the hyperbolic paraboloid surface.

# Scale 1:1

**Fig. C-2**

**C-3.** The 3D graphic on the right shows a table lamp with a modern lampshade. The lampshade is open at the top and at the bottom.



**Surface Geometry**

The plan and elevation of the lampshade are shown in Fig. C-3.

1. Draw the given views of the lampshade.
2. Draw a one-piece surface development of the lampshade.

# Scale 1:1

**Fig. C-3**

**C-4.** Cams are used in motorbike engines, like the one shown in the 3D graphic on the right.



**Dynamic Mechanisms**

Fig. C-4 below shows the outline of such a cam.

The cam imparts this motion to an inline knife edge follower:

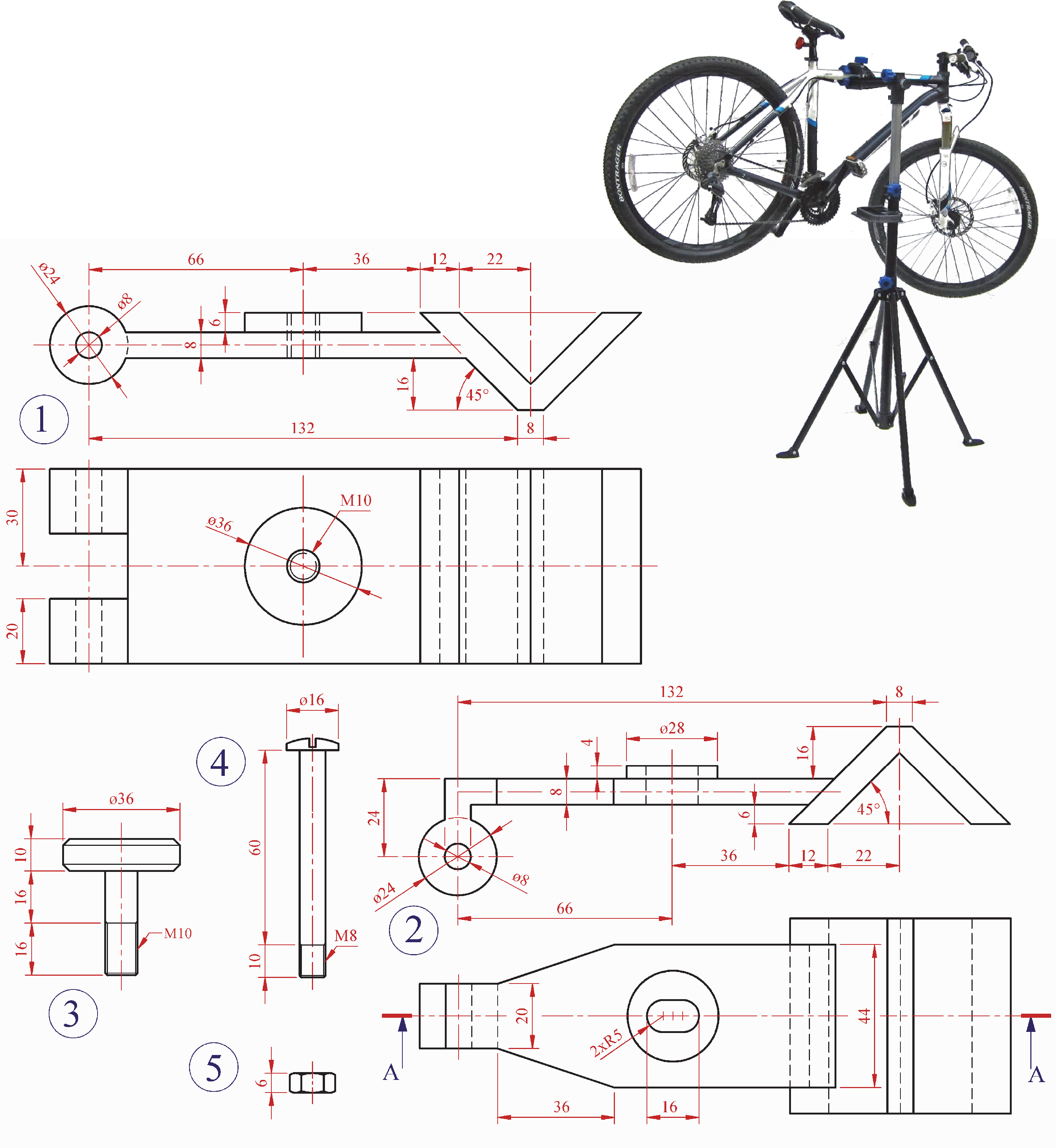
|  |  |  |  |
| --- | --- | --- | --- |
| **** 0° | to | 90° | Rise 50mm with uniform velocity |
| **** 90° | to | 180° | Dwell |
| **** 180° | to | 360° | Fall 50mm with uniform acceleration |
|  |  |  | and retardation (UAR). |

1. Draw the displacement diagram for the cam.
2. Draw the cam profile given the following:
   * The cam rotates in an anti-clockwise direction
   * The nearest approach of the follower to the centre of the camshaft is 30mm
   * The camshaft diameter is 20mm.

# Scale 1:1



**Fig. C-4**



**C-5.** Details of a Clamp Mechanism from the top of a bicycle stand, as shown on the right, are given in Fig. C-5 below.

**Assemblies**

A 3D graphic of the individual parts is also shown as well as a tabulated parts list.

Draw the ***sectional elevation*** A-A of the assembled Clamp Mechanism.

*(All chamfers are 2mm×2mm. Any omitted dimensions may be estimated.)*

# Scale 1:1

**Fig. C-5**

|  |  |  |
| --- | --- | --- |
| **Part** | **Name** | **Qty.** |
| 1 | Bottom Clamp Jaw | 1 |
| 2 | Top Clamp Jaw | 1 |
| 3 | Clamping Screw | 1 |
| 4 | M8 Bolt | 1 |
| 5 | M8 Hex Nut | 1 |

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