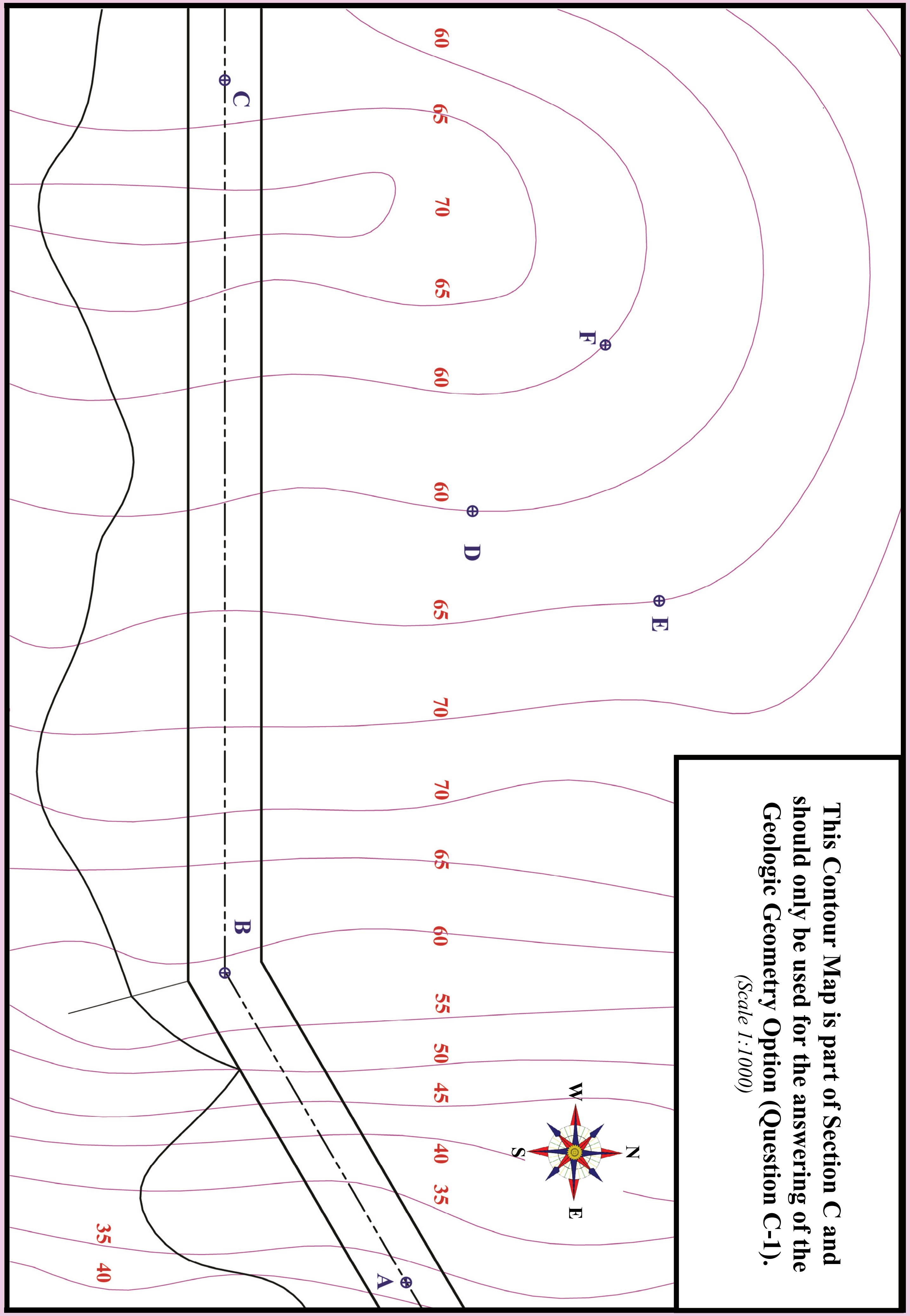


Pre-Leaving Certificate Examination, 2016

Design & Communication Graphics

Higher Level

Section A *(60 marks)*

Time: 3 Hours

This examination is divided into three sections:

SECTION A	(Core - Short Questions)
SECTION B	(Core - Long Questions)
SECTION C	(Applied Graphics - Long Questions)

SECTION A
- Four questions are presented.
- Answer **any three** on the A3 sheet overleaf.
- All questions in Section A carry **20 marks** each.

SECTION B
- Three questions are presented.
- Answer **any two** on drawing paper.
- All questions in Section B carry **45 marks** each.

SECTION C
- Five questions are presented.
- 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 Name, School Name and Teacher's Name in the box below and on all other sheets used.*

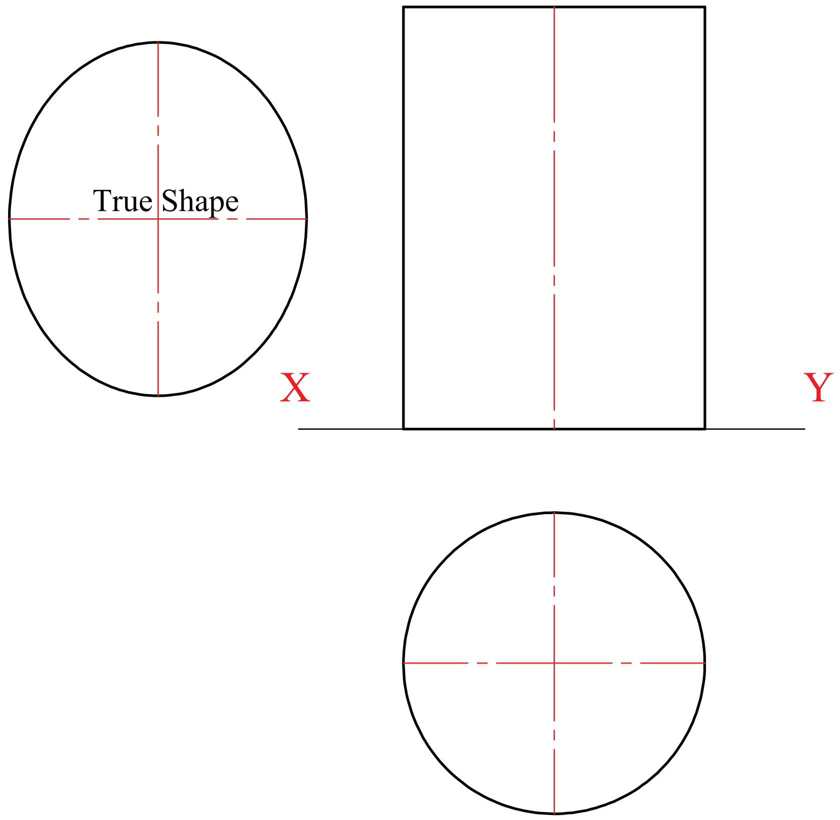
Name:	
School Name:	
Teacher's Name:	

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

A-1. The 3D graphic below shows a tin of beans. The logo printed on the front of the label is based on an ellipse.

The drawing on the right shows the true shape of the elliptical label. The elevation and plan of the cylinder are also shown.

Complete the elevation of the cylinder where the elliptical label is wrapped around the cylinder.

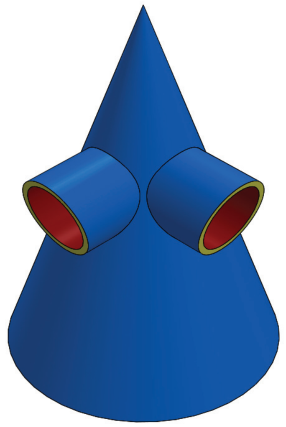


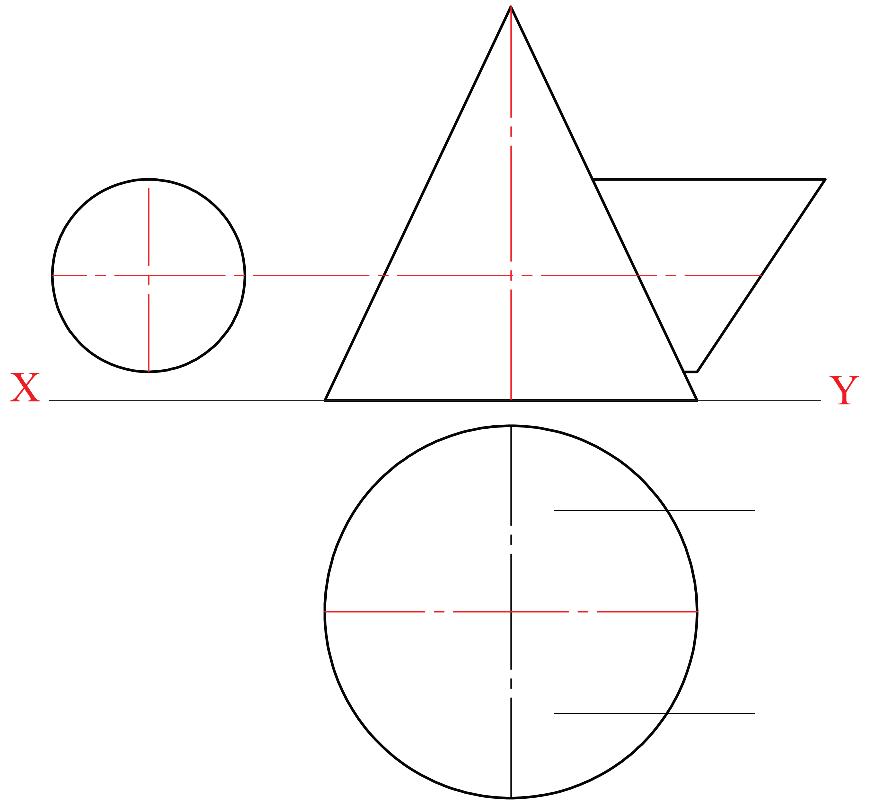
A-3. The 3D graphic below shows a building based on an intersecting cone and cylinders.

The drawing on the right shows a partially completed elevation, plan and sectional end elevation.

(a) Complete the elevation.

(b) Complete the plan.

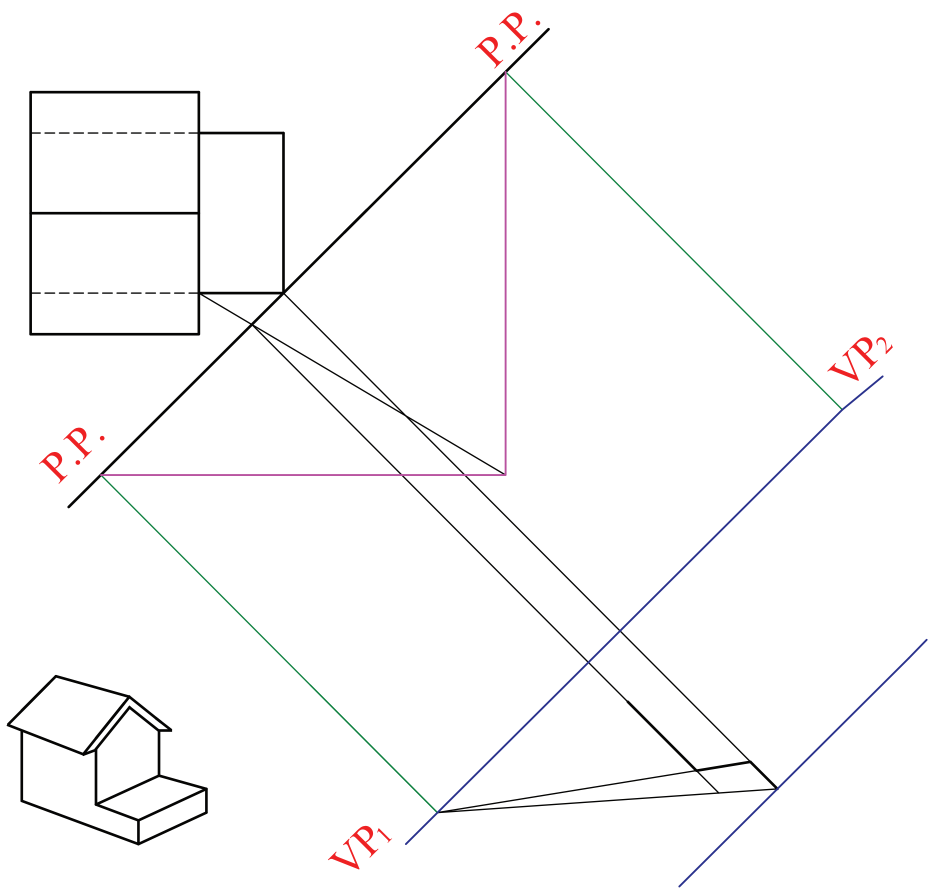




A-2. The 3D graphic below shows a birdhouse. The drawing on the right is a partially completed perspective view of the birdhouse.

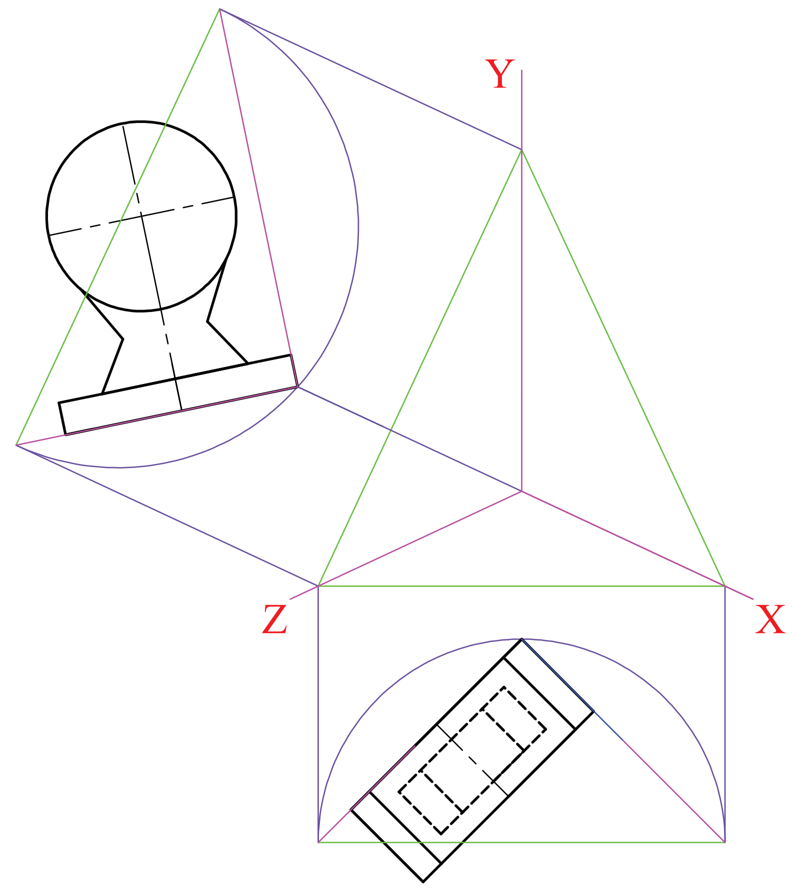
(a) Complete the perspective drawing of the birdhouse.

(b) Determine an auxiliary vanishing point for the 25° sloping surfaces and complete the drawing.



A-4. The 3D graphic below shows a trophy. A set of dimetric axes is shown on the right and the elevation and plan of the trophy have been positioned relative to the axes as shown.

Draw the axonometric projection of the trophy.



This examination paper must be returned at the end of the examination – You must include your Name, School Name and Teacher's Name on the front cover.

Pre-Leaving Certificate Examination, 2016

Design & Communication Graphics
Higher Level
Sections B and C (180 marks)

Time: 3 Hours

This examination is divided into three sections:

SECTION A	(Core - Short Questions)
SECTION B	(Core - Long Questions)
SECTION C	(Applied Graphics - Long Questions)

SECTION A	• Four questions are presented. • Answer **any three** on the accompanying A3 examination paper. • All questions in Section A carry **20 marks** each.
SECTION B	• Three questions are presented. • Answer **any two** on drawing paper. • All questions in Section B carry **45 marks** each.
SECTION C	• Five questions are presented. • 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 Name, School Name and Teacher's Name in the box provided on section A and on all other sheets used.*

SECTION B - Core

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

B-1. The 3D graphic on the right shows a stage set from an Irish television programme. The panelists' table includes intersecting planar faces.

The horizontal and vertical coordinates of the planes **ABC** and **ABD** are given below.

A	=	30	---	50	---	25
B	=	40	---	0	---	60
C	=	120	---	50	---	75
D	=	65	---	0	---	20

(a) Draw the plan and elevation of the planes.
(Use a horizontal orientation for the A3 sheet to maximise space)

(b) Determine the dihedral angle between the two planes.

(c) Determine the vertical and horizontal traces of the plane **ABC**.

(d) Determine the angle of inclination of plane **ABC** to the vertical plane.

Scale 1:1

B-2. The 3D graphic on the right shows a modern shopping centre. The design of the building includes a conical surface which is cut as shown.

Fig. B-2 below shows the elevation of the truncated cone.

(a) Draw the given elevation of the structure.

(b) Use a focal sphere to find the focal point, vertex and directrix of the hyperbolic cut surface.

(c) Determine the true shape of the hyperbolic cut surface.

(d) Project an end elevation of the truncated cone.

Scale 1:100

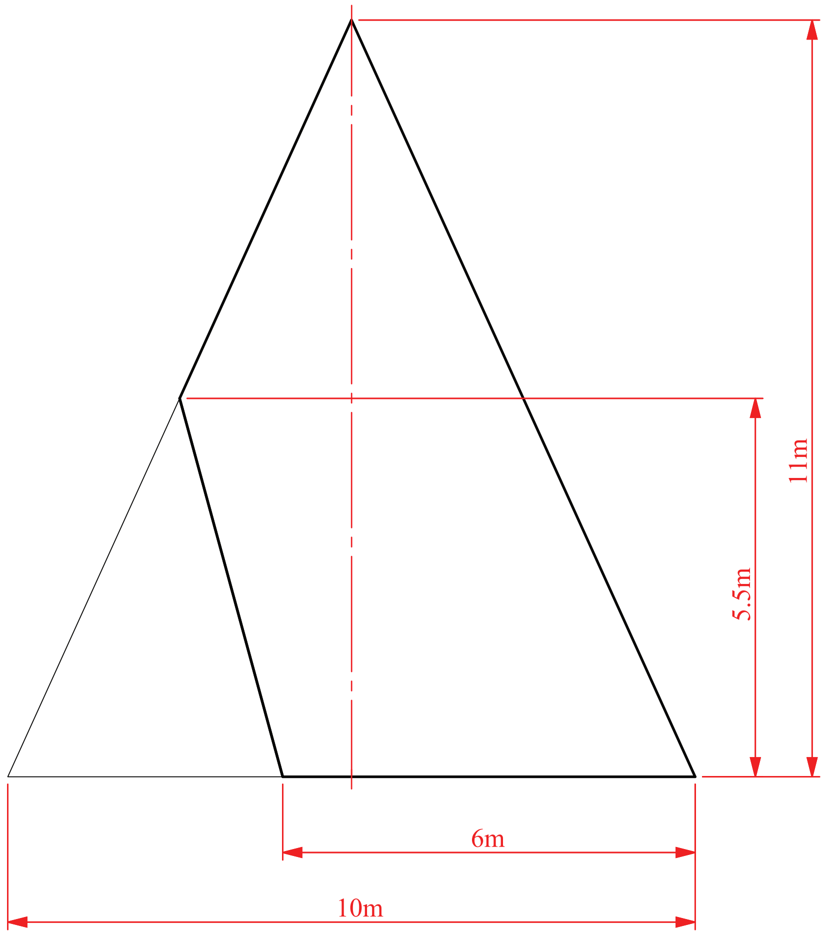


Fig. B-2

B-3. The 3D graphic on the right shows a golf ball and a golf club.

Fig. B-3 below shows the elevation and plan of the golf ball and the golf club face which are in contact. The oblique plane which contains the golf club face is inclined at an angle of 50 ° to the horizontal plane.

(a) Draw the given elevation.

(b) Determine the vertical and horizontal traces of the oblique plane.

(c) Draw the given plan.

Scale 1:1

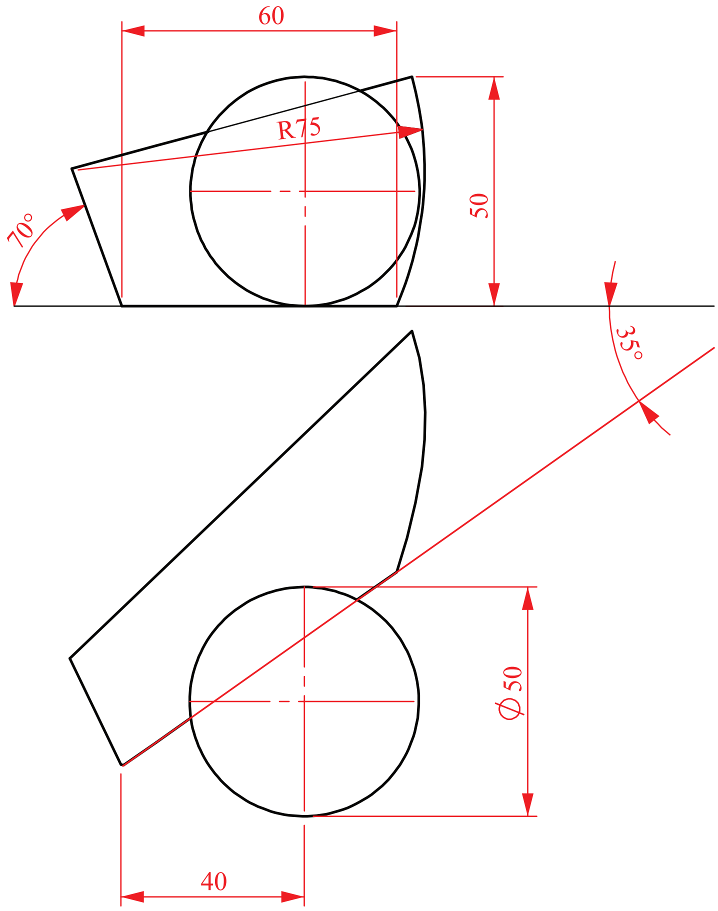


Fig. B-3

SECTION C - Applied Graphics

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

Geologic Geometry

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

ABC is the centreline of a proposed roadway.

The roadway **ABC** has the following specifications:

- the section between **A** and **B** is level at an altitude of 50m;
- the section from **B** to **C** has a gradient of 1 in 20 rising.

Using side slopes of 1 in 1.5 for the cuttings and 1 in 2 for the embankments, complete the earthworks necessary to accommodate the roadway on its northern side.

Note: *The earthworks on the southern side have already been completed.*

(b) On the map, vertical boreholes at points **D**, **E** and **F** reveal the top surface of a stratum of ore at distances of 25m, 10m and 15m below **D**, **E** and **F**, respectively.

Determine the dip and strike of the stratum.

Scale 1:1000

Structural Forms

C-2. The graphic on the right shows a modern building. The roof portion of the building is based on a hyperbolic paraboloid.

Fig. C-2 below shows the hyperbolic paraboloid surface **ABCD** which is seen as ellipse in plan.

(a) Draw the given plan of the structure.

(b) Draw the given elevation of the structure.

(c) A plane director for the elements **AB** and **CD** is positioned so that it contains the point **B**.
Draw the traces for this plane director.

Scale 1:1

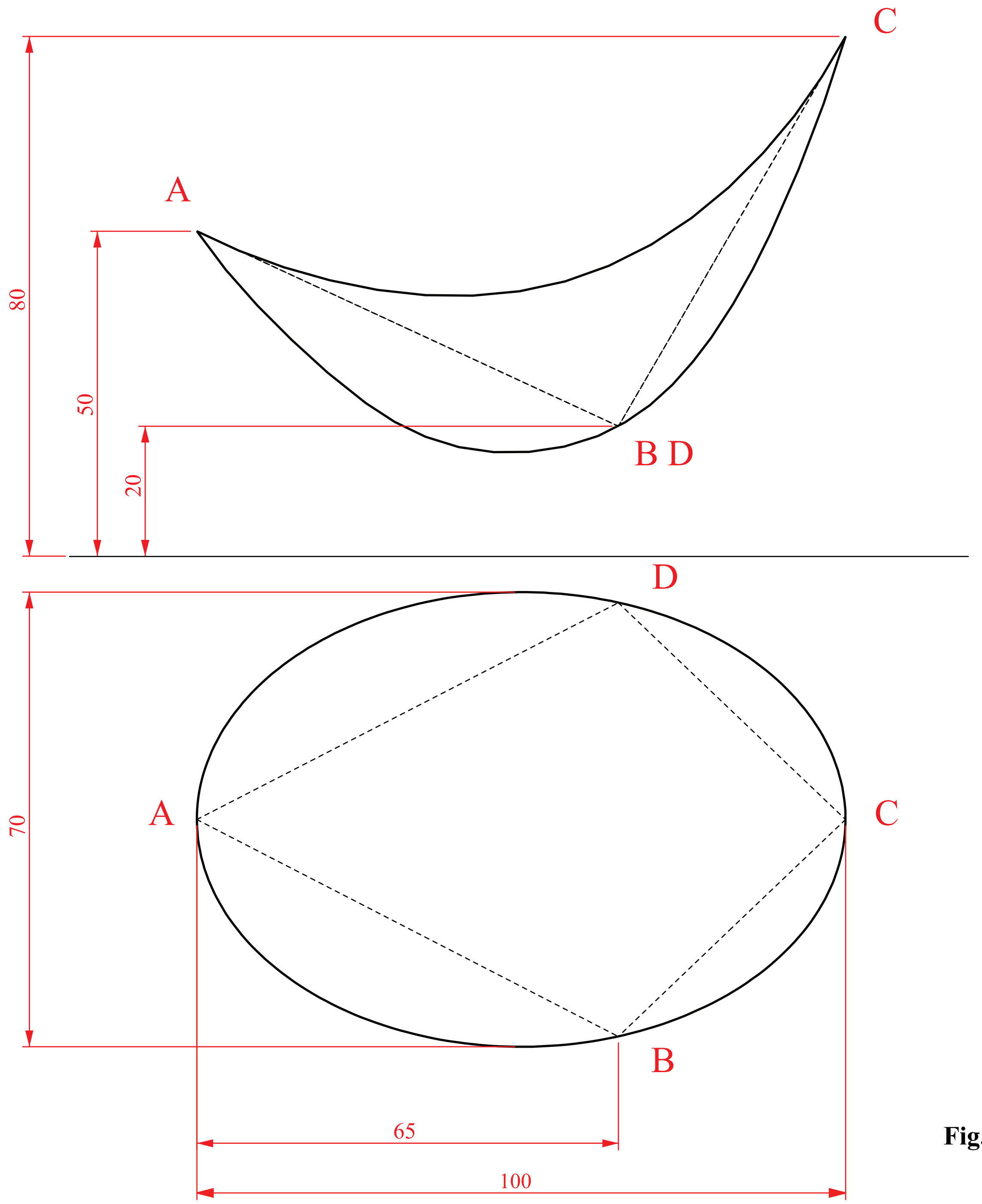


Fig. C-2

Surface Geometry

C-3. The graphic on the right shows a modern house.

The projections of the outline of the house are shown in Fig. C-3 below.

Surfaces **A**, **B** and **C** are inclined at 70 °, 40 ° and 60 ° to the horizontal plane, respectively.

(a) Draw the given plan and elevation.

(b) Determine the dihedral angle between the surfaces **A** and **B**.

Scale 1:100

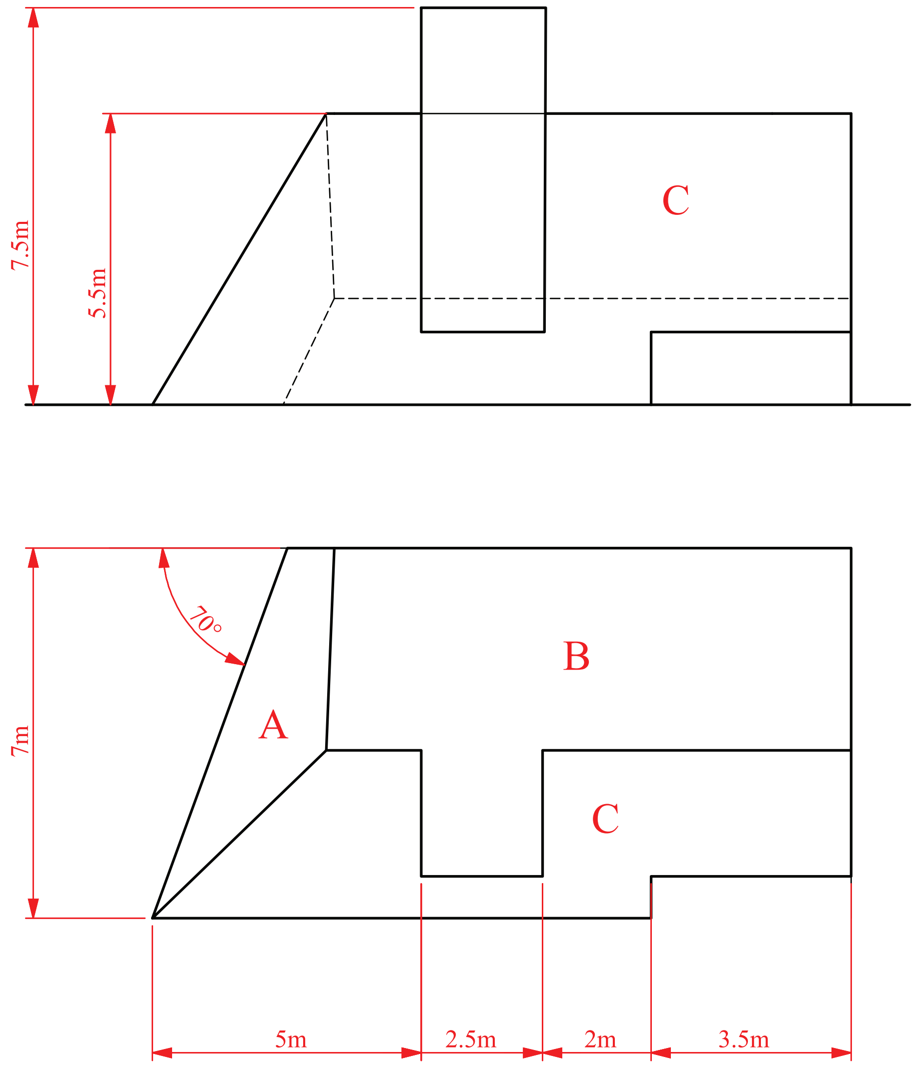


Fig. C-3

Dynamic Mechanisms

C-4. (a) The graphic on the right shows a go-cart with a steering mechanism.

Such a mechanism is shown in line diagram format in Fig C-4 (a) below.

In the mechanism, the circle rolls clockwise along the line **AB** for half of one revolution. The link **TP** is constrained to slide through the fixed point **S**. **T** is a pin joint.

Plot the locus of point **P** for the combined movement.

Scale 1:1

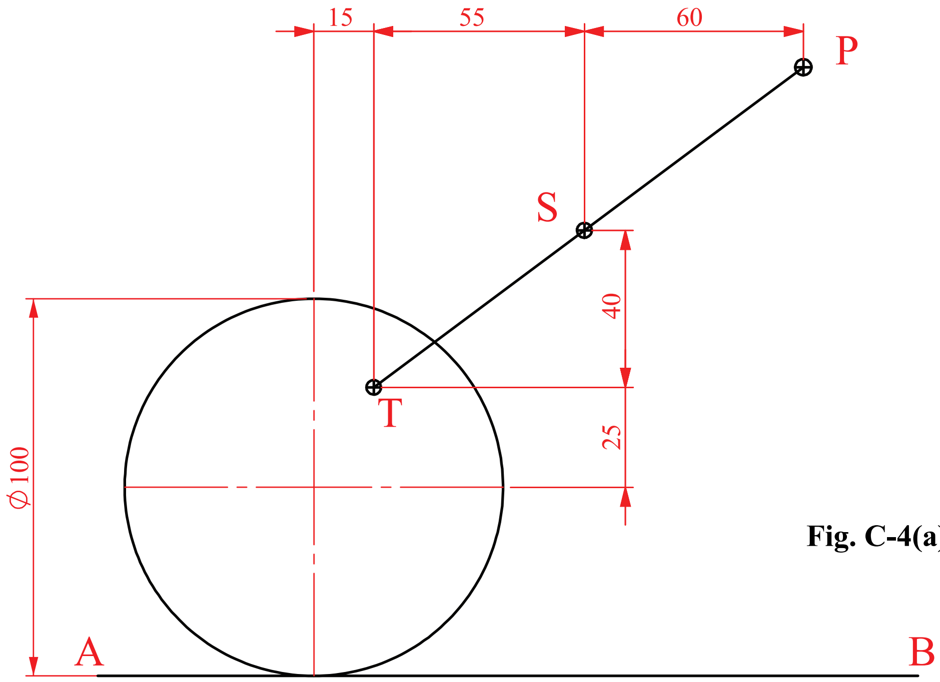


Fig. C-4(a)

(b) The image on the right shows a pull along toy. A cam attached to the front axle of the toy causes the head to move up and down as the toy is pulled along.

The nearest approach of the in-line flat follower to the cam centre is 20mm. The cam rotates in a clockwise direction and has a ø6mm camshaft.

Draw the displacement diagram and the cam profile given the following data:

- 0° to 90° Rise 35mm with uniform acceleration and retardation
- 90° to 180° Rise of 20mm with uniform velocity
- 180° to 270° Dwell
- 270° to 360° Fall of 55mm with simple harmonic motion.

C-5. (a) Details of a *Winch*, used for tightening ropes, are shown in Fig. C-5. The parts list is also given. Draw a full size sectional elevation on A-A$_1$, showing the parts fully assembled and with the handle in its normal hanging position.
(Unless otherwise stated, any omitted dimensions may be estimated.)

(b) Determine, and indicate on your drawing, the length of string that is wound initially when the handle of the winch is rotated from one locked position to the next locked position.

Part	Name	Qty.
1	Bracket	1
2	Pulley	1
3	M10 Bolt	1
4	M10 Bolt	1
5	Handle	1
6	Arm	1
7	Lock	1
8	M8 Bolt	2
9	M10 nut	2
10	M10 washer	2

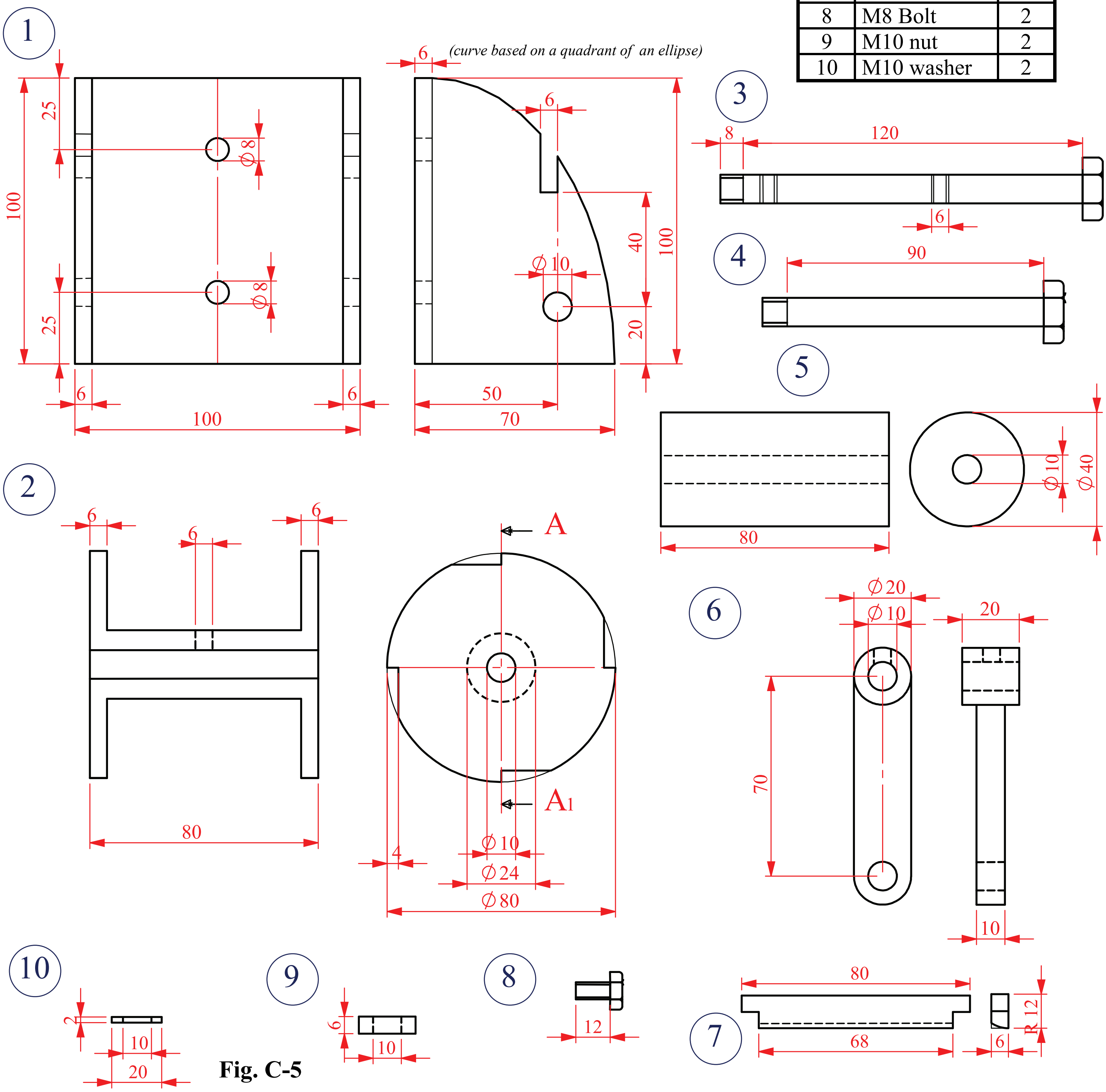


Fig. C-5

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