

CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Advanced Level

GEOMETRICAL AND MECHANICAL DRAWING 9351/1

PAPER 1

OCTOBER/NOVEMBER SESSION 2002

3 hours

Additional materials:
A2 Drawing paper (4 sheets)
Standard Drawing Equipment

TIME 3 hours

INSTRUCTIONS TO CANDIDATES

Print your name, Centre number and candidate number at the bottom right-hand corner of every sheet of paper you use.

Answer **all** questions from Section I and any **three** questions from Section II.

Write or draw your answers on the separate drawing paper provided.

Work **all** your answers in SI units. Use both sides of the drawing paper.

All solutions are to be drawn full-size unless a contrary instruction is given. Construction lines must be shown clearly.

If you use more than one sheet of paper, fasten the sheets together.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [] at the end of each question or part question.

The diagrams are not necessarily drawn to scale.

All dimensions are in millimetres unless otherwise stated.

You are reminded of the need for clear presentation in your answers.

This question paper consists of 10 printed pages and 2 blank pages.

Section I (40 marks)

Answer **all** questions in this section.

1 The design of a logo for a record company is shown in the sketch Fig. 1.

The logo consists of:

- a regular pentagon with each side 60 mm long and the base horizontal;
- a regular octagon circumscribing the pentagon;
- a square inscribed in the pentagon.

Construct an accurate full size view of the logo.

[8]

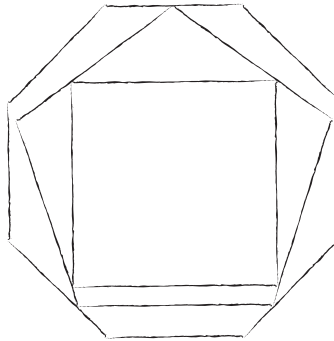


Fig. 1

2 Orthographic views of a machine block are given in Fig. 2.

(a) Draw the given views full size. [2]

(b) Project the auxiliary view of the block as seen in the direction of arrow **AV**. [6]

(c) Determine, by an accurate method, the area of face **F** and print your answer under your drawing. [1]

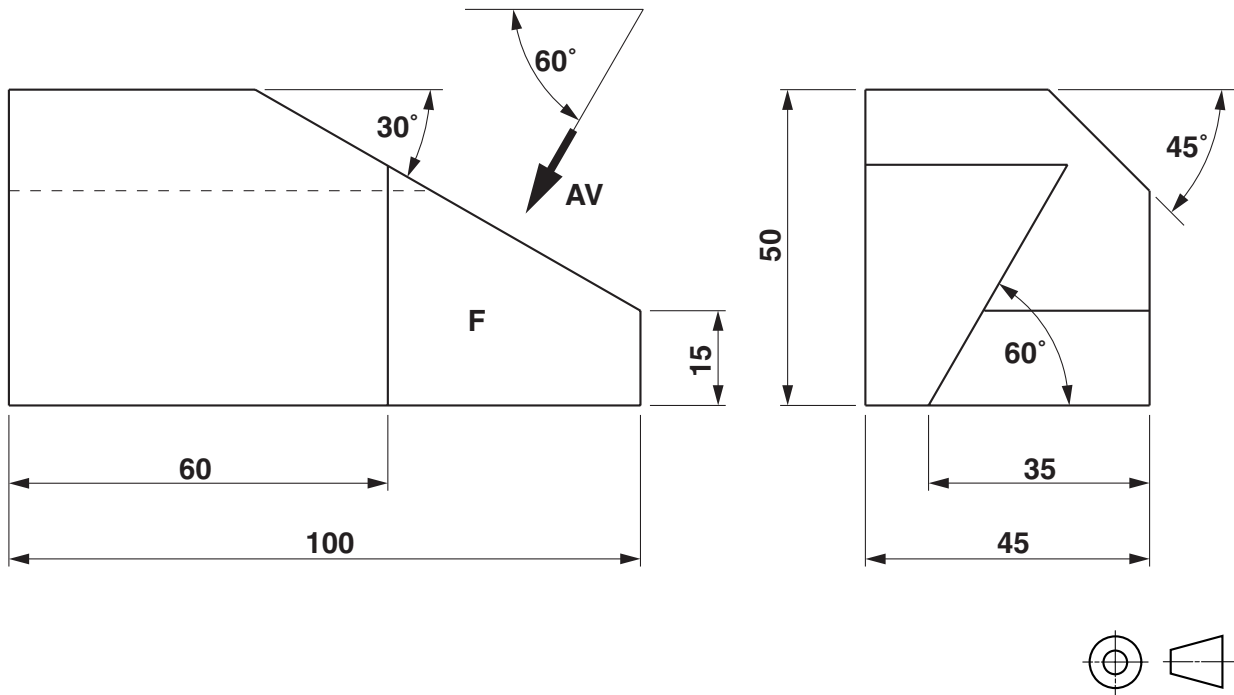


Fig.2

- 3 A thin metal plate is shown in Fig. 3. The plate is to be wrapped tightly round a 56 mm diameter rod, indicated on the drawing by short chain lines, so that the two edges **AB** and **CD** touch each other.

Draw, full size, a view of the plate after it has been formed to shape and the rod removed. Show the edges **AB** and **CD** at the front of your drawing. [10]

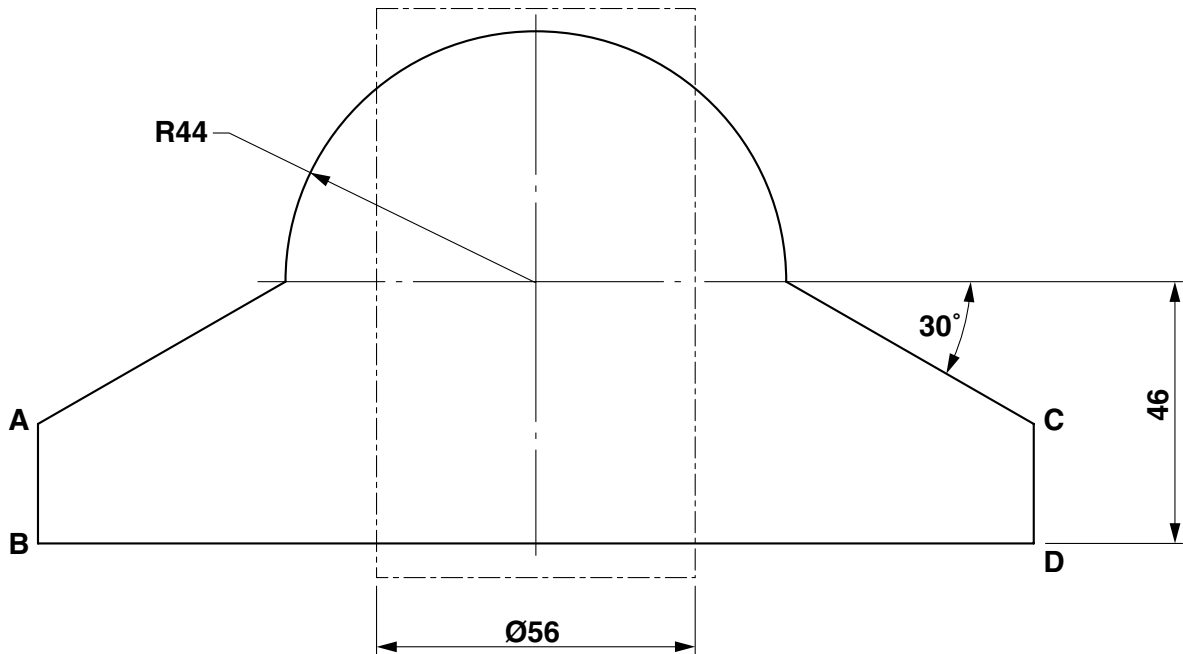


Fig. 3

4 The plan of the base board of an electronics system is given in Fig. 4.

Draw the base board full size using geometrical constructions wherever necessary.

Note: Fig. 4 has not been drawn to scale;
Points A and B lie on the circumference of the circle centre O.

[13]

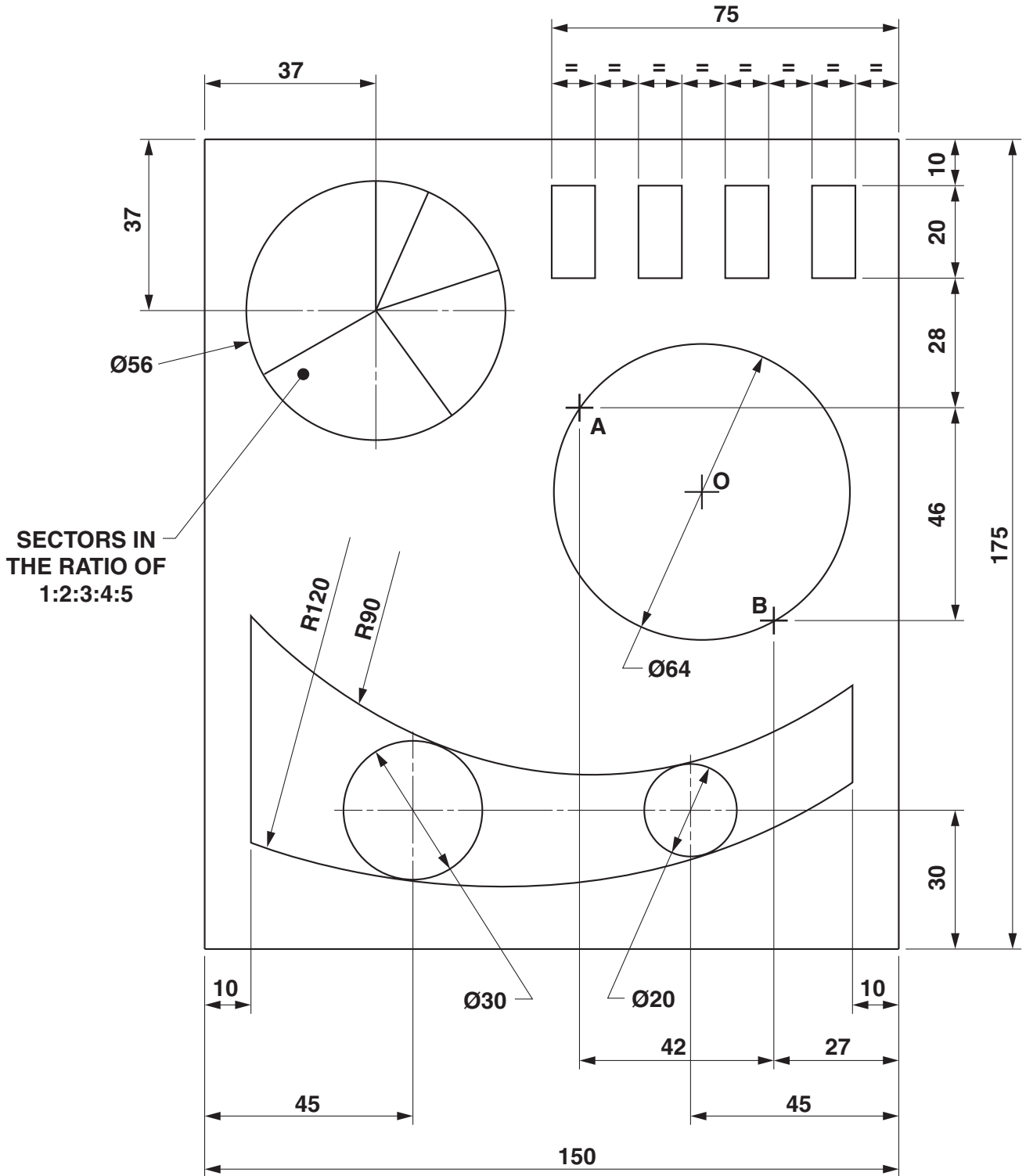


Fig. 4

Section II (60 marks)

Attempt no more than **three** questions from this section.

All questions carry equal marks.

5 Read all parts of the question before starting to draw.

Fig. 5 is a diagram of part of a printing machine.

(a) Draw the diagram full size. [2]

(b) The mechanism consists of an arm **AB** which oscillates about the pivot **O**. There is a roller-ended follower at the right hand end of **AB**. A cam is required to raise and lower the roller-ended follower through an angle of 30° , as indicated, at uniform angular velocity during one revolution of the cam. The cam is to revolve clockwise. Construct the outline of the cam. [10]

(c) The left hand side of the mechanism consists of three rods **BC**, **CD** and **DE**, pin jointed at **B**, **C** and **D**. **CD** is constrained to move vertically while **E** moves horizontally along the line **EF**. Plot the locus of **P**, the mid point of **DE** as **B** oscillates from **B** to **B₁**. [8]

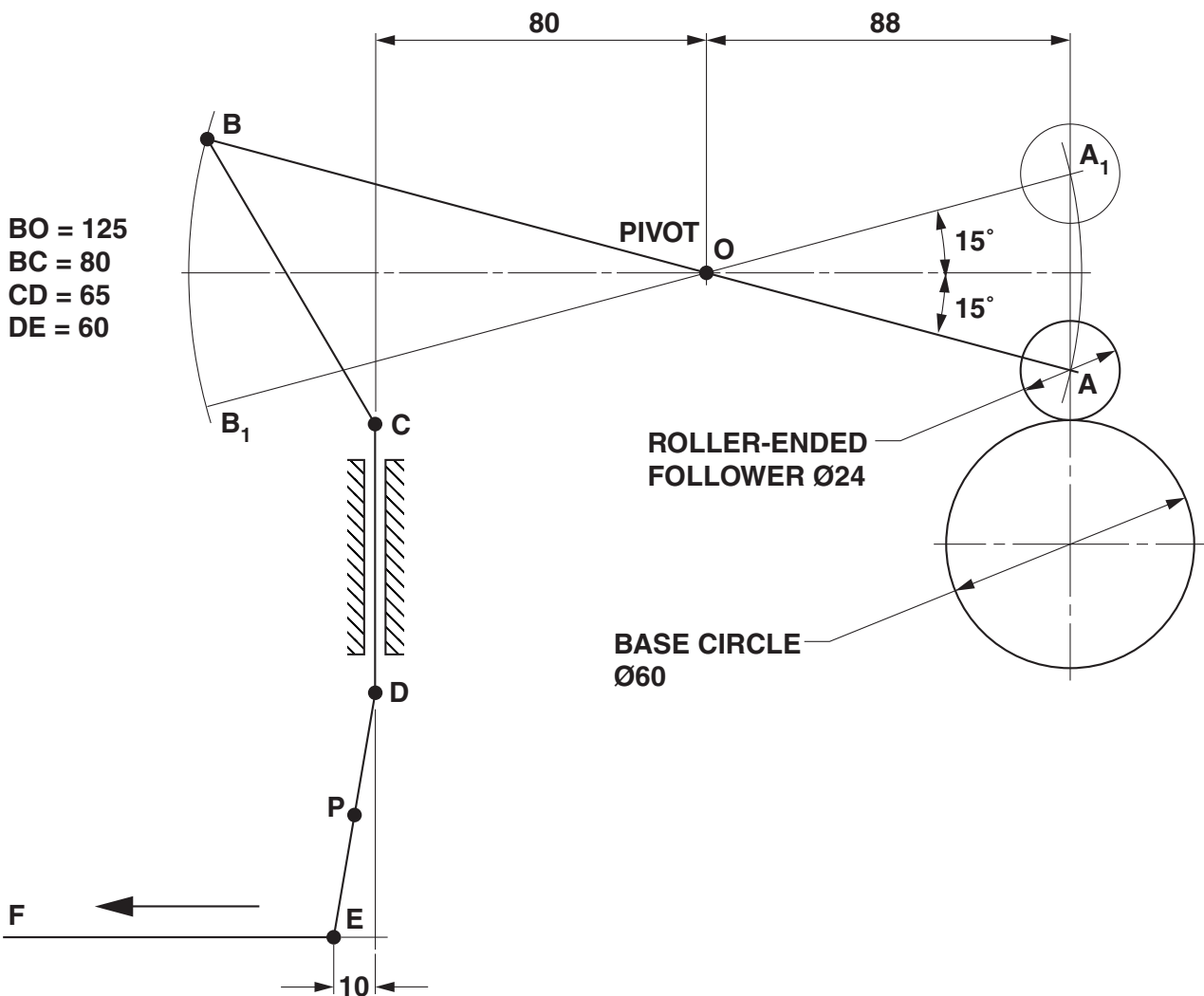


Fig. 5

- 6 Part of a sheet metal ornamental garden feature is shown in the incomplete orthographic views, Fig. 6. The feature consists of a truncated right hexagonal pyramid intersected by a cylinder.

The pyramid is open at the top and the base.

- (a) Draw the given figure to a scale of 1:10. Do not include hidden detail. [3]
 (b) Complete the plan view by showing face **D** as hidden detail. [2]
 (c) Construct the development of the truncated pyramid. [5]
 (d) Construct the true shape of a cap to cover the end **C**. [3]
 (e) Complete view **SV** showing the line of intersection between the cylinder and pyramid. [3]

Ignore the thickness of the metal. [7]

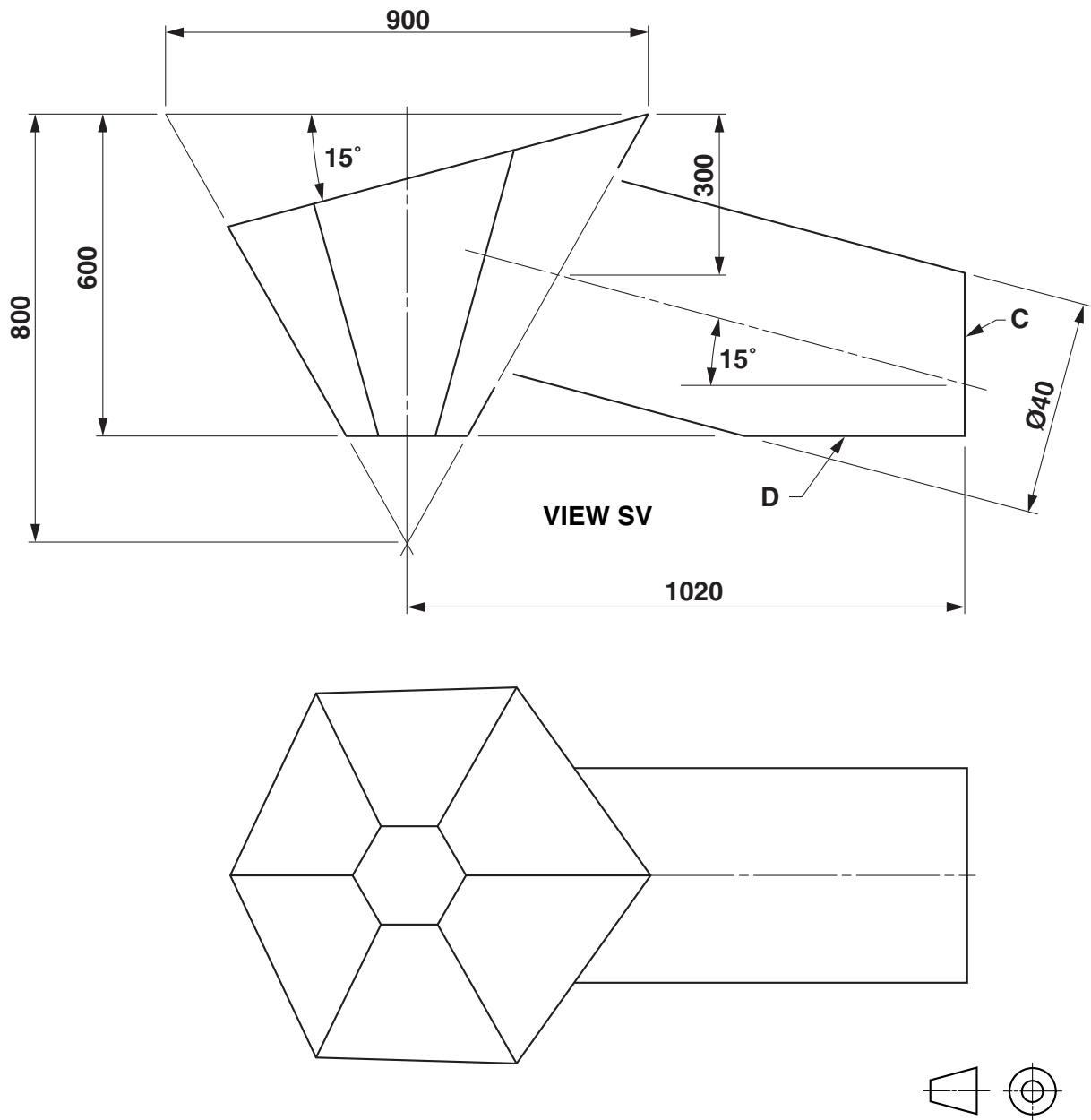


Fig. 6

7 Orthographic views of a bracket are given in Fig. 7.

Construct an **isometric** view of the bracket with corner **A** to the front.

Do **not** use the isometric scale.

[20]

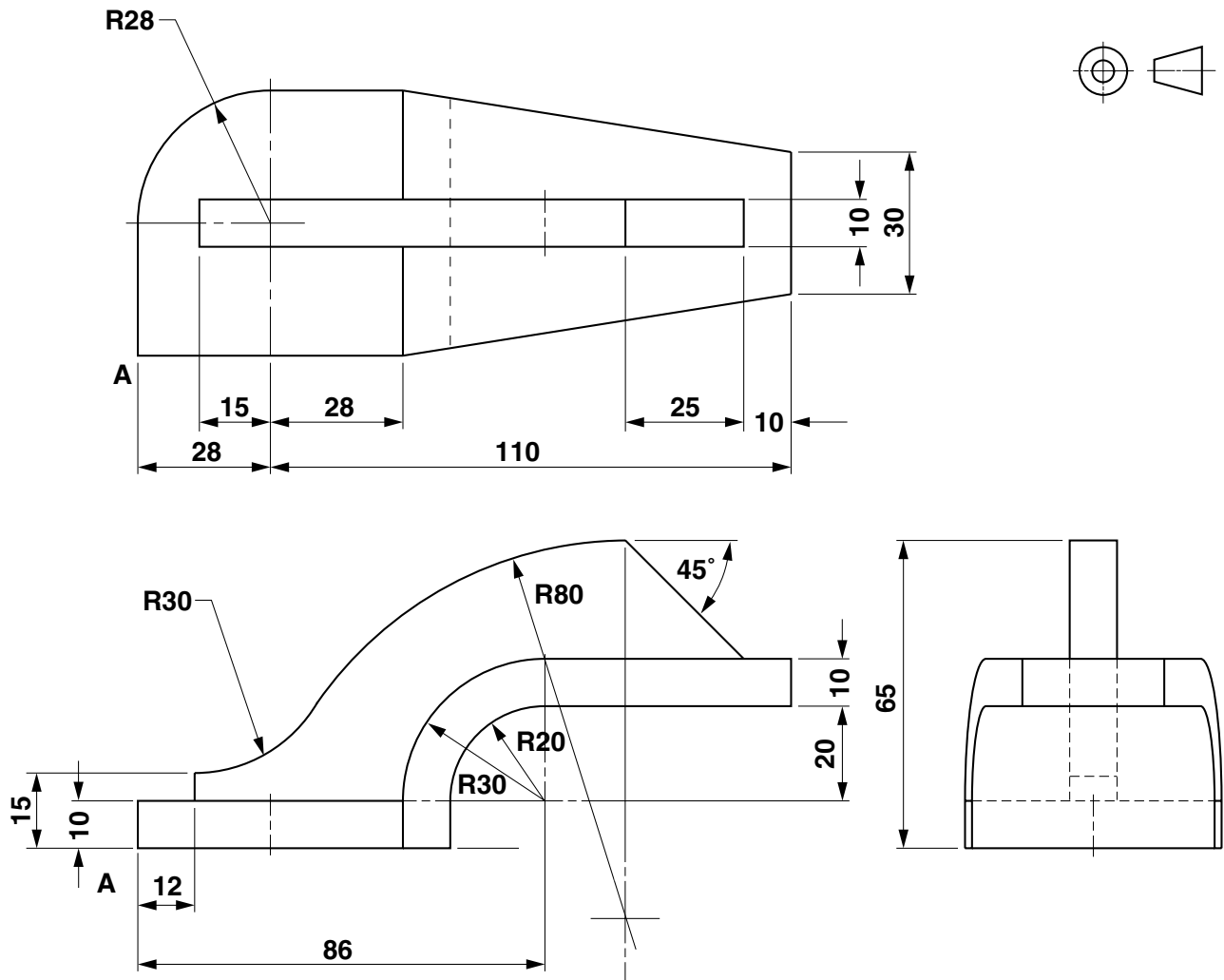


Fig. 7

8 Fig. 8 shows a framework carrying two loads. The framework is supported by a hinge at the left hand end and a cable passing over a pulley at the right hand end.

- (a) Draw the framework to a scale of 10 mm to 1 m and use Bow's notation to identify the members. [4]
- (b) Determine the magnitude and direction of the reactions at the two ends of the framework. [7]
- (c) Determine the magnitude and nature of the forces in the three members of the frame indicated with *. Do not tabulate the forces for the whole structure. [9]

Give your answers to parts (b) and (c) tabulated clearly under your drawing.

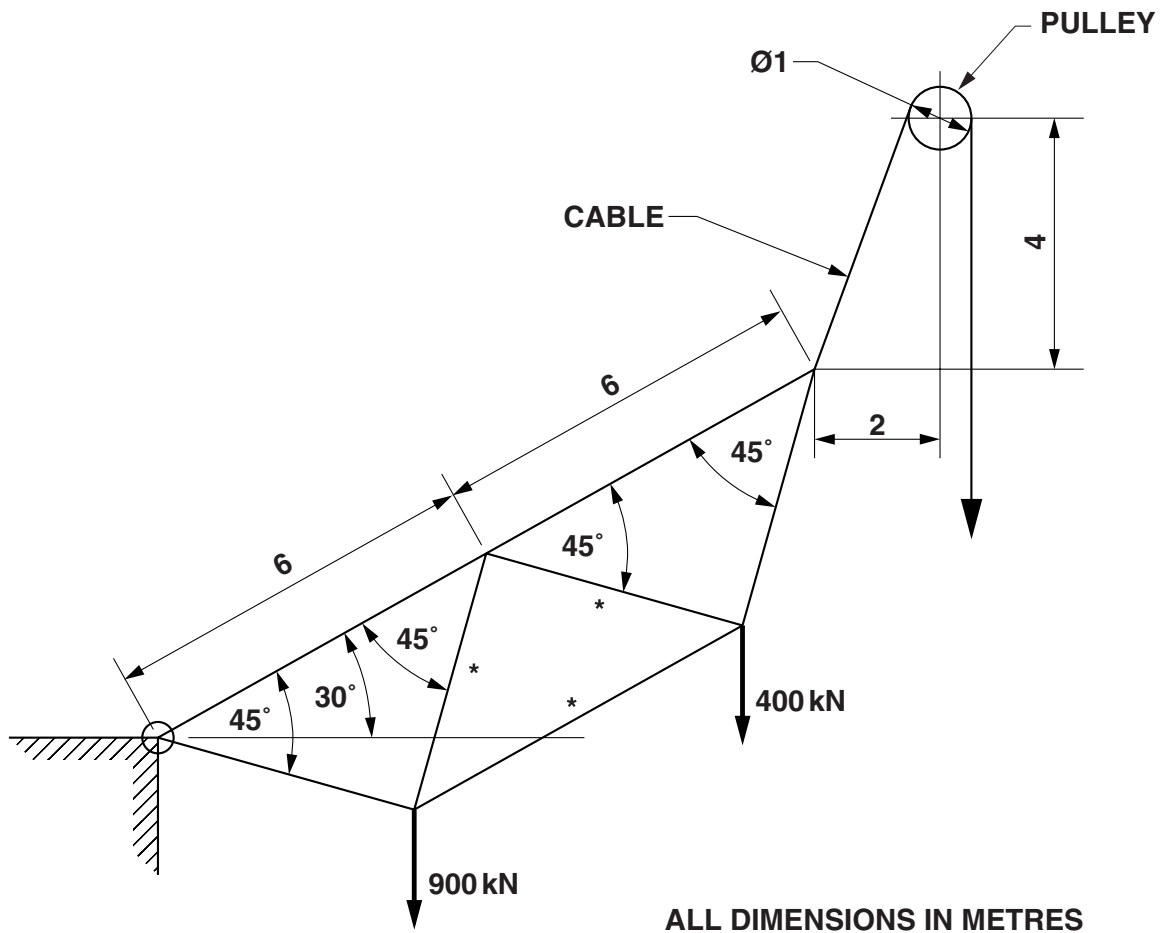


Fig. 8

9 Read all parts of the question before starting to draw.

Fig. 9 shows a pivot.

The upper part of the pivot is a cone with a flat face **F** parallel with the generator of the cone as shown. The lower part of the pivot **T** has a square thread throughout its length.

The dimensions of the thread are:

- major diameter 80 mm;
- minor diameter 50 mm;
- pitch 30 mm.

- (a) Draw the given view full size. [1]
- (b) Complete the lower part of the pivot by drawing the square thread. [10]
- (c) Construct the view of the face **F** as seen in the direction of arrow **AV**. [8]
- (d) Print the geometrical name of the face **F** under your drawing. [1]

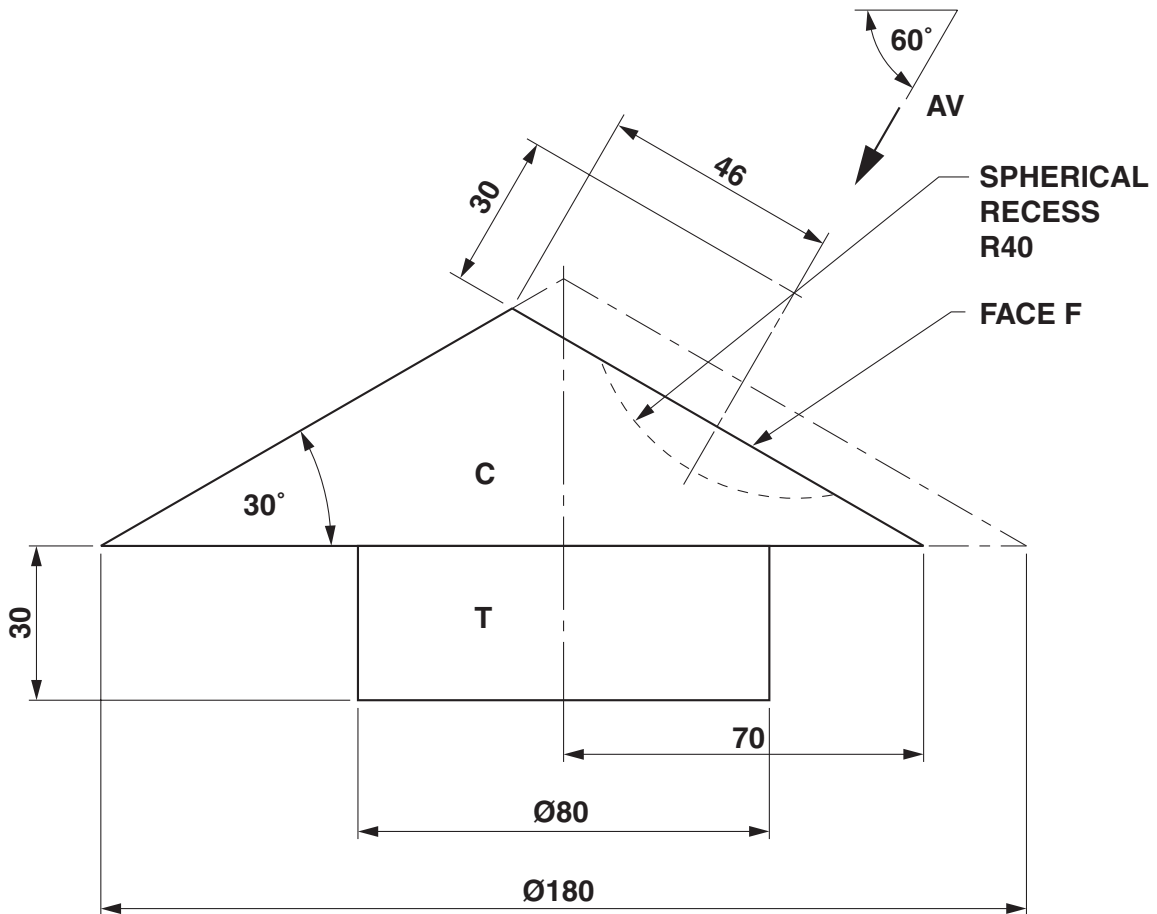


Fig. 9

