

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD
UNIVERSITY OF MALTA, MSIDA

MATRICULATION CERTIFICATE EXAMINATION
INTERMEDIATE LEVEL
MAY 2012

SUBJECT:	ENGINEERING DRAWING AND GRAPHICAL COMMUNICATION
DATE:	8th May 2012
TIME:	9.00 a.m. to 12.00 a.m.

Directions to Candidates

Write your **index number** where indicated **at the top** of **all** Drawing Sheets.

Only scientific calculators may be used. Programmable calculators are **NOT** allowed.

Unless otherwise stated:

- B.S. or equivalent (ISO) recommendations should be adopted throughout your answers;
- all dimensions are in millimetres, unless otherwise stated;
- all answers to Section A and Section B are to be accurately drawn with instruments;
- all construction lines must be left in each solution;
- drawing aids may be used.

Dimensions not given should be estimated.

Careful layout and presentation are important.

Marks will be awarded for accuracy, clarity and appropriateness of constructions.

Mark allocations are shown in brackets.

Colour/shading may be used where appropriate.

Section A: Attempt any **FOUR** questions from five.

Section B: Attempt any **ONE** question from two.

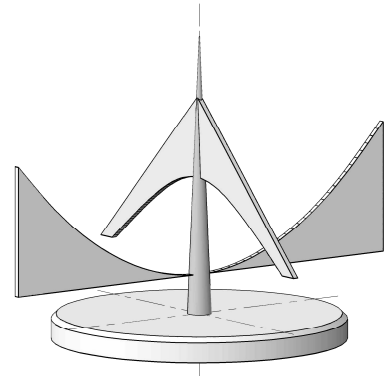
Section C: Attempt any **ONE** question from two.

SECTION A

Attempt only **FOUR** questions from this section.

Question 1

A gold plated trophy for a specific sporting event is illustrated. The top part of the trophy consists of a triangle with a machined hyperbolic curve. The lower part is formed from a rectangular plate with a machined parabolic curve. The two plates are mounted on a circular disc. Details of the design of the trophy are given in the orthographic views shown in Figure 1.



- a) Draw the front elevation of the trophy by drawing only, the triangular plate and constructing the hyperbola using an eccentricity of 3:2.
- b) Construct the end elevation by drawing only the parabola within the rectangle 240mm x 80mm.
- c) Find the position of the focus and directrix of the parabola.

(13 marks)

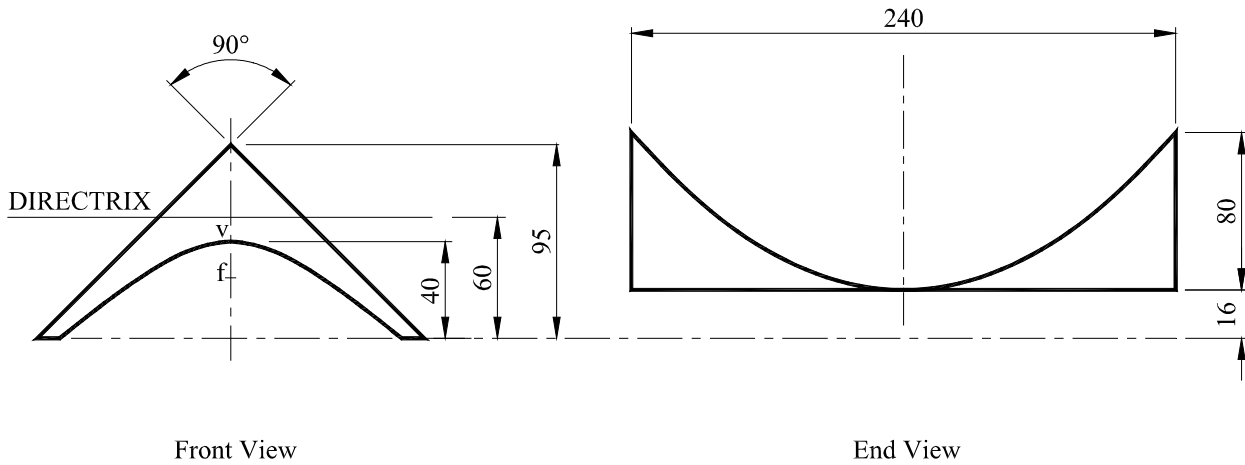


FIG. 1

Question 2

An illustration of a transition piece is shown below. The top part of the transition piece is to be fitted to a square duct. The lower opening is rectangular in section, with the corners rounded off.

- Draw, full size, the two given elevations shown in Figure 2;
- construct the necessary true lengths, for the partial development requested in (c);
- draw a one-fourth development of the transition piece.

Note: The 30mm radius is to be divided into at least four parts.

The construction of the true lengths must be clear and represented by light lines.

Neglect bending allowance and material thickness.

(13 marks)

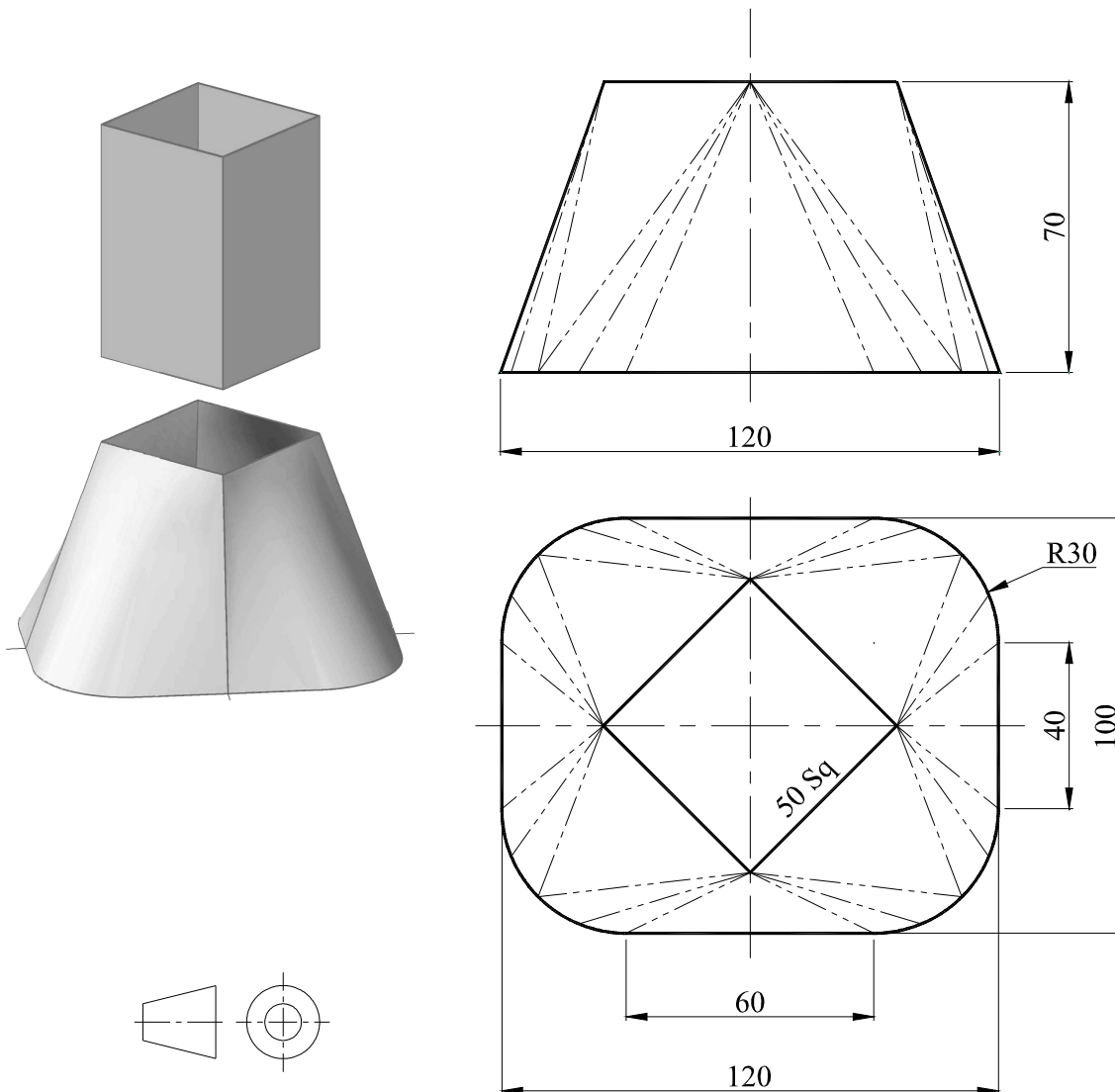


FIG. 2

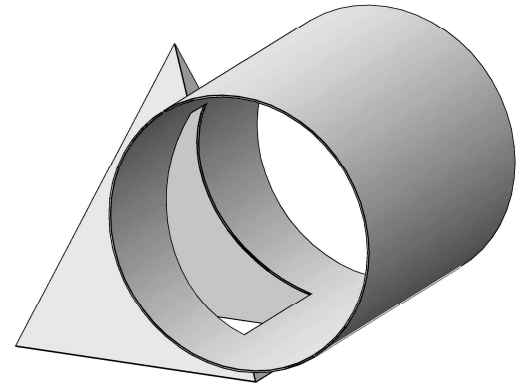
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Question 3

The pictorial view shows a right cylinder intersecting a right rectangular pyramid.

Two views of the rectangular pyramid with the cylinder removed are shown in Figure 3.

- a) Copy, full size, the given front elevation.
- b) Construct a plan showing the complete shape of the intersection.
- c) Draw the surface development of the three sides of the pyramid, resulting from the intersection.



(13 marks)

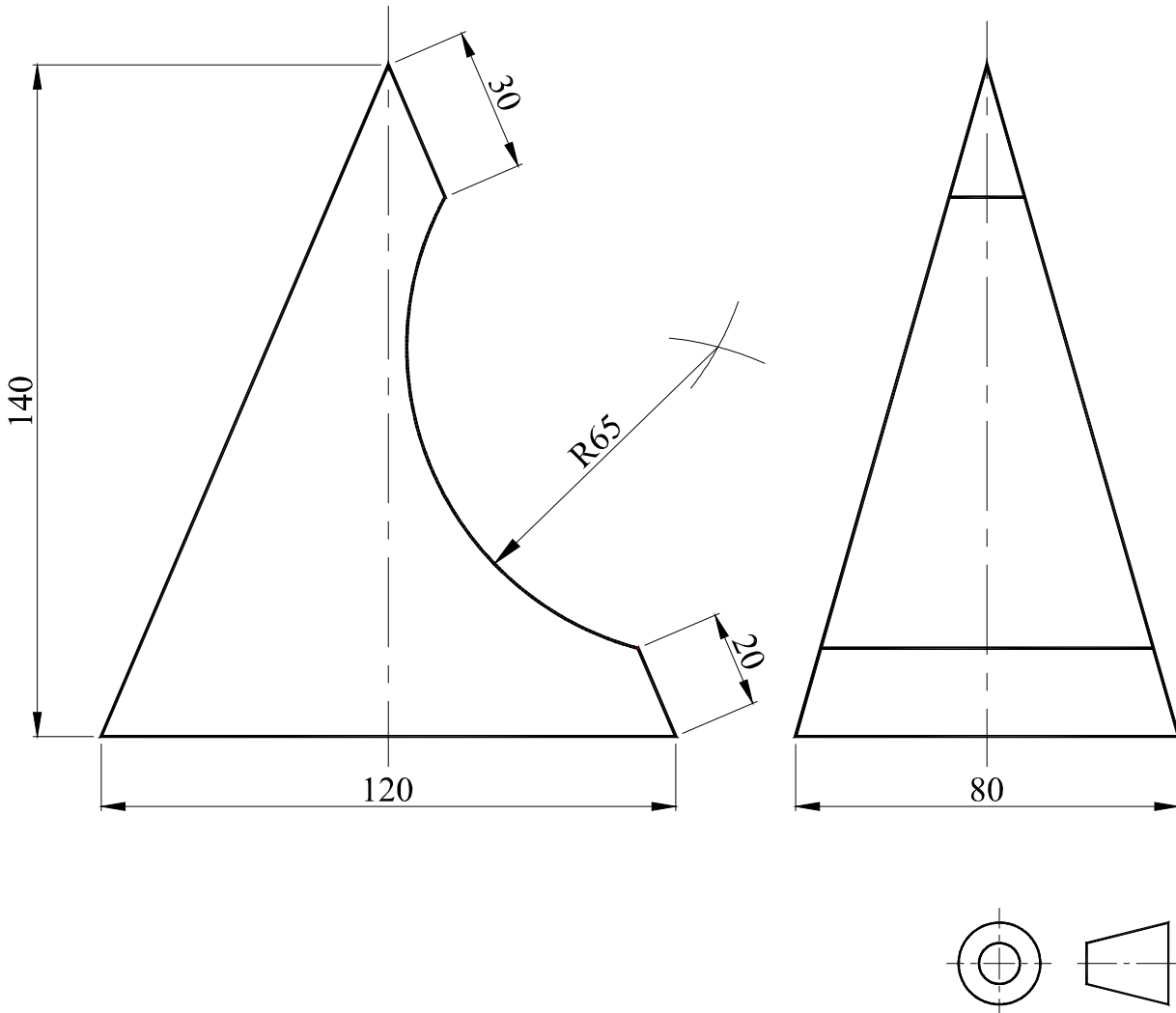


FIG. 3

Question 4

An illustration of a mechanism of a part for a particular cam pump is shown. The piston is pushed upwards and downwards by the cam.

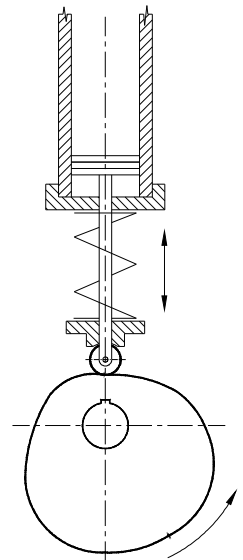
Using the dimensions of the disc cam and roller-ended follower shown in Figure 4, construct:

a) the displacement diagram described in the cam data given below;

<i>Cam's angular displacement</i>	<i>Follower's linear displacement</i>
0° up to 150°	Rise of 60mm with simple harmonic motion
150° up to 180°	Top dwell
180° up to 300°	Fall of 50mm with uniform acceleration and retardation motion
300° up to 360°	Fall of 10mm with uniform velocity.

b) The cam profile which imparts motion to the roller-ended follower, as described in the cam data.

The rotation of the disc cam is anticlockwise.



(13 marks)

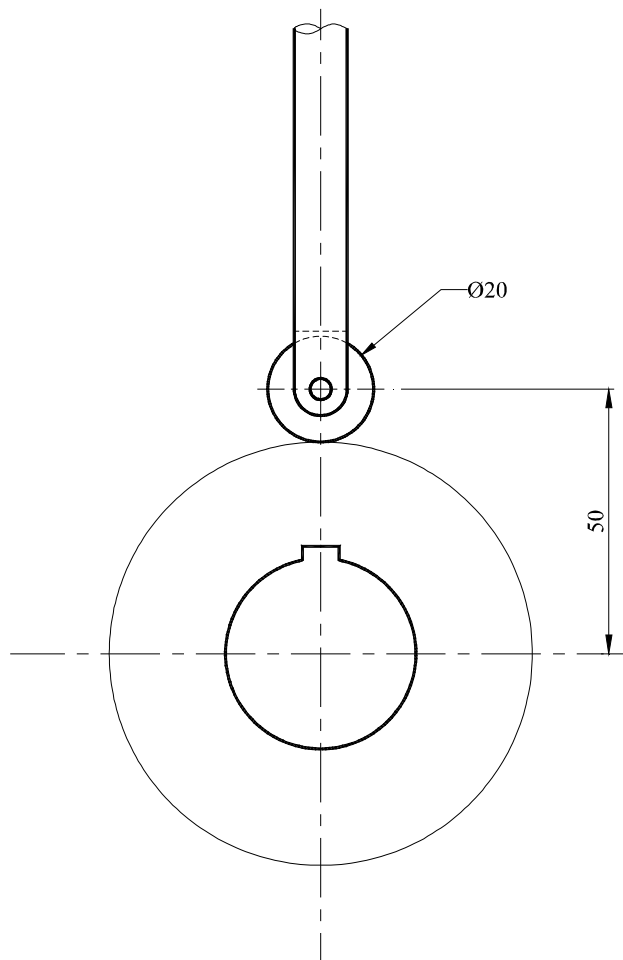


FIG. 4

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Question 5

The diagram shows a stanchion supporting beams for a building. Figure 5 shows a dimensioned drawing of the same arrangement.

Draw:

- a linear diagram of the stanchion supporting beams to a scale of 10mm representing 1 metre;
- a load line, using a scale of 10mm representing 1kN and a polar diagram;
- the shear force diagram and bending moment diagrams for the loaded beam;
- calculate graphically the reactions R_L and R_R on the left and right hand side.

(13 marks)

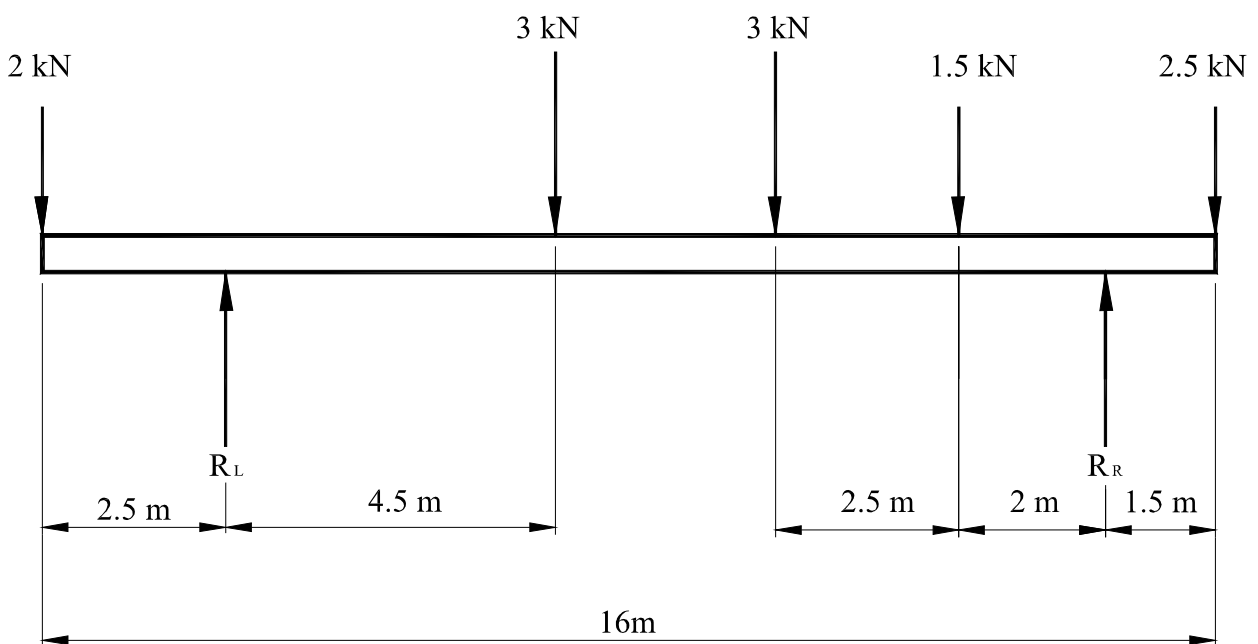
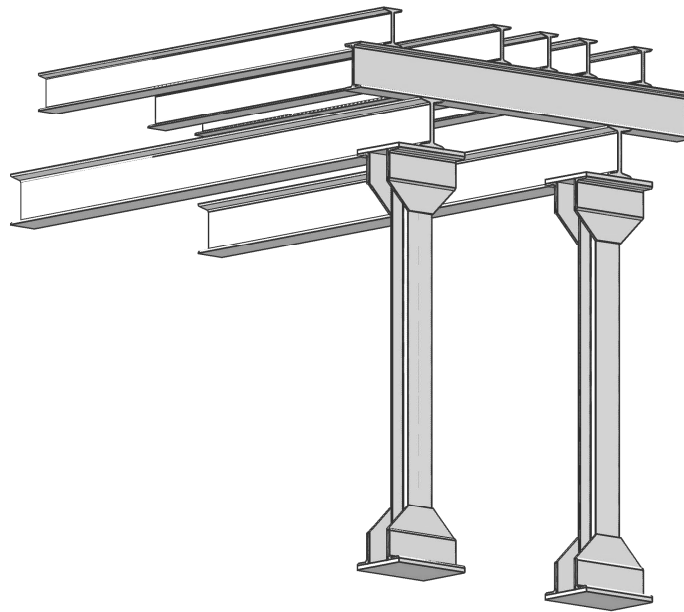


FIG. 5

SECTION B

Attempt only **ONE** question from this section.

Question 6

Figure 6 below shows an exploded pictorial diagram indicating the position of the separate parts of a spraying unit used for horticultural purposes.

Figures 6 (a) and 6 (b) on the attached A3 sheets show the component parts of the spraying unit.

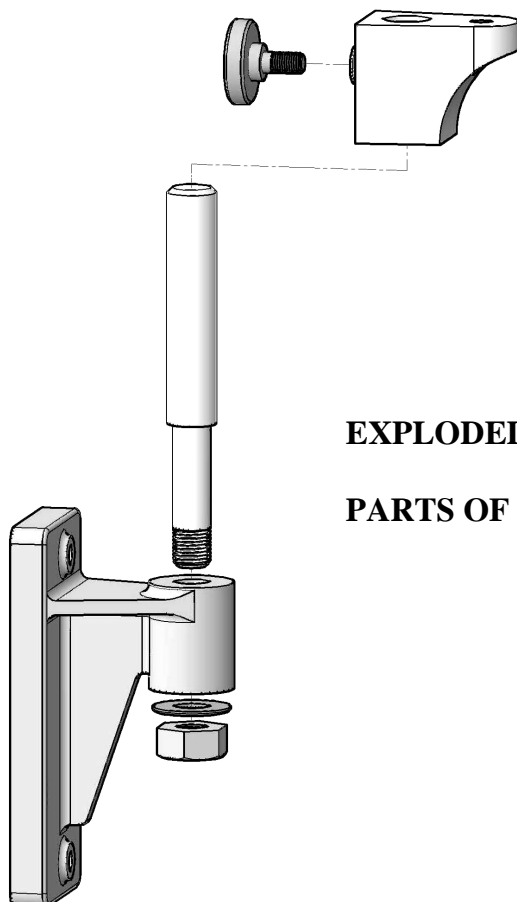
The parts are assembled as follows.

The slider column is inserted into the 15mm diameter hole in the wall bracket and firmly secured using the M15 x 1.5 standard hexagon nut and washer. The slider is fitted over the column and held in a convenient position by the slider locking screw which is screwed into the M8 x 1 tapped hole in the raised boss of the slider.

Draw, **FULL SIZE**, a sectional elevation of the assembled parts, the plane of the section and the required view being indicated by X X and conforming to the following:

- i) the 160mm x 70mm back plate of the wall bracket facing the left-hand side of the drawing paper and to lie in the vertical plane with its boss uppermost;
- ii) the full length of the slider column to be shown;
- iii) the slider to be positioned 15mm above the boss (face A) from which the slider column extends.

NOTE: Hatching lines can be widely spaced but all sections which require hatching must be fully hatched. Hidden details are not to be shown.



(24 marks)

**EXPLODED VIEW OF THE COMPONENT
PARTS OF THE SPRAYING UNIT.**

FIG. 6

(Please turn the page)

Question 7

Figure 7 shows a pictorial view, an elevation and plan of a pressure cam.

Draw, FULL SIZE, an isometric view of the pressure cam with corner X situated at the foreground in your drawing.

Show neatly all necessary construction.

(24 marks)

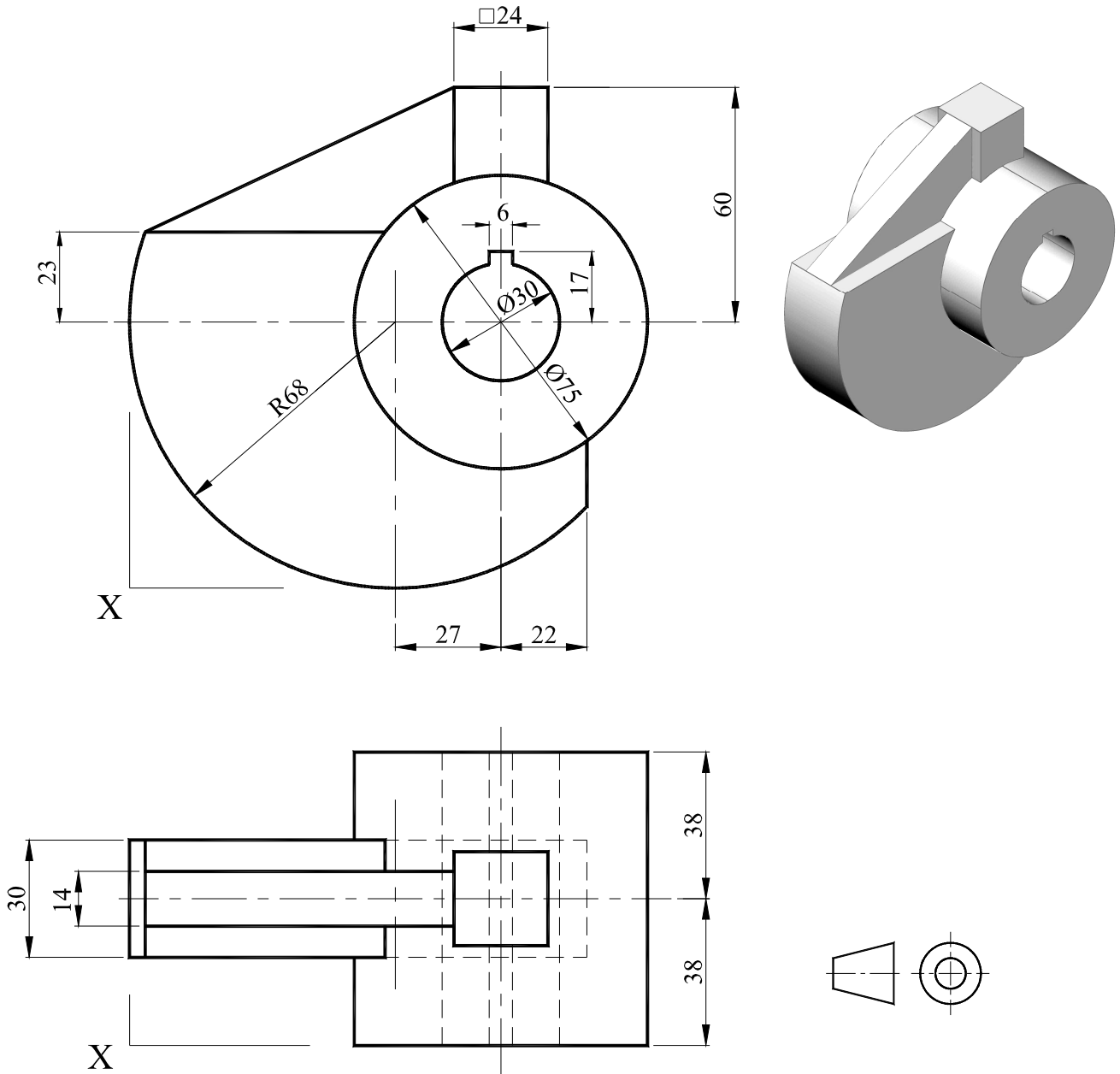


FIG. 7

SECTION C

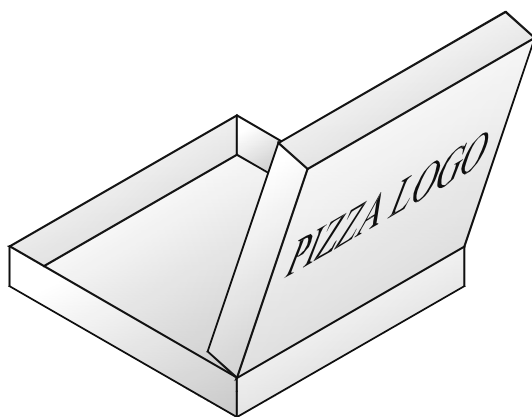
Attempt only **ONE** question from this section.

Question 8

The management of a new pizza shop named PIZZA SLICE organized a logo design contest. In their design brief they emphasized that the logo has to reflect their specialty, which is preparing dough and cooking their pizza in the traditional manner. The chosen design, which is intended to appear on the shop sign, the menus, the pizza takeaway boxes, the letterheads, envelopes and website, must be eye catching and stimulate appetite in the customers who see it. The colours used must be associated with food and the font used must portray feelings of fun, relaxation and nostalgia. The message has to be clear and simple as it has to be reproduced in both colour and in black and white in small and large formats. You have been asked to submit your proposal of the new logo for the pizza shop. Your work must be broken down in the steps given below, with each part clearly identified, as suggested in Figure 8.

- i. **Written analysis**
Make a brainstorming exercise to identify possible elements related to pizza that might be included in your logo design. You can refer to question 9 for inspiration. (6 marks)
- ii. **Graphical analysis**
Based on your response to (i) produce at least four sketches to illustrate your developing ideas and picture composition including the letters. (6 marks)
- iii. **Graphical synthesis**
Clearly identify those elements produced in your response to (ii) that you intend to use in your final image. (2 marks)
- iv. **Final realization**
Produce your final solution in a square 150mm x 150mm and neatly render by using suitable colours. (10 marks)

(24 marks)



PIZZA LOGO		
Written analysis		
Graphical analysis:	Final realization	
<input style="width: 40px; height: 40px; border: 1px solid black;" type="text"/> <input style="width: 40px; height: 40px; border: 1px solid black;" type="text"/>	<input style="width: 40px; height: 40px; border: 1px solid black;" type="text"/> <input style="width: 40px; height: 40px; border: 1px solid black;" type="text"/>	<input style="width: 100px; height: 80px; border: 1px solid black;" type="text"/>
Graphical synthesis:		

FIG. 8

(Please turn the page)

Question 9

The front view and the plan of a Pizza Takeaway Shop is shown in Figure 9b. The shop, including the kitchen, measures 490cm x 490cm x 280cm high. The floor tiles dimensions are 35cm x 35cm and the height of the courses is 35cm.

The furniture of the shop consists of:

- one combined counter and working top together with drop-down soffit ceiling 'A';
- four artificial wooden beams attached to the drop-down soffit ceiling 'A';
- one traditional brick pizza oven 'B';
- one table 'C';
- two benches 'D';
- one wall table 'E';
- two stools 'F'.

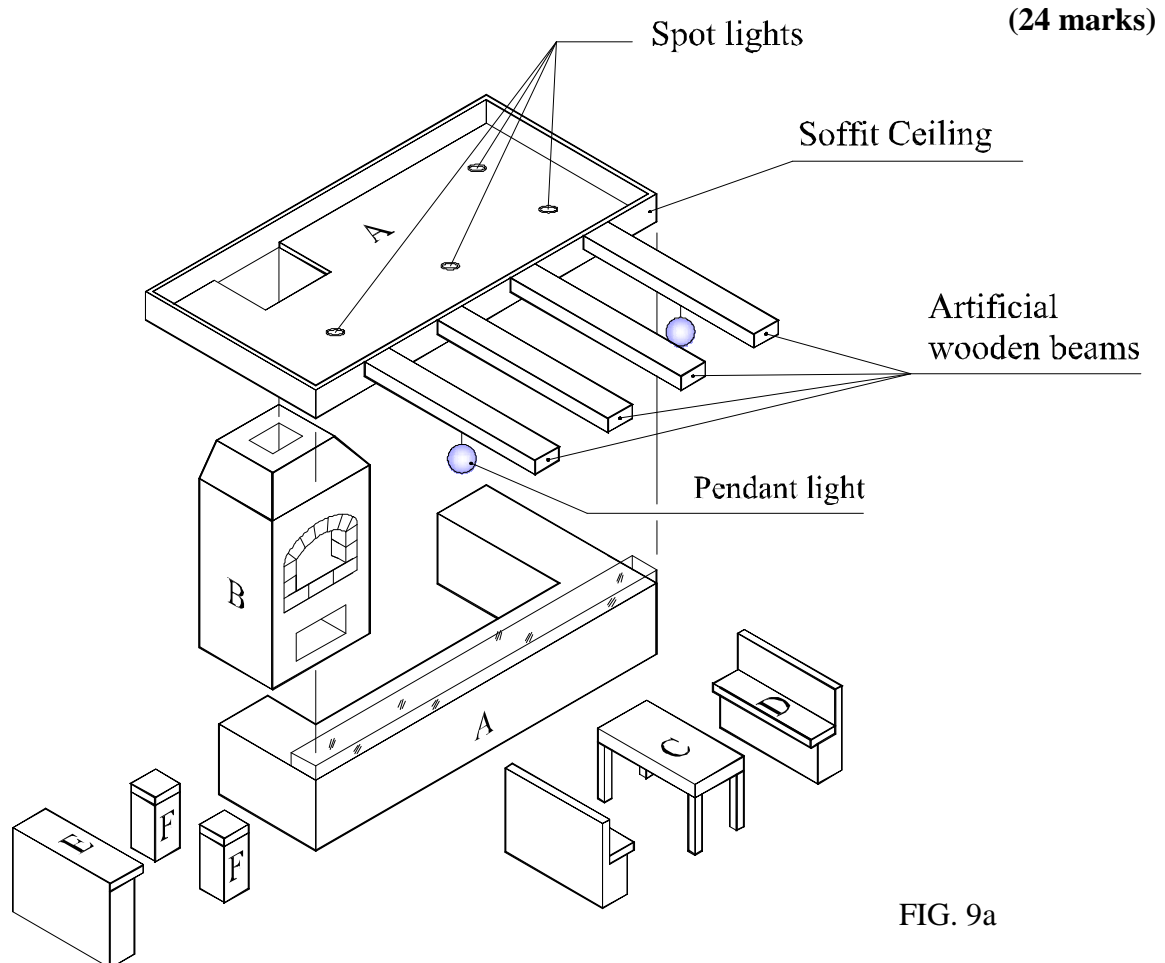
Details of the furniture are given below, in Figure 9a.

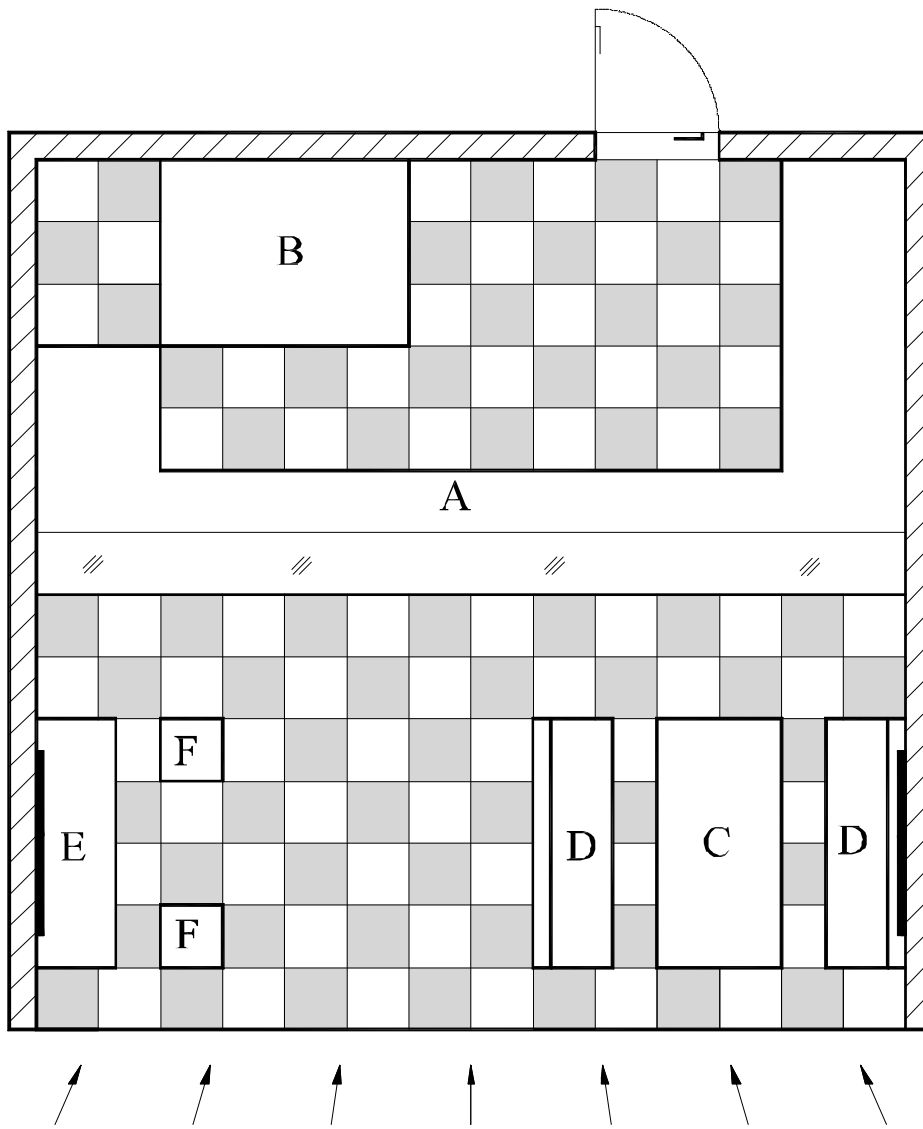
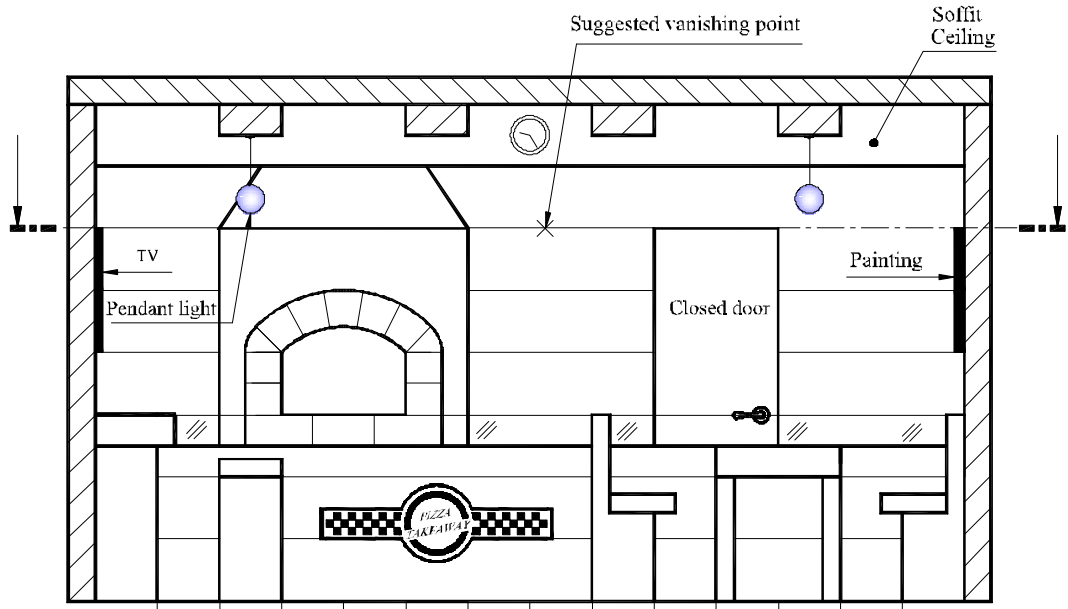
To a scale of 1:10, produce an estimated single-point perspective view of the shop. The size of the picture plane must be 490mm wide and 280mm high. The viewing angle is indicated by arrows and the suggested vanishing point is indicated in Figure 9b.

Render your drawing to enhance the solution.

Notes:

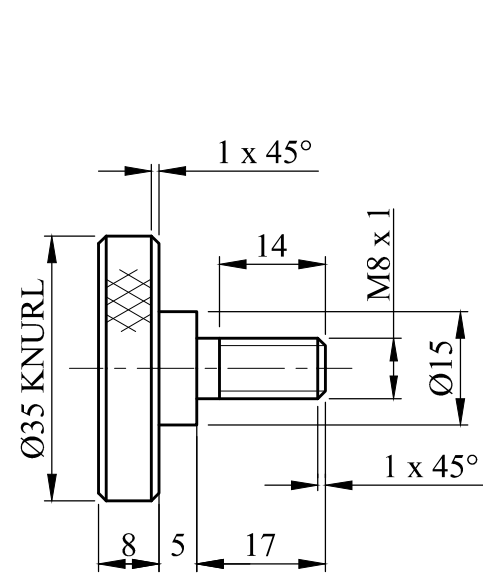
- *Drop-down soffit ceiling 'A' is fitted with four spotlights.*
- *Two spherical pendant lights hang from artificial wooden beams.*



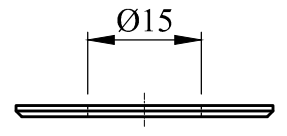


Plan
FIG. 9b

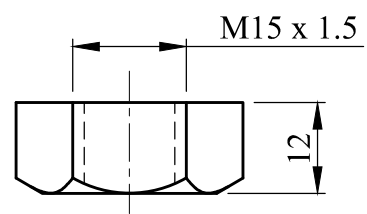
End of examination paper



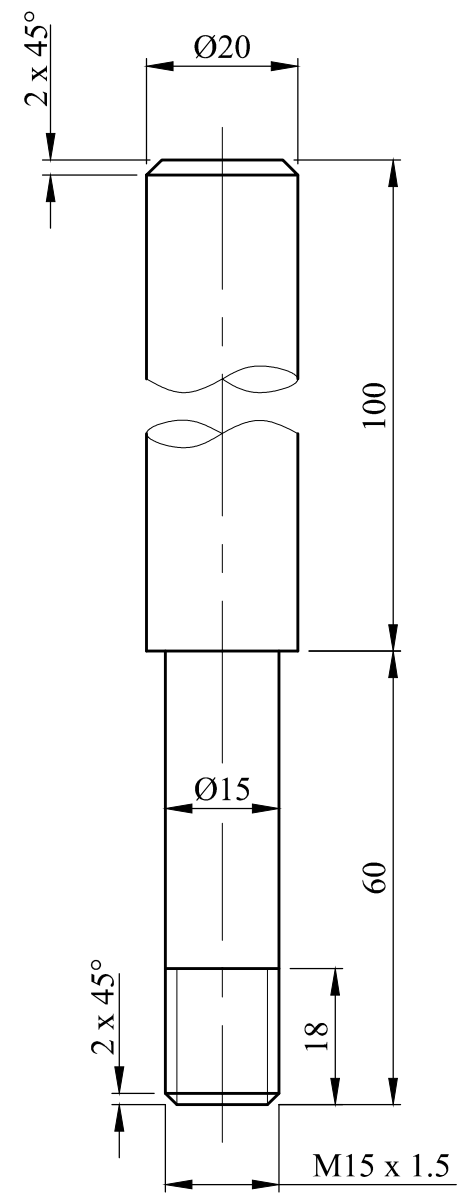
SLIDER LOCKING SCREW



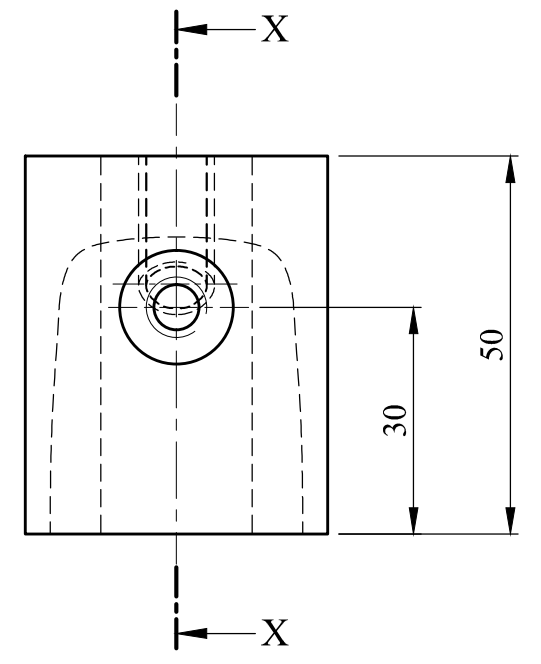
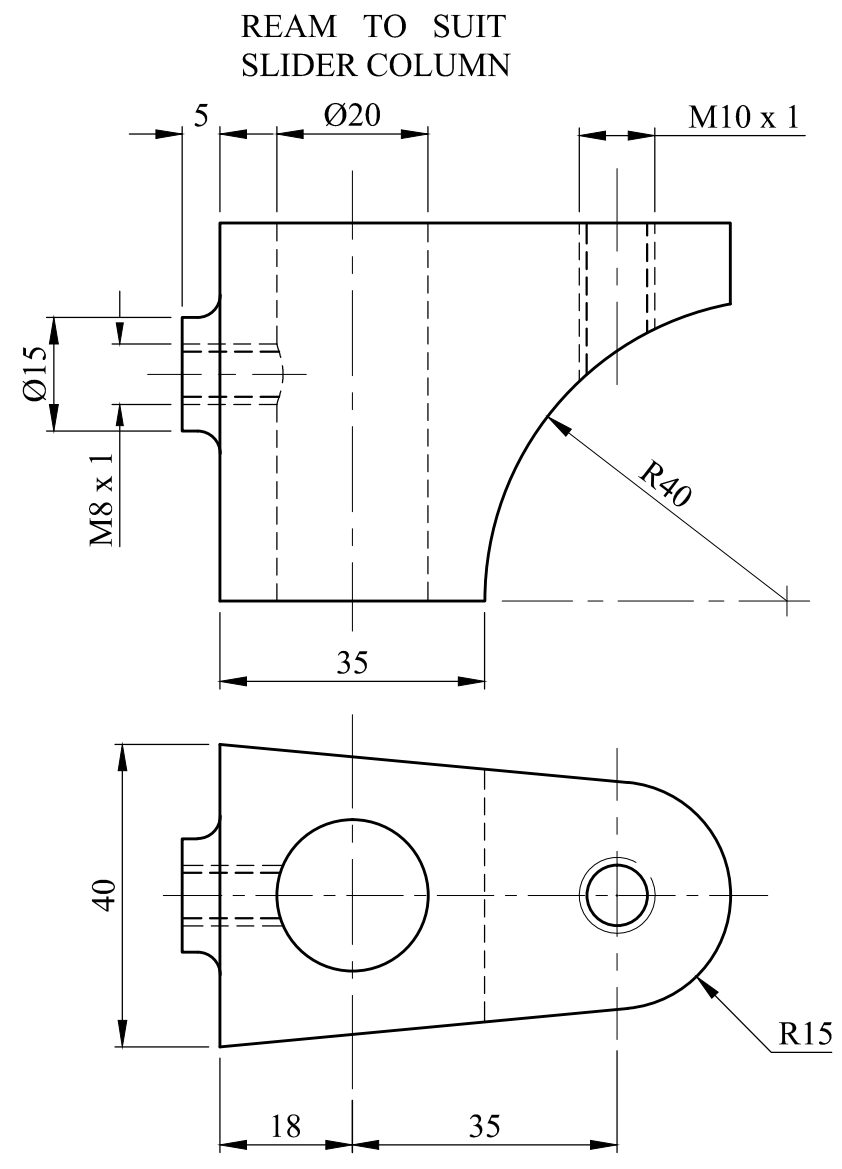
STANDARD WASHER



STANDARD HEX. NUT



SLIDER COLUMN



SLIDER

