

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

MATRICULATION CERTIFICATE EXAMINATION
INTERMEDIATE LEVEL
SEPTEMBER 2012

SUBJECT:	ENGINEERING DRAWING AND GRAPHICAL COMMUNICATION
DATE:	10th September 2012
TIME:	4.00 p.m. to 7.00 p.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.

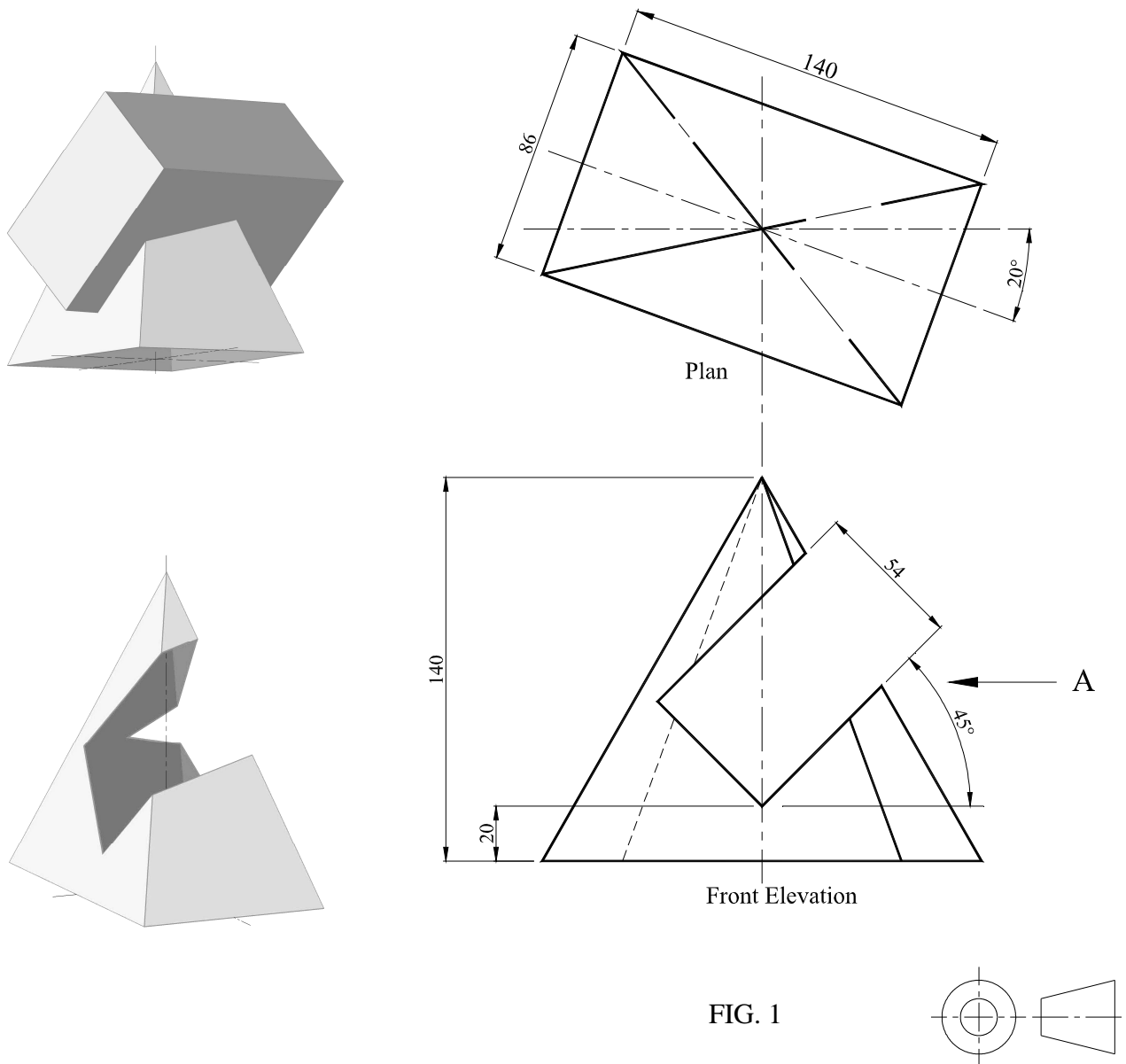
Question 1

A complete front elevation and an incomplete plan view of a rectangular hollow pyramid ready to be intersected by a rectangular prism are shown in Figure 1.

- a) Copy full size the given front elevation.
- b) Complete the given plan view.
- c) Project an end elevation as seen from direction of arrow A.

All hidden detail must be shown.

(13 marks)



Question 2

The illustration shows a helicoid on an excavating building machinery. The helicoid is held in place from the reduced end shaft and rotate in two roller-ended bearings.

The diagram in Figure 2 shows the dimensions of the helicoid. Construct, full size, an elevation of the helicoid, showing clearly the method how the curves of the helices are constructed.

Show all hidden details of the helicoid drawn on the first pitch only.

(13 marks)

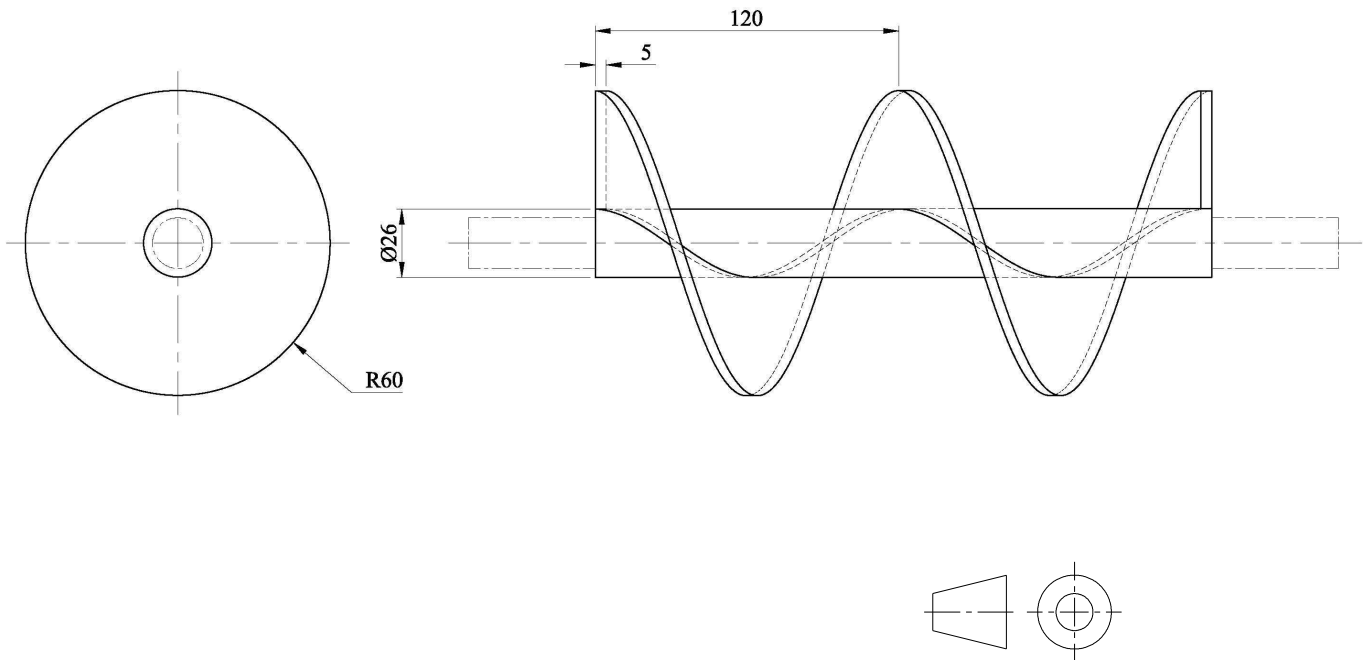
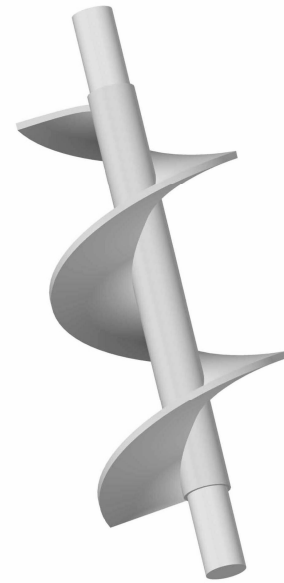


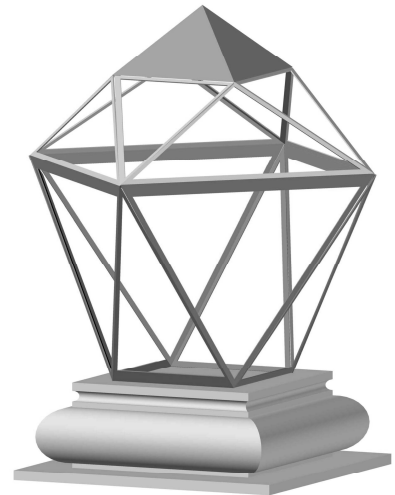
FIG. 2

(Please turn the page)

Question 3

A pictorial view of a small ornamental brass lantern is shown on the right. The top of the lantern is a regular square pyramid and the remaining parts are all triangular.

- Draw, full size, the front elevation and plan views of the lantern shown in Figure 3.
- Study the views drawn and construct the true lengths of the lines required to draw the surface development of the parts marked A and B of the lantern.
- Use the constructed true lengths and draw a half surface development of parts A and B excluding the top part (the square pyramid) of the lantern.



(13 marks)

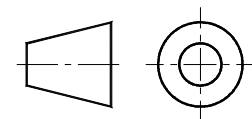
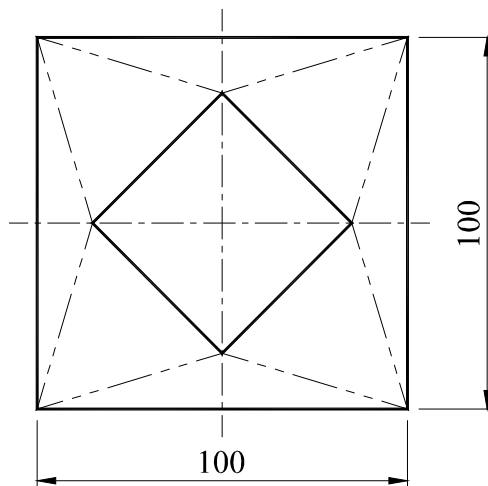
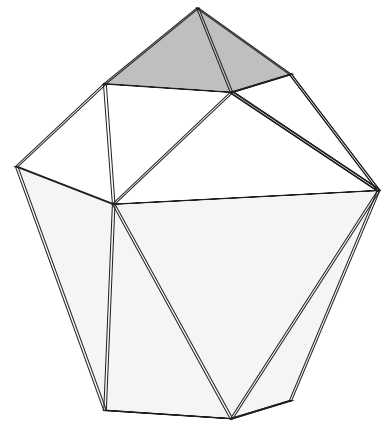
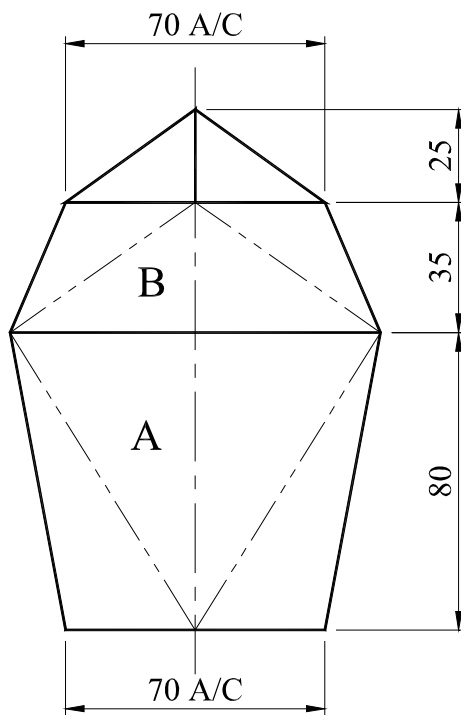


FIG. 3

Question 4

An illustration of a conventional arrangement of a rack and a driving pinion is given. The necessary details of the pinion are shown in Figure 4 below. The gear wheel teeth have an involute form, with a module of 18mm and a pressure angle is 20°.

- a) To a scale of 1 : 1, construct geometrically, one pinion flank face (tooth profile) showing how the true involute form is obtained.
- b) Draw three pinion teeth profiles. The tooth flank faces of these three teeth, may be constructed using an approximate method.
- c) Clearly label, on the drawing, the base circle radius and the tooth thickness of the pinion.

(13 marks)

Pinion data:

No. of teeth: 15
 Pressure angle: 20°
 Module: 18mm

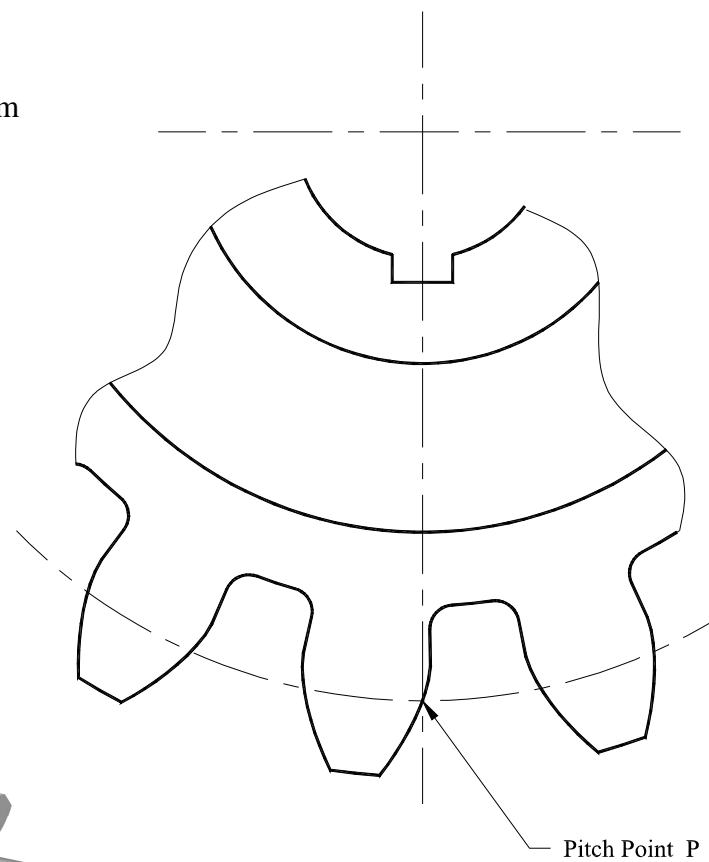
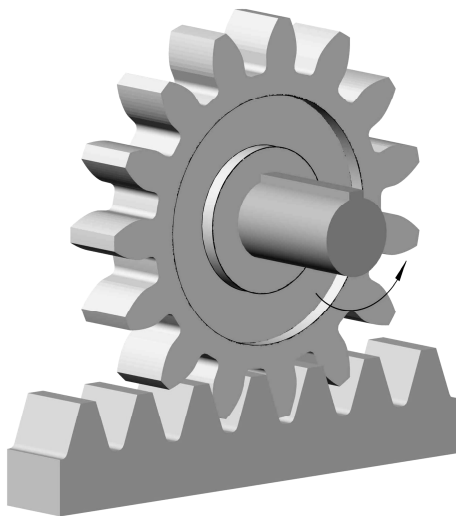


FIG. 4



(Please turn the page)

Question 5

A decorative arrangement of two spheres and a right cone are suspended as illustrated.

The three geometrical solids are in mutual contact with each other.

Construct the two views shown in Figure 5, showing clearly how the points of contact between the solids are obtained.

Indicate the points of contact between the solids.

(13 marks)

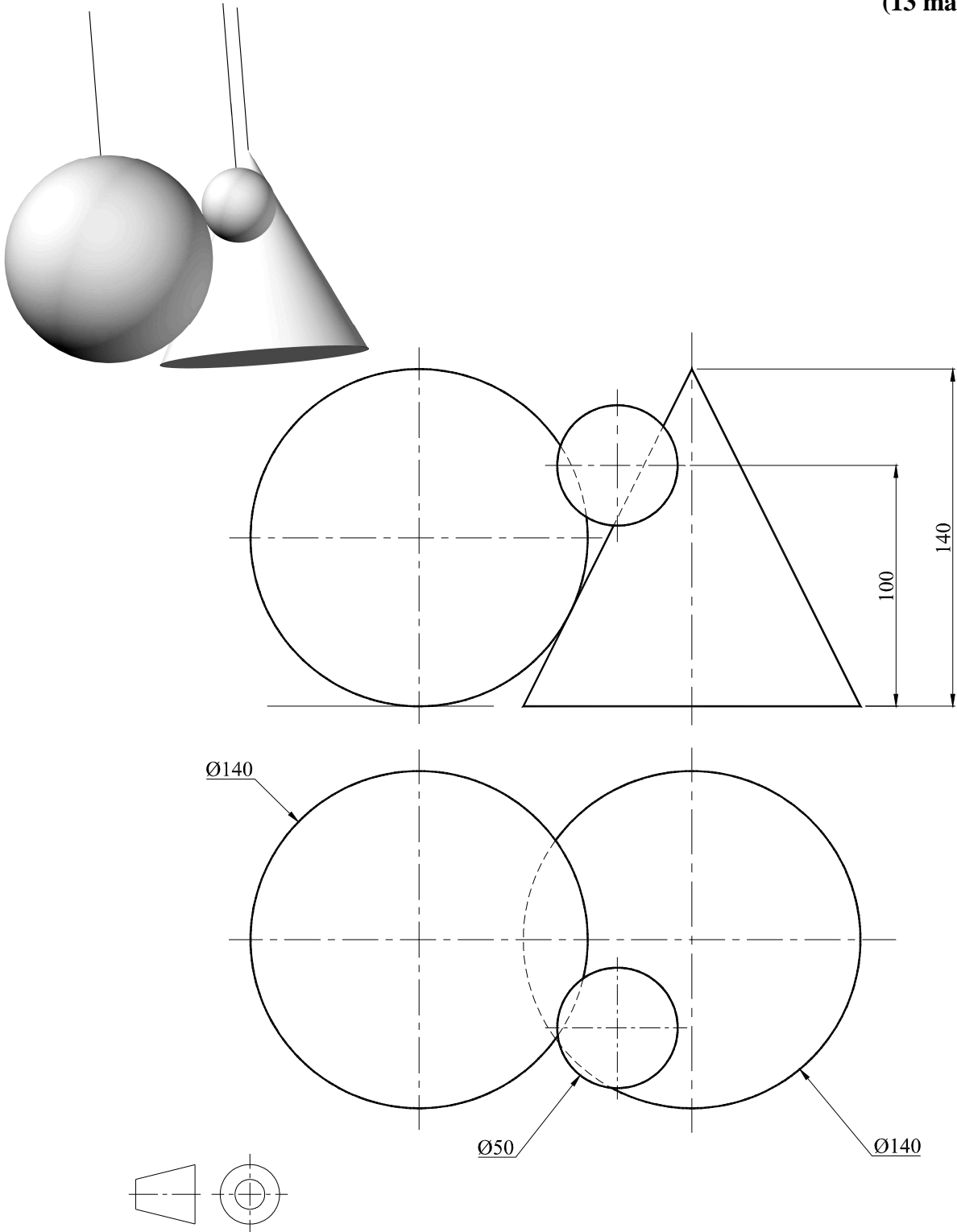


FIG. 5

SECTION B

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

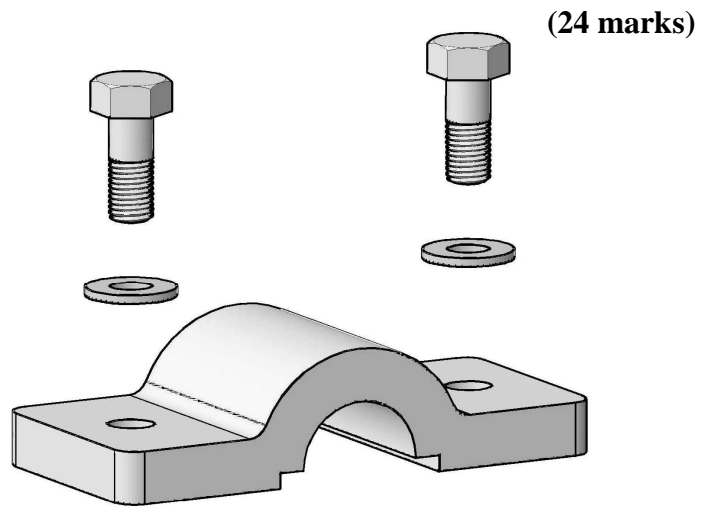
Question 6

Figure 6 below shows an exploded pictorial diagram indicating the position of the separate parts of a pipe support assembly.

Figures 6 (a) and 6 (b) on the attached A3 sheets show the component parts of the pipe support bracket.

Draw, **FULL SIZE**, a sectional elevation of the assembled parts. The cutting plane and the required view being indicated by A - A.

NOTE: Hatching lines can be widely spaced but all sections which require hatching must be fully hatched. Hidden details are not to be shown. All fillet and corner radii are 5mm.



EXPLODED VIEW OF THE COMPONENT PARTS OF THE PIPE SUPPORT BRACKET.

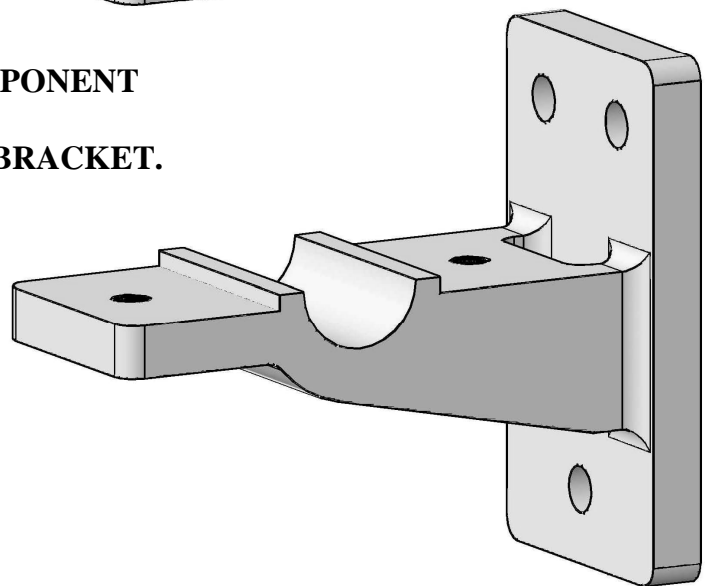


FIG. 6

(Please turn the page)

Question 7

Figure 7 on the attached A3 sheet shows a detailed orthographic view of a Fabricated Bracket. An exploded pictorial diagram of the separate parts of the bracket are also provided below. Draw, FULL SIZE, an isometric view of the assembled bracket with corner X situated at the foreground in your drawing.

- a) Show neatly all necessary construction.
- b) Isometric scale is not required.

(24 marks)

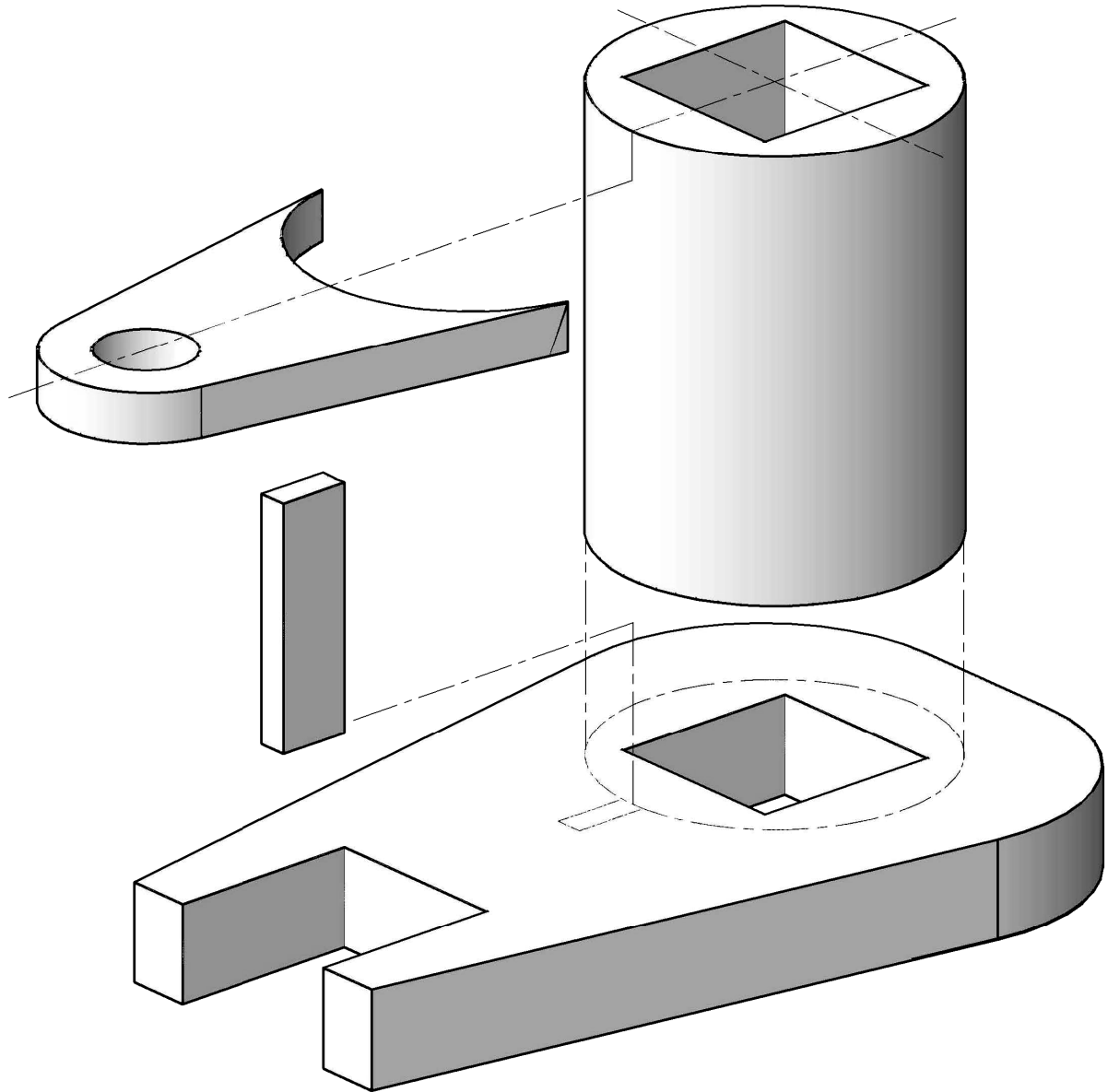


FIG. 7

SECTION C

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

Question 8

A sports club is organising a Darts / Bowling / Billiards Triathlon. The darts and bowling pictograms shown below are to be placed at the entrance of the locations where the competitions are to be held.

You have been asked to design the **Billiards Pictogram** which must have similar characteristics to those of the other two pictograms.

Your work must be broken down in the steps given below, with each part clearly identified, and according to the suggested layout (below).

a) **Written analysis**

After analysing the given pictograms, identify their main common characteristics.

b) **Brainstorming**

Write down keywords and short phrases related to the Billiards game and the typical poses of the Billiards player (you may use the drawing below as a source of inspiration).

c) **Graphical analysis**

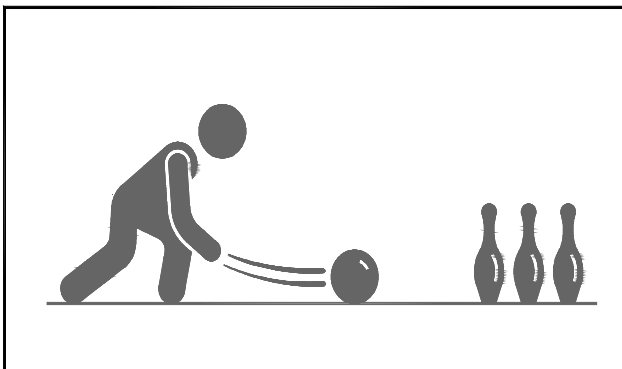
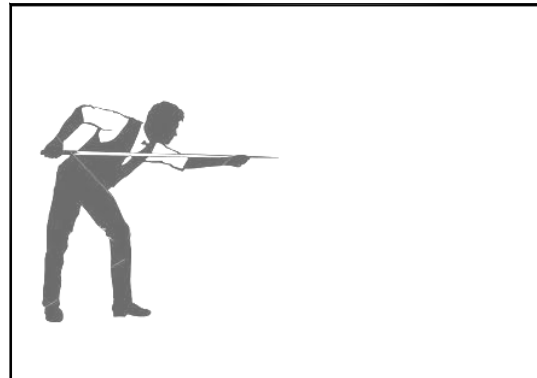
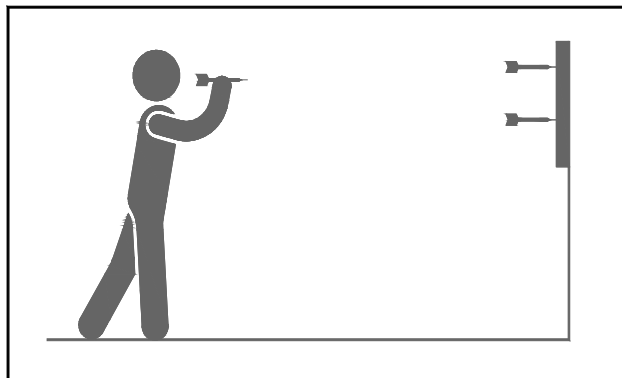
Based on your response to (a) and (b), produce a series of sketches to help you develop your ideas into pictogram style drawing.

d) **Graphical synthesis**

Clearly identify those elements produced in your response to (c) that you intend to use in your final image.

e) **Final realization**

Produce your final solution in a rectangle 300mm x 160mm. You are advised to use drawing instruments and drawing aids to finish your drawing. **Neatly** render the pictogram. **(24 marks)**



BILLIARDS PICTOGRAM		
Written Analyses (2 marks)		
Brainstorming (2 marks)		
Graphical Analysis (6 marks)		Final Realisation (12 marks)
Graphical Synthesis (2 marks)		

FIG. 8

(Please turn the page)

Question 9

The front view and the plan of a Billiards Room are shown in Figure 9b. The room measures 4.8m wide x 5.4m deep x 3.0m high. The floor tiles dimensions are 30cm x 30cm and the height of each course is 30cm.

The furniture and the main feature of the room consist of:

- One billiard table “A”
- One drop-down soffit ceiling “B” (fitted with adequate lighting, having the same length and width of the billiards table and located directly above the table)
- One combined score board and cue rack “C”

Details of the furniture are shown in Figure 9a below.

To a scale of 1:10, produce an estimated single point perspective drawing of the room. The size of the picture plane must be 480mm wide and 300mm high. The viewing angle is indicated by arrows in the plan view while the suggested vanishing point is indicated in the front view.

Render your drawing to enhance your solution.

Note: The door is eight courses high.

(24marks)

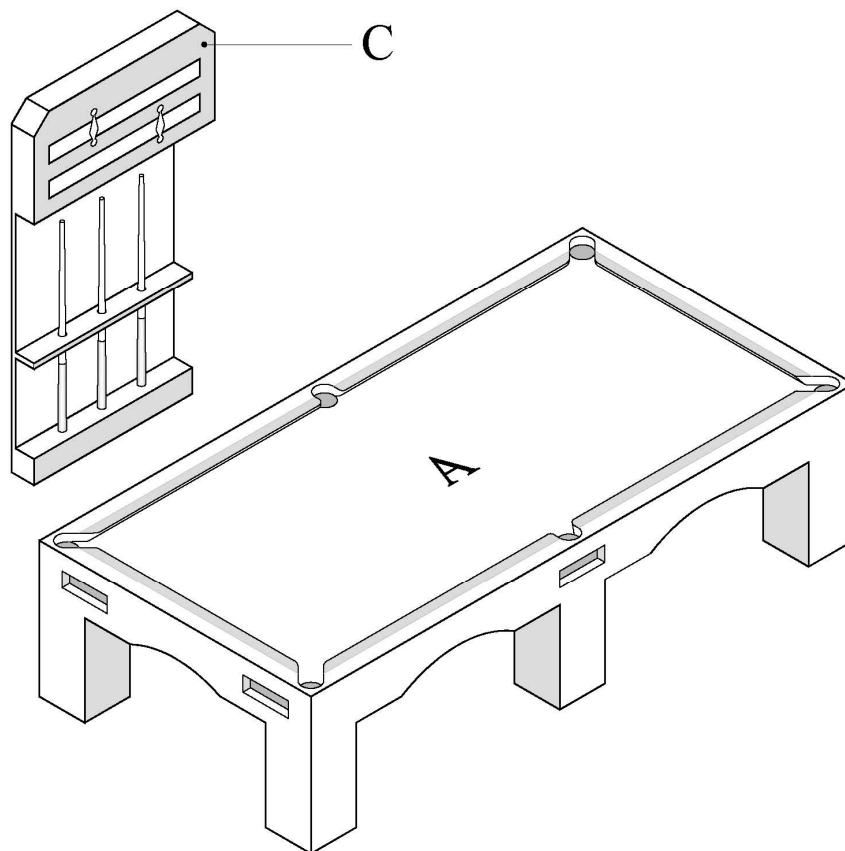


FIG. 9a

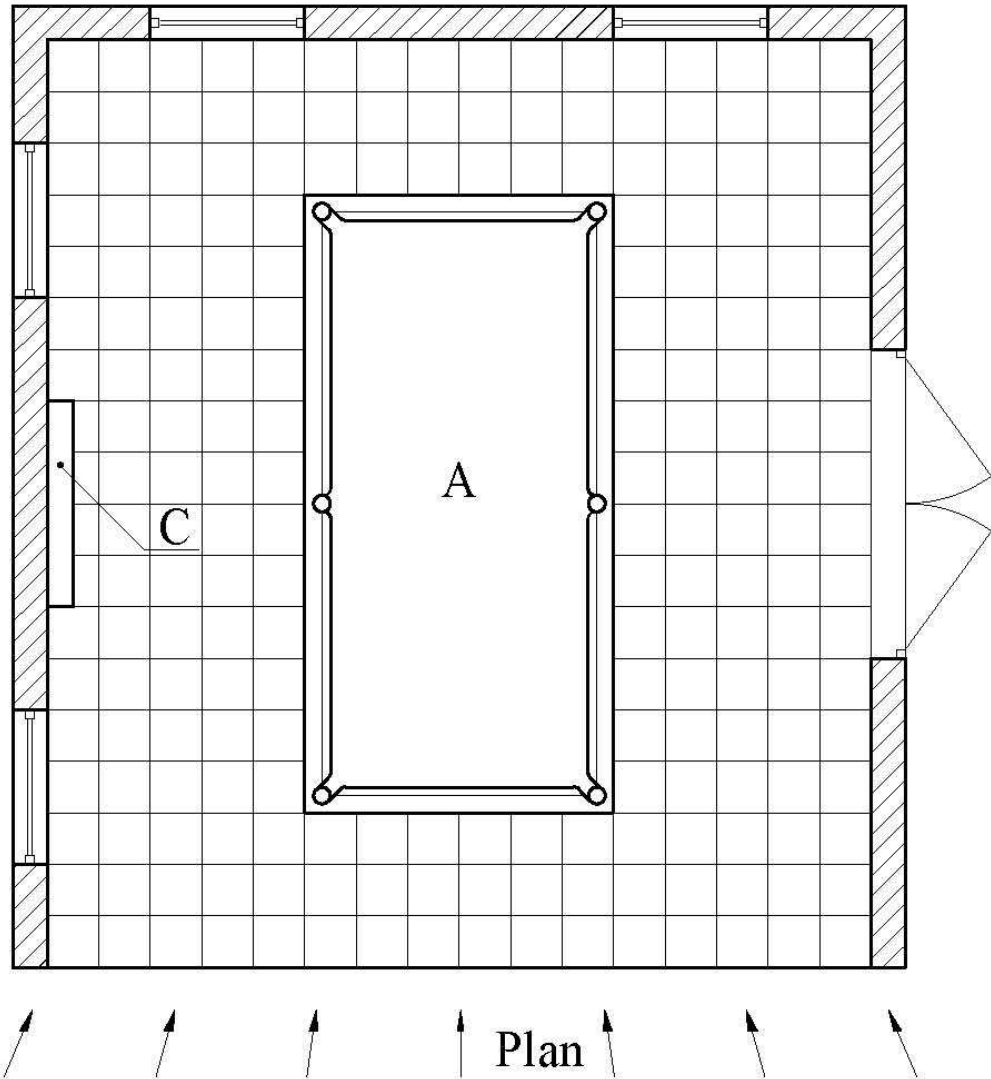
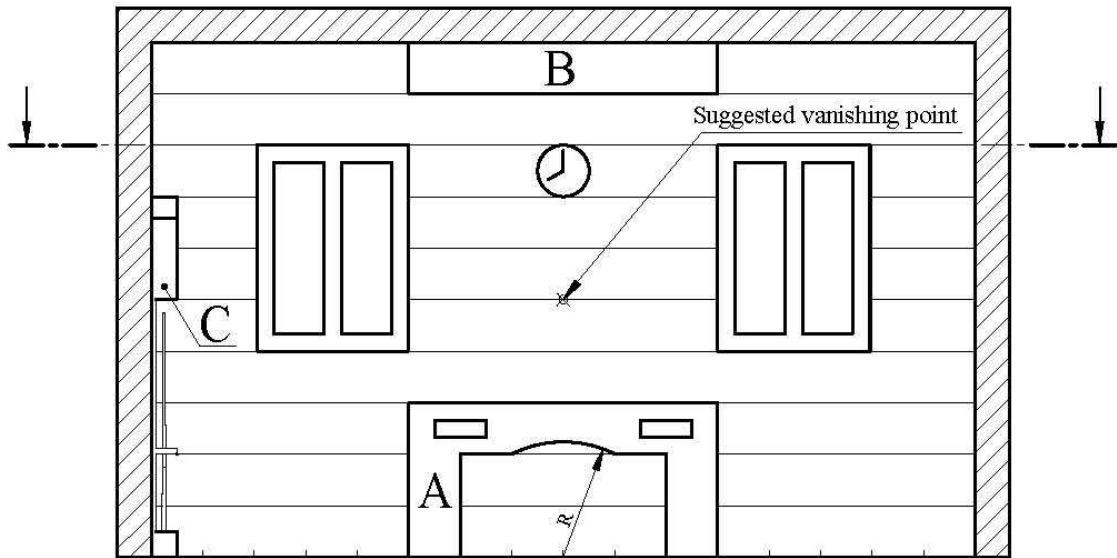
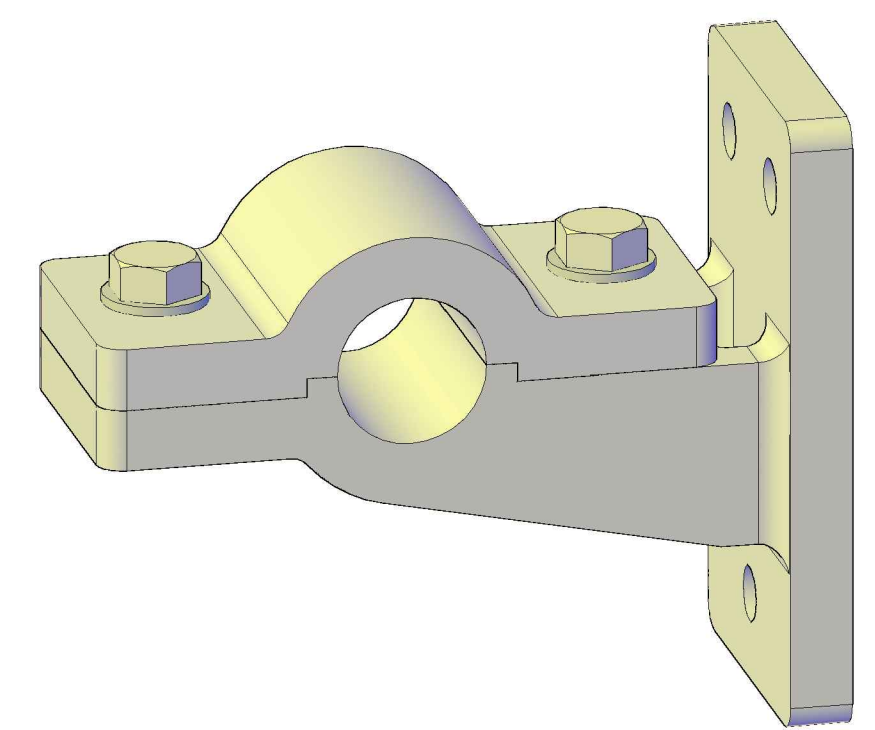
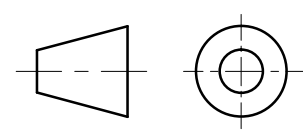
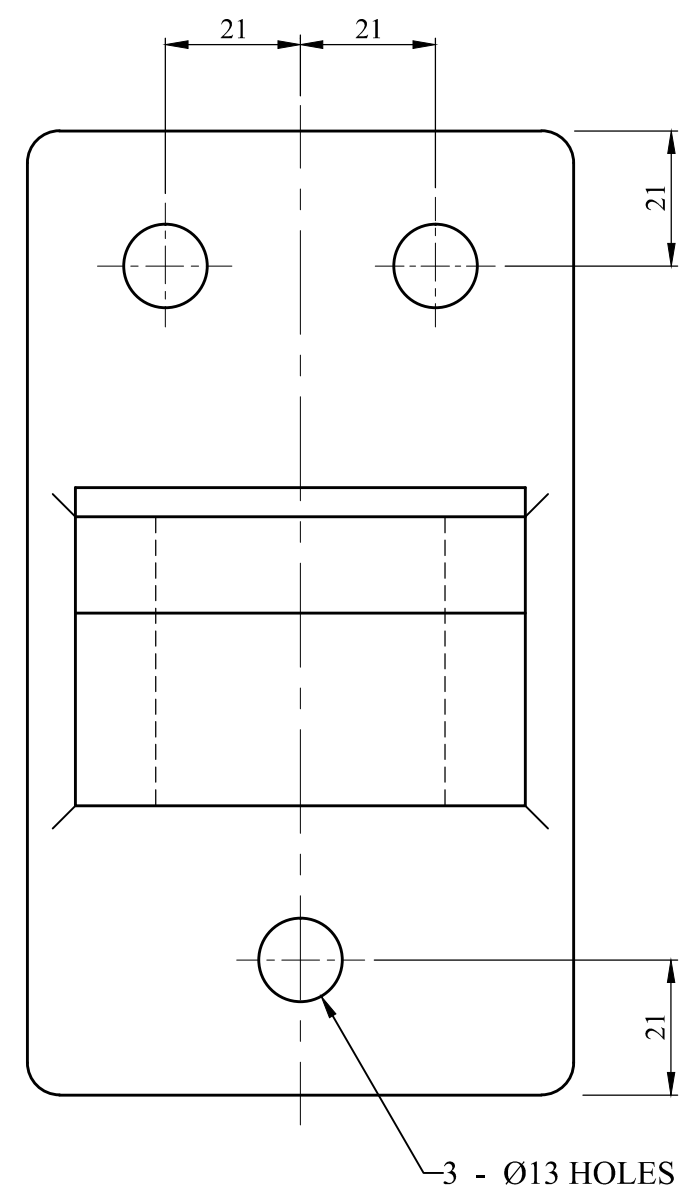
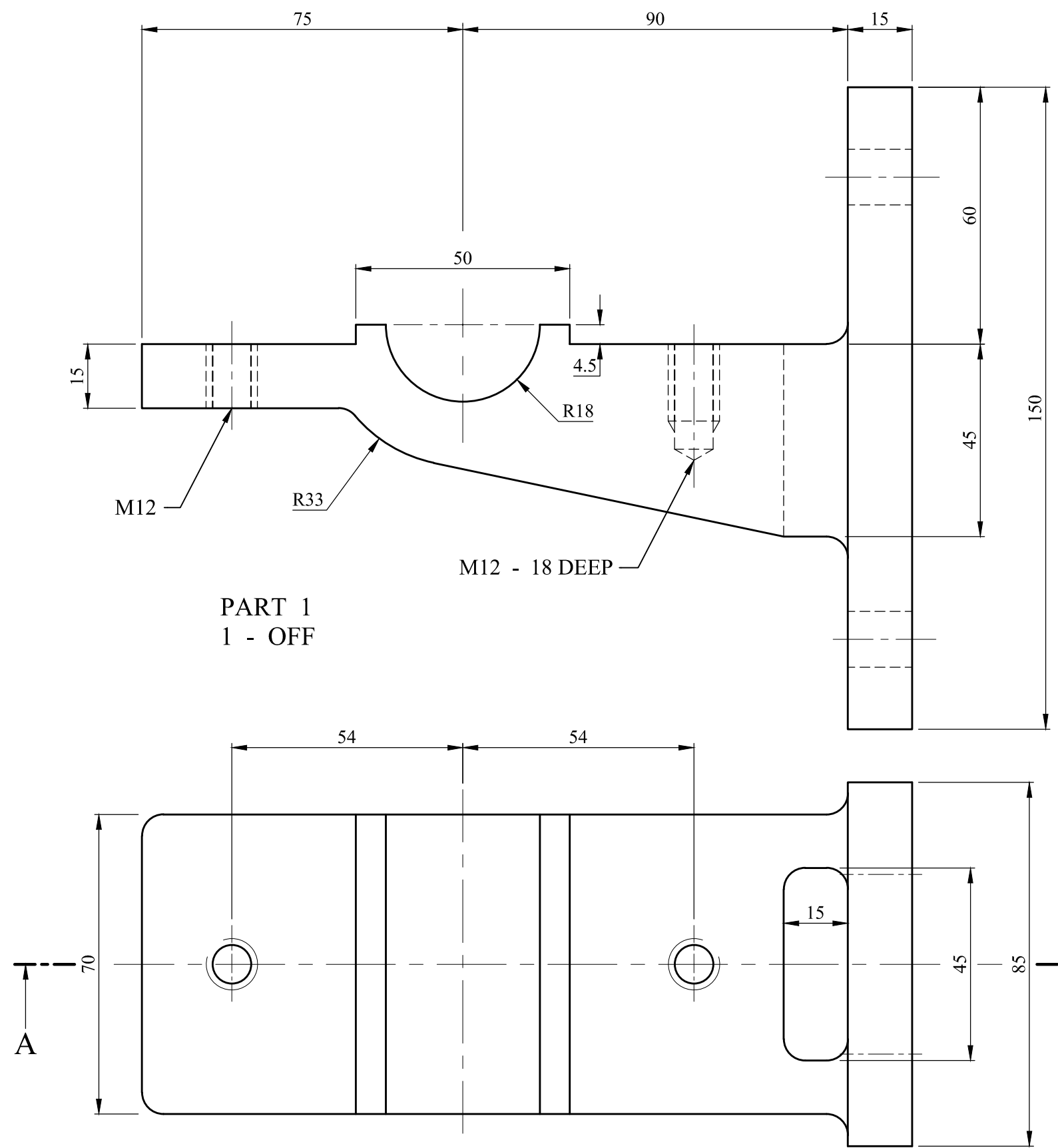
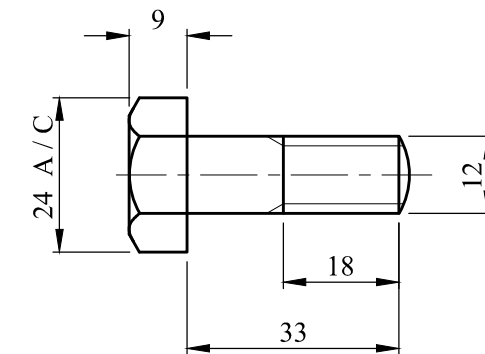
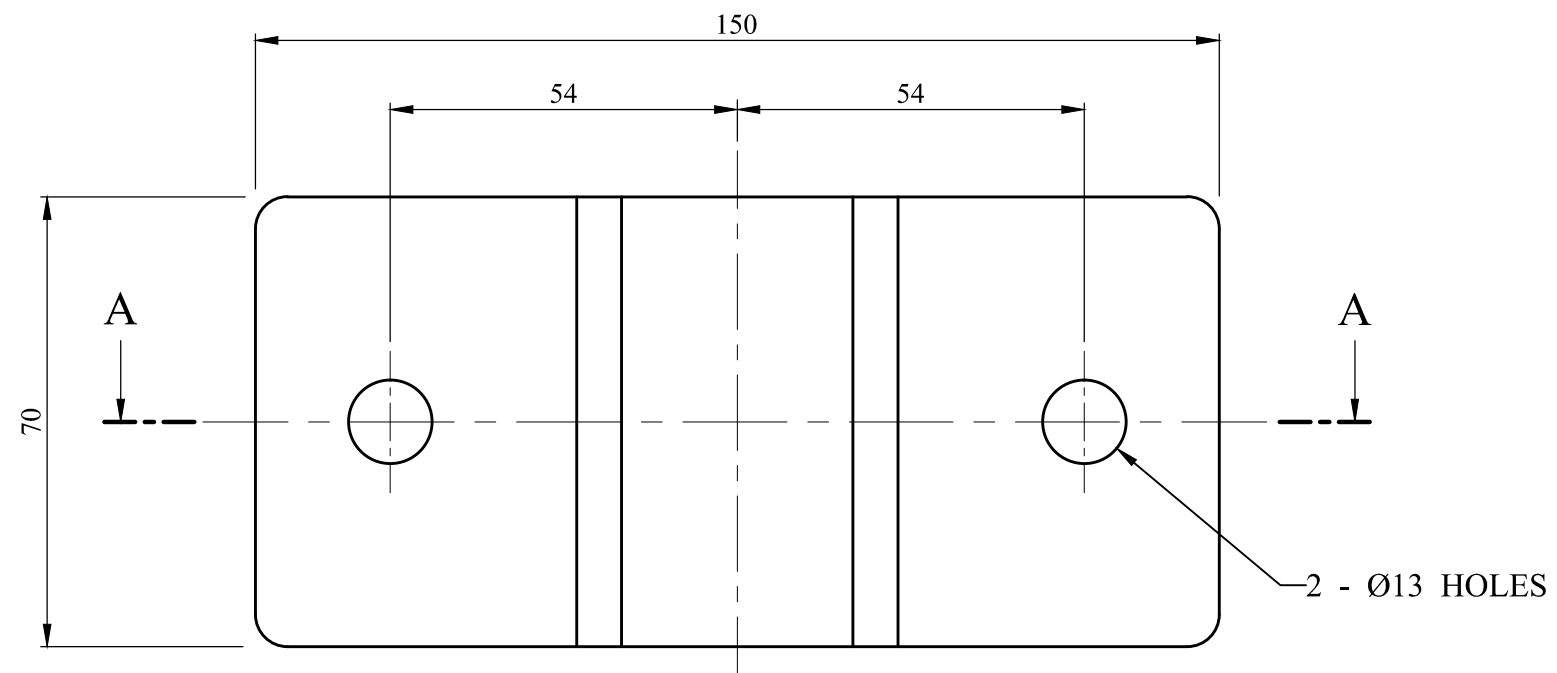


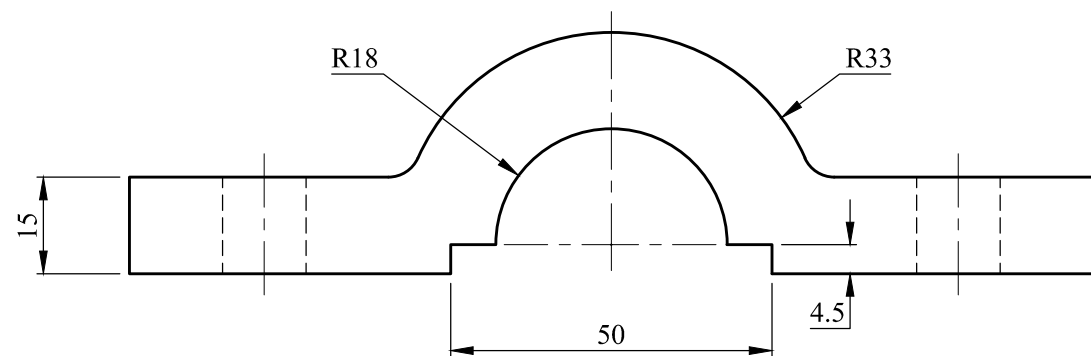
FIG. 9b

End of examination paper

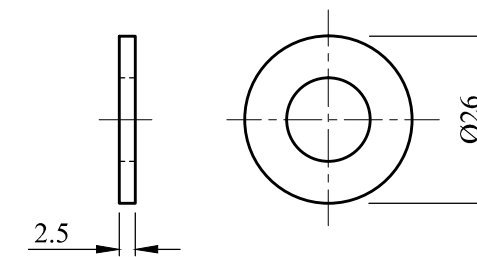




M12 BOLT
PART 3
2 - OFF



PART 2
1 - OFF



M12 WASHER
PART 4
2 - OFF

NOTE: ALL UNDIMENSIONED RADII
ON PARTS 1 AND 2 = 5mm

