

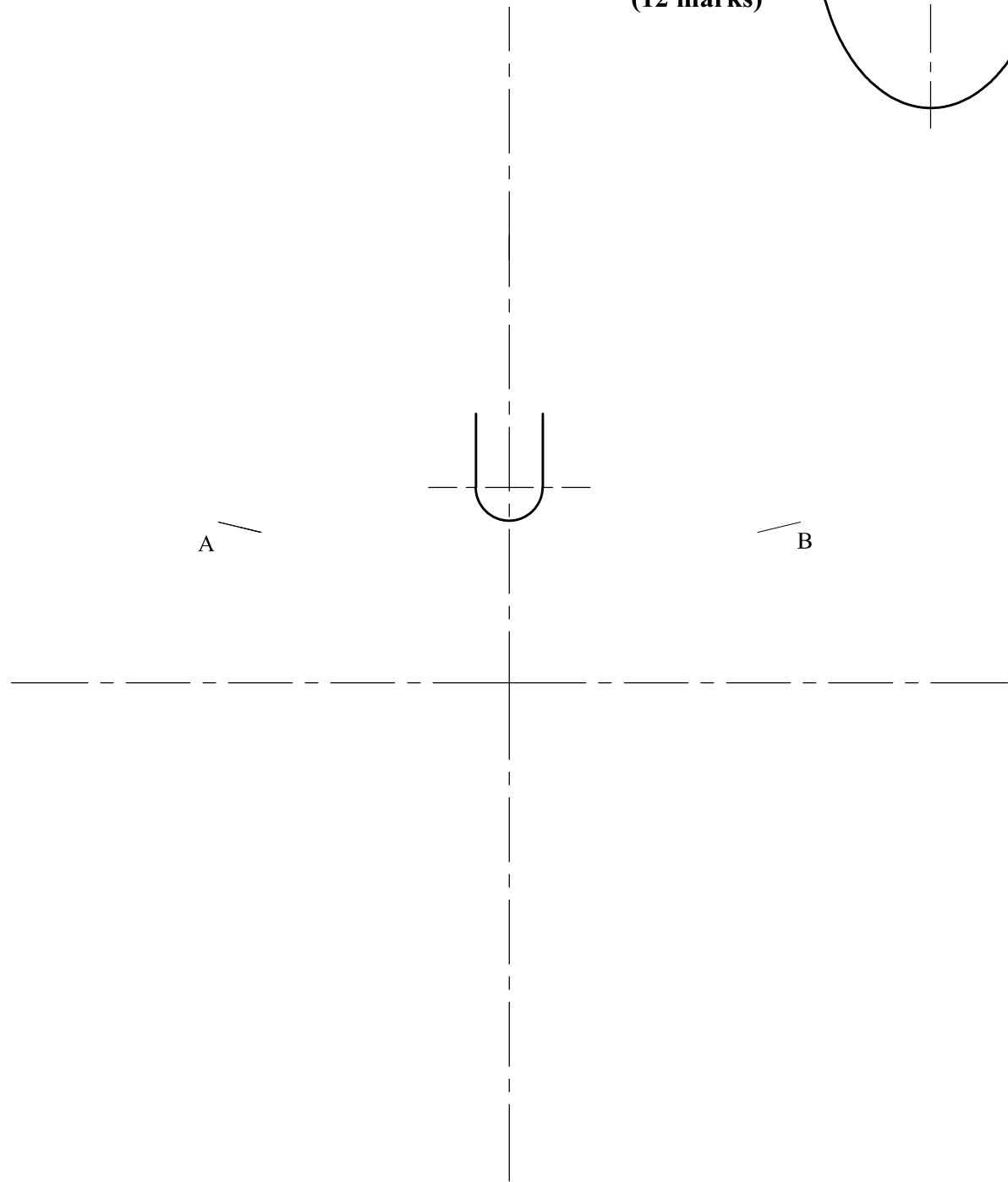
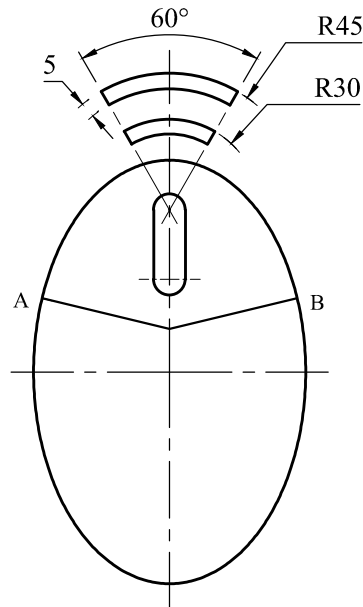
Question 1.

The profile of an elliptical wireless mouse icon is given on the right. The ellipse has a major axis of 140mm and a minor axis of 90mm. Using the start lines given below:

- Construct the ellipse;
- Locate the focal points of the ellipse;
- Construct a normal at point A and extend to the vertical centre line;
- Reflect the normal at point B;
- Complete the icon.

Note: Use the upper focal point as the centre of the 5mm wide arcs and of the upper semi circle of the scroll wheel.

(12 marks)



Question 2.

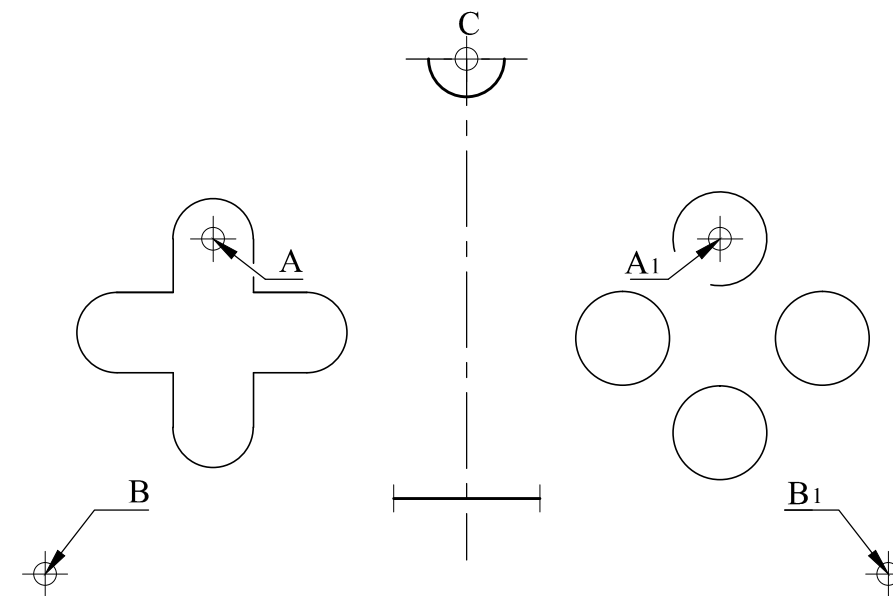
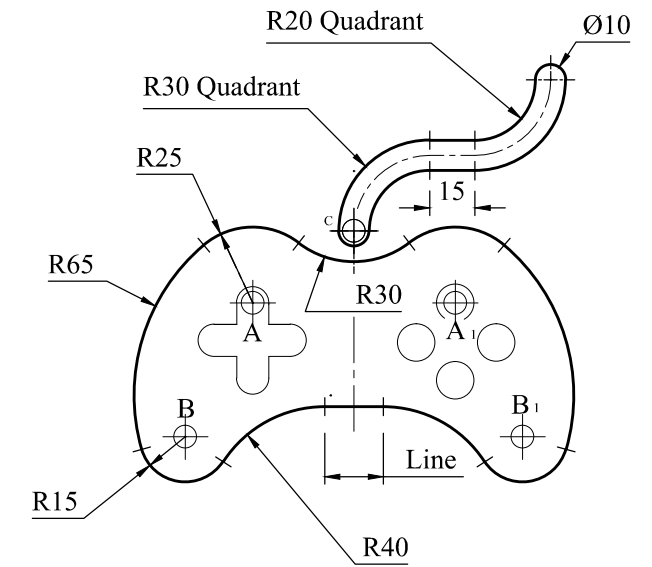
The symmetrical outline of a PC Game Controller symbol is composed of straight lines and arcs. On the given start lines:

- Construct the profile of the Controller;
- Complete the profile of the wire.

Notes:

- A, A₁ and B, B₁ are the centres of the R25 and R15 arcs respectively.
- C is the centre of the given Ø10 semi circle.
- The short dashes indicate points of tangencies.
- Constructions necessary to locate centres and points of tangencies must be left visible.

(15 marks)

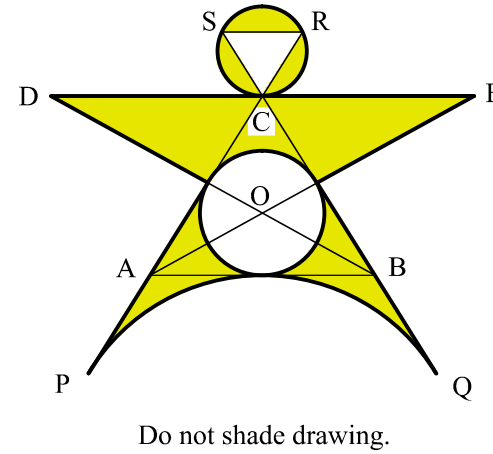


Question 3.

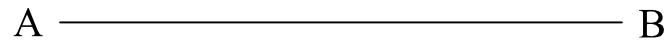
The geometric logo shown consists of a stylised dancer. **Construct** the logo by following the given steps:

- On the given base AB, **construct** an isosceles triangle ABC having sides $AC = BC = 70\text{mm}$.
- Inscribe a circle centre O inside triangle ABC.
- Extend AC and BC downwards by 40mm to locate P and Q and upwards by 25mm to locate S and R.
- Escribe an arc touching line AB and the extended sides AP and BQ.
- Locate the centre and draw the circular head by circumscribing isosceles triangle SRC.
- Draw lines AOE and BOD to meet the horizontal line DCE.

(10 marks)



Do not shade drawing.



Question 4.

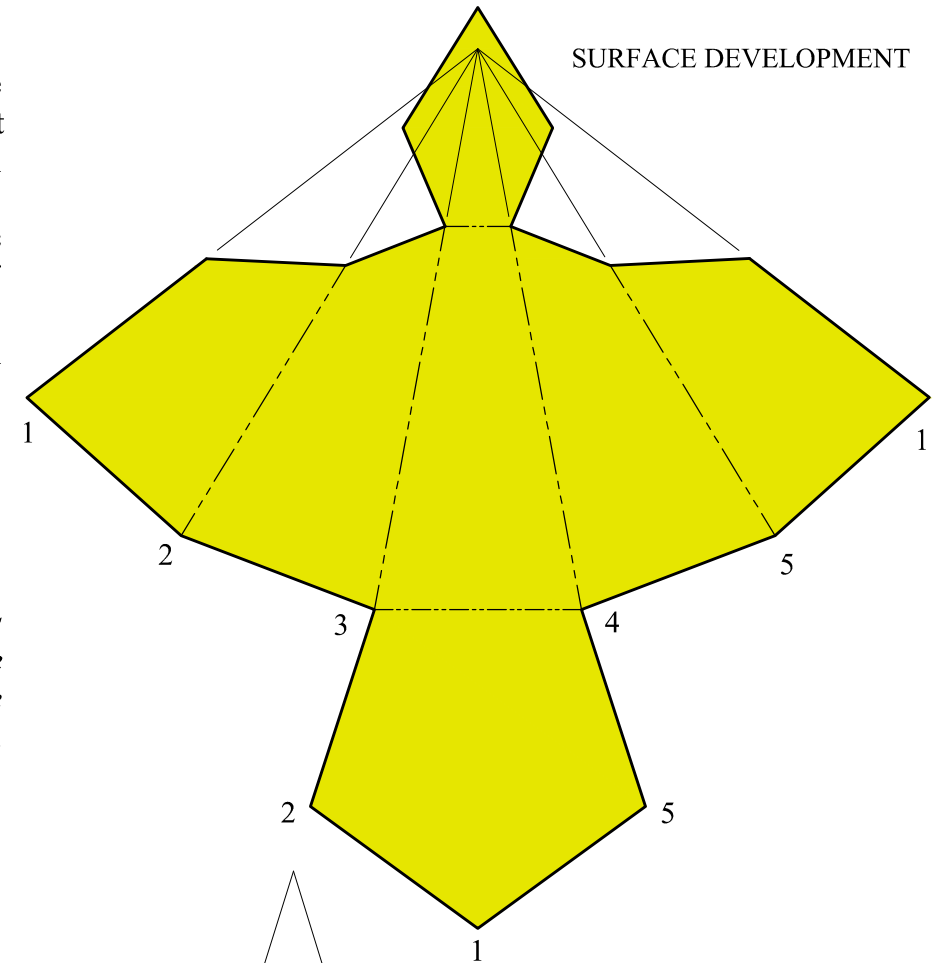
A full size one-piece surface development of a cut pentagonal pyramid is given on the right.

Three incomplete orthographic views and a pictorial view of the pyramid are given below. Use the information given in the surface development to complete the following:

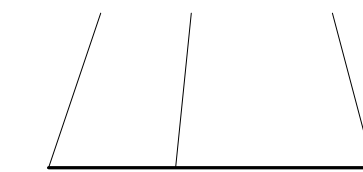
- Front elevation;
- End elevation;
- Plan;
- True shape of cut.

Note: The pentagonal bases shown in the plan and in the surface development are numbered to help visualisation.

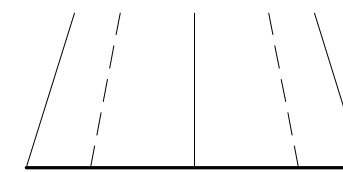
(15 marks)



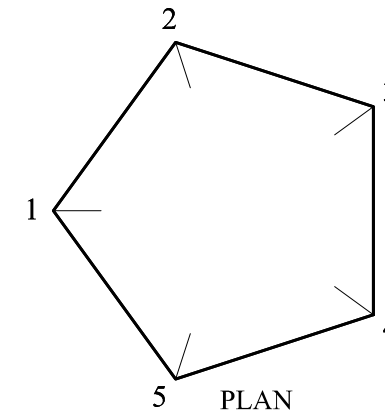
TRUE SHAPE OF CUT



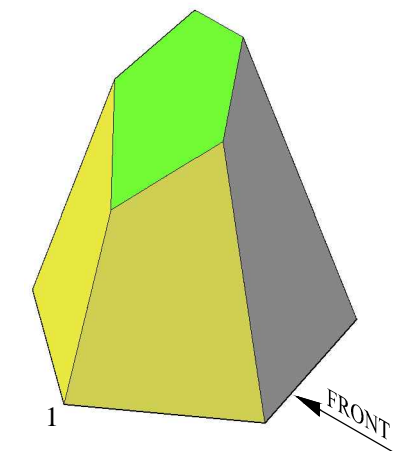
FRONT ELEVATION



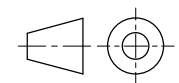
END ELEVATION



PLAN



PICTORIAL VIEW



Question 5.

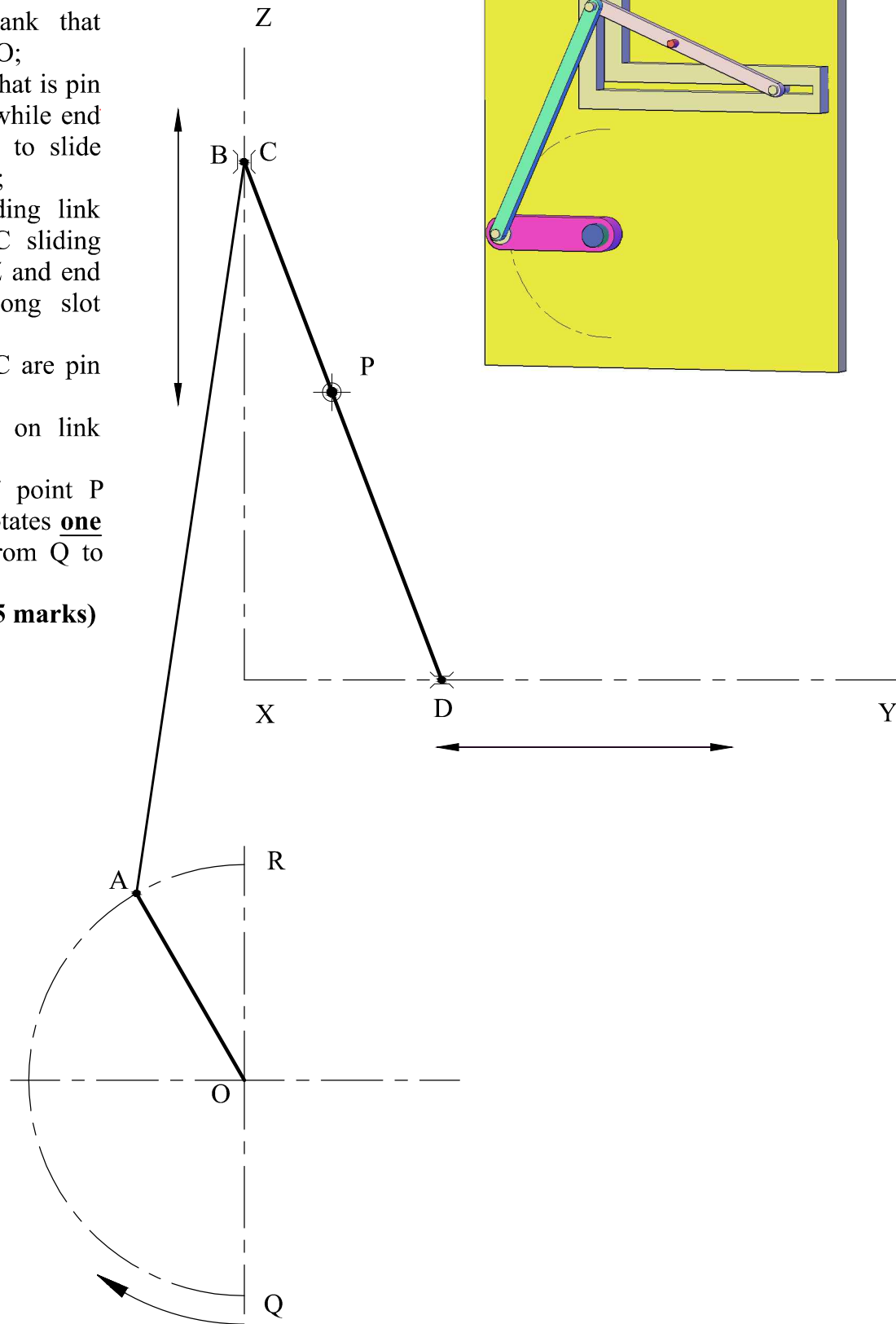
A pictorial view and a line drawing of a mechanical linkage are given.

The following are details of the arrangement:

- AO is a crank that rotates about O;
- AB is a link that is pin jointed at A while end B is allowed to slide along slot XZ;
- CD is a sliding link having end C sliding along slot XZ and end D sliding along slot XY;
- Ends B and C are pin jointed.
- P is a point on link CD.

Plot the locus of point P when crank OA rotates **one half revolution** from Q to R.

(15 marks)



Question 6.

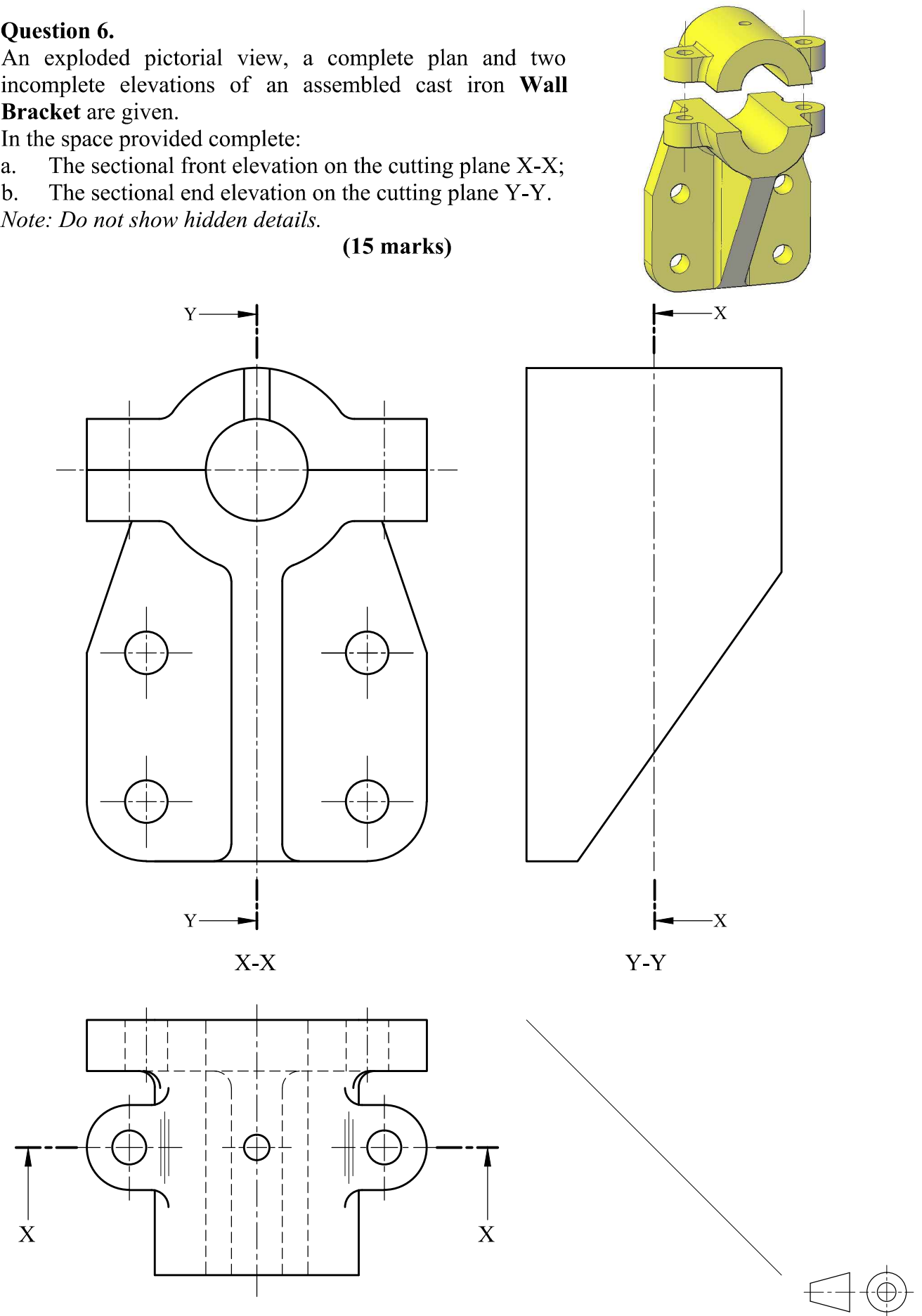
An exploded pictorial view, a complete plan and two incomplete elevations of an assembled cast iron **Wall Bracket** are given.

In the space provided complete:

- The sectional front elevation on the cutting plane X-X;
- The sectional end elevation on the cutting plane Y-Y.

Note: Do not show hidden details.

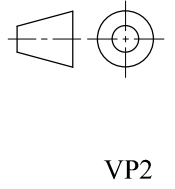
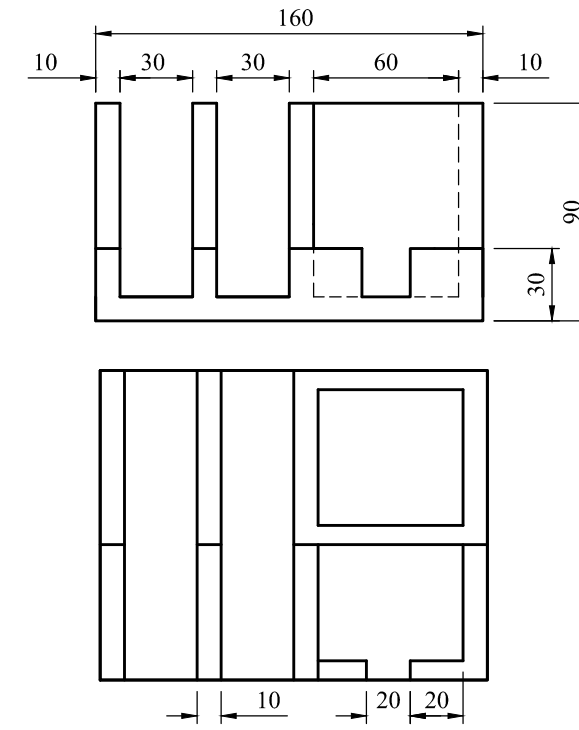
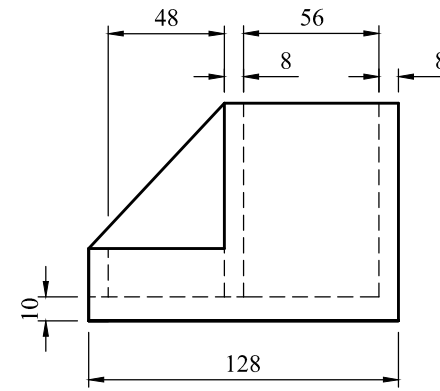
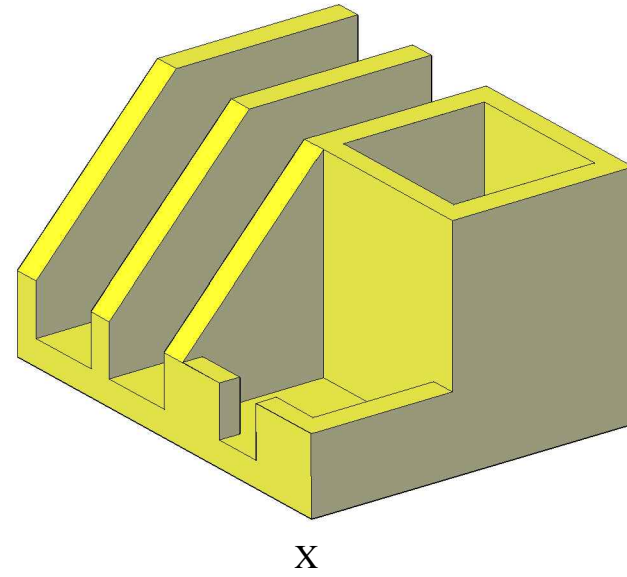
(15 marks)



Question 7.

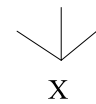
A pictorial view and three orthographic views of a desk organiser are given on the right. Using the given start lines and dimensions, **project an estimated two-point perspective view** of the object placing corner X in the lowermost position.

(18 marks)



VP1

VP2



Question 1.

The following computer programme is written to create a Geometric Design.

```
DATA: A = 0; B = 50; C = 100; D = 150; E = 200; F = 250; G = 300; H = 350; J=400.
ACI 7: MOVE F,D; DRAW F,E; DRAW G,F; DRAW H,E; DRAW G,D; DRAW F,D:
ACI 7: MOVE J,F; DRAW H,G:
ACI 5: MOVE G,C; DRAW E,C; DRAW E,E:
ACI 1: MOVE J,A; DRAW G,C; DRAW J,E; DRAW G,G; DRAW E,E; DRAW C,G:
ACI 3: MOVE J,B; DRAW H,C; DRAW J,D:
ACI 3: MOVE F,G; DRAW E,F; DRAW D,G:
```

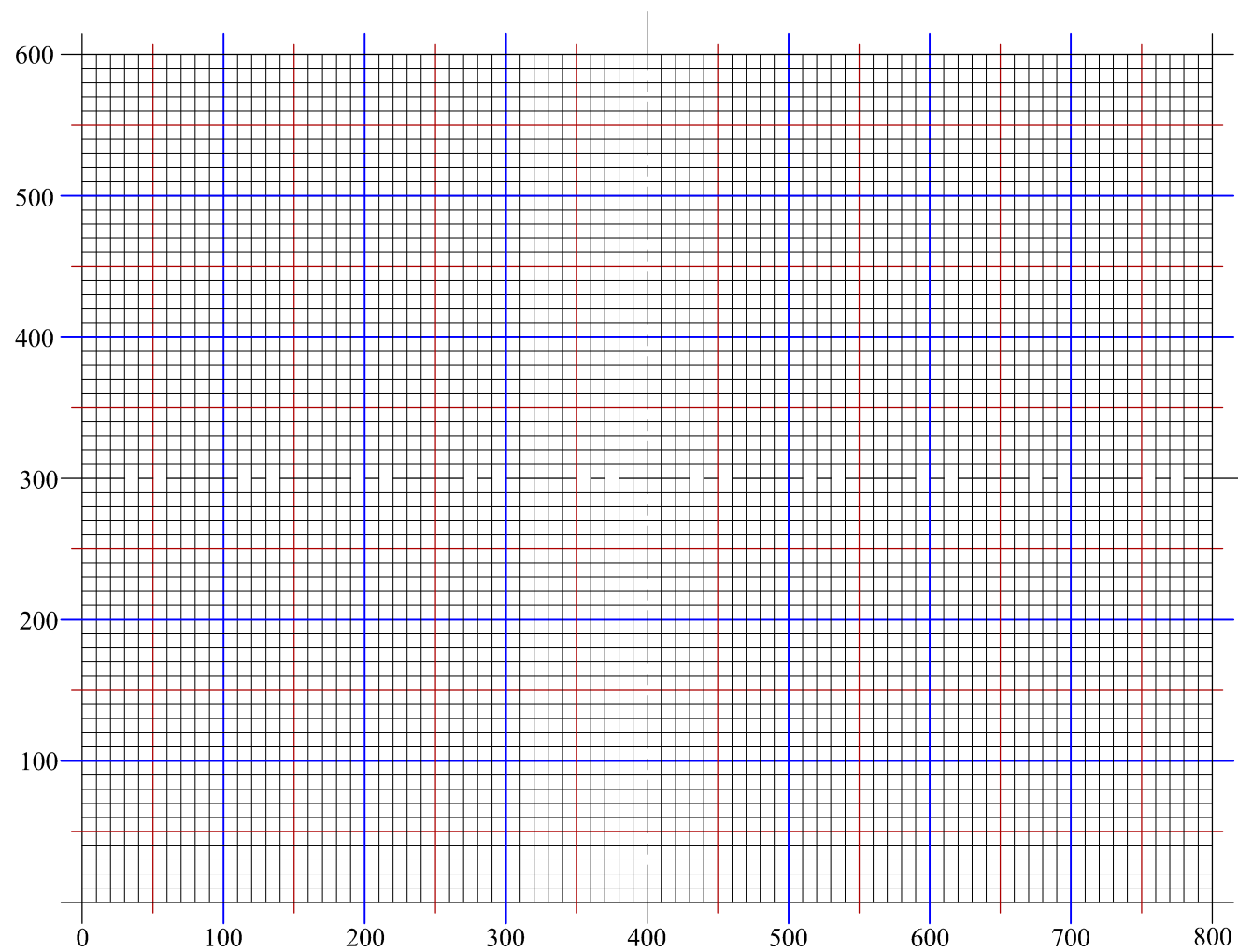
MIRROR the plotted design, using the vertical centre line as the mirror line (line of symmetry).
MIRROR the plotted design, using the horizontal centre line as the mirror line (line of symmetry).

The **DATA** statement specifies the numeric values (in pixels) of given variables. **MOVE**, positions the cursor at a new location without drawing a line. **DRAW** draws a line from a current location to a new location. **MIRROR** creates a mirror image (reflection) of the original. The instruction **ACI No:** makes the images that follow the instruction, appear in the colour associated with the number. The computer responds to the following colour commands:

Colour	ACI No.
RED	1
GREEN	3
BLUE	5
BLACK	7

The starter sheet below shows a pre-printed grid representing an 800 x 600 graphical display. Use the grid to plot the image produced by this programme.

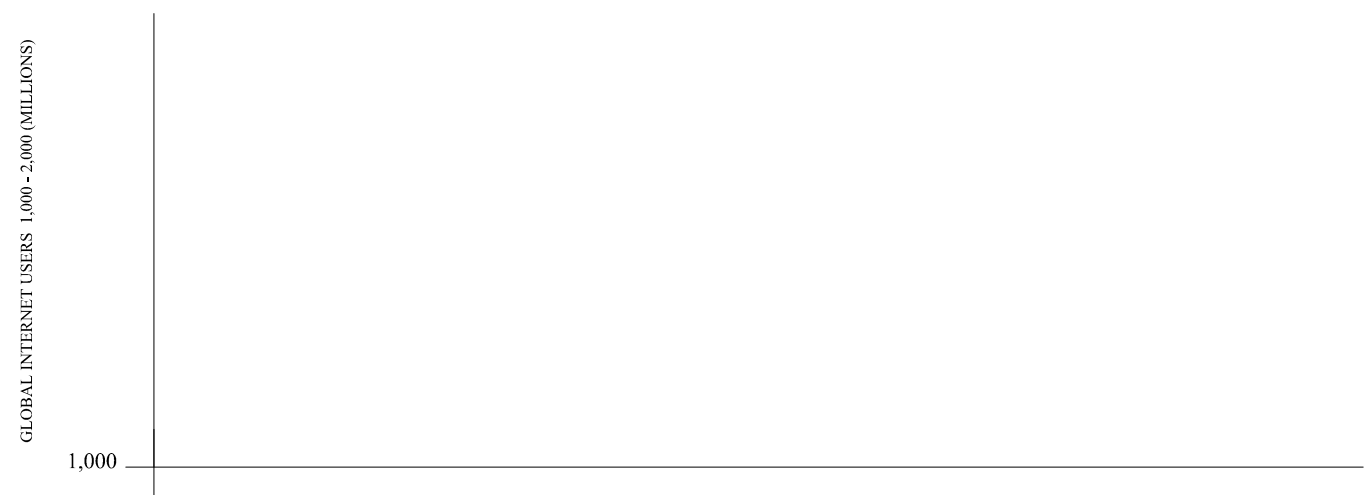
(12 marks)



Question 2.

a. Internet can be accessed either through a desktop PC, or through a mobile phone. The following data compares the use of the two alternatives from the years 2011 to 2015. Draw a line graph to compare the numbers of desktop and mobile internet users. **(5 marks)**

KEY		2011	2012	2013	2014	2015
<input type="checkbox"/>	Desktop internet users (in millions)	1,400	1,500	1,600	1,650	1,700
<input type="checkbox"/>	Mobile internet users (in millions)	1,100	1,300	1,400	1,650	1,900



b. During the year 2014, internet users accessed their emails through the following devices:

- Smartphones 45% ;
- Tablets 15% ;
- Desktop computers 40%.

Draw a 3-D piechart to represent graphically the comparison between the three devices.

Note: Marks will be awarded for correctness, the organisation of the charts, keys and colouring. **(7 marks)**

EMAILS OPENED ON A SMARTPHONE, TABLET OR DESKTOP

KEY	DEVICE	%	Angle
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			

Working

Question 3.

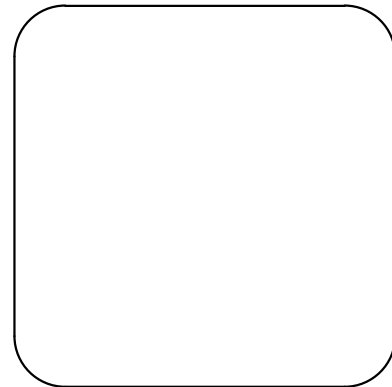
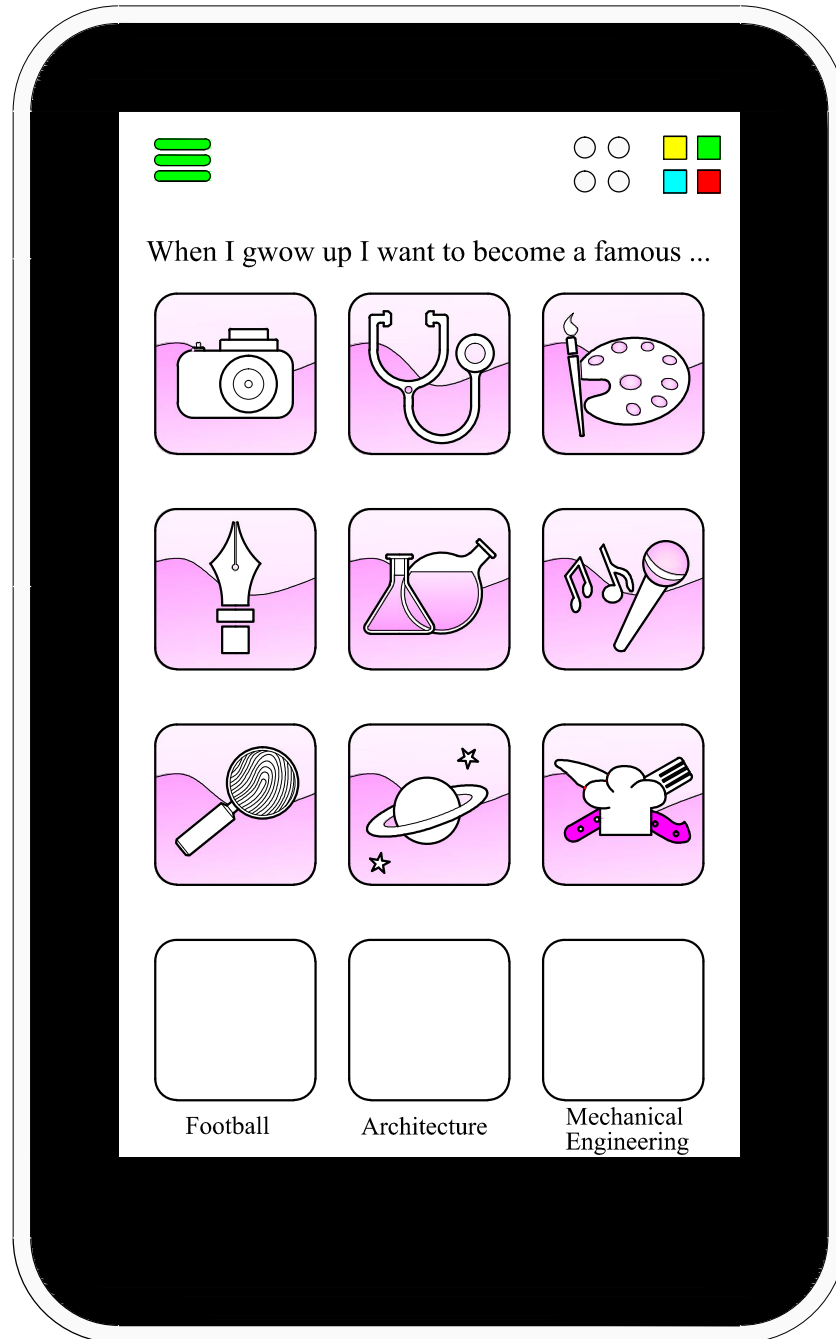
The kids' tablet shown below is being designed with the purpose of encouraging the users to search for information about their preferred interest. The first nine App icons, all of which represent particular interests, have already been designed. You have been asked to design **two** of the remaining three icons. Draw the icons to represent two of the following interests:

- Football;
- Architecture;
- Mechanical Engineering.

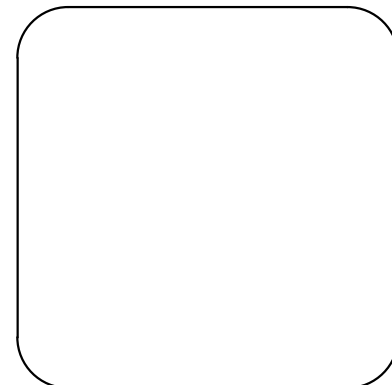
Notes:

- It is important that the icons that you design, **match the style** of the given icons.
- Draw preparatory sketches in the blank spaces on the tablet.

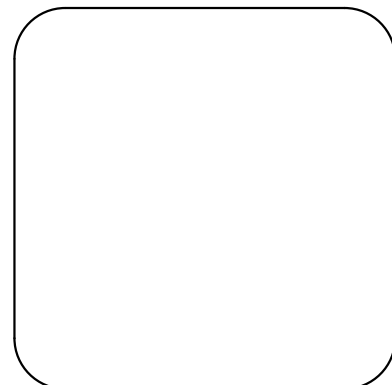
(12 marks)



Football Icon



Architecture Icon



Mechanical Engineering Icon

Question 4.

An exploded pictorial view of a football trophy together with orthographic views of the separate items are given.

The trophy consists of the following items:

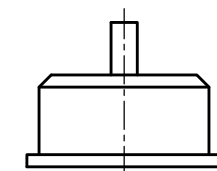
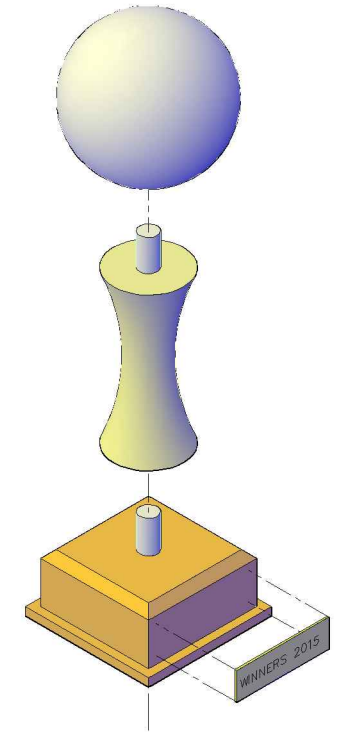
- Wooden base (Item 1);
- Gold plated sheet metal label (Item 2);
- A machined brass pedestal (Item 3);
- A marble sphere with flat base (Item 4).

The parts are assembled and glued together.

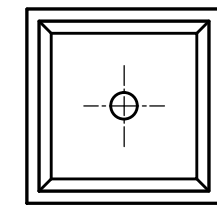
In the space provided below:

- Draw a well proportioned **freehand** isometric sketch of the assembly.
- Colour the drawing paying particular attention to the textures of the different materials.

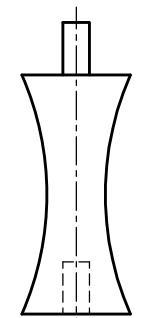
(14 marks)



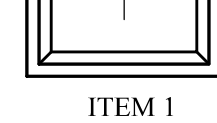
ITEM 1



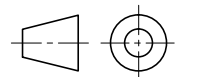
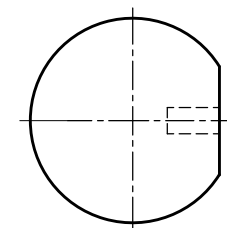
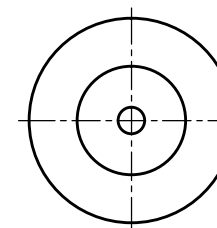
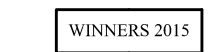
ITEM 2



ITEM 3



ITEM 4



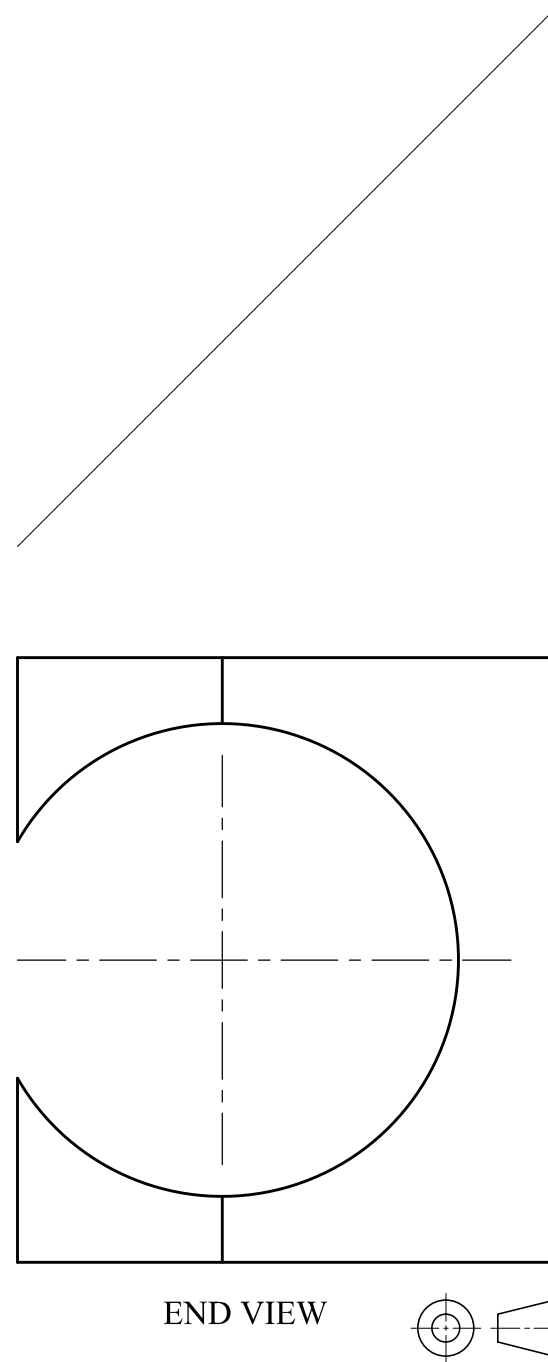
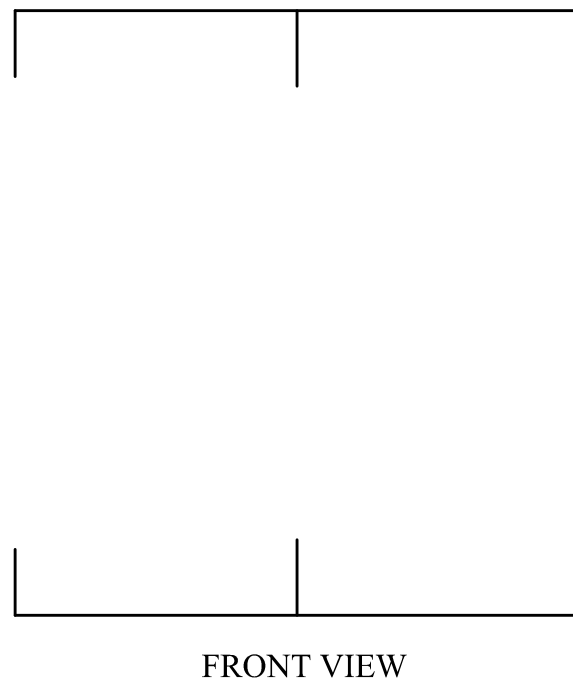
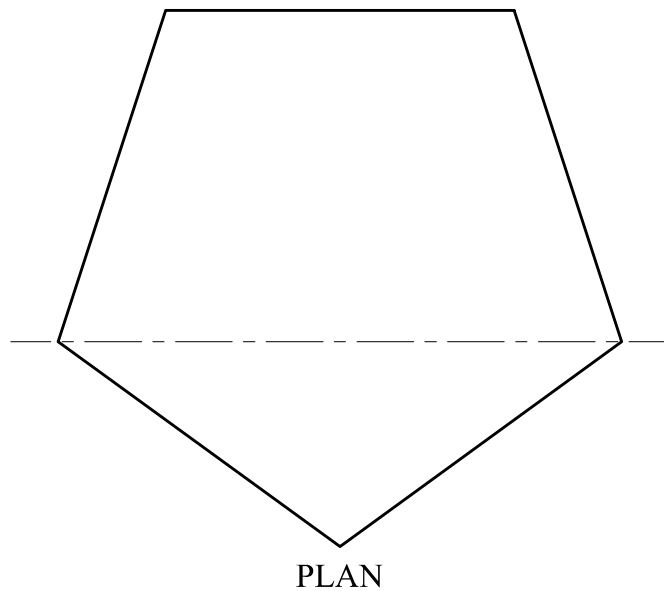
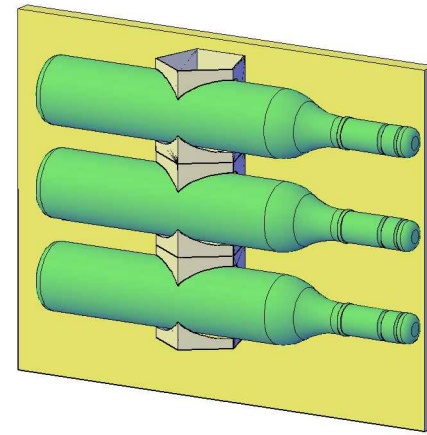
Question 5.

The picture on the right illustrates a wine bottle rack composed of sheet metal holders screwed on to a wooden panel.

The complete end view and plan, given below, show one sheet metal pentagonal prism which has been intersected by a cylinder to accommodate the bottle. An incomplete front view is also given.

In the space provided, complete the **Front View** showing clearly the constructions necessary to trace the resulting curves of intersection.

(14 marks)

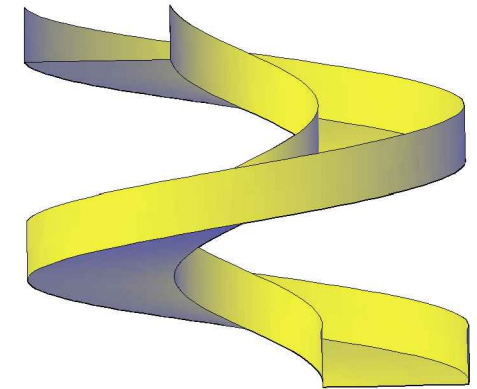


Question 6.

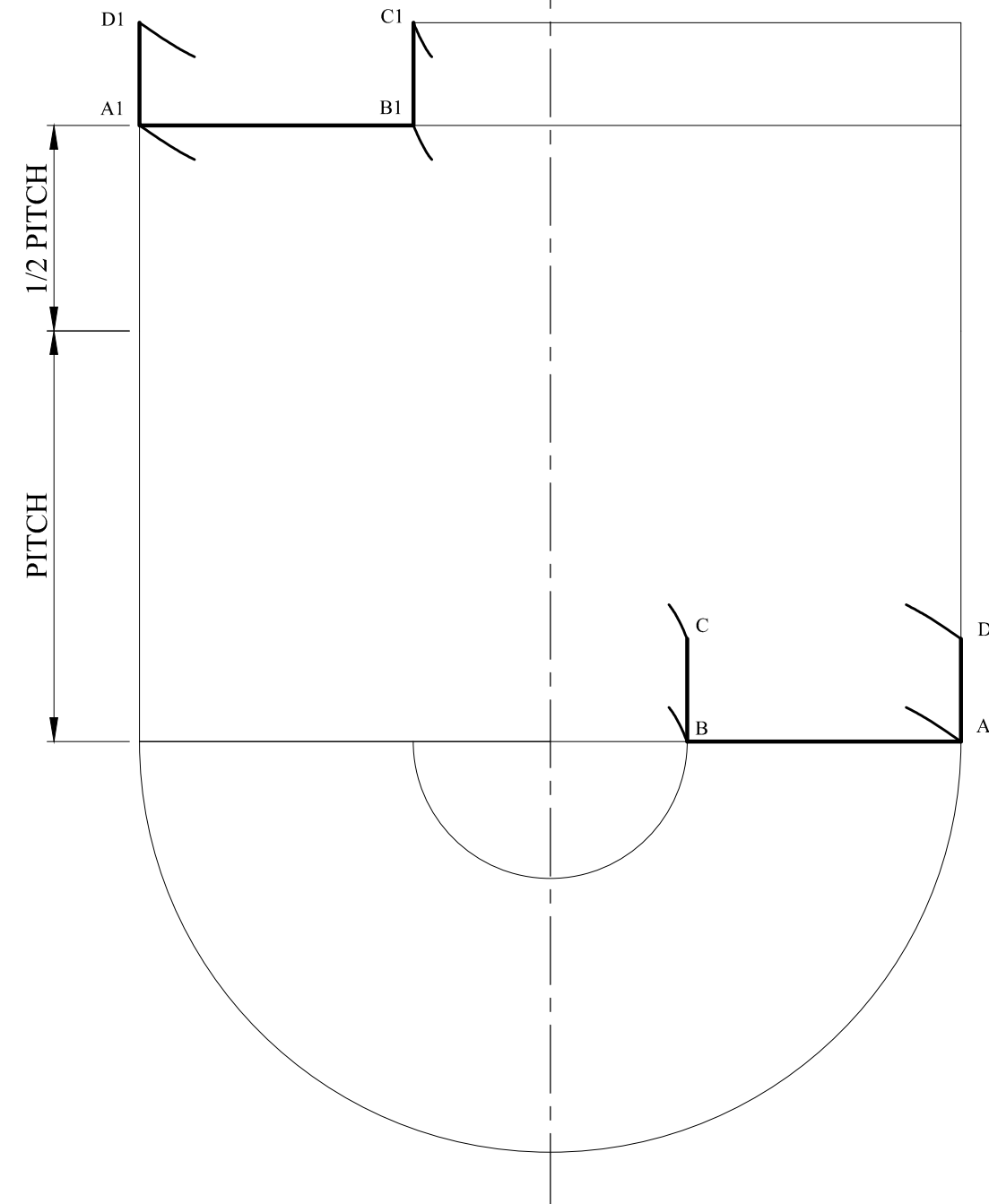
A stand in a stationary shop, consists of **one and a half turns** of a helical U-shaped channel. Using the given start lines, construct the four helices A, B, C and D to represent the elevation of the stand.

Notes:

- Line in, with a bold outline, the visible areas of the helices.
- Leave all construction lines visible.
- Hidden detail is not required.



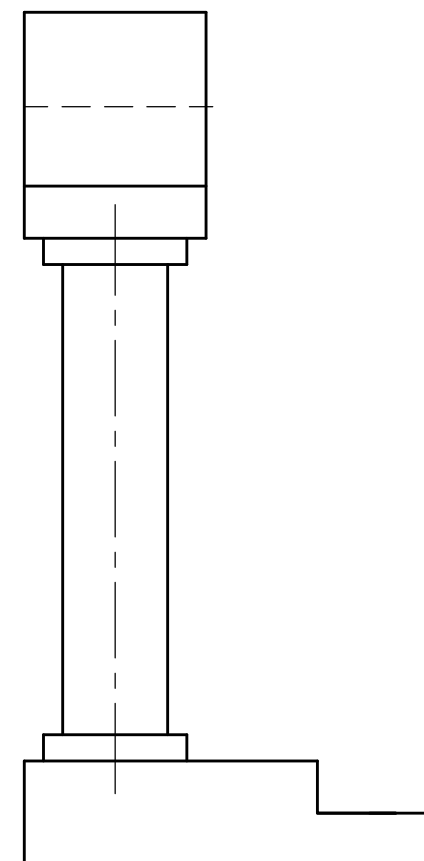
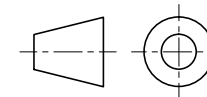
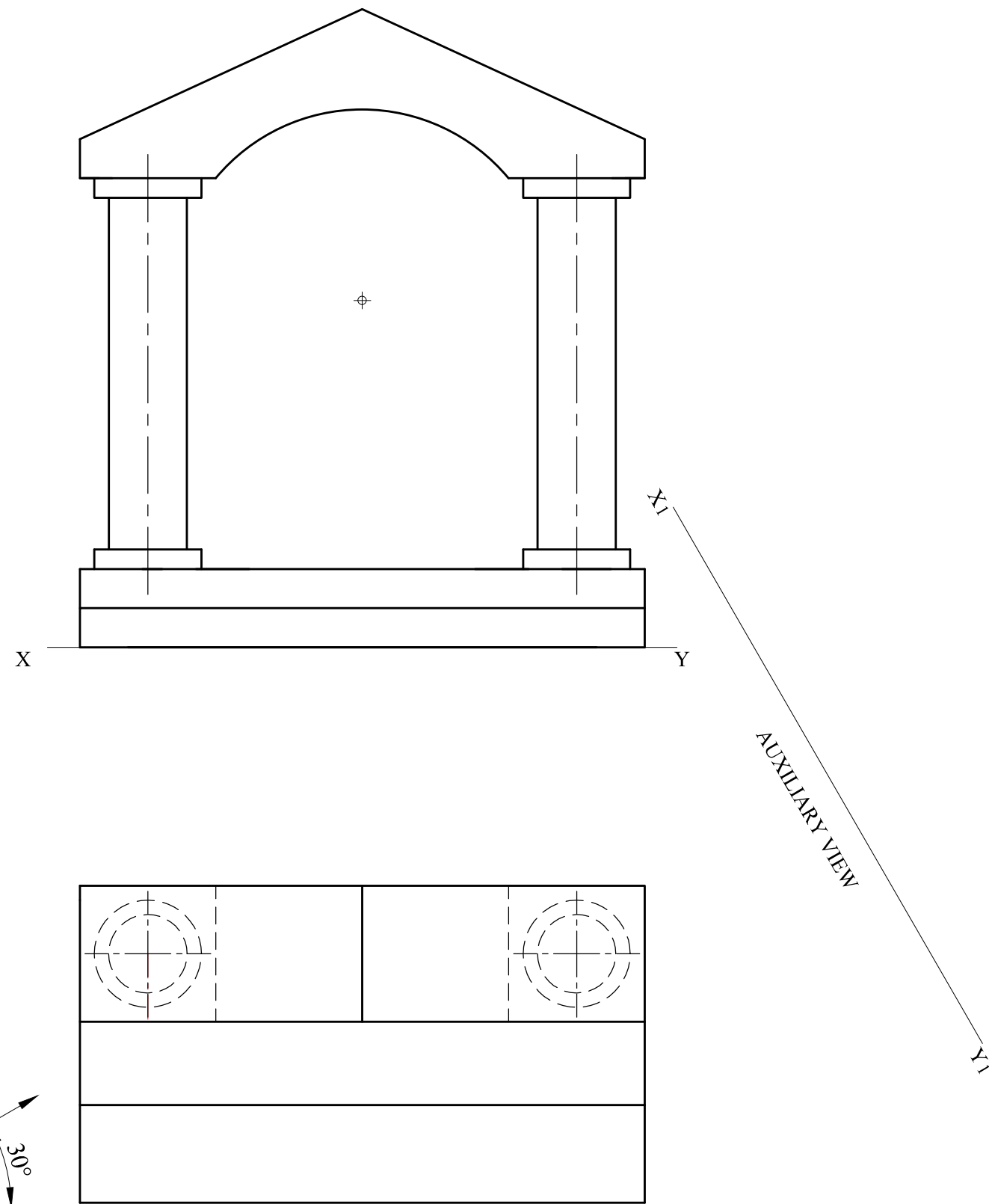
(18 marks)



Question 7.

Three orthographic views of a photo shoot background prop are given below. In the work space provided you are requested to:

- a. Draw a 3D freehand sketch of the prop;
 - b. Project an Auxiliary view on X1, Y1 as seen from the direction of arrow A (*do not show hidden details*).
- (18 marks)**



3D Freehand sketch of the prop

Question 1.

The following computer programme is written to create an aerobic logo.

DATA: A = 50; B = 100; C = 150; D = 200; E = 250; F = 300; G = 350; H = 400; I = 450; J = 500;
K = 550; L = 600; M = 650; N = 700; O = 750.

ACI 5: Move O,F; Draw K,E; DRAW B,E; DRAW B,F:

ACI 7: Move K,E; Draw G,A; Draw F,A; Draw F,E:

ACI 7: Move D,E; Draw B,C; Draw A,C; DRAW B,E:

ACI 1: Move F,C; Draw G,C; Draw H,D; Draw F,D:

ACI 3: Move F,B; Draw G,B; Draw J,E:

Mirror the resulting design using the horizontal centre line as the mirror line.

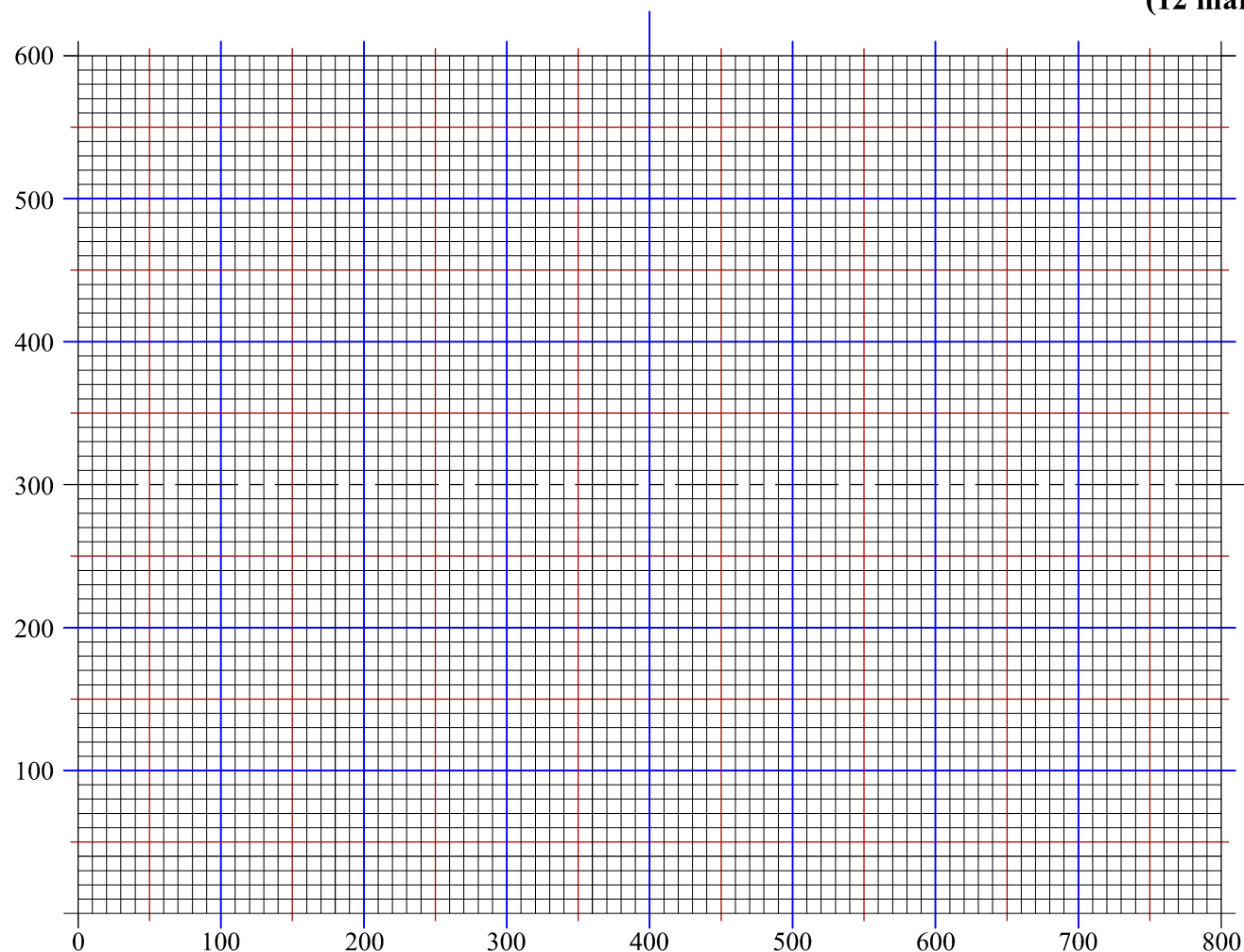
The **DATA** statement specifies the numeric values (in pixels) of given variables. **MOVE**: positions the cursor at a new location without drawing a line. **DRAW**: draws a line from a current location to a new location. **MIRROR**: creates a mirror image (reflection) of the original. The instruction **ACI No**: makes the images that follow the instruction appear in the colour associated with the number. The computer responds to the following colour commands:

Colour	ACI No.
RED	1
GREEN	3
BLUE	5
BLACK	7

The starter sheet below shows a pre-printed grid representing an 800 x 600 graphical display.

Use the grid to plot the image produced by this programme.

(12 marks)



Question 2.

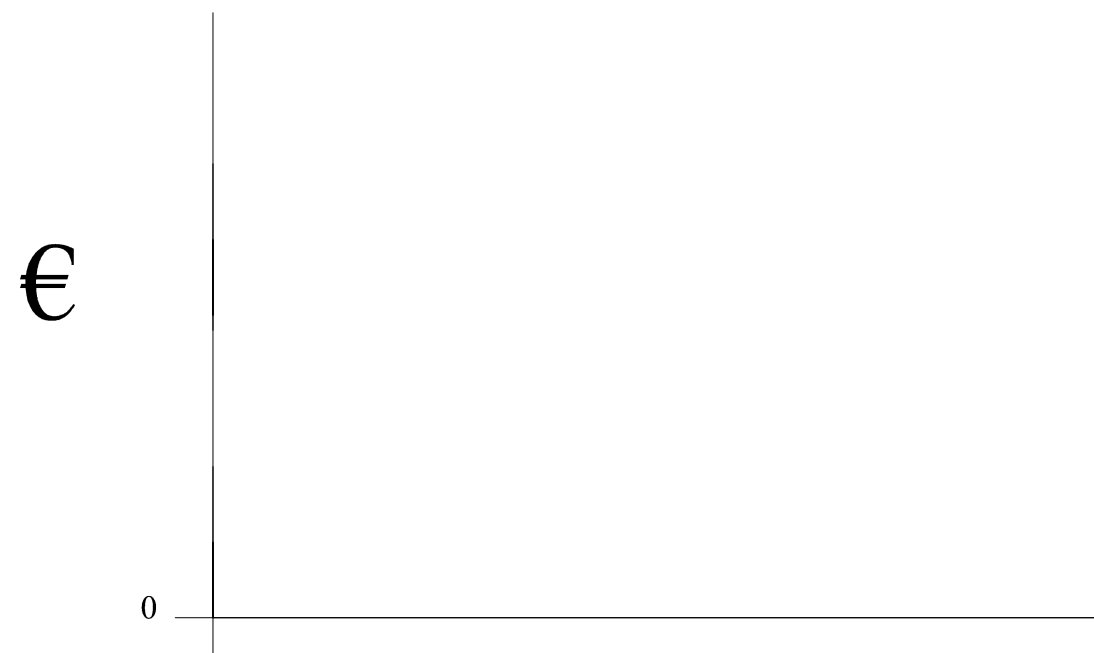
A model aeroplane club has three vending machines selling coffee, soft drinks and ice creams.

The sales in Euro per quarter during the last year were as follows:

Key	Symbol	Vending Machines	Jan - Mar	Apr - Jun	Jul - Sep	Oct - Dec
<input type="checkbox"/>		COFFEE	€30	€20	€10	€20
<input type="checkbox"/>		SOFT DRINKS	€20	€30	€50	€30
<input type="checkbox"/>		ICE CREAMS	€10	€40	€80	€20

a) Draw a line graph to represent the quarterly sales of the coffee, soft drinks and ice creams.

(8 marks)



b) Complete the table below and draw a pie chart to represent the total sales of coffee, soft drinks and ice creams during last year.

(4 marks)

Key	Symbol	Vending Machines	Total
<input type="checkbox"/>		COFFEE	€
<input type="checkbox"/>		SOFT DRINKS	€
<input type="checkbox"/>		ICE CREAMS	€
TOTAL SALES			€



Question 3.

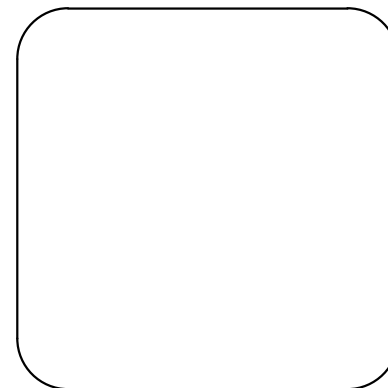
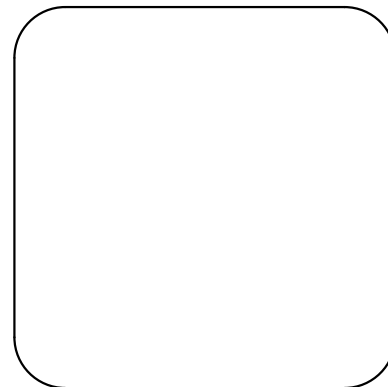
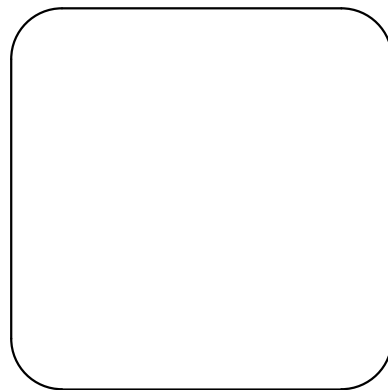
Travel Planner and Organizer is an App for smart phones which facilitates travel arrangements. The first nine App icons have already been designed. In the spaces provided, you have been asked to design **two** of the remaining three icons which should represent the following:

- a. Car Hire;
- b. Bars;
- c. Cinemas.

Notes:

- It is important that the icons that you design, **match the style** of the given icons.
- Draw preparatory sketches in the blank spaces on the smart phone.

(12 marks)



Question 4.

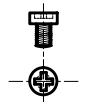
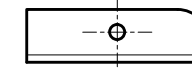
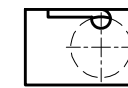
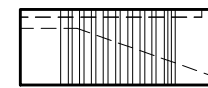
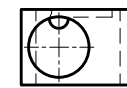
An exploded pictorial view of a pencil sharpener is shown on the right. Orthographic views of the parts that make up the sharpener are given below. The parts consist of the following items:

- The plastic body of the sharpener (item 1);
- The polished steel blade (item 2);
- The screw that holds the blade and the body together (item 3).

In the space provided below:

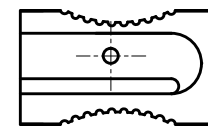
- a. Draw a well proportioned **freehand** isometric sketch of the assembly.
- b. Colour the drawing paying particular attention to the textures of the different materials.

(14 marks)

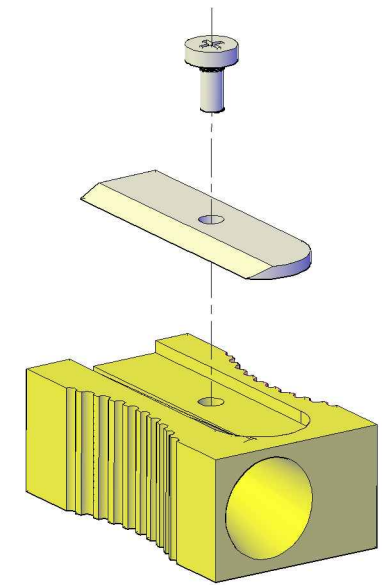
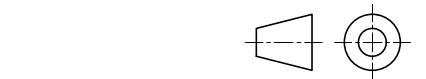


Item 2

Item 3



Item 1



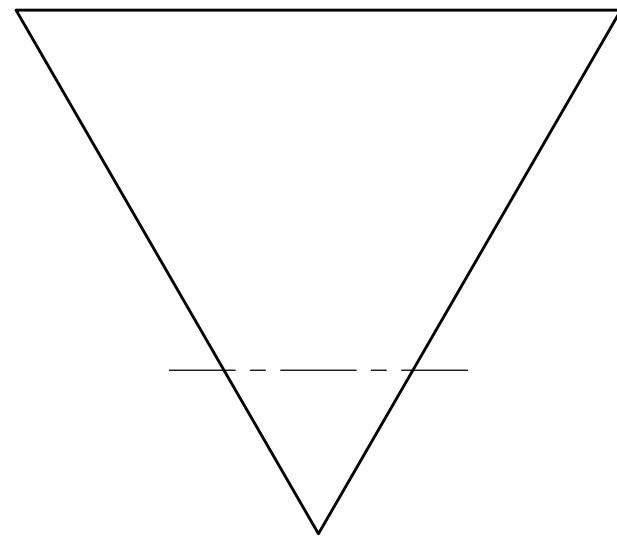
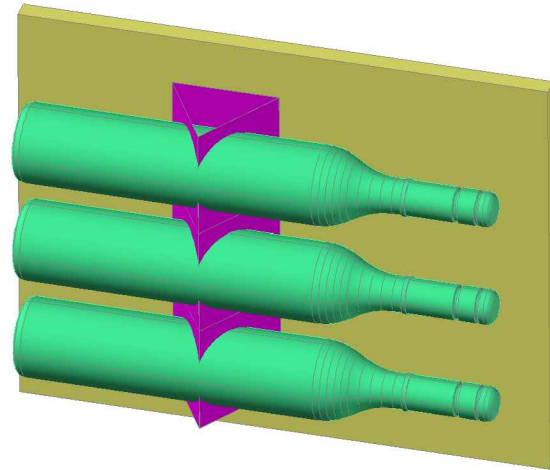
Question 5.

The picture on the right illustrates a wine bottle rack composed of sheet metal bottle holders screwed on to a wooden panel.

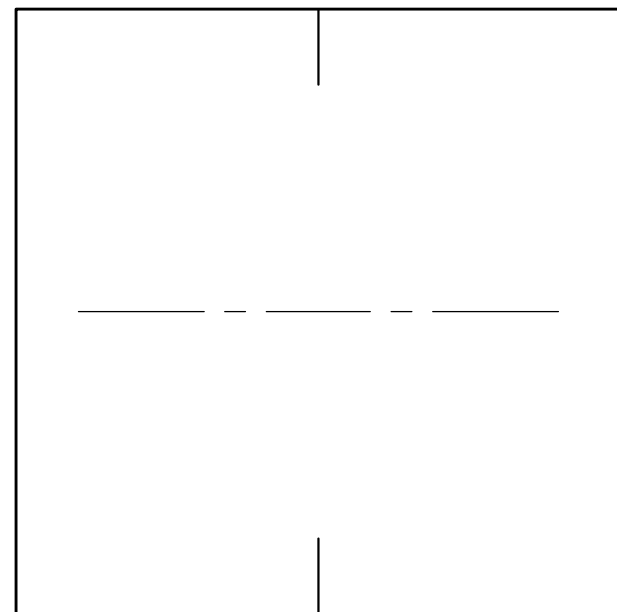
The end view and plan given below show one sheet metal triangular prism which has been intersected by a cylinder to accommodate the bottle.

In the space provided, complete the **Front View** showing clearly the constructions necessary to trace the resulting curves of intersection.

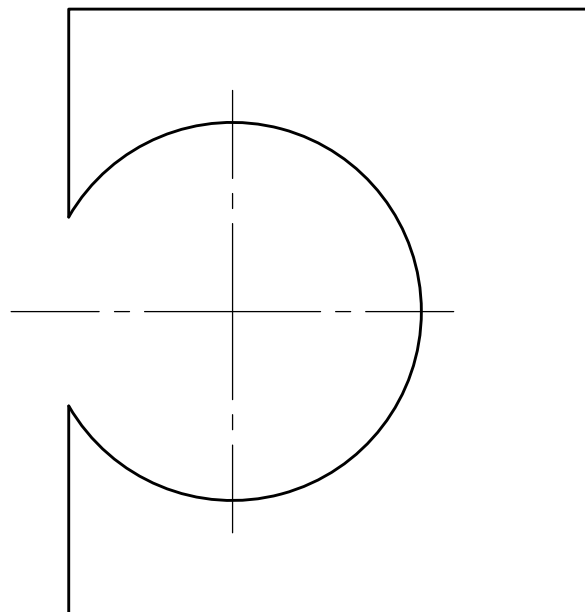
(14 marks)



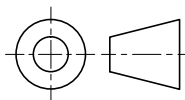
PLAN



FRONT VIEW



END VIEW



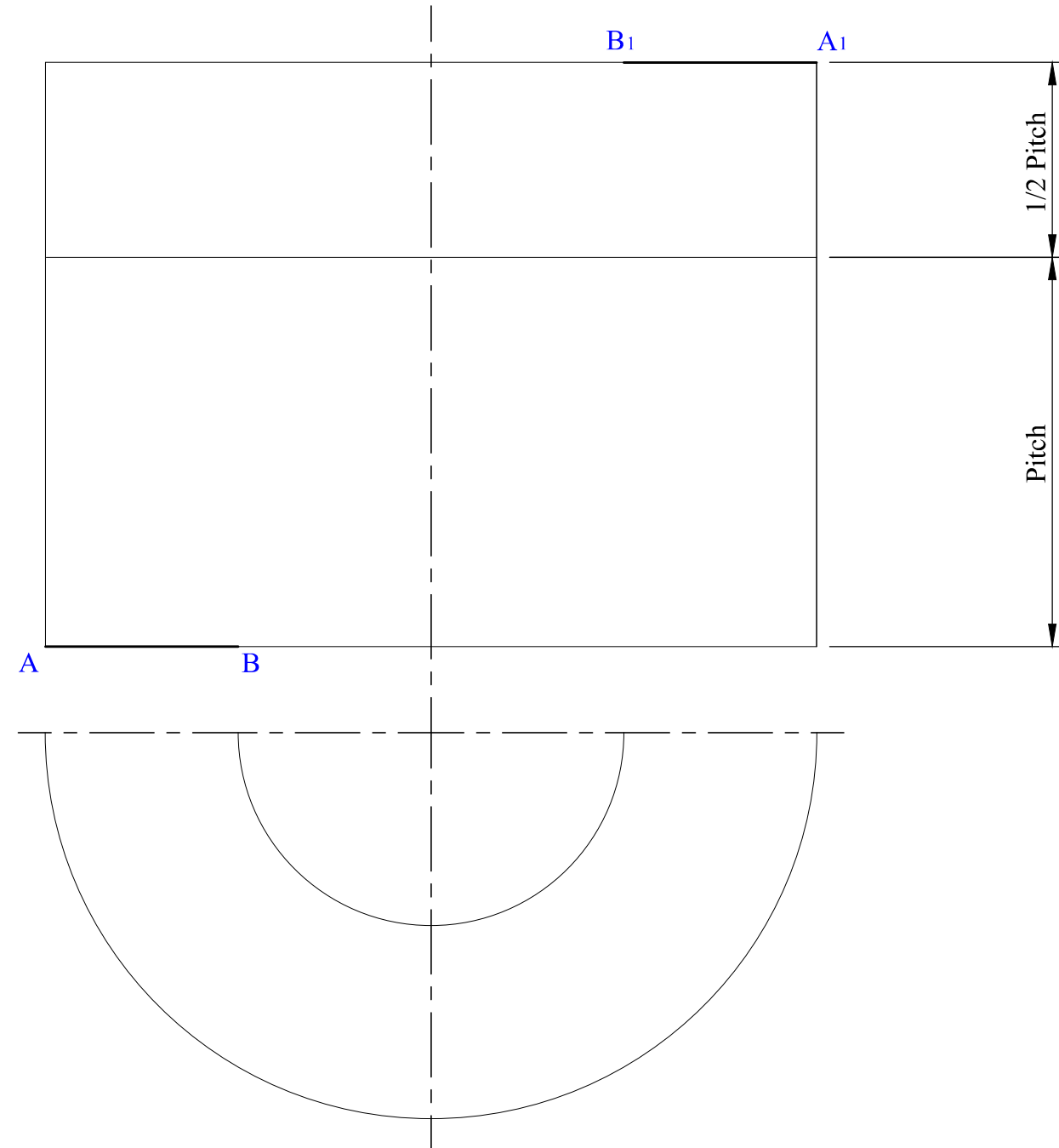
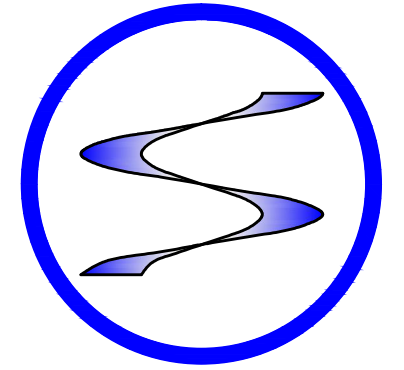
Question 6.

The logo of a company that produces helical blades is shown on the right.

- The 'S' shape of the logo is produced by constructing one-and-a-half ($1\frac{1}{2}$) turns of two right hand helices.
- One helix starts from point A and ends at point A¹.
- The other helix starts from point B and ends at point B¹.
- Both helices have a pitch of 60mm.

On the given start lines, construct the 'S' shape of the logo.

(18 marks)

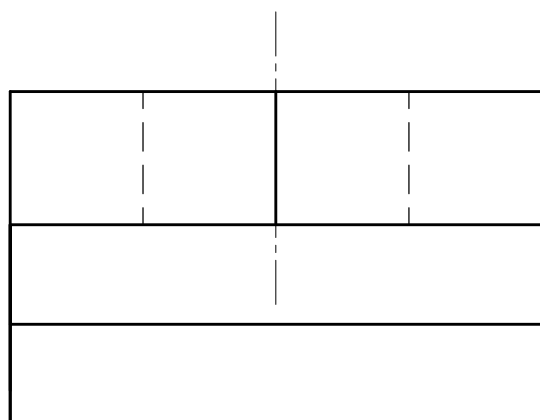
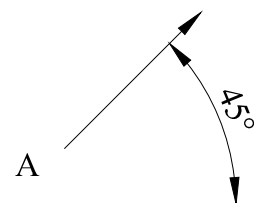
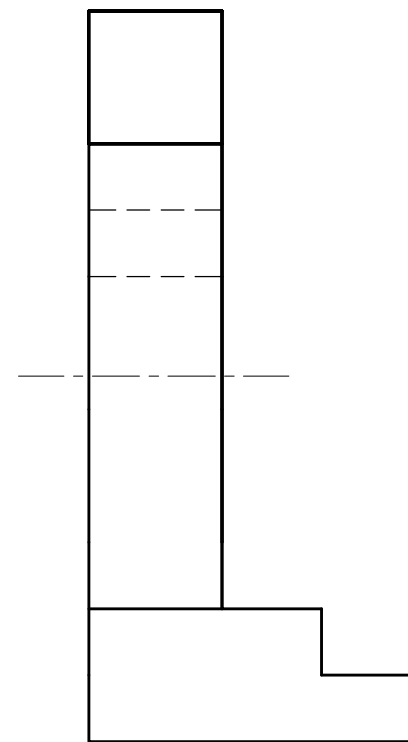
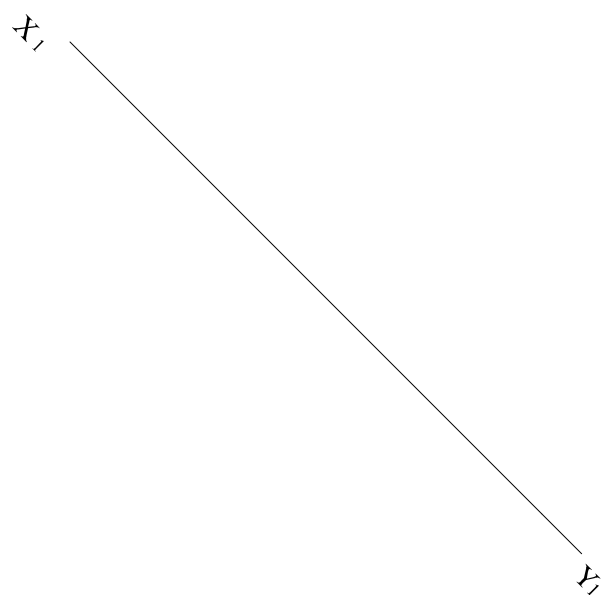
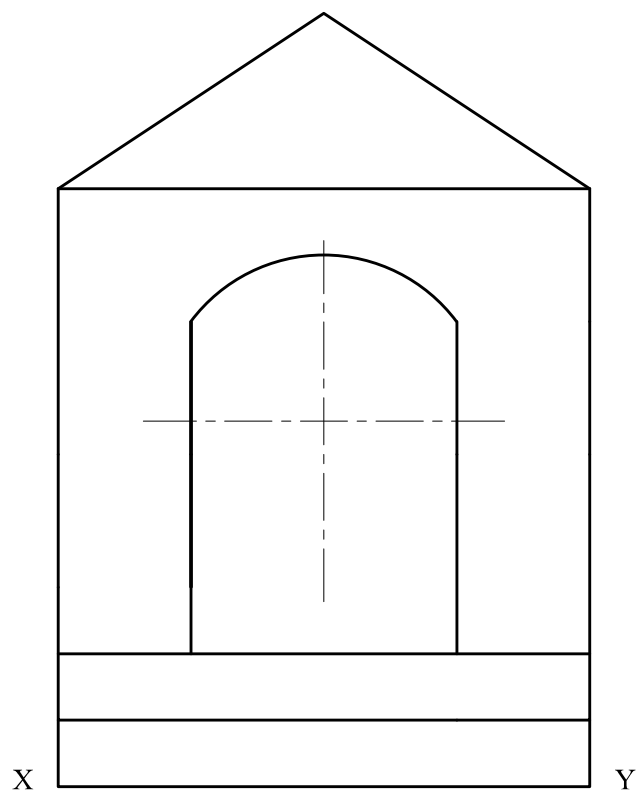


Question 7.

Three orthographic views of an assembled wooden toy gate are given below. In the space provided you are requested to:

- a. Draw a 3D freehand sketch of the toy gate.
- b. Project an Auxiliary view on X1, Y1 as seen from the direction of arrow A.

(18 marks)



3D Freehand sketch of the toy gate

