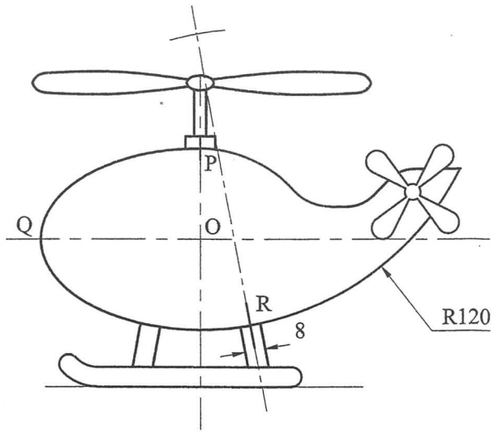
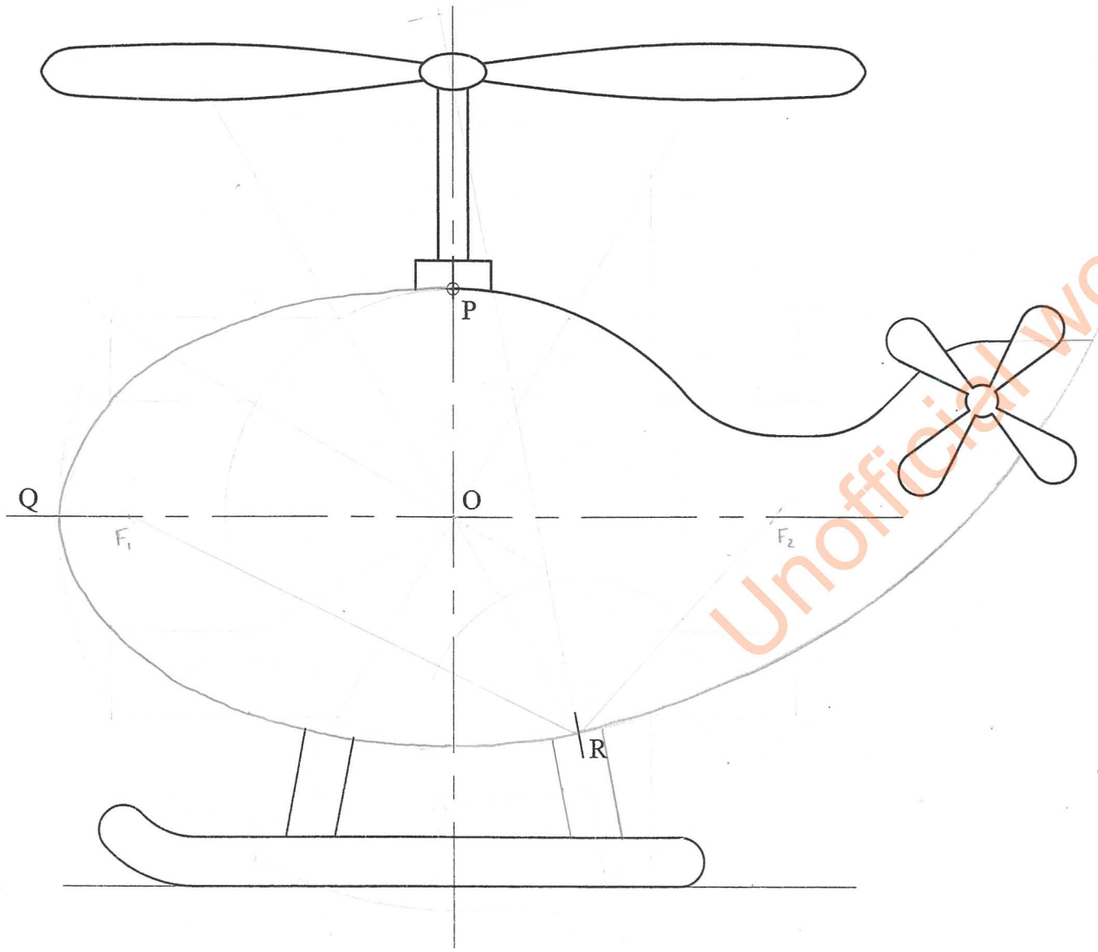
Question 1.

The profile of the helicopter given on the right, consists of a part ellipse P Q R and tangential arcs. Using the start lines given below:

a. construct the part ellipse P Q R using a major axis of 130mm and a half minor axis OP;
b. locate the focal points of the part ellipse;
c. construct a normal at point R to locate the centre line of the bracket of the landing skids;
d. extend upwards the normal drawn in (c) and locate the centre of the arc R120 passing through R;
e. draw the R120 arc and complete the drawing.

(12 marks)





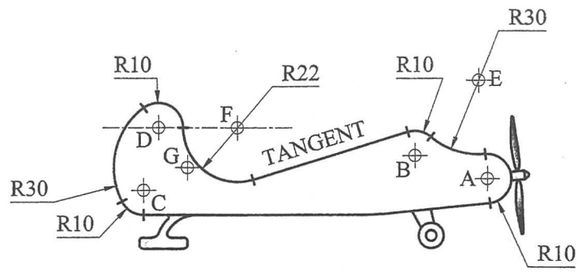
Question 2.

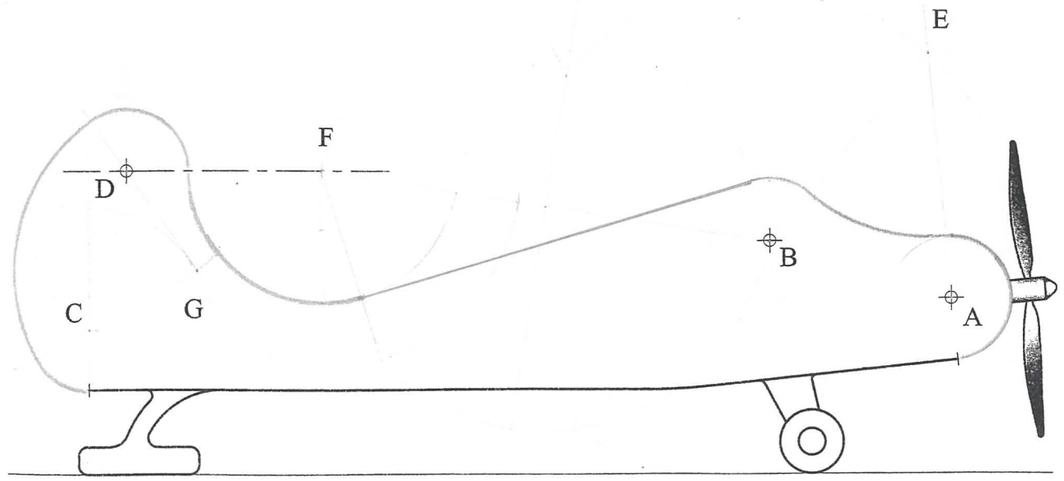
The outline of a model light aircraft is composed of straight lines and arcs. On the given start lines and centre lines, construct the profile of the airplane.

Notes:

- *The arcs having centres A, B, C and D are all R10.*
- *Centres A, B and D are given.*
- *Centre C occurs vertically above the end of the given horizontal line.*
- *The tangent between arc R22, centre F and arc R10, centre B is to be constructed.*
- *Show all constructional work.*

(12 marks)





Question 3.

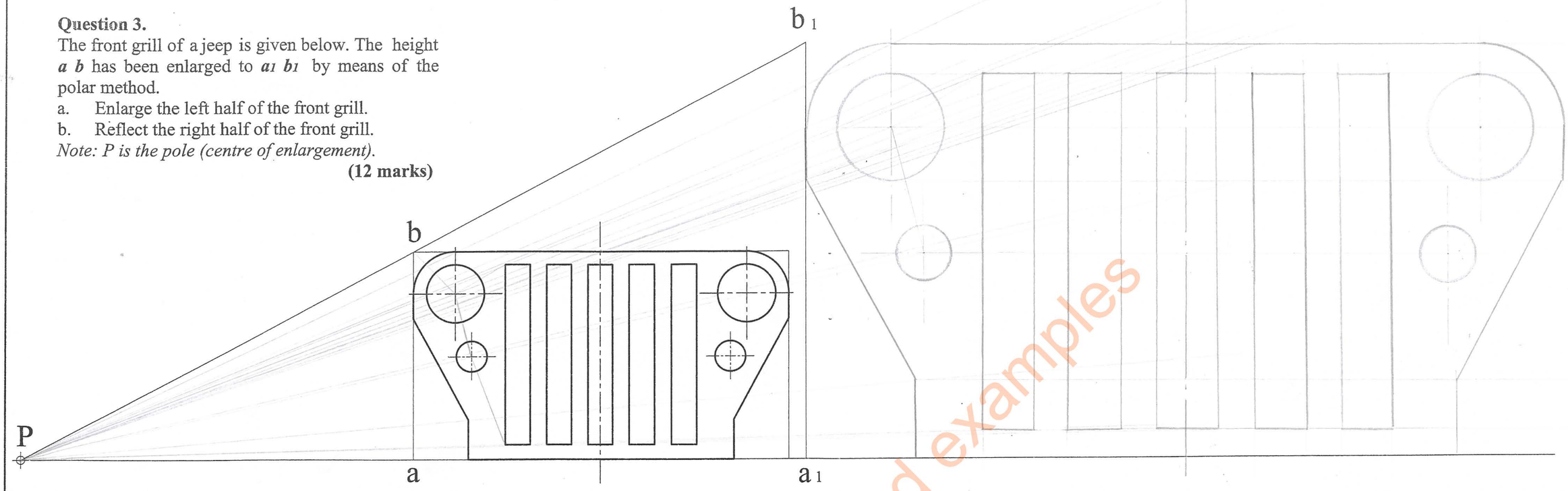
The front grill of a jeep is given below. The height ***a b*** has been enlarged to ***a1 b1*** by means of the polar method.

a. Enlarge the left half of the front grill.

b. Reflect the right half of the front grill.

Note: P is the pole (centre of enlargement).

(12 marks)



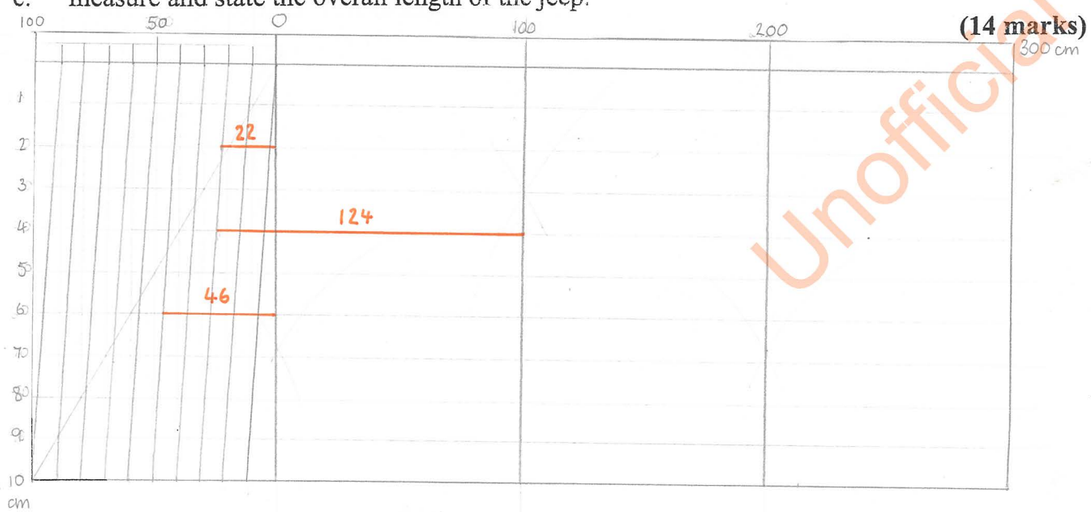
Question 4.

a. In the space provided below, construct a diagonal scale of 1 : 25 to measure up to 4 metres and to show hundredths of a metre (centimetres). Use the scale to:

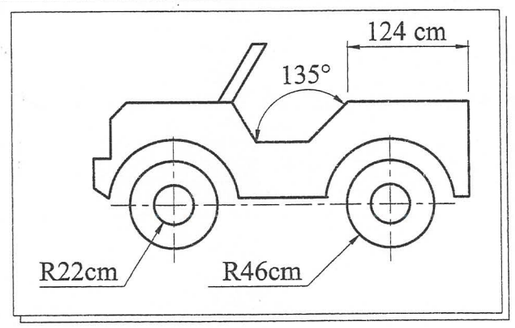
b. complete the drawing of the jeep, using the dimensions given on the right;

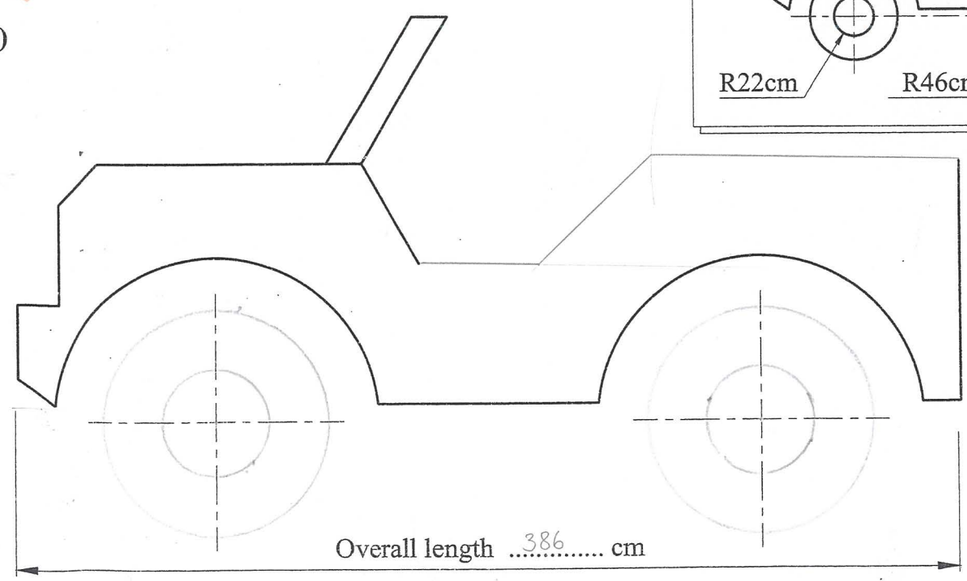
c. measure and state the overall length of the jeep.

(14 marks)



DIAGONAL SCALE SCALE 1 : 25





Overall length ..386..... cm

2

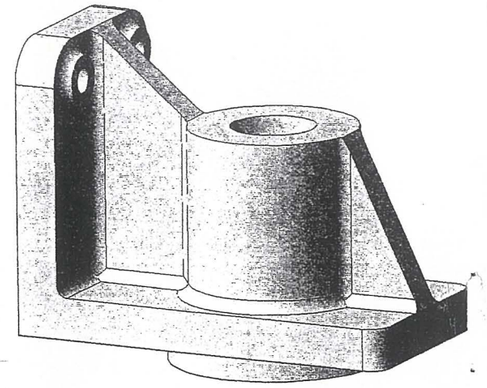
Question 5.

A pictorial view, an end elevation and a plan of a Cast Iron Bracket are given. In the space provided:

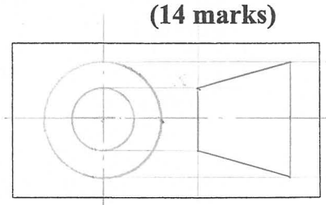
a. project a sectional front elevation on the cutting plane X-X indicated in the plan;
b. draw the symbol of the projection used.

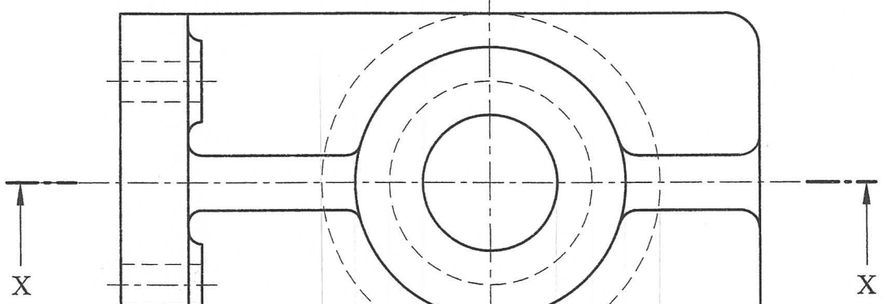
Note: Do not show hidden details.

(14 marks)

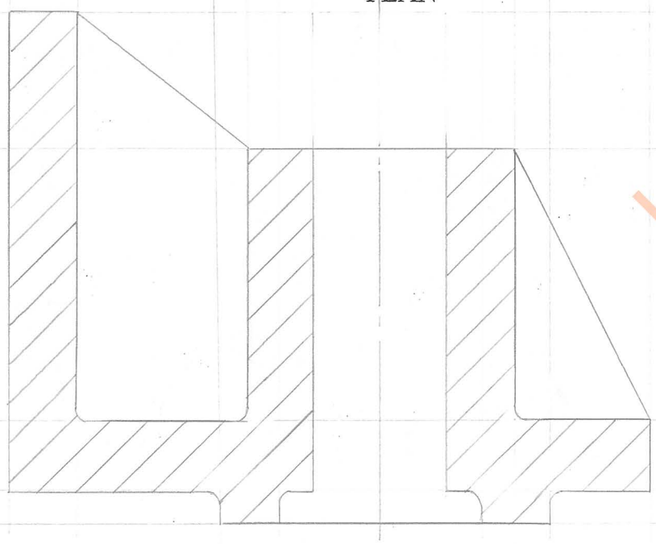


PROJECTION SYMBOL

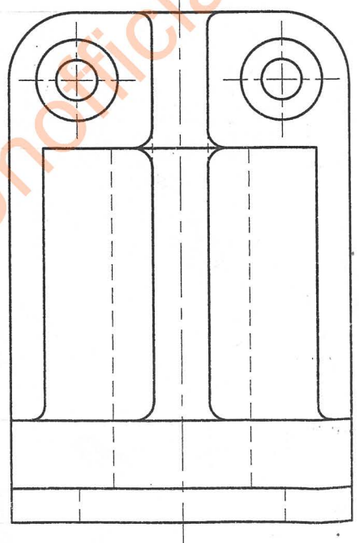




PLAN



SECTIONAL FRONT X-X



END ELEVATION

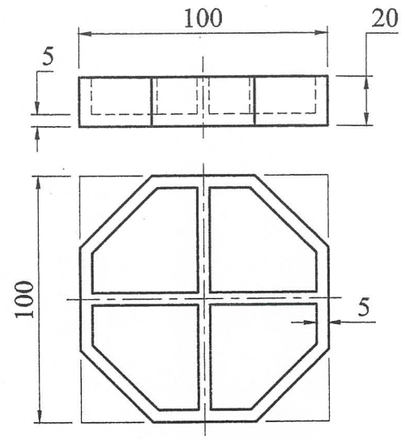
Question 6.

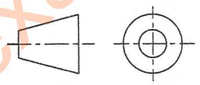
Two orthographic views of an octagonal sewing organiser are given. The box is divided into four compartments. Using the given dimensions and start lines, draw a 60°/30° planometric view of the octagonal box.

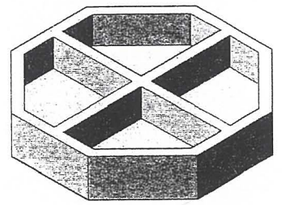
Notes:

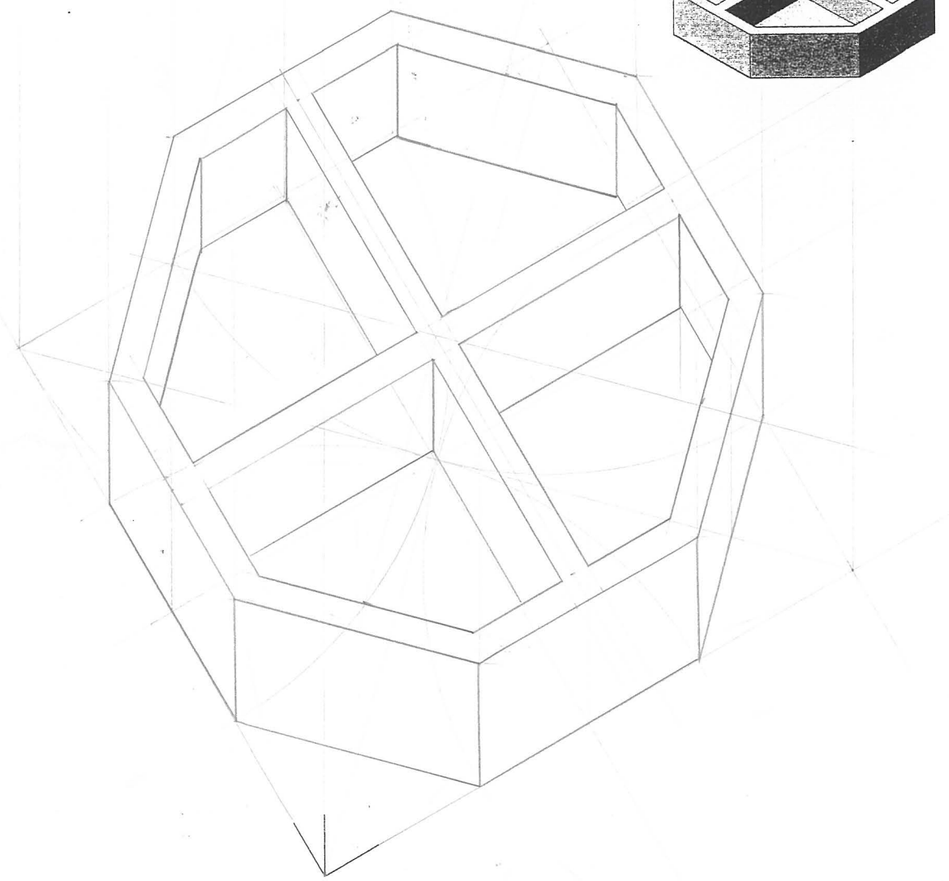
a. Start by drawing the planometric crate.
b. Construct the top octagonal shape, clearly indicating the method used.
c. Complete the octagonal prism and the internal compartments.
d. The material thickness is 5mm throughout.

(18 marks)









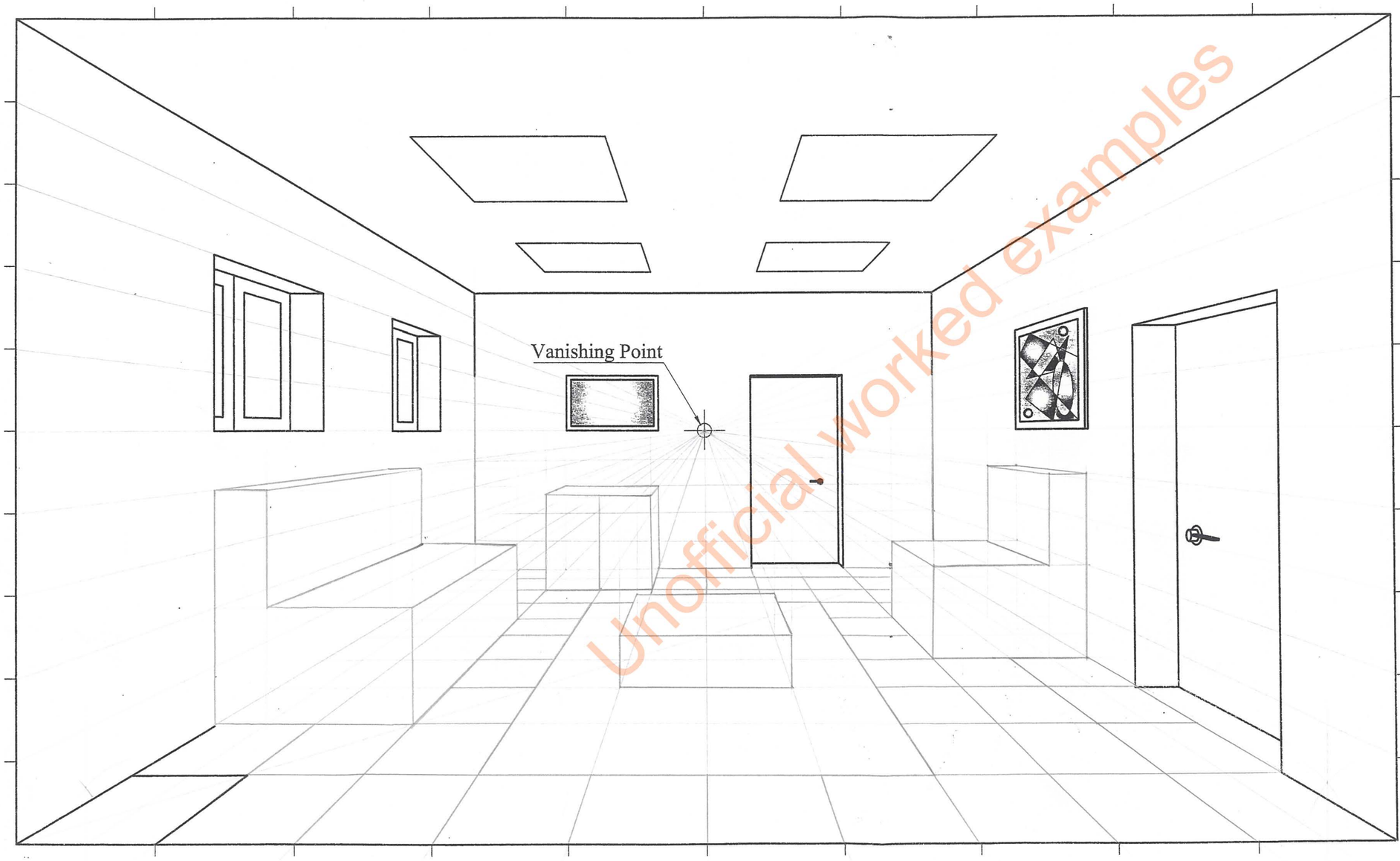
Question 7.

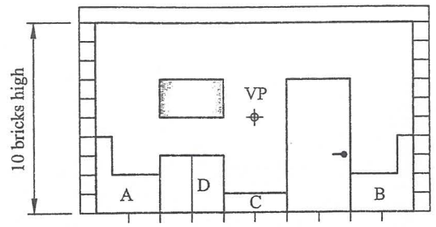
Two orthographic views and an isometric view of a waiting room are given on the right. On the start lines given below, project an estimated **Single-Point Perspective** view of the room.

Notes:

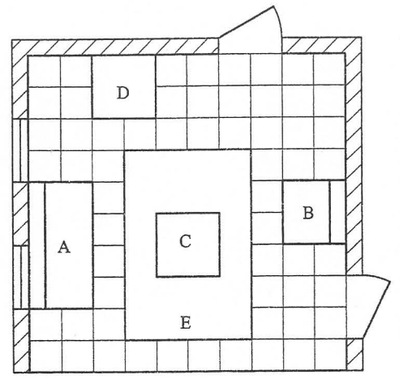
a. *The viewing direction and the vanishing point are indicated.*
b. *A corner tile is given. The other tiles are to be constructed according to the perspective rules.*
c. *The tiles and courses are marked on the picture plane.*
d. *The measurements, the locations of the furniture and the carpet are indicated in the given views.*
e. *Leave all construction lines visible.*

(18marks)

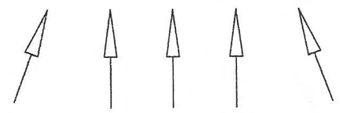




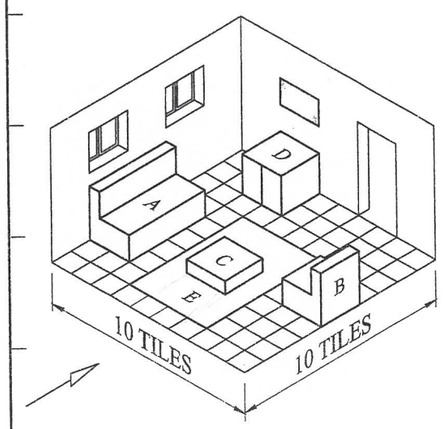
FRONT VIEW



PLAN



VIEWING DIRECTION



ISOMETRIC VIEW

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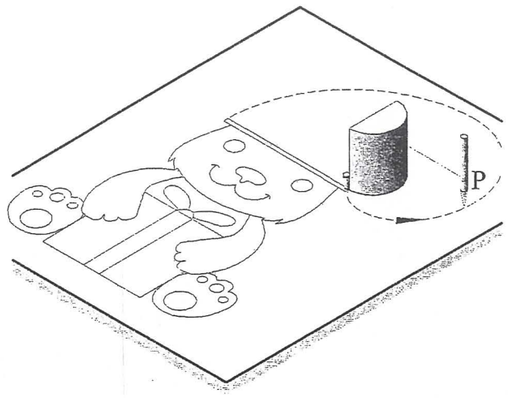
Question 1.

The drawing of a soft toy is shown on the right. The hood has the shape of an involute. It is produced by a pencil attached to the end P of a taut string, as this is unwound anticlockwise from a fixed semi-cyclinder. The string is as long as the perimeter of the semi-cylinder.

On the start lines given below, draw the hood by constructing geometrically the locus of the end point P of the string.

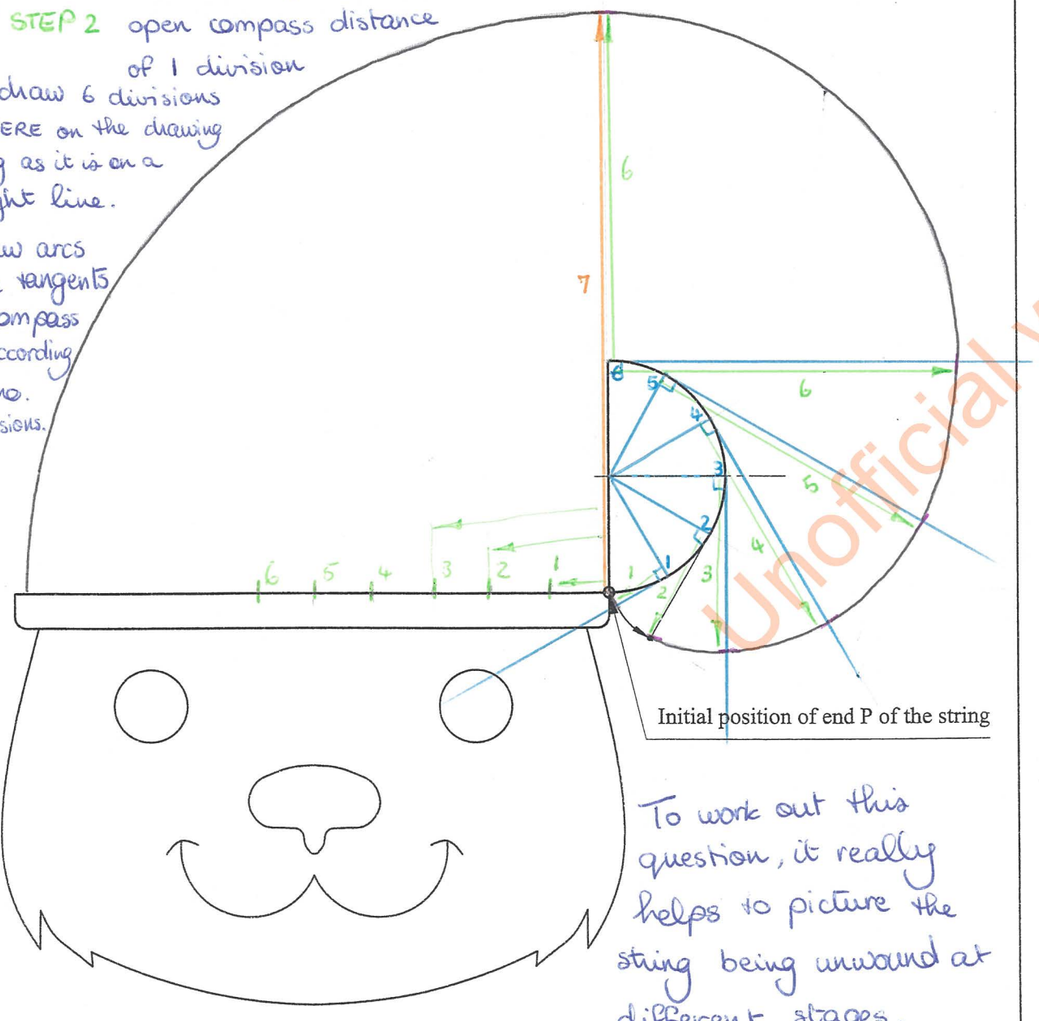
(10 marks)



STEP 1 divide semi-circle into 6. draw a tangent from each point.

STEP 2 open compass distance of 1 division and draw 6 divisions ANYWHERE on the drawing as big as it is on a straight line.

draw arcs on the tangents with compass open according to the no. of divisions.



Initial position of end P of the string

To work out this question, it really helps to picture the string being unwound at different stages.

Question 2.

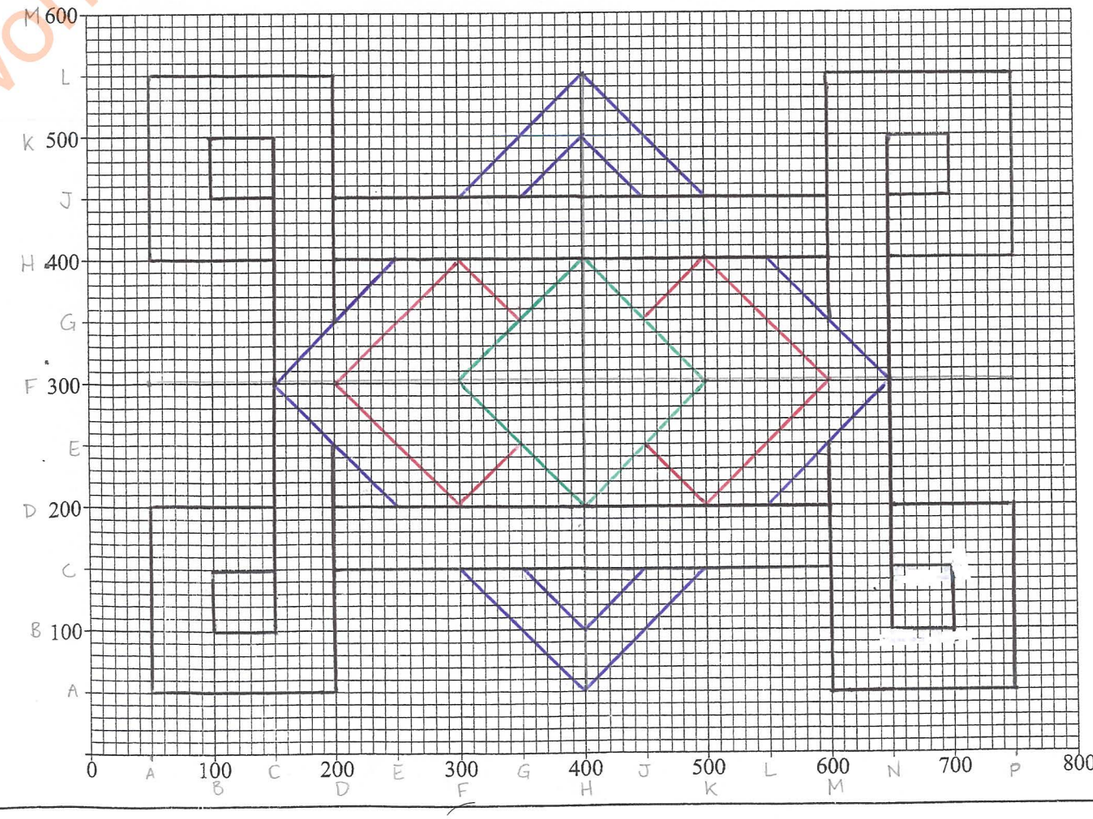
The following computer programme is written to create a symbol for a geometric logo.

```
DATA:    A = 50; B = 100; C = 150; D = 200; E = 250; F = 300; G = 350; H = 400; J=450; K=500; L=550; M = 600;
         N = 650; P = 750:
ACI 253: MOVE H,L; DRAW H,A:  MOVE A,F; DRAW P,F:
ACI 7:   MOVE C,F; DRAW C,K; DRAW B,K; DRAW B,J; DRAW C,J:
ACI 7:   MOVE D,G; DRAW D,L; DRAW A,L; DRAW A,H; DRAW C,H:
ACI 7:   MOVE D,J; DRAW H,J:
ACI 7:   MOVE D,H; DRAW H,H:
ACI 5:   MOVE C,F; DRAW E,H:  MOVE F,J; DRAW H,L:  MOVE G,J; DRAW H,K:
ACI 1:   MOVE D,F; DRAW F,H; DRAW G,G:
ACI 3:   MOVE F,F; DRAW H,H:
         MIRROR the plotted design, using the vertical grey line as the mirror line (line of symmetry).
         MIRROR the resulting design, using the horizontal grey 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
GREY	253

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 3.

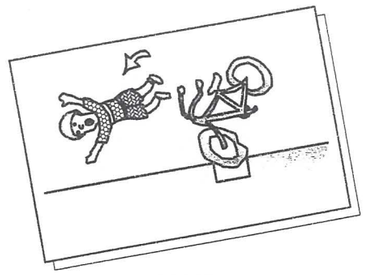
The drawings on the right illustrate how a cartoon drawing of a cyclist (who fell off the bicycle after cycling over a drainage grate), was converted into a hazard warning sign. The human figure, the bicycle and the grate were transformed into a pictogram.

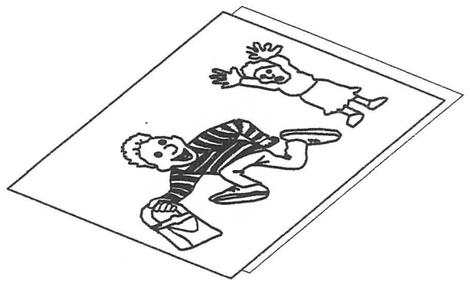
The cartoon below represents the case of a woman who is robbed by a handbag snatcher.

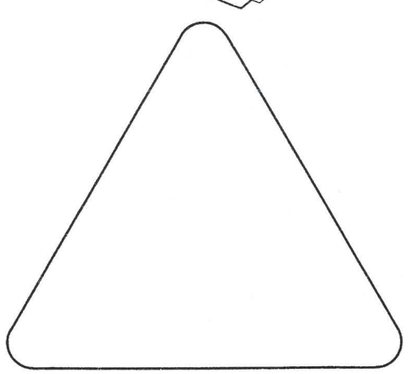
Convert the cartoon into a pictogram that serves to warn the pedestrians to be extra careful and watch out for handbag snatchers.

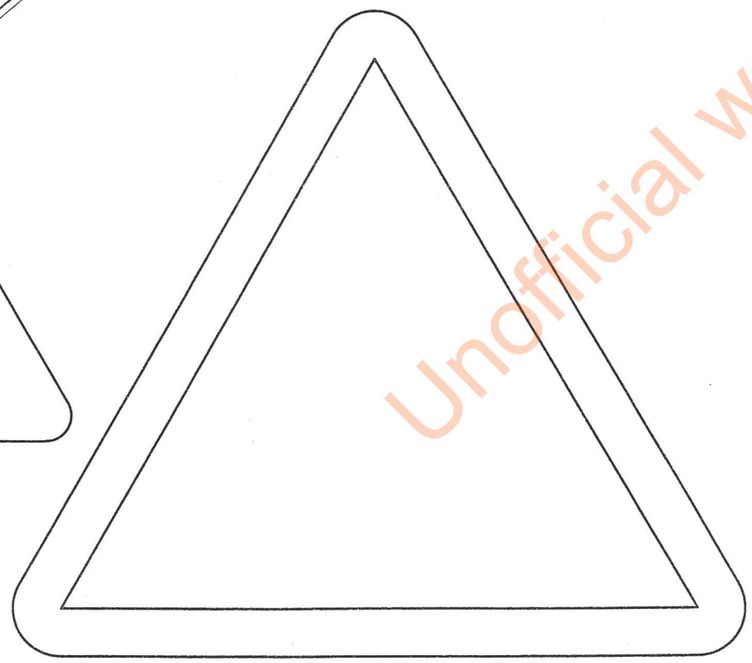
a. Make a preparatory design in the smaller triangle provided.
b. Produce a final pictogram in the larger triangular frame.
c. Colour the final sign as per approved recognized standards.

(12 marks)









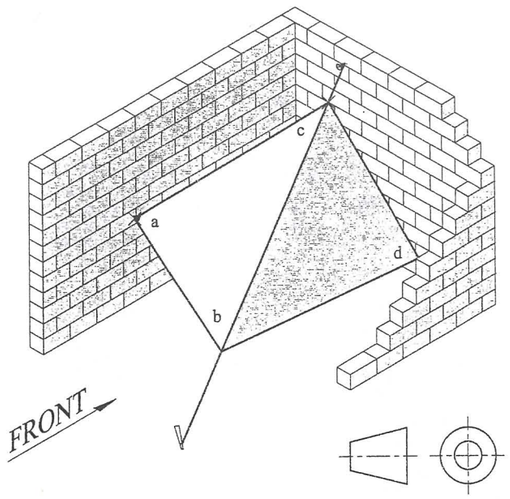
Question 4.

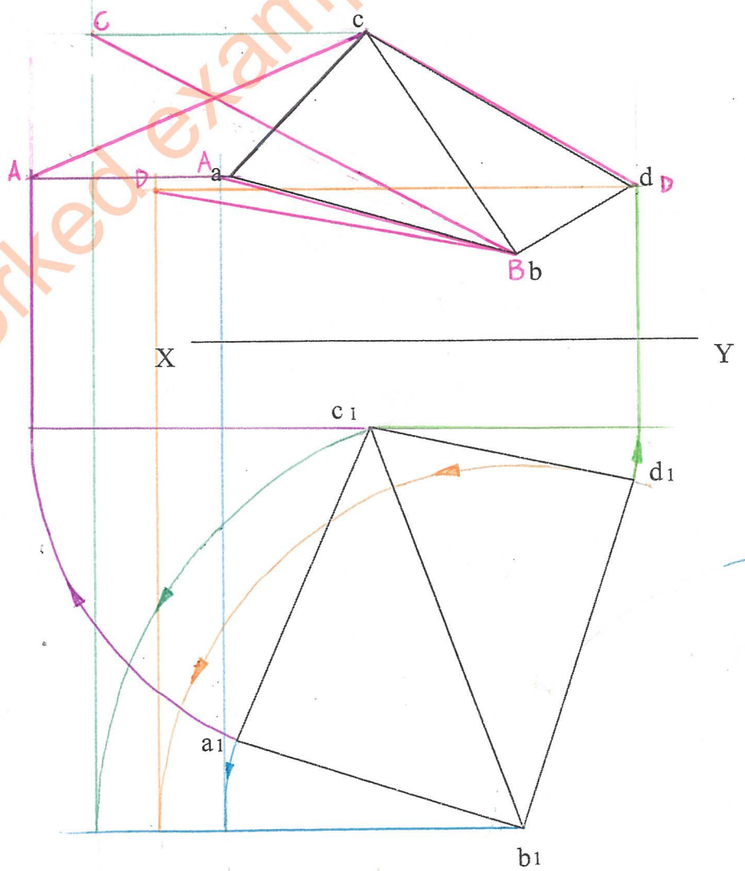
The pictorial drawing shows a sun canopy ABCD. It is erected by a builder to protect himself from the scorching sun. The canopy is attached to brick walls at corners A and D. Corners B and C are attached to a rope which is secured to the ground at one end and to another brick wall at the other.

Two views of the arrangement are given below.

a. Find by construction, the true lengths of the lines AB, BC, AC, CD and BD.
b. Construct the true shape of the canopy.

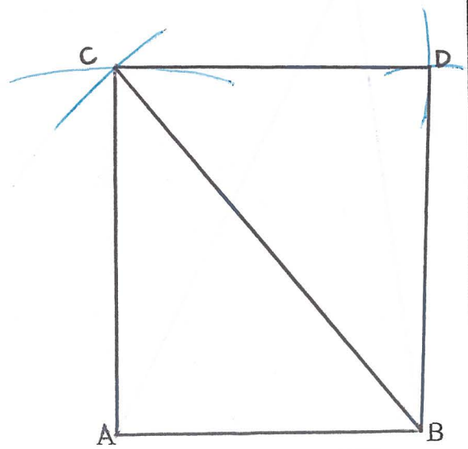
(16 marks)





True length AB = ...50....mm
True length BC = ...78....mm
True length AC = ...60....mm
True length CD = ...51....mm
True length BD = ...60....mm

Focus on one line at a time. Use the list above to guide you.



TRUE SHAPE OF CANOPY

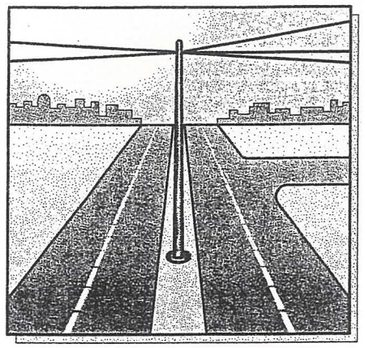
Question 5.

A pole P is used to distribute electrical power across a main road and its side streets. Five electrical cables connect to the pole, and act in the same horizontal plane. The given space diagram represents a state of equilibrium. The space diagram describes completely the forces in three of the cables, and the lines of action of the other two.

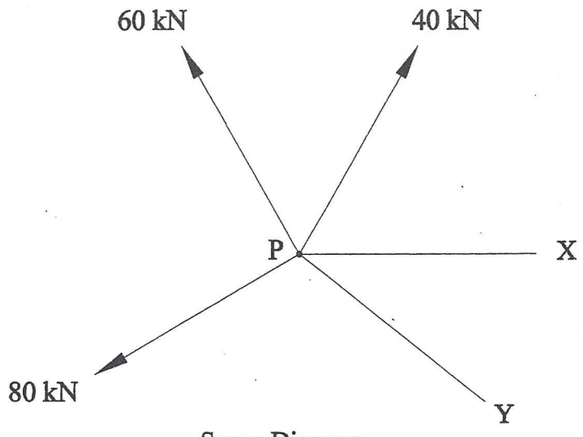
a. Using a scale of 10mm representing 10kN, construct a corresponding vector diagram.

b. From your vector diagram read off the magnitude of the forces in the other two cables X and Y. Record the magnitude rounded to the nearest kN. Indicate on your diagram the direction of the two unknown forces.

(14 marks)

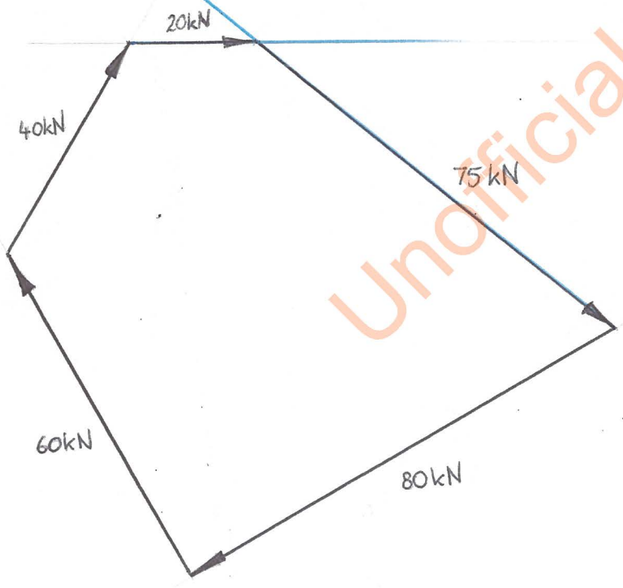


Pictorial Diagram



Space Diagram

Vector Diagram



Force in cable X .....20.....kN

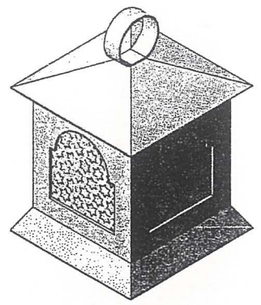
Force in cable Y .....75.....kN

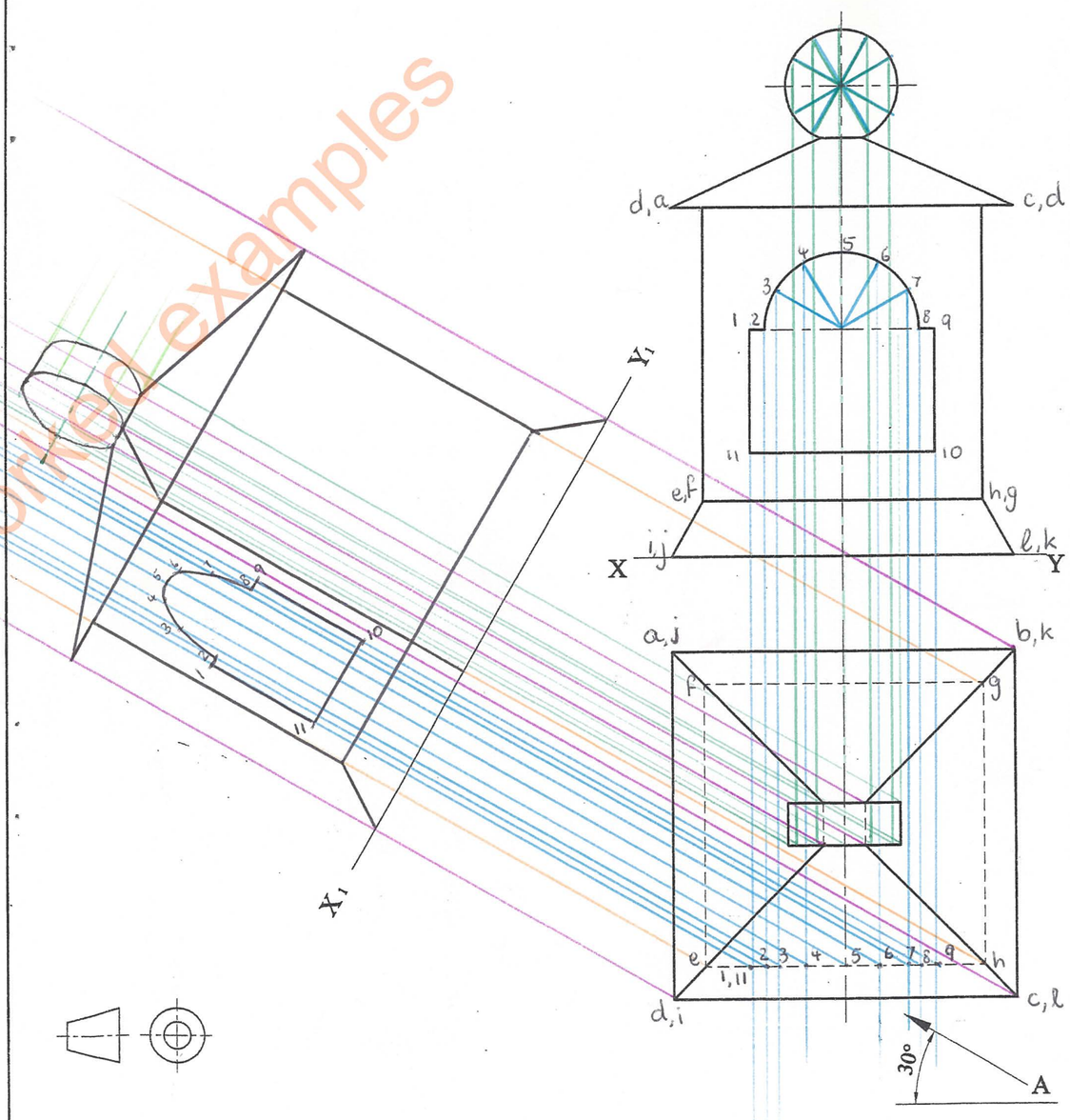
Question 6.

The given views describe a model lantern made from cardboard. The four vertical faces of the lantern are identical in their size and design.

Draw an auxiliary elevation of the lantern by looking on the plan in the direction of arrow A. *Hidden detail is not required.*

(18 marks)





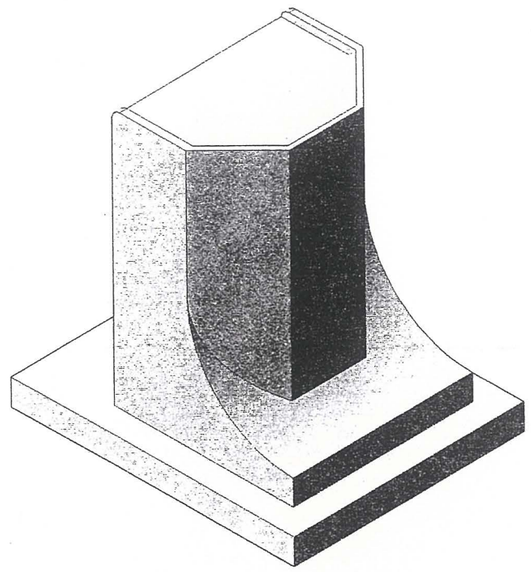
Question 7.

The pictorial view on the right shows a podium. The podium consists essentially of a part octagonal prism intersecting a curved plane surface. The given orthographic drawing shows two complete views and an incomplete front elevation.

a. Complete the front elevation by constructing geometrically the curves and line of intersection.

b. Draw the surface development of the panels marked A,B and C.

(18 marks)



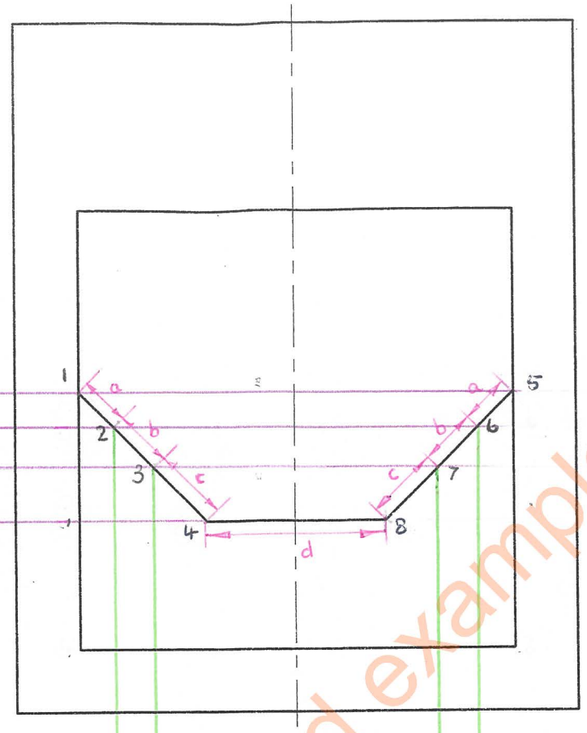
STEP 1

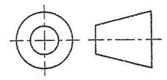
STEP 2

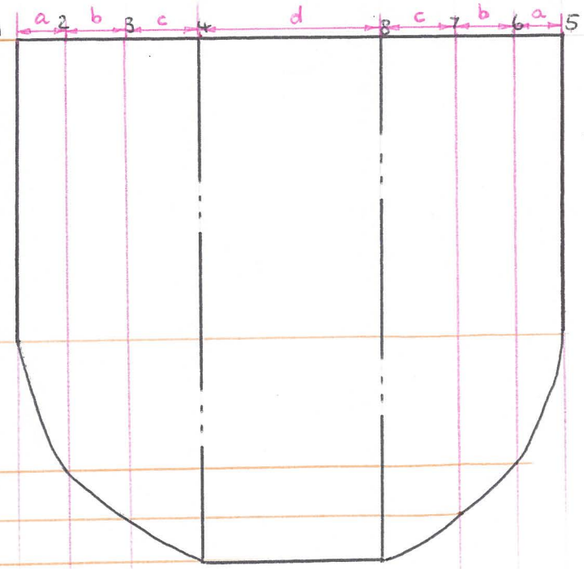
STEP 3

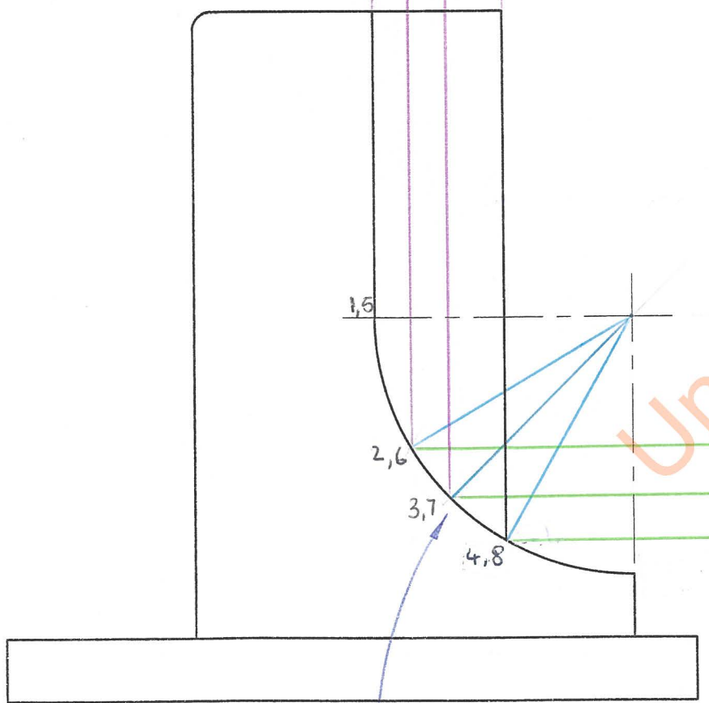
STEP 4

STEP 5

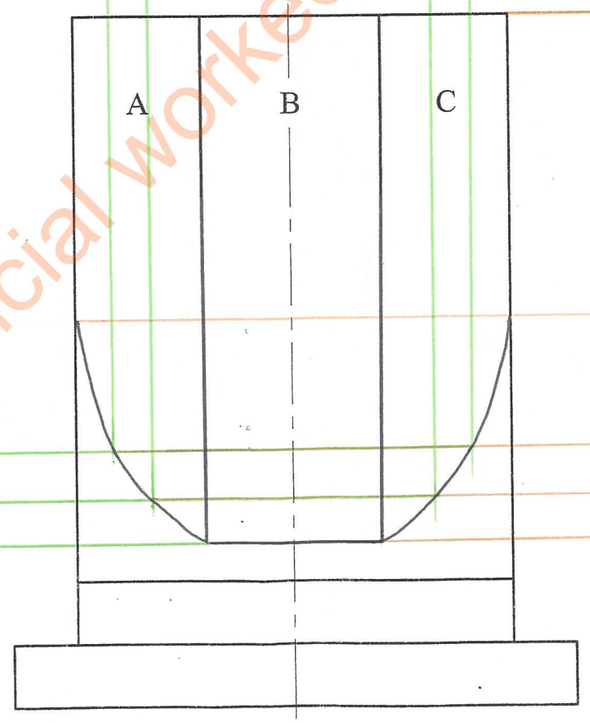








take an extra point at a 45° angle so that you have 4 points to form the curve.



SURFACE DEVELOPMENT OF PANELS A, B and C