

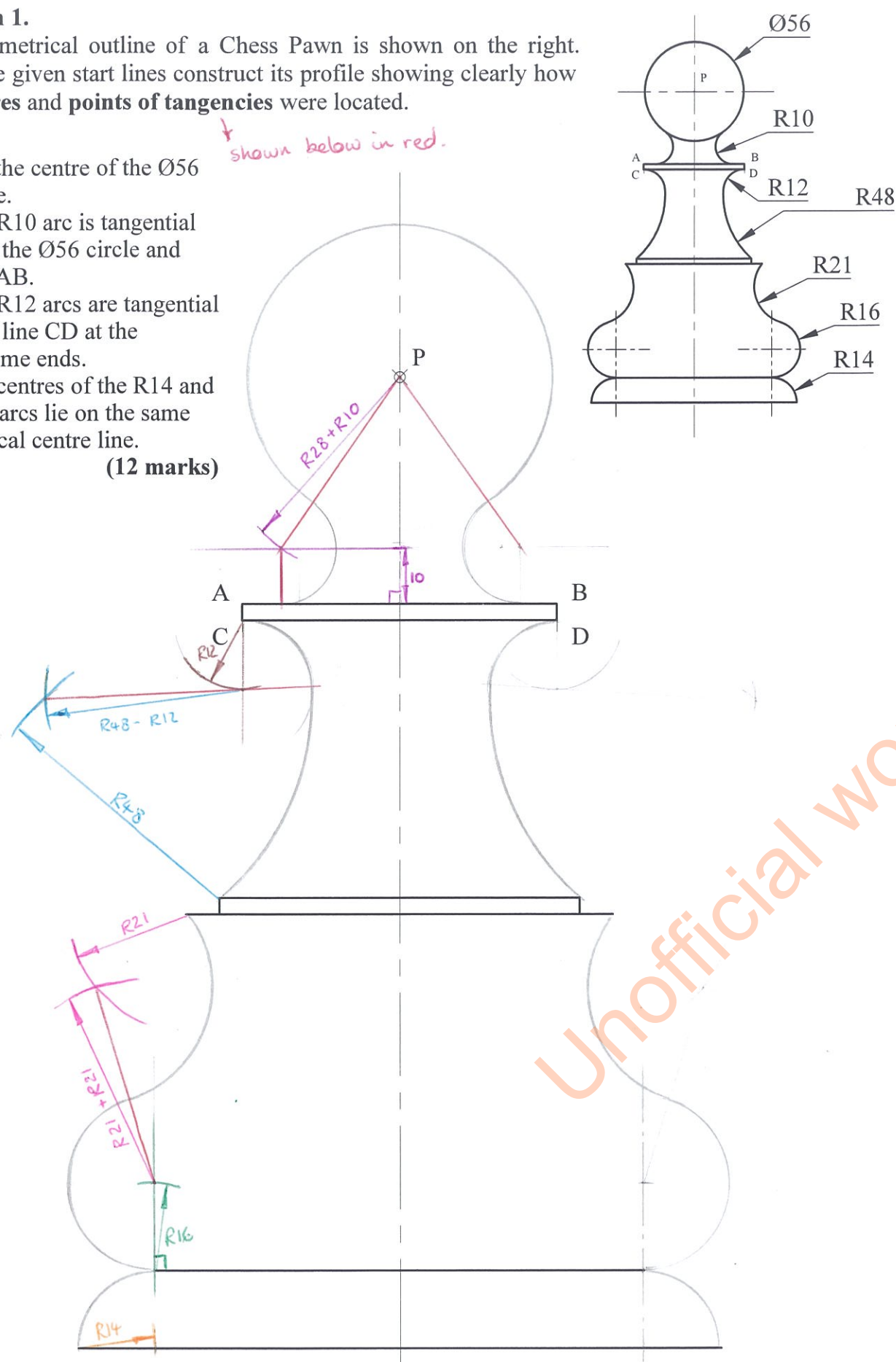
Question 1.

The symmetrical outline of a Chess Pawn is shown on the right. Using the given start lines construct its profile showing clearly how the **centres** and **points of tangencies** were located.

Notes:

- P is the centre of the $\varnothing 56$ circle.
- The R10 arc is tangential with the $\varnothing 56$ circle and line AB.
- The R12 arcs are tangential with line CD at the extreme ends.
- The centres of the R14 and R16 arcs lie on the same vertical centre line.

(12 marks)

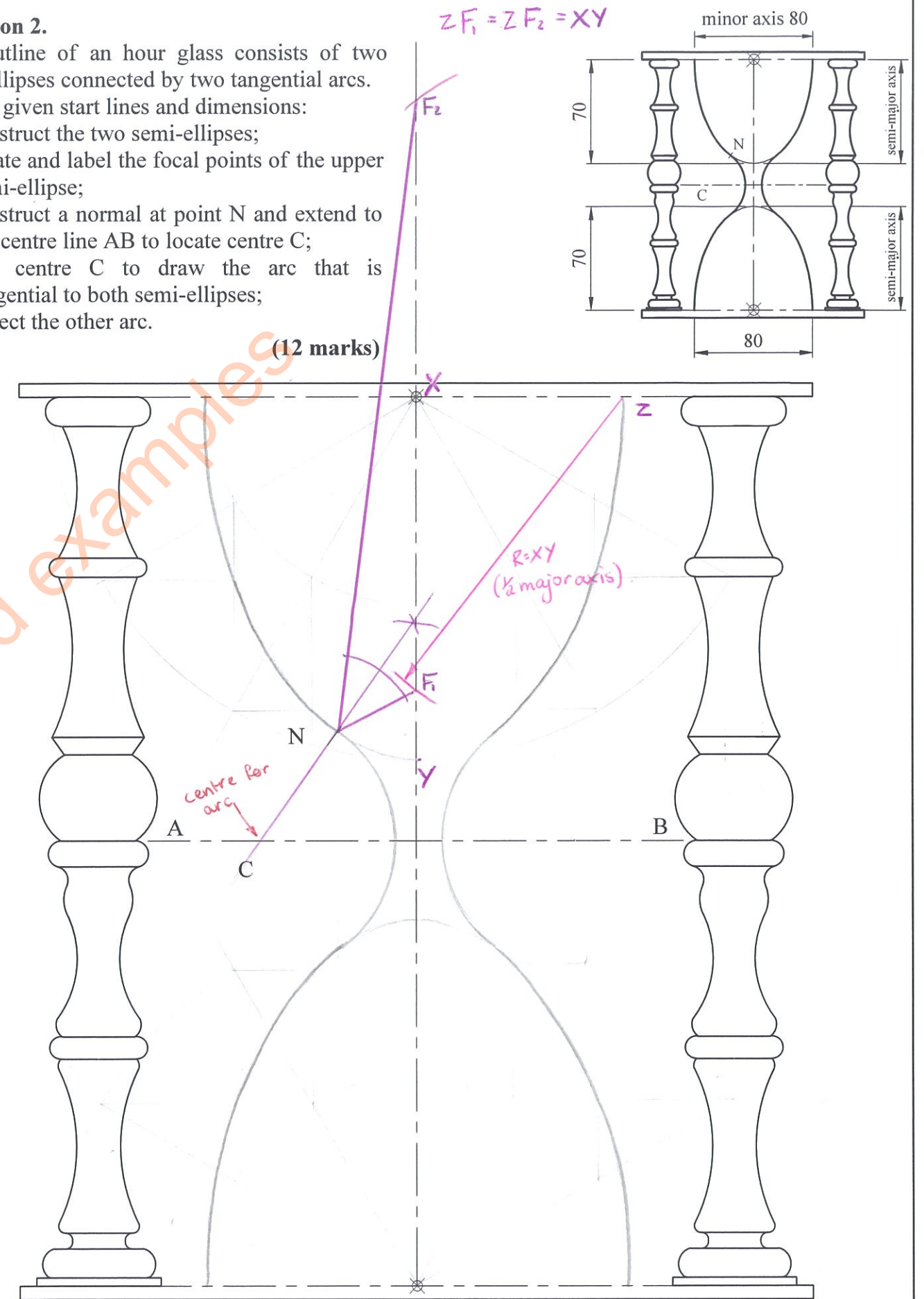


Question 2.

The outline of an hour glass consists of two semi-ellipses connected by two tangential arcs. On the given start lines and dimensions:

- construct the two semi-ellipses;
- locate and label the focal points of the upper semi-ellipse;
- construct a normal at point N and extend to the centre line AB to locate centre C;
- use centre C to draw the arc that is tangential to both semi-ellipses;
- reflect the other arc.

(12 marks)



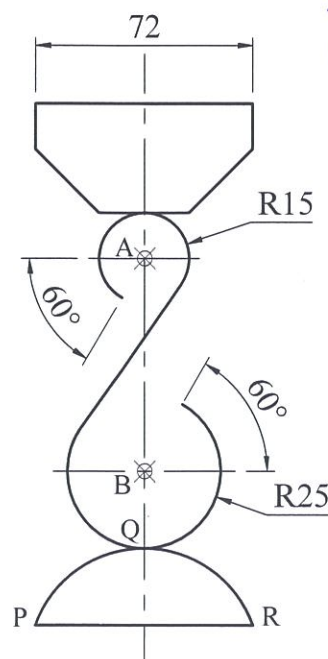
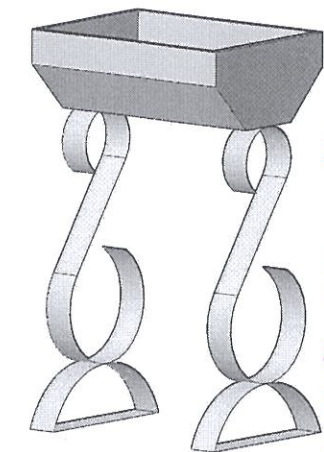
Question 3.

An elevation and an illustration of a wrought iron flower pot are shown below. Use the given start lines to construct **geometrically** the profile of the decorative ironwork.

Notes:

- A and B are the centres of R15 and R25 arcs respectively.
- The internal tangent between the two circles and the radius of arc PQR are to be found by construction.
- The flower pot has a semi-octagonal profile which has to be constructed.

(14 marks)



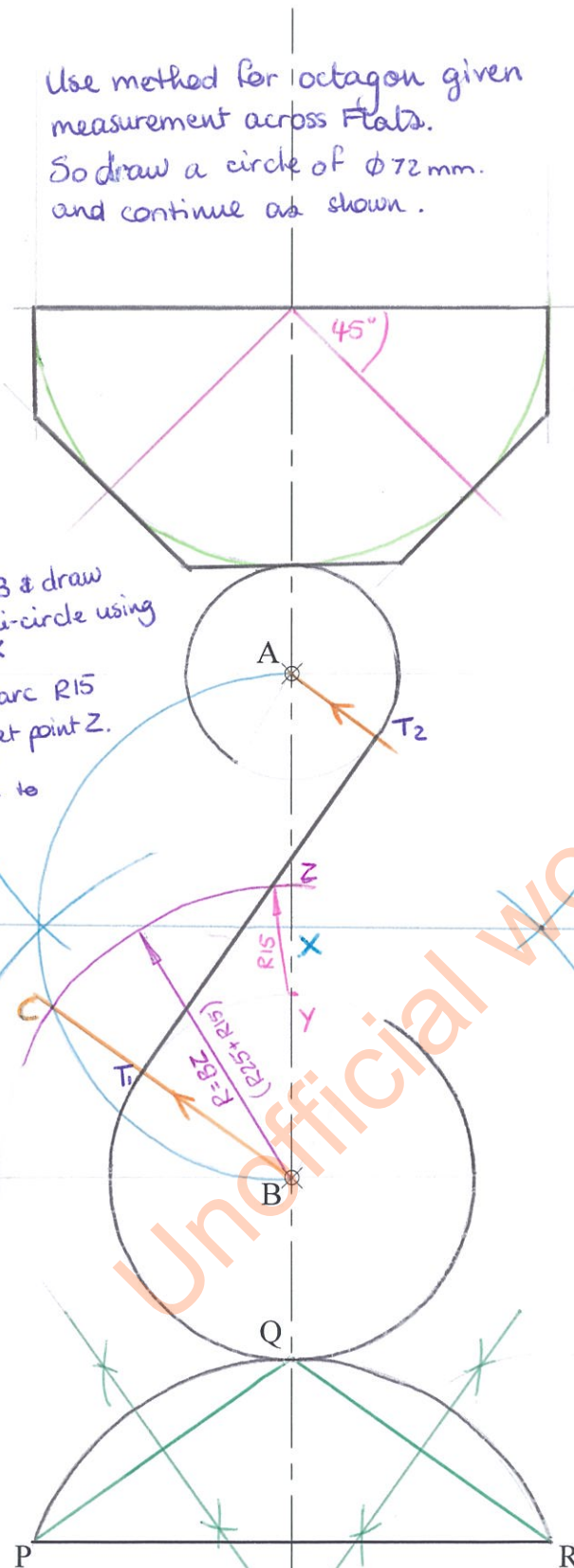
STEP 1: Bisect AB & draw the semi-circle using centre X

STEP 2: Draw arc R15 from point Y to get point Z.

STEP 3: Draw arc to get point C

STEP 4: Draw line from B to C to find the tangential point T

Use method for octagon given measurement across flats.
So draw a circle of $\phi 72\text{mm}$. and continue as shown.



Bisect PQ and QR to find centre U
centre for arc PQR

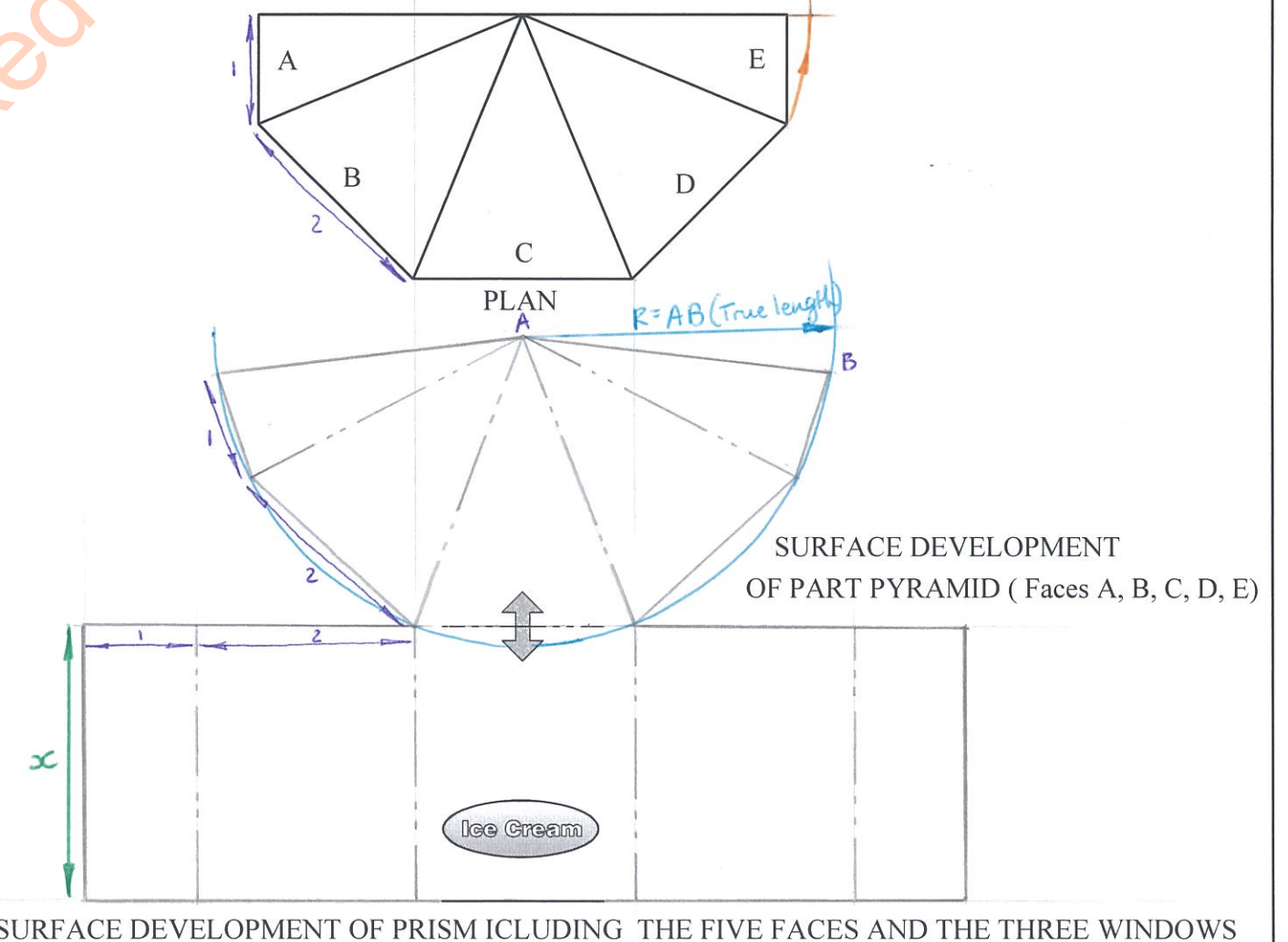
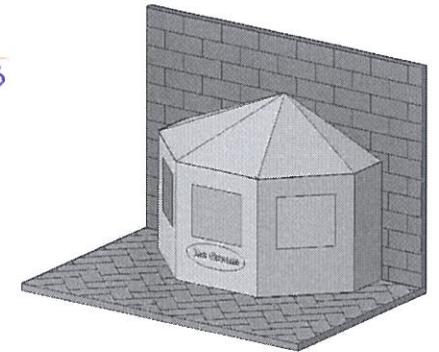
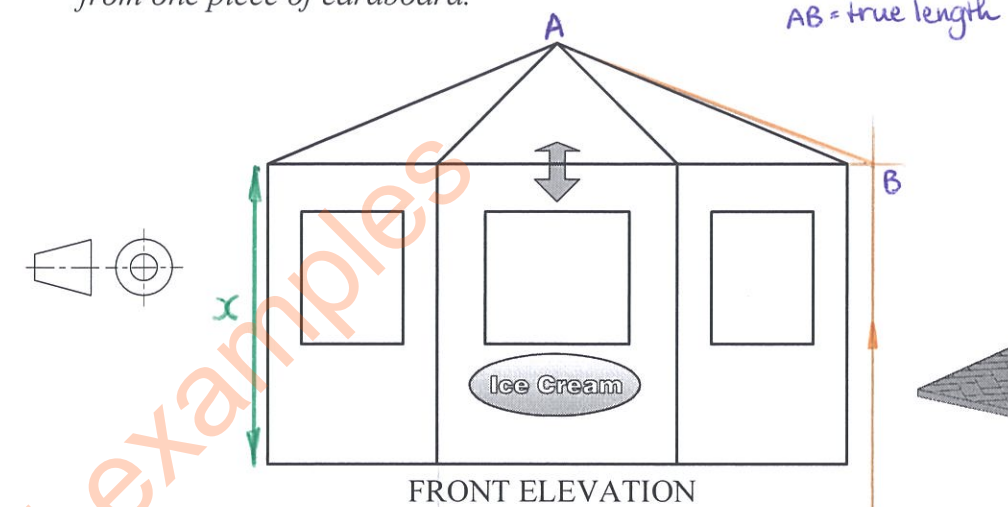
Question 4.

A cardboard model of an Ice-Cream Kiosk has a shape of a semi-octagonal combined prism and pyramid. An illustration and two orthographic views are given. Using the given start lines, construct the surface developments of the **prismatic** and the **pyramidal** parts of the kiosk.

Notes:

- Do not include the base and the back in your development.
- The two developments are to be joined where indicated by the arrows in order to be cut from one piece of cardboard.

(14 marks)



SURFACE DEVELOPMENT OF PRISM INCLUDING THE FIVE FACES AND THE THREE WINDOWS

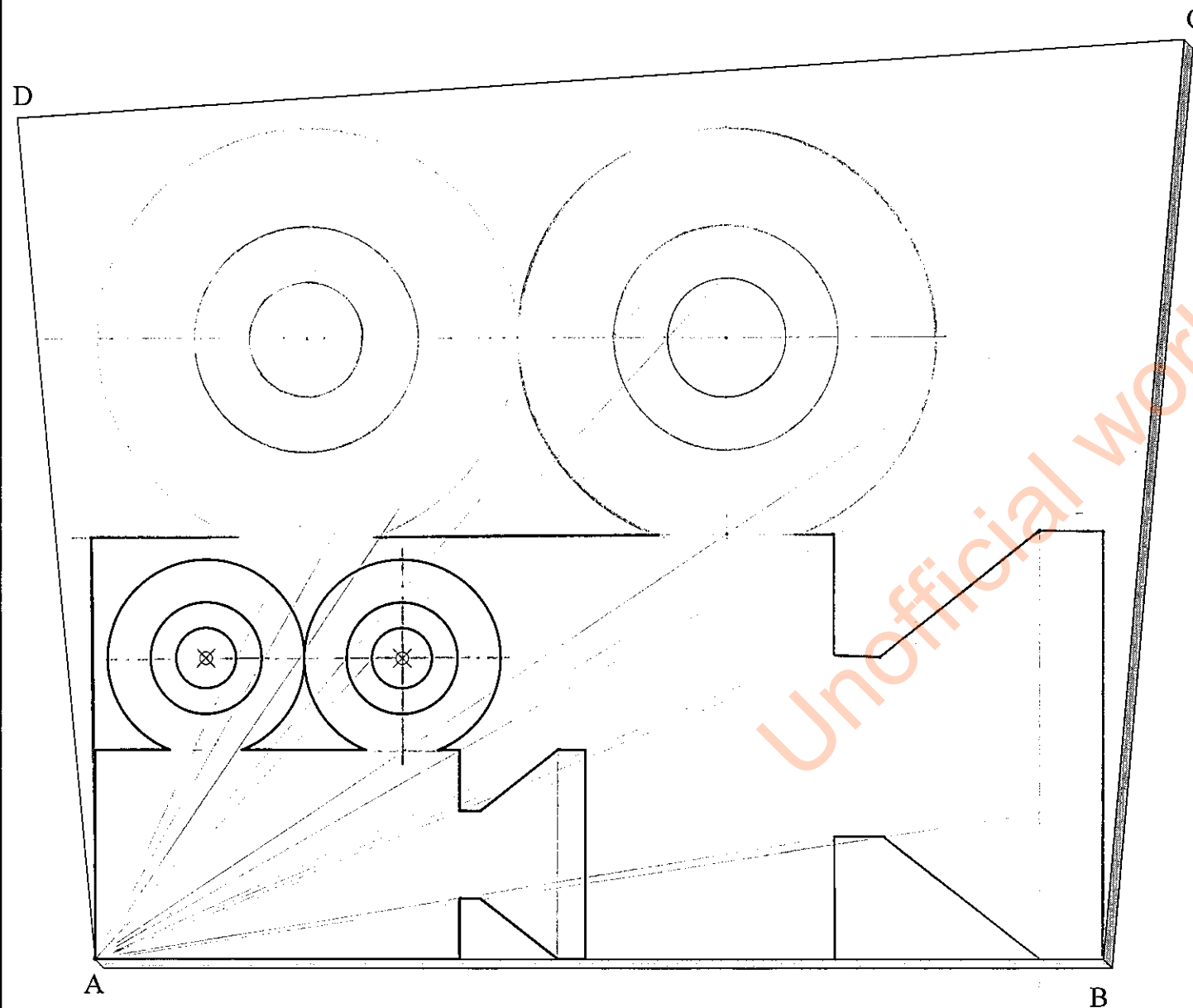
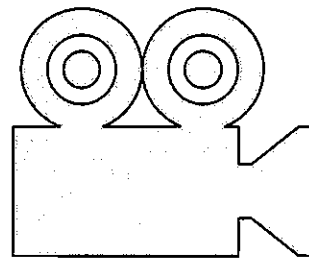
Question 5.

A cardboard profile of a Movie Camera graphic symbol is placed on a plastic sheet ABCD.

By using appropriate construction, draw the largest similar figure to be cut from the plastic sheet.

Note: Corner A is to remain common and is to be used as the pole of enlargement.

(15 marks)



Question 6.

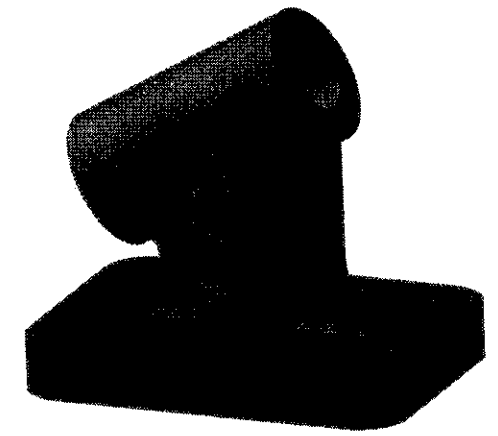
An illustration, end elevation, plan and incomplete front elevation of a **Guide Block** are given.

In the space provided:

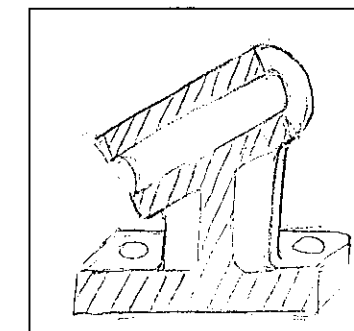
- draw a 3D freehand sketch of the solution (section X-X);
- complete a sectional front elevation on the cutting plane X-X;

Note: Do not show hidden details.

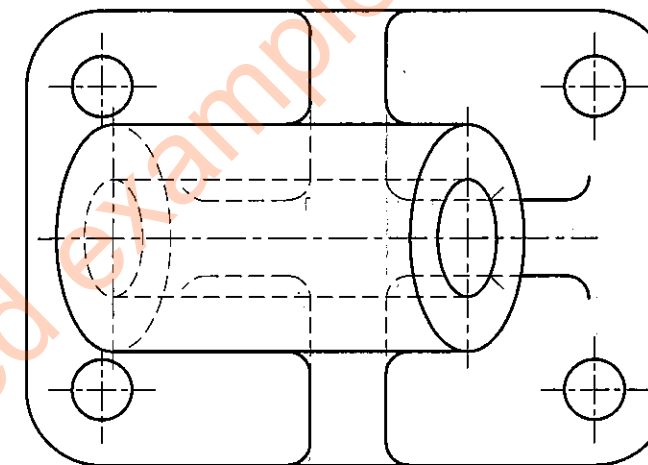
(15 marks)



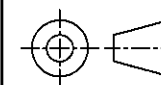
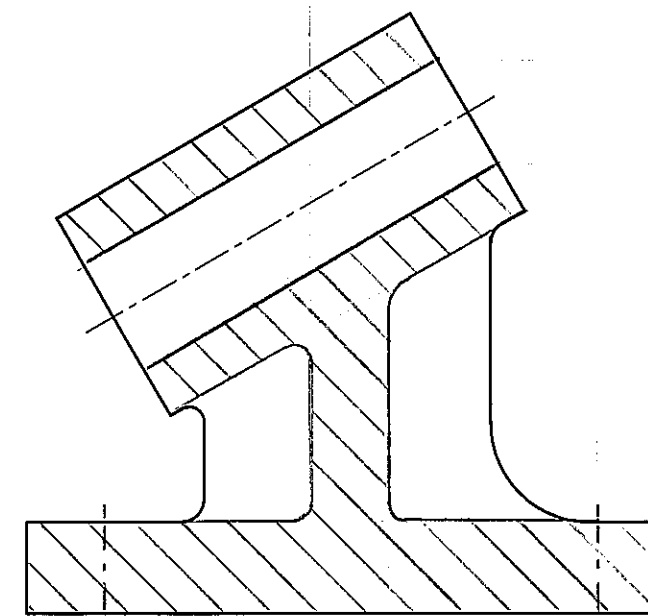
GUIDE BLOCK



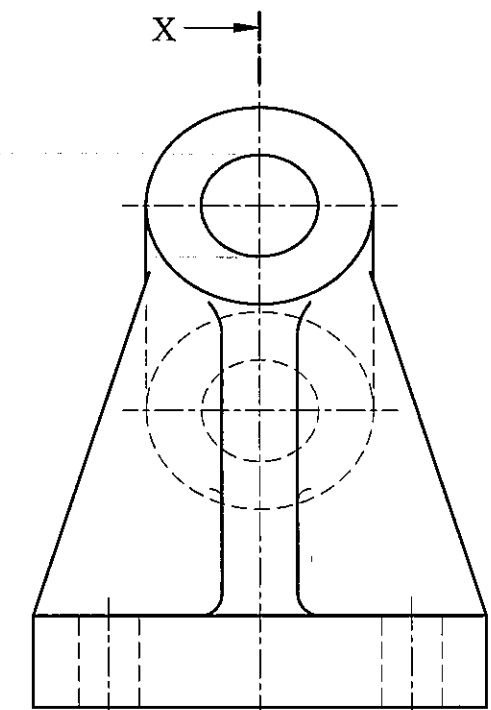
3D FREEHAND SKETCH



PLAN



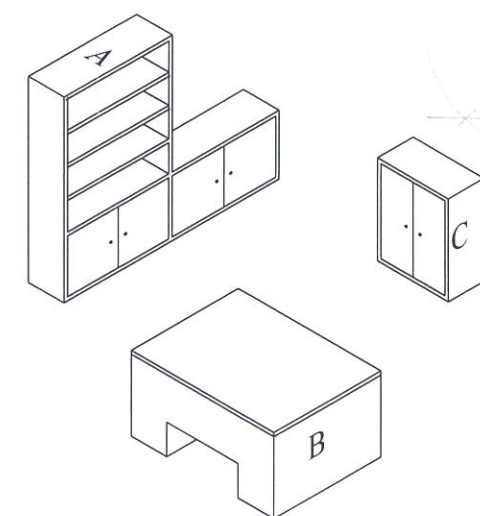
SECTIONAL FRONT X - X



X → END

Notes:

- (18 marks)



Question 1.

The following computer programme is written to create a CCTV camera icon.

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; O = 700.

ACI 7: MOVE N,A; DRAW O,A; DRAW O,G; DRAW N,G; DRAW N,A;

ACI 5: MOVE N,E; DRAW L,E; DRAW J,G;

ACI 5: MOVE N,C; DRAW L,C; DRAW H,F;

ACI 1: MOVE F,D; DRAW L,J; DRAW J,L; DRAW D,F; DRAW F,D;

ACI 3: MOVE D,B; DRAW D,C; DRAW E,D; DRAW D,E; DRAW C,D; DRAW B,D; DRAW D,B;

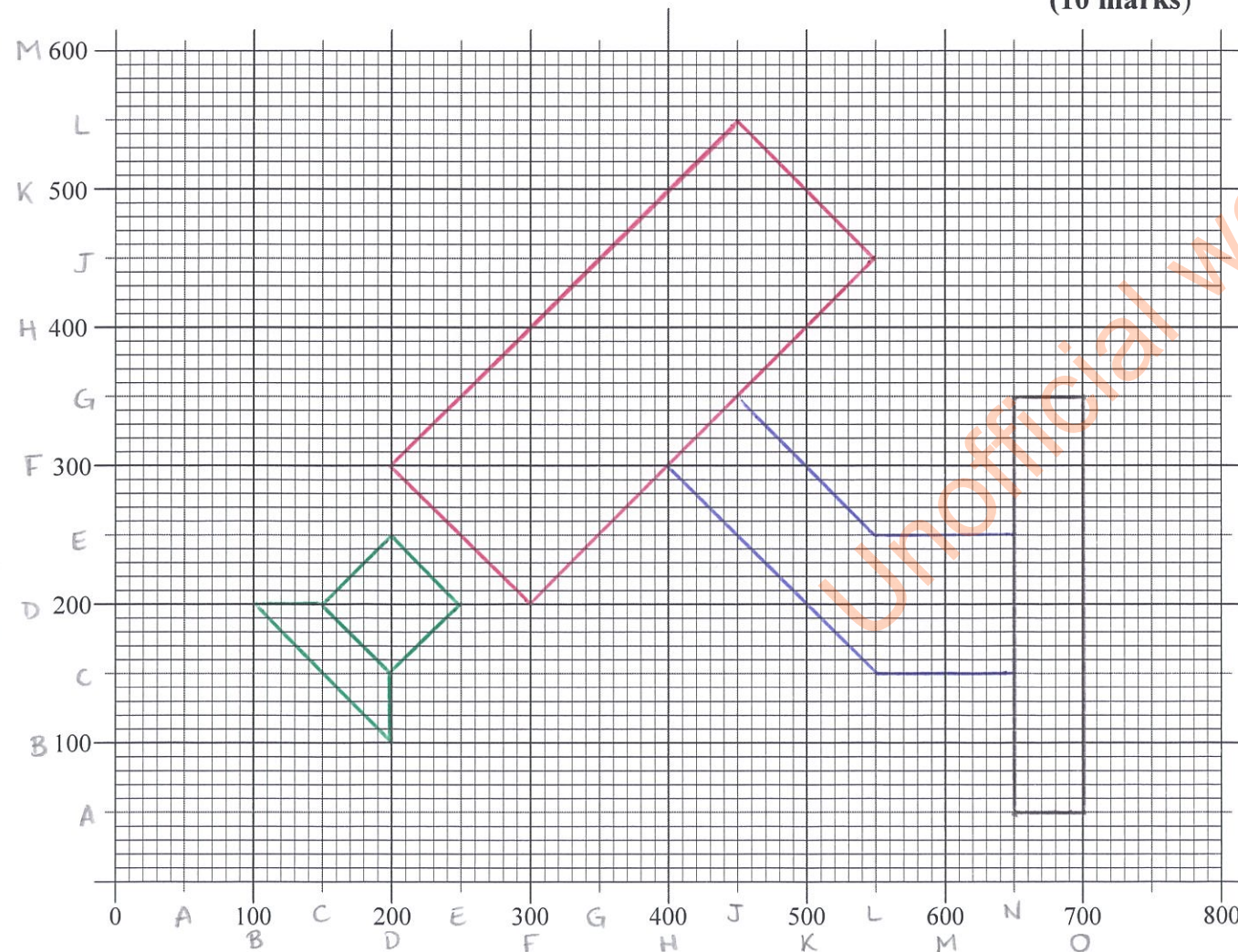
ACI 3: MOVE D,C; DRAW C,D.

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. 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.

(10 marks)



Question 2.

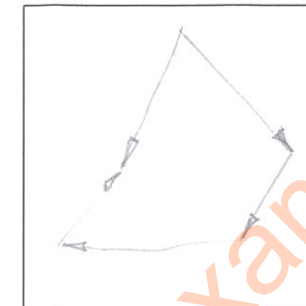
A system of four concurrent forces acting on a body is shown.

- Determine the resultant force and draw an arrowhead to indicate how it acts.
- State the magnitude and angle to the horizontal plane.

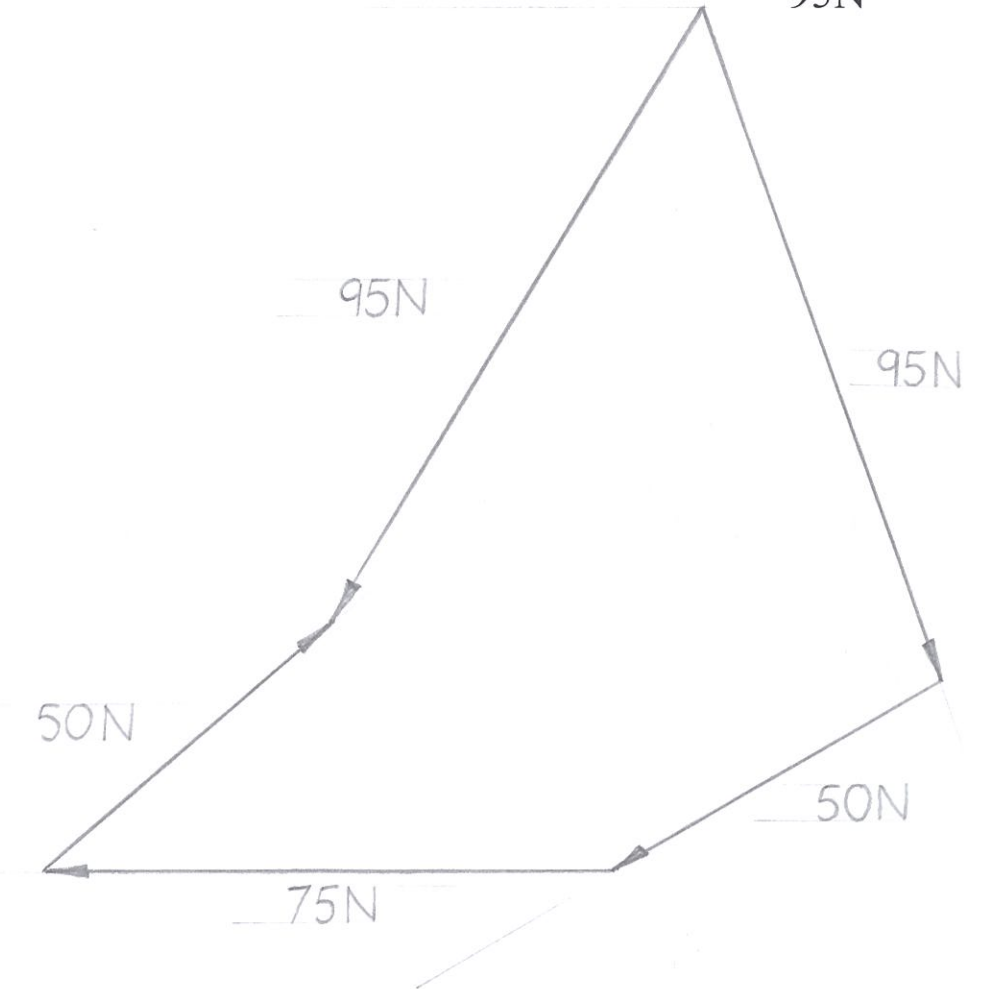
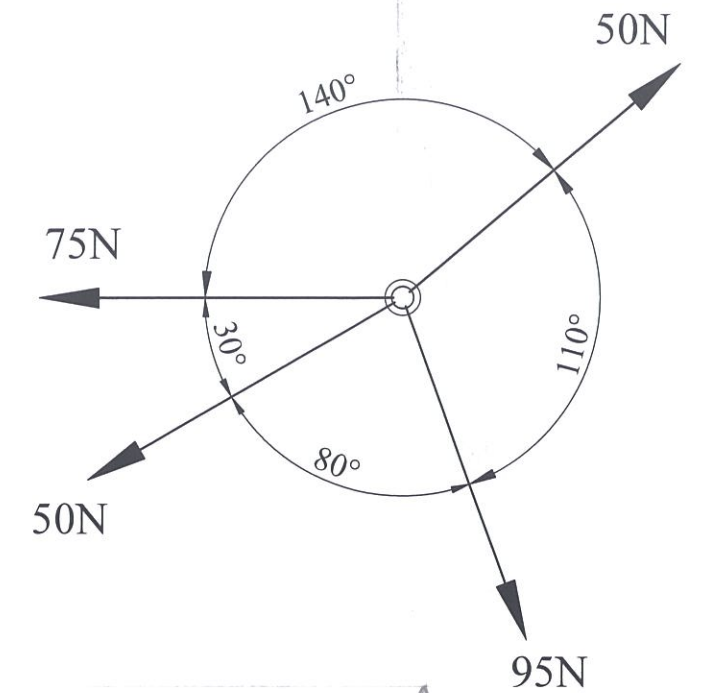
Notes:

- Use a scale of 10mm representing 10N.
- Use the square below to draw a freehand sketch of the vector diagram.

(10 marks)



Freehand sketch



Magnitude of resultant = 95N at 58° to the horizontal

Question 3.

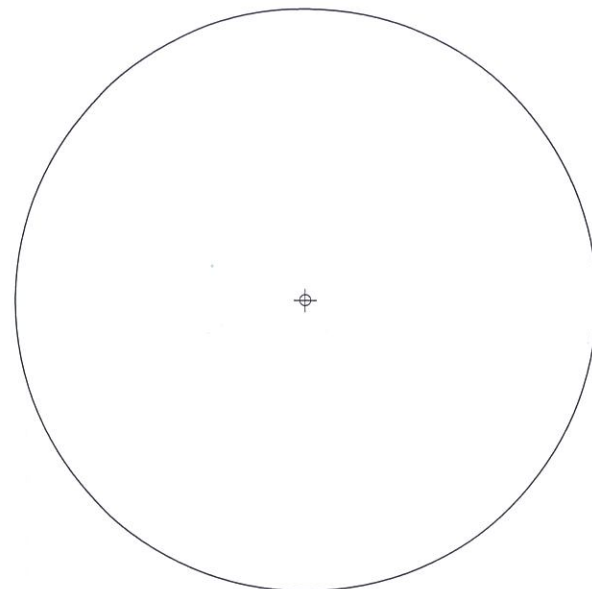
One of the science laboratory safety rules states that:
"Before you work with flames, tie back loose hair".

You are requested to draw two safety signs to:

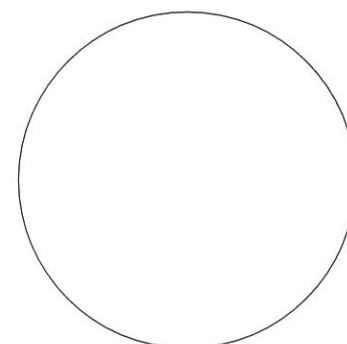
- Prohibit** long loose hair in the laboratory;
- Order** the lab user to tie back loose hair.

Notes:

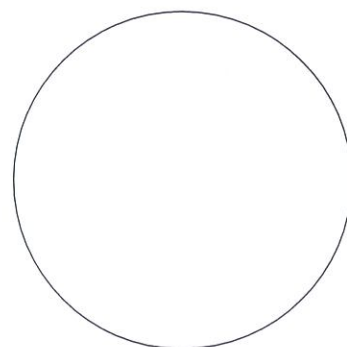
- The geometric shapes and colours of the signs are to conform with BS and ISO regulations.
- Use the small circles to draw the preparatory sketches. **(15 marks)**



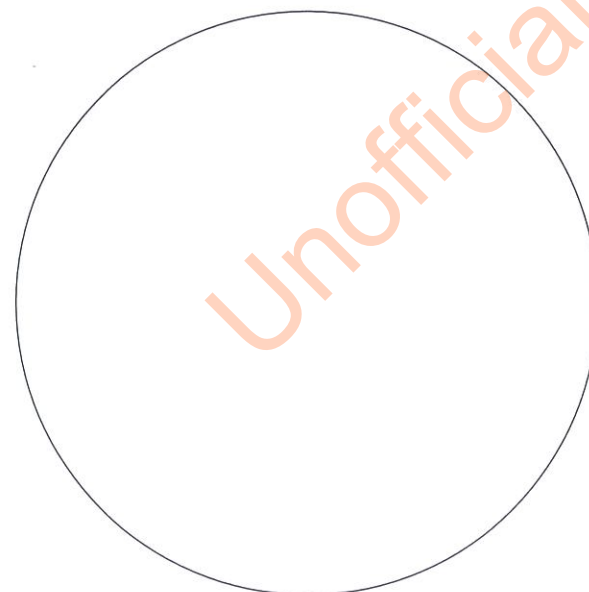
PROHIBITION SIGN FINAL DRAWING



PROHIBITION SIGN SKETCH



MANDATORY SIGN SKETCH



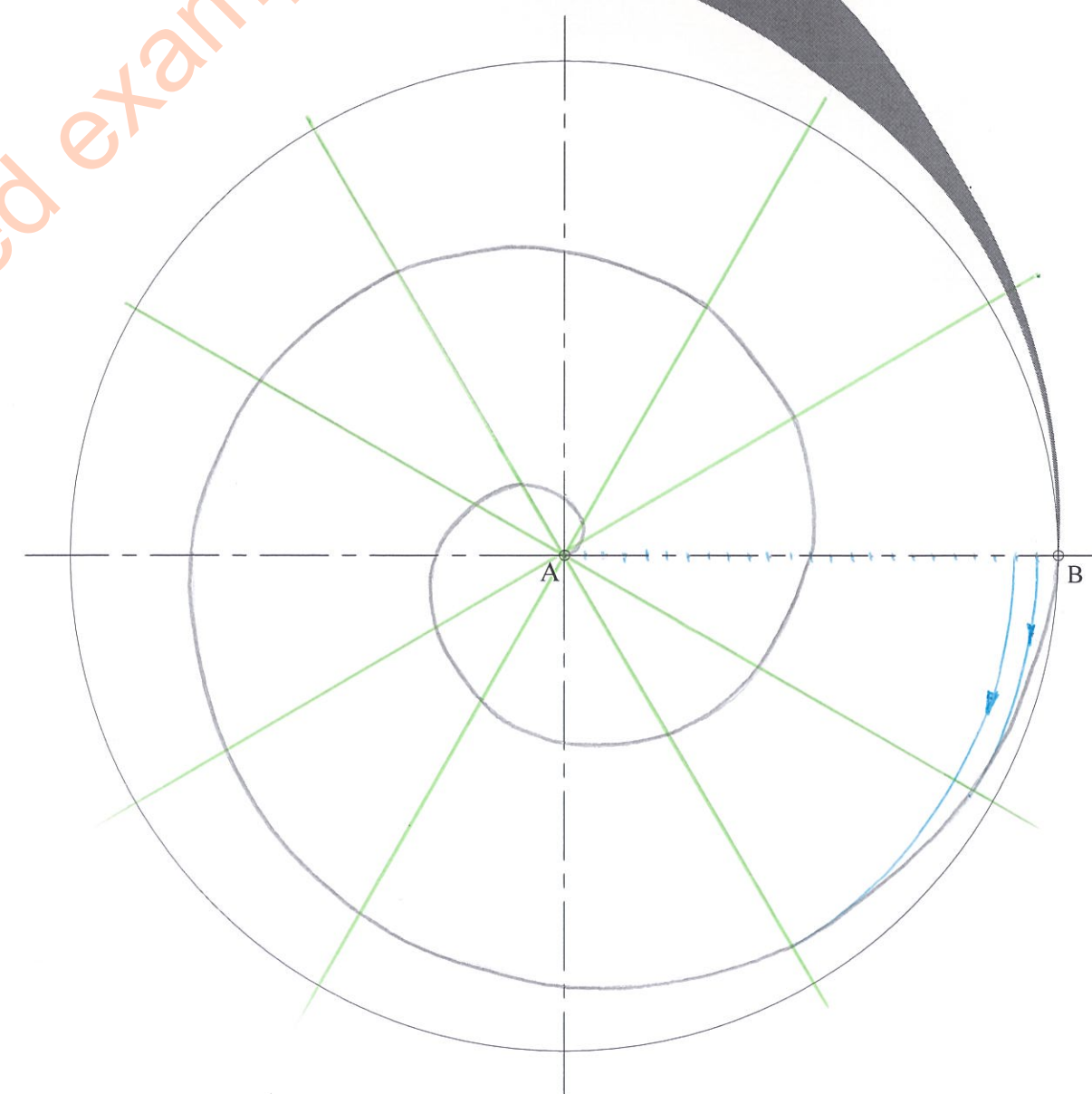
MANDATORY SIGN FINAL DRAWING

Question 4.

Part of a logo of a fitness club consists of two turns of an Archimedean spiral.

Using the given start lines, construct the two turns starting from the pole A and ending at point B.

(15marks)



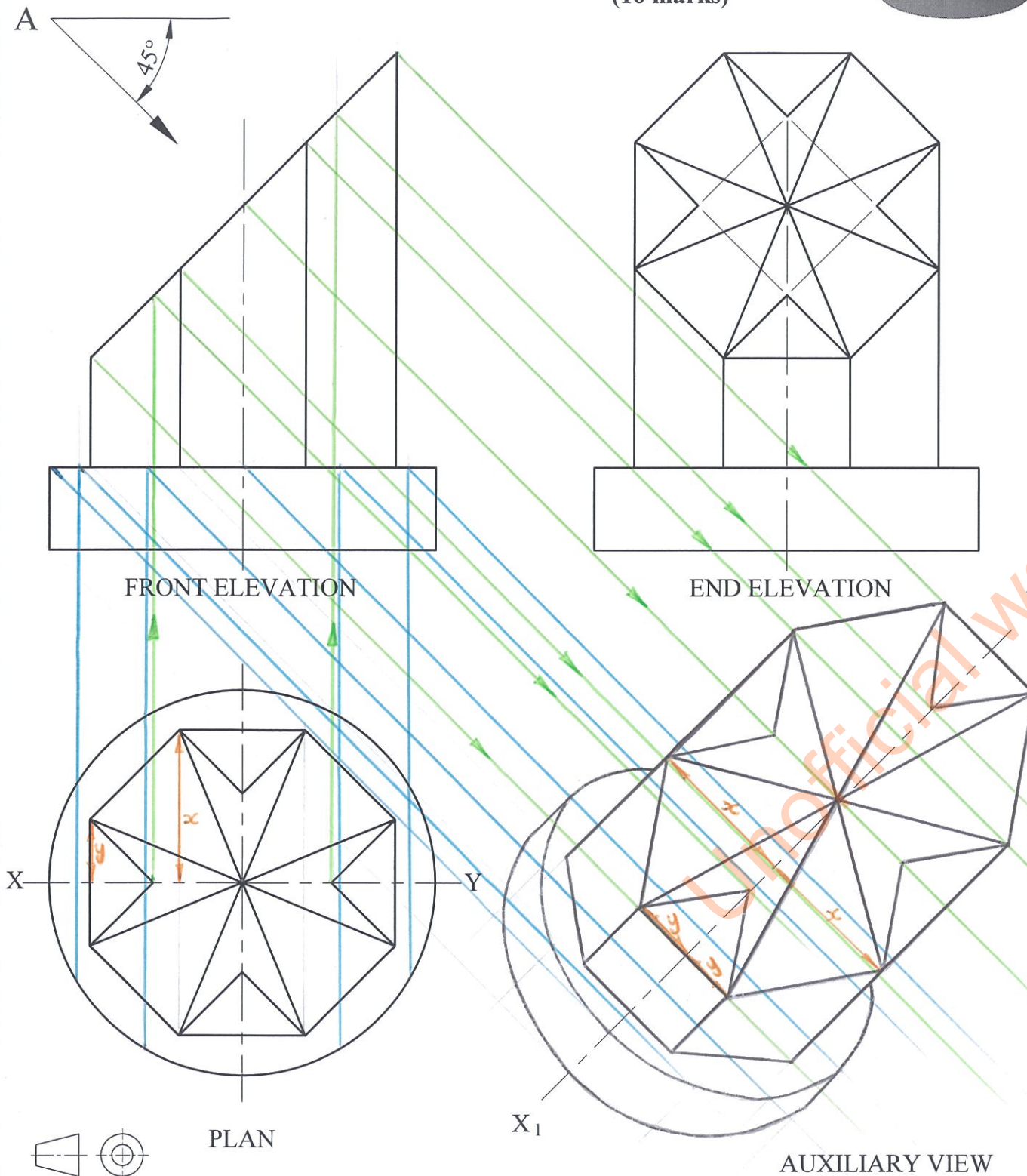
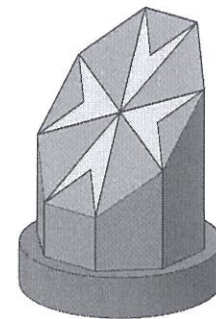
Question 5.

An illustration and three orthographic views of a wooden souvenir are shown. The cylindrical base, the octagonal prism and the inlaid Maltese Cross are made of different types of wood.

Using the given start lines project an auxiliary view of the souvenir as viewed from the direction of arrow A.

Note: Do not include hidden details.

(16 marks)



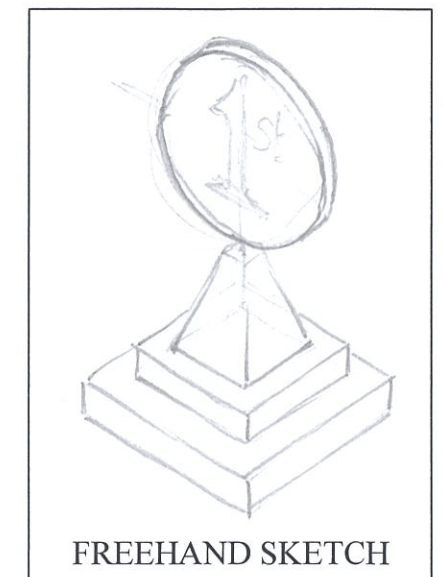
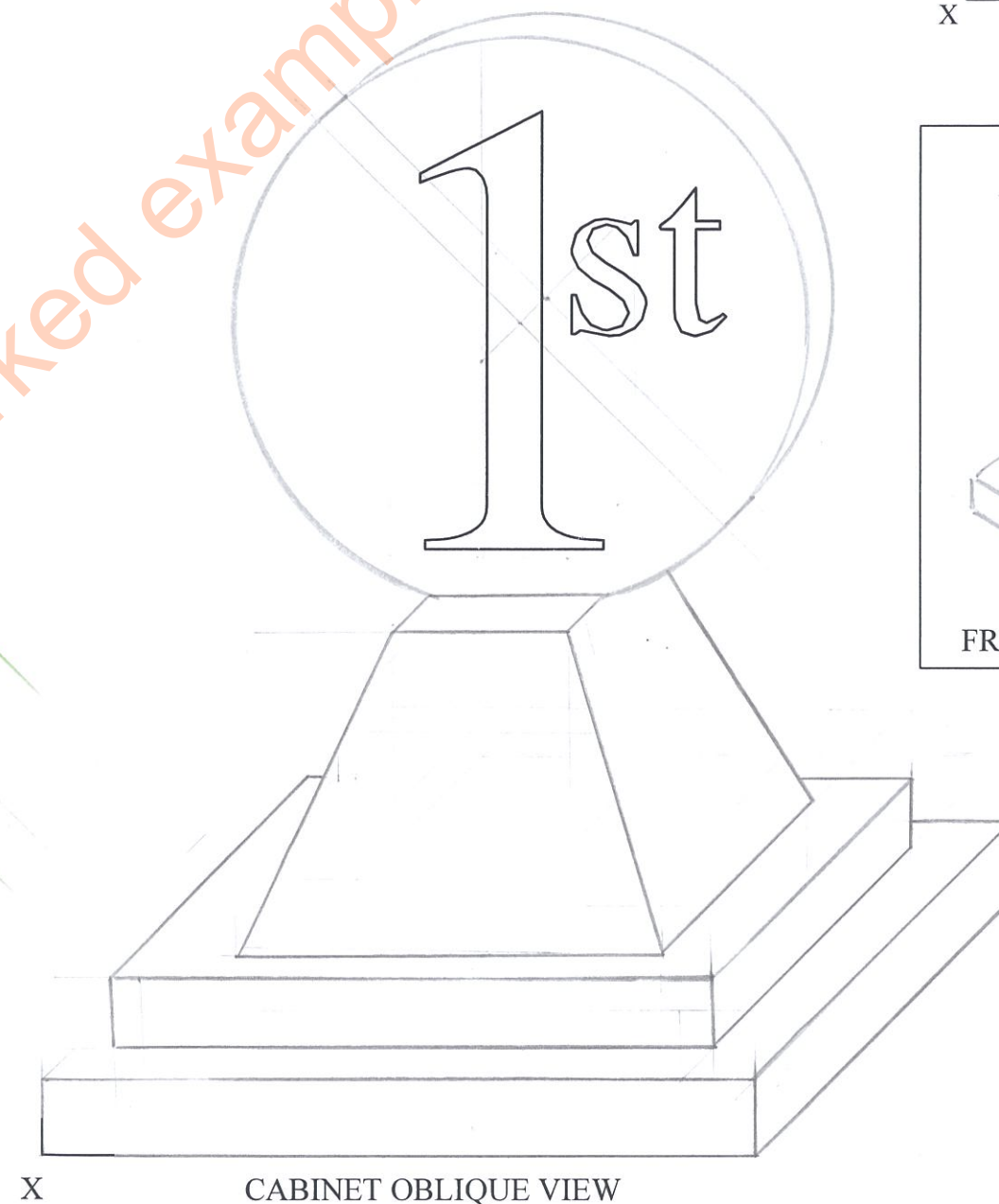
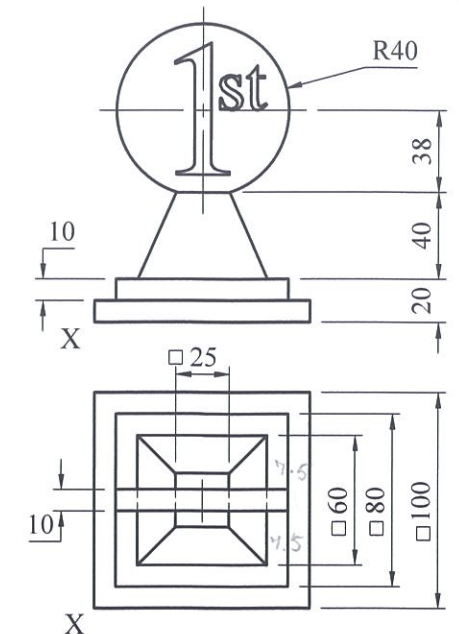
Question 6.

A sports trophy consists of wooden square stepped base, a marble truncated square pyramid and a gold plated medal partly inserted in the pyramid.

- In the window provided, draw a **freehand** pictorial sketch of the trophy.
- Colour the sketch to distinguish between the materials and to create texture.
- Using the given dimensions and your instruments, draw a cabinet oblique view of the trophy placing corner X in the bottom left hand corner.

Note: Do not include hidden details.

(16 marks)



Question 7.

The main body of a wooden toy airplane consists of a combination of cylindrical and conical solids. Both solids were truncated to accommodate the cockpit and the passengers' window (as shown in the front elevation and in the illustration). The truncated portion was replaced by part cylindrical and part conical transparent coloured plastic sheets to represent glass (shown shaded).

Using the given start lines:

- complete the plan by projecting the curves of intersections resulting from the truncation to form the cockpit and the passengers' window;
- name the conic section of the cut cone;
- construct the three surface developments of the shaded plastic sheets (one conical and two cylindrical).

(18 marks)

