L-Università ta' Malta

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE
EXAMINATIONS BOARD

ADVANCED MATRICULATION LEVEL
2018 FIRST SESSION

SUBJECT:	**Engineering Drawing/Graphical Communication**
PAPER NUMBER:	I
DATE:	2nd May 2018
TIME:	4:00 p.m. to 7:05 p.m.

Directions to Candidates

Write your index number where indicated at the top of all drawing sheets.

Attempt any **FIVE** questions.

Programmable calculators cannot be used.

Unless otherwise stated:

a. drawings should conform to B.S. or equivalent (ISO) standards;
b. all dimensions are in millimetres;
c. all answers are to be accurately drawn with instruments;
d. unless otherwise stated, all construction lines must be left in each solution;
e. 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.

1. A loaded truss is shown in Figure 1.
   a) Using a scale of 10 mm representing 1 m, copy the space diagram and label the frame using Bow's notation. (3)
   b) Calculate the left and right support reactions for the unsymmetrical loaded truss. (5)
   c) Construct the stress diagram for the truss and determine the force in the vertical member HJ. (8)
   d) State whether the member HJ is in compression or in tension. (4)

(Total: 20 marks)

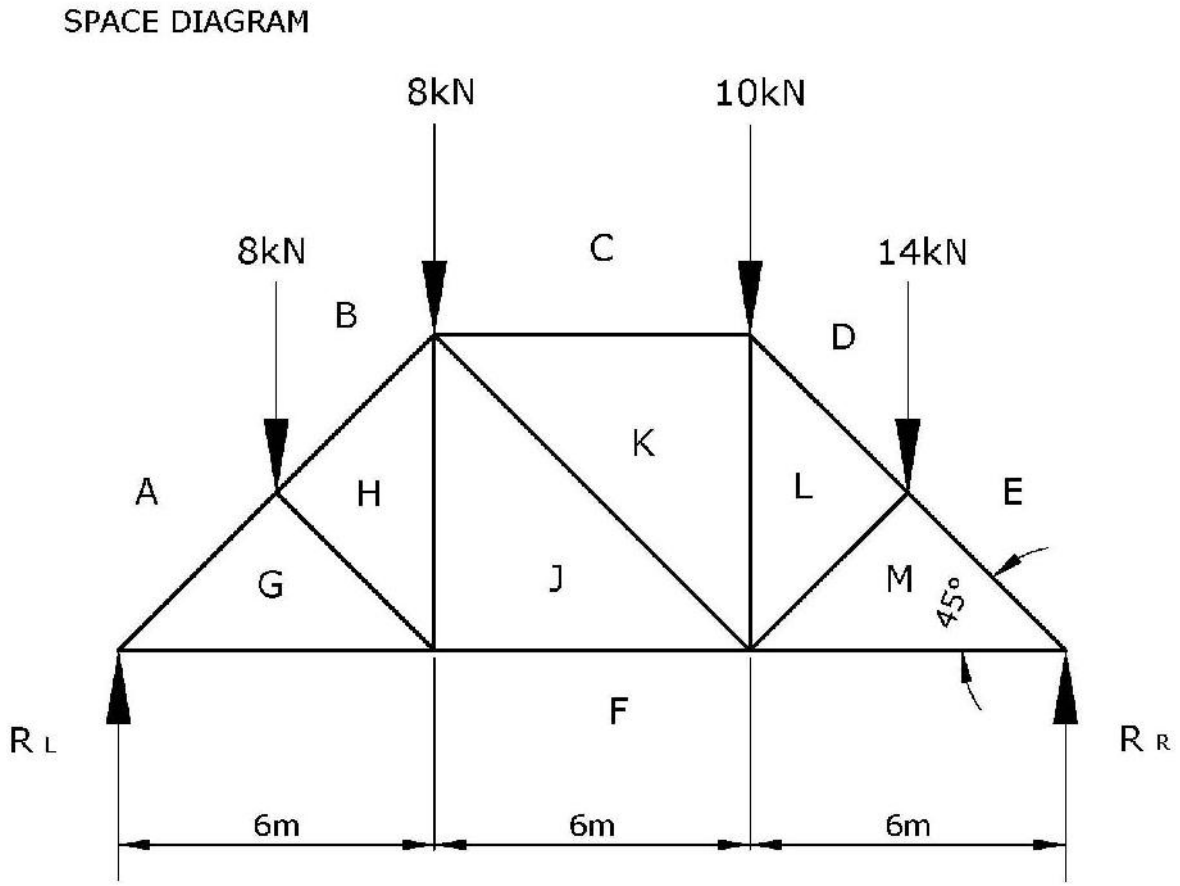

Figure 1

2. A line in space is heading in the direction of a triangular plate as shown in the sketch of Figure 2a.

   a) Copy, full size, the plan and front views of the triangular plate ABC and the line EF shown in Figure 2b. (5)

   b) Draw an auxiliary view to show the triangular plate ABC as an edge. Include the line EF in this view. Locate the point of intersection P of the line EF with the triangular plate. Project the point of intersection P on the front and plan view. (4)

   c) Project another auxiliary view showing the true size of the triangular plate and the projection of the line EFP. (6)

   d) Construct by projection an auxiliary view showing the true length of the line EF and the angle that the line meets the plate. State the length of the line EF and the extended line FP. (5)

(Total: 20 marks)

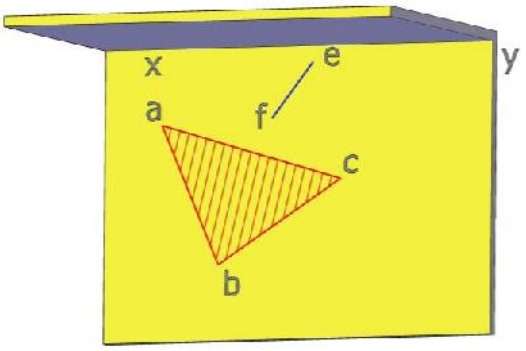

Figure 2a

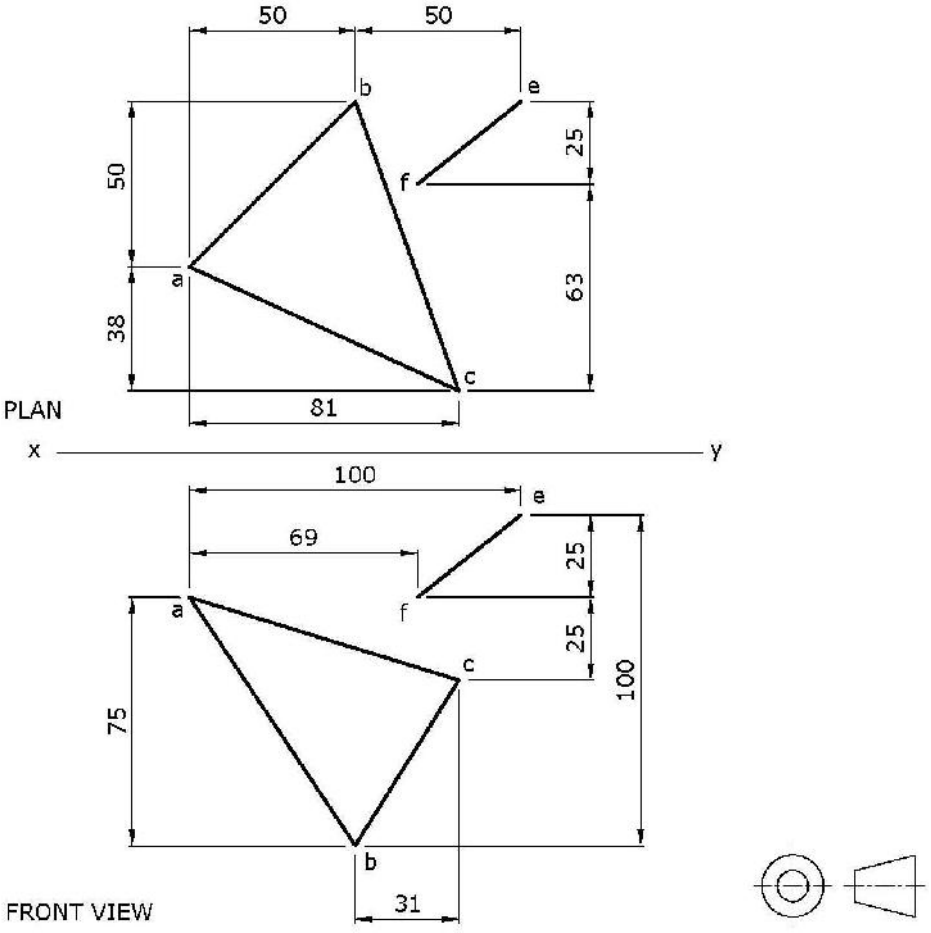

Figure 2b

3. A right cylinder intersecting an oblique truncated cone is illustrated in Figure 3a
   a) Copy, full size, the plan and the incomplete front elevation of the truncated oblique cone and intersecting cylinder shown in Figure 3b. (2.5)
   b) Project an end elevation of the **TWO** geometrical solids. (2.5)
   c) Determine the intersection of the cone and cylinder on the end elevation and show the curve of intersection on the front elevation. (6)
   d) Draw a half surface development of the truncated oblique cone, showing neatly the construction of the true lengths. (9)

(Total: 20 marks)

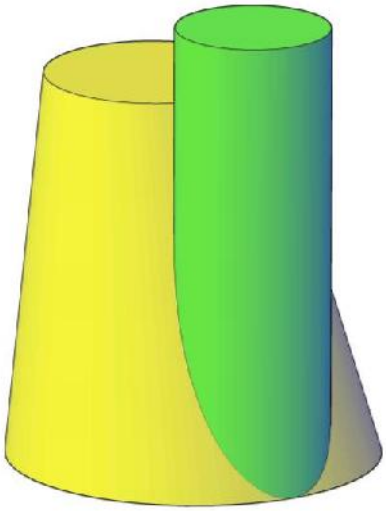

Figure 3a

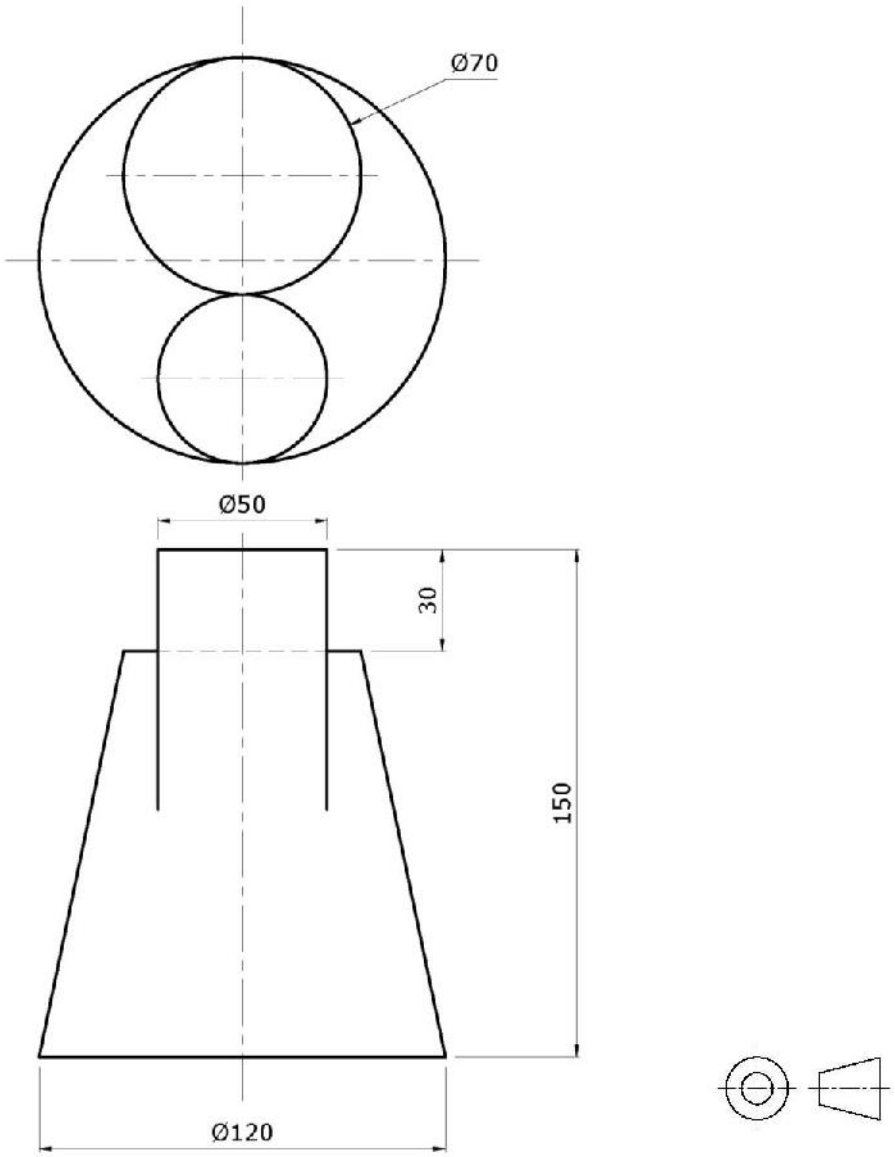

Figure 3b

4. A disc cam, radial arm and roller follower are illustrated in Figure 4a. The follower is constrained to oscillate an angle of 60° to give a maximum lift. The specification of the motion is as follows:

Cam rotation	Follower movement
0° to 90°	From minimum position, follower to rise an angle of 60° with simple harmonic motion.
90° to 150°	Follower to dwell.
150° to 300°	Follower to fall an angle of 60° with uniform acceleration and retardation.
300° to 360°	Follower to dwell.

Disc cam to rotate in an anticlockwise direction.

a) Copy, full size, the details shown in Figure 4b and draw a suitable motion displacement diagram. (8)

b) Construct the cam profile to impart the stated motion to the follower. (12)

(Total: 20 marks)

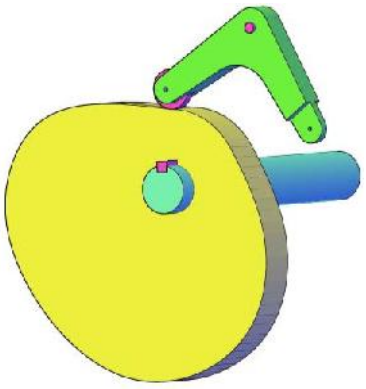

Figure 4a

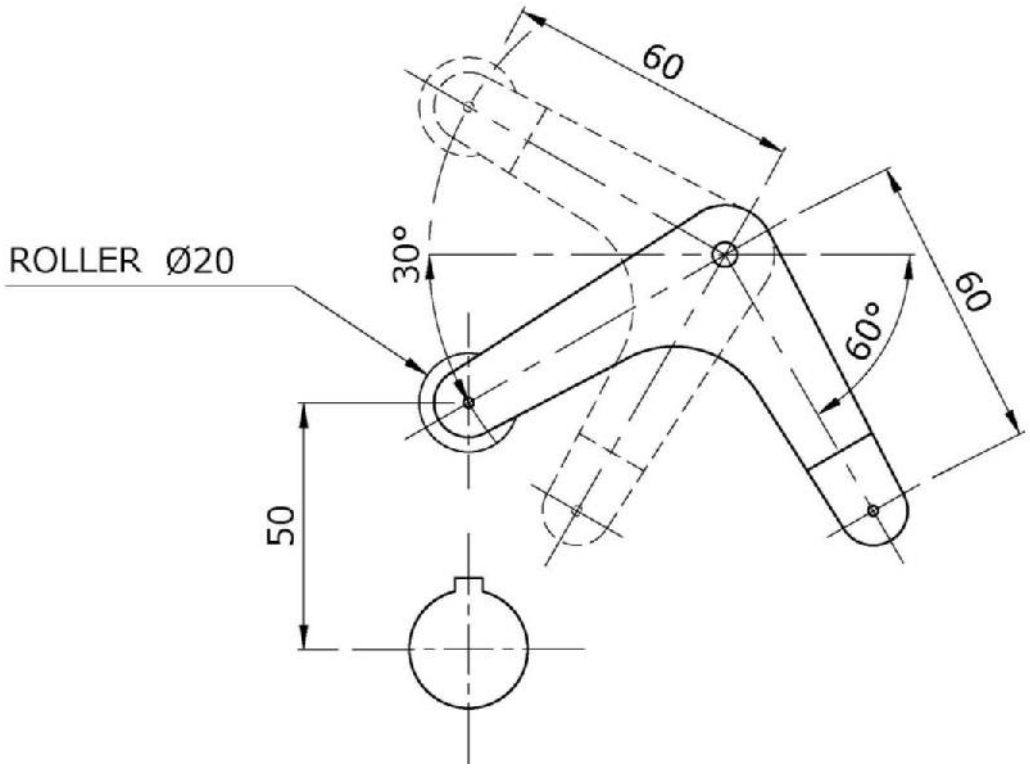

Figure 4b

5. An arrangement of a special screw of a rapid and slow feed mechanism is illustrated in Figure 5a. A left hand single start square thread and a right hand two start square thread were cut on the machined bar. The helices on each thread have been omitted from the elevation shown in Figure 5b.
Construct, full size, the elevation of the machined bar shown in Figure 5b, containing:
   a) screw A, the left-hand single-start square thread, on the left-hand side; (10)
   b) screw B, the right-hand two-start square thread, on the right-hand side. (10)

   Notes:
   - All visible helices of the square thread are to be shown.
   - Hidden detail is not to be shown.

(Total: 20 marks)

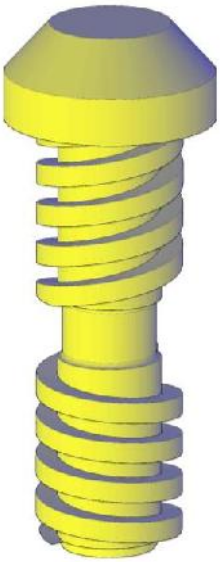

Figure 5a

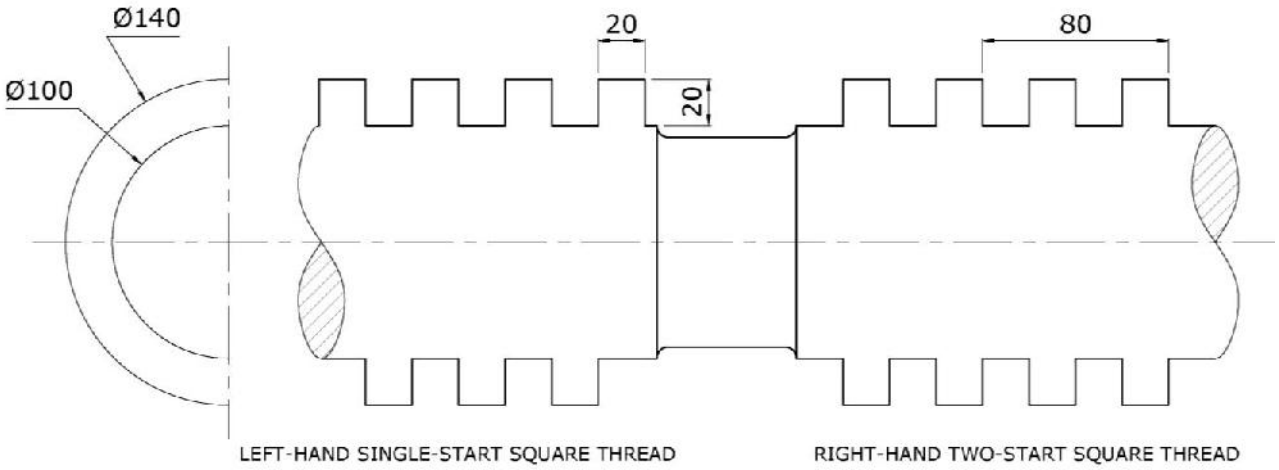

Figure 5b

6. A prism is placed on its pentagonal base between a vertical plane and a horizontal plane. A cylinder resting on its sides is also placed next to the prism. The cylinder has a segment cut off to prevent the solid from rolling. The two geometrical solids are cut by an oblique plane VTH as illustrated in Figure 6a.
   a) Draw, full size, Figure 6b. (5)
   b) Construct an auxiliary elevation showing the oblique plane as an inclined plane, and how the oblique plane cuts the two solids. (5)
   c) Complete the plan showing that part of the prism and cylinder under the oblique plane. (5)
   d) Project a front elevation of the two solids. (5)

(Total: 20 marks)

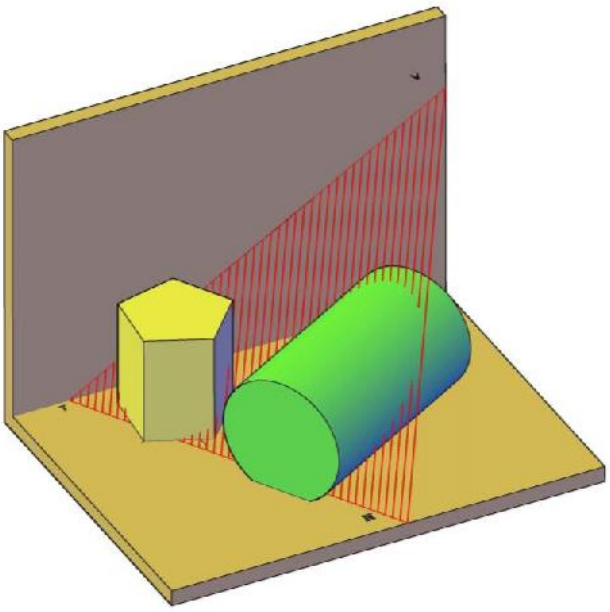

Figure 6a

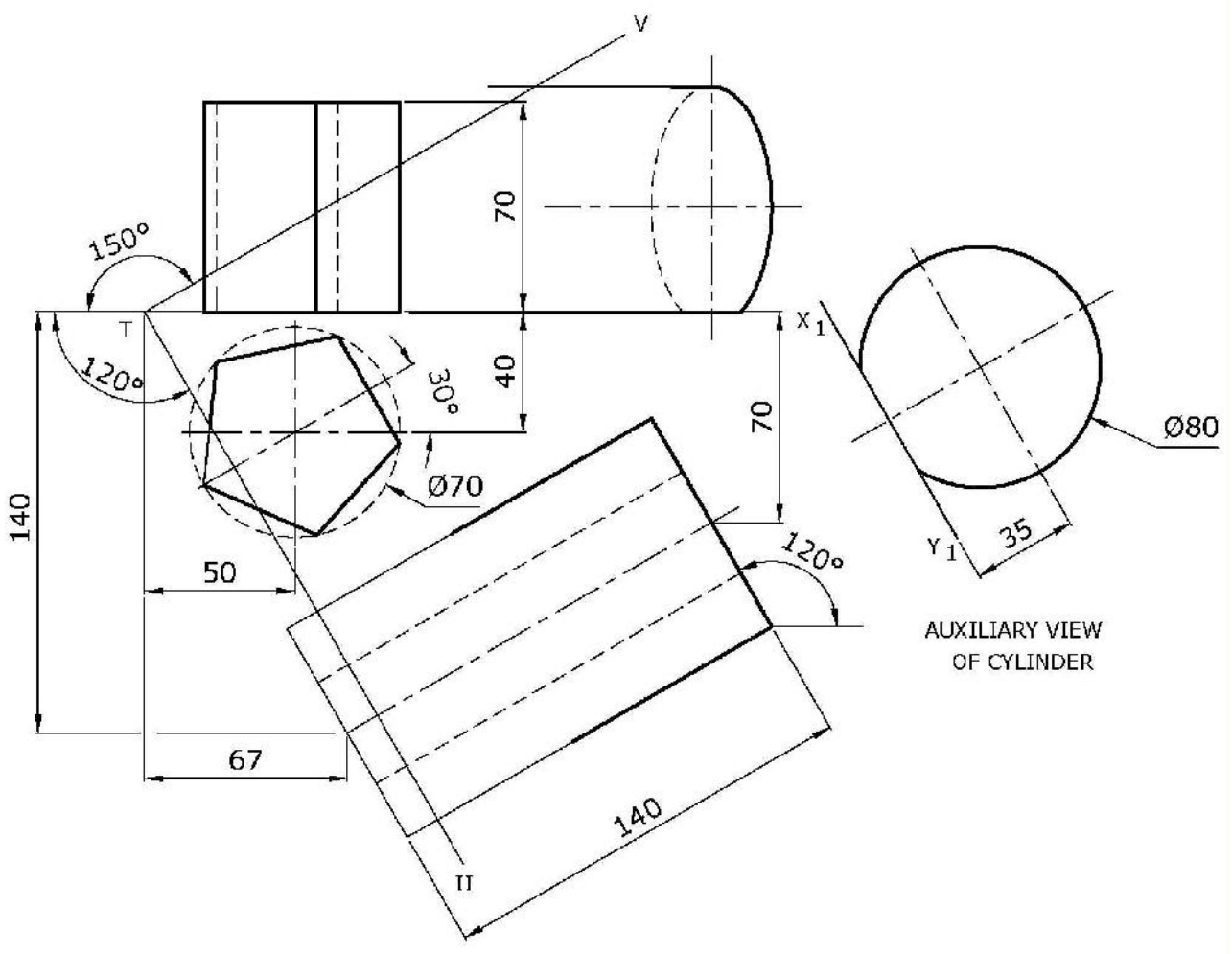

Figure 6b

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MATRICULATION AND SECONDARY EDUCATION CERTIFICATE
EXAMINATIONS BOARD

ADVANCED MATRICULATION LEVEL
2018 FIRST SESSION

SUBJECT:	**Graphical Communication**
PAPER NUMBER:	II
DATE:	3rd May 2018
TIME:	9:00 a.m. to 12:05 p.m.

Directions to Candidates

Write your index number where indicated at the top of all drawing sheets.

Attempt all questions.

Programmable calculators cannot be used.

Unless otherwise stated:

a. drawings should conform to B.S. or equivalent (ISO) standards;
b. all dimensions are in millimetres;
c. answers are to be accurately drawn with instruments;
d. all construction lines must be left on each solution;
e. 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.

Colour/shading should be used where appropriate.

Mark allocations are shown in brackets.

Question 1 carries 34 marks. Questions 2, 3 and 4 carry 22 marks each.

1. An illustration of a model flower garden is given in Figure 1a. The garden consists of a wooden arbour (an arched framework incorporating two benches and serving as a passageway), a paved area, and a small fountain. Flowers are planted in a brick planter trough which surrounds three sides of the garden area.

   A front elevation and a plan of the garden area are given in Figure 1b.

   You are requested to draw a one-point estimated perspective view of the garden. The viewing direction required is indicated by the arrows in the plan view.

   a. Using **THREE** preliminary sketches, explore alternative positions of the horizon line and identify the one which, in your opinion, best presents the spaciousness of the garden. (3)
   b. Based on the choice made in part (a), produce the required illustration on a single side of an A2 size paper making the best use of the space available. (25)
   c. Enhance your answer graphically using colours, tone and texture. (6)

   Notes:
   - The width of the square floor tiles is 60 mm.
   - Each unit in the vertical scale represents 30 mm.
   - 12 x 12 mm and 12 x 6 mm wooden strips are used to build the structure.
   - Place the three 50 mm x 30 mm preliminary sketches at the top of the drawing sheet.
   - You are not expected to colour all your drawing. Partial colouring of the different elements would be sufficient.

(Total: 34 marks)

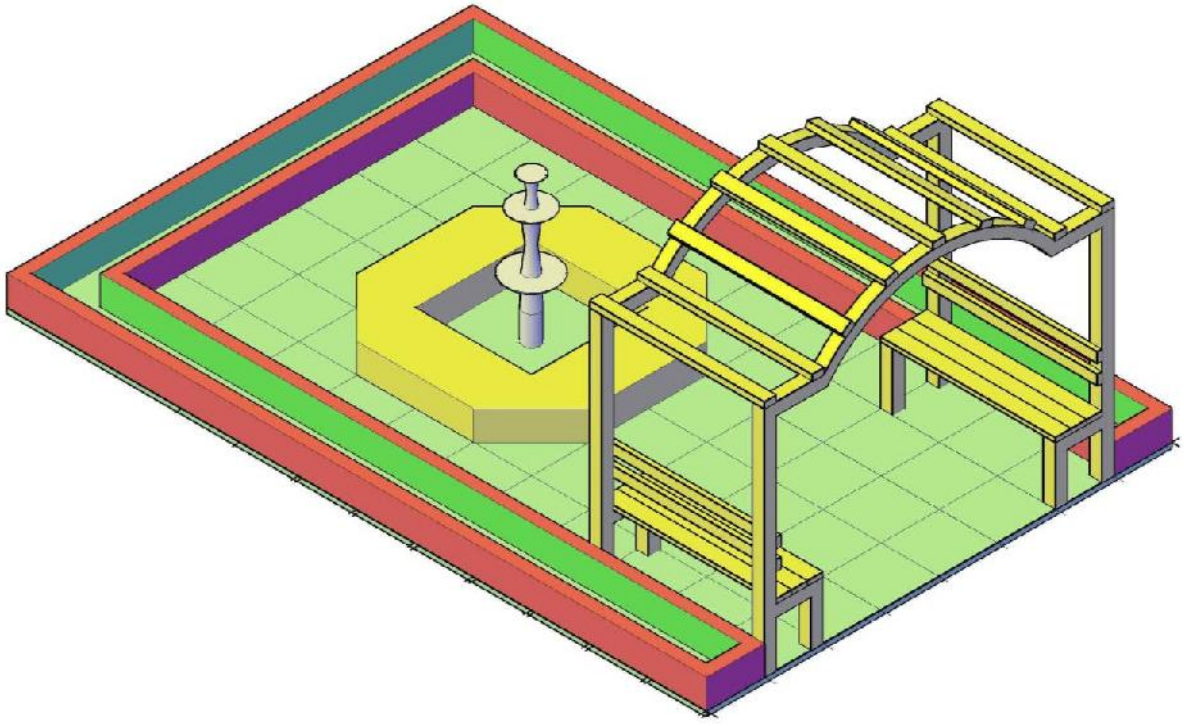

Figure 1a

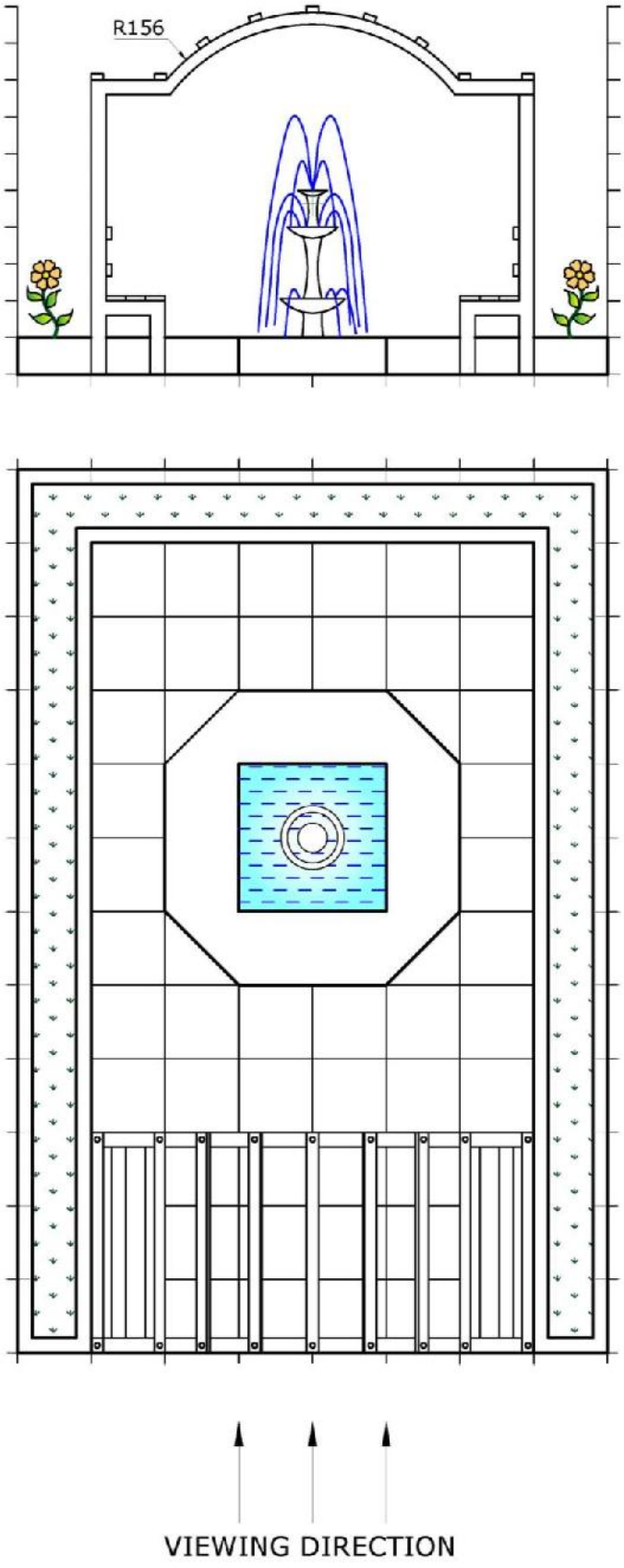

Figure 1b

2. Nowadays, many young adults lead a sedentary lifestyle which may lead to serious side effects. A healthy, active routine can help maintain normal weight and prevent health issues.
The following is a set of tips for a healthier and happier lifestyle:

- wake up early in the morning;
- eat your breakfast;
- go out for the early morning walk;
- drink 3 litres of water a day;
- get away from the computer every 30 minutes;
- exercise regularly;
- brush and floss your teeth;
- sleep earlier.

A pictogram of a typical fit person is given in Figure 2.

You are requested to make use of the given character to design a poster that illustrates graphically the above listed daily routine.

The title of the poster is: TIPS FOR A HEALTHY LIFESTYLE

Note: Try to keep the size and proportions of the pictogram given below.

(Total: 22 marks)

Figure 2

3. Classic Ironworks is the name of a family-owned company that manufactures a variety of decorative wrought iron works using traditional tools such as forge, sledge hammers, tongs and anvils. Their products include wrought iron gates and shop signs. Illustrations of the tools used, and the company's products are shown in Figure 3.

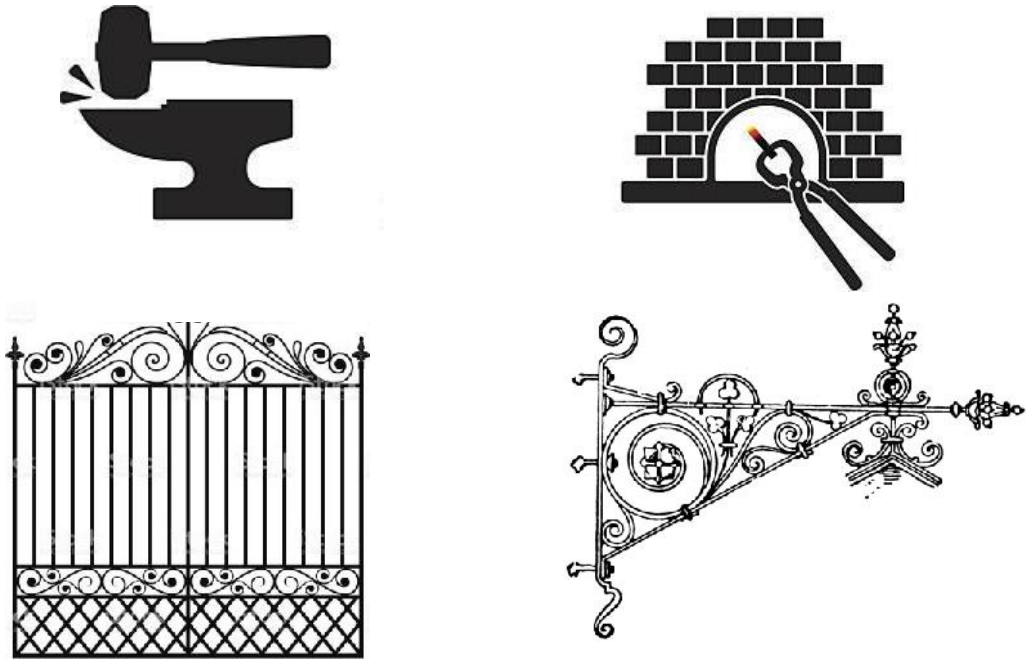

Figure 3

The management of the expanding company requires a new logo, composed of both text and a graphic symbol.

You are to submit your proposed logo together with the preparatory work organised as indicated below:

a. Written analysis
   Identify, using keywords/short phrases, the main parameters of the design brief. (2)
b. Graphical analysis
   Based on your response to part (a), produce a series of preparatory sketches that illustrate your developing ideas. (4)
c. Graphical synthesis
   Clearly identify the elements in your sketches which you intend to use in the final drawing. (2)
d. Final realisation
   Produce your final solution. (14)

(Total: 22 marks)

4. Figure 4a shows the wooden machined parts required to assemble a rocking chair. Figure 4b shows an exploded view of a wooden rocking chair. The parts are to be assembled, glued and screwed.
   You are requested to:
   a) draw a well-proportioned pictorial freehand sketch of the assembled chair; (16)
   b) colour and shade your drawing. (6)

   Note: The height of the drawing should be approximately 300 mm.

(Total: 22 marks)

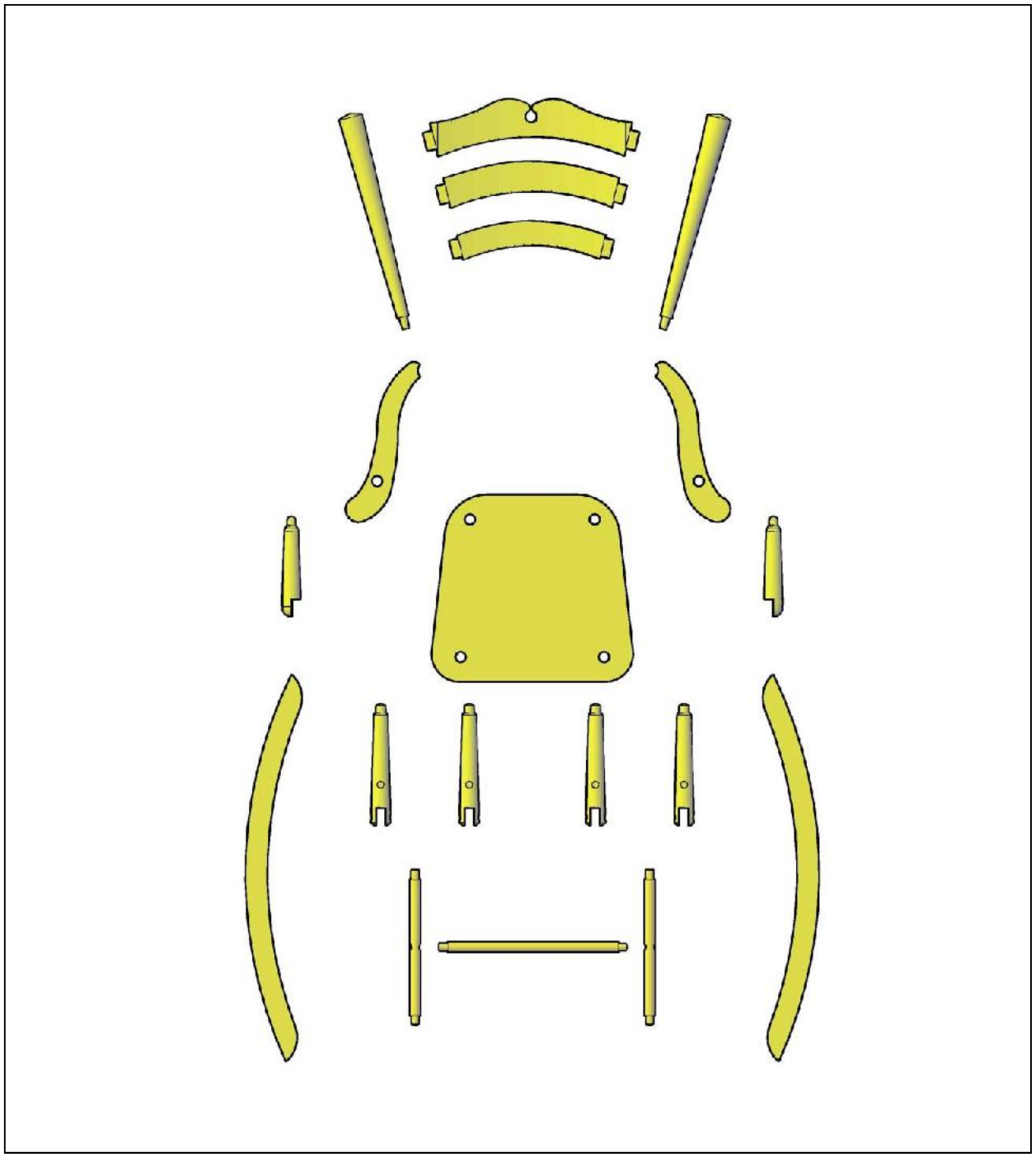

Figure 4a

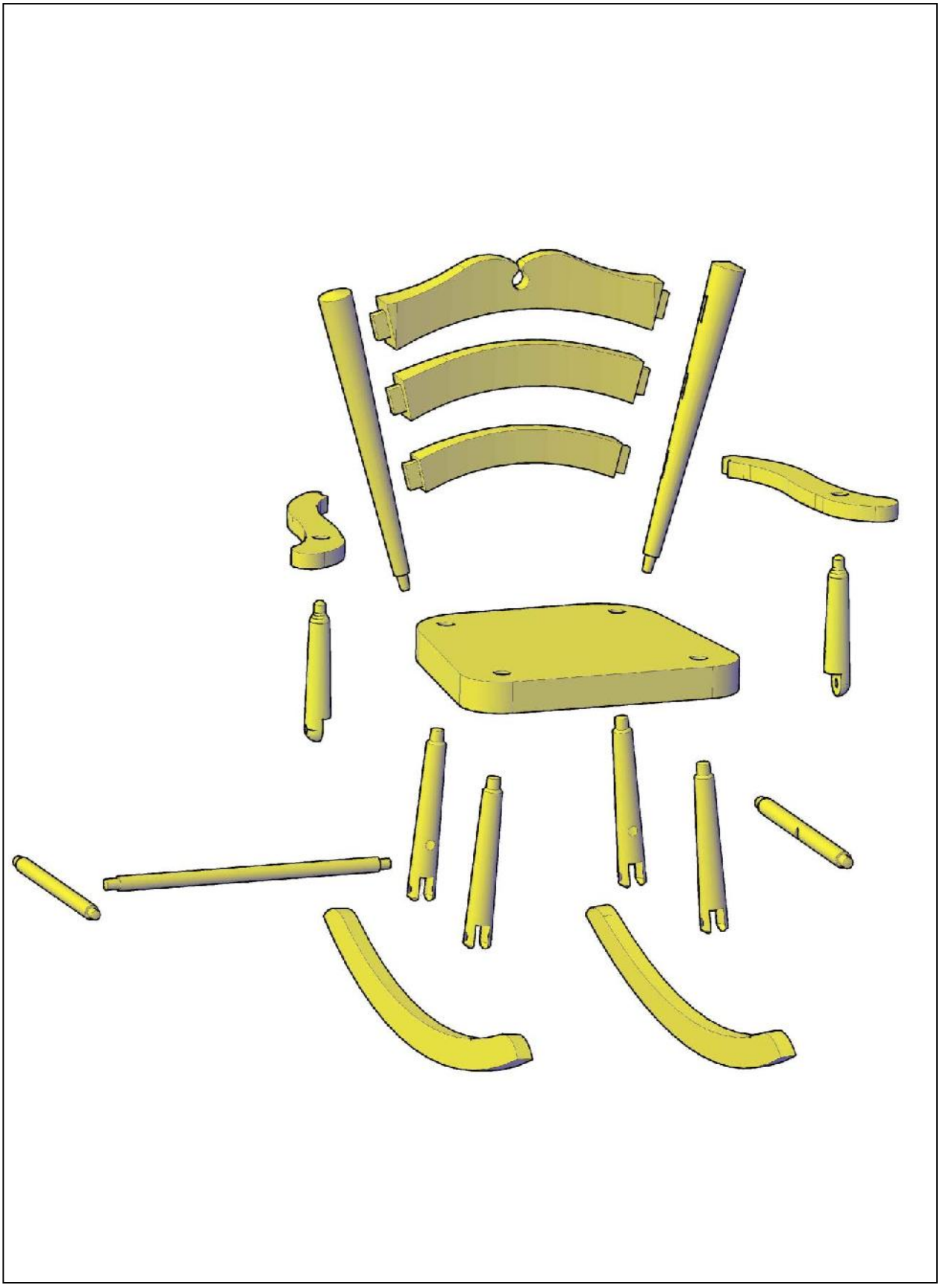

Figure 4b