



L-Università
ta' Malta

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE
EXAMINATIONS BOARD

**INTERMEDIATE MATRICULATION LEVEL
2026 FIRST SESSION**

SUBJECT:	Engineering Drawing and Graphical Communication
DATE:	18 th May 2026
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.

Only scientific calculators may be used. Programmable calculators are not allowed.

Unless otherwise stated:

- a. B.S. or equivalent (ISO) recommendations should be adopted throughout your answers;
- b. all dimensions are in millimetres;
- c. all answers are to be accurately drawn with instruments;
- d. 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.

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 any **FOUR** questions from this section.

Question 1.

An illustration of a radial cam and an in-line flat-faced follower is given in Figure 1a. A dimensioned layout of the cam shaft and follower is given in Figure 1b.

The cam rotates with a uniform angular velocity in a clockwise direction. The nearest distance between the follower face and the cam centre is 50 mm. The motion imparted on the flat follower is described below.

CAM DISPLACEMENT	FOLLOWER DISPLACEMENT
0°- 90°	Lift of 30 mm with simple harmonic motion.
90°- 150°	Lift of 15 mm with uniform velocity.
150°- 180°	Dwell.
180°- 360°	Fall 45 mm with uniform acceleration and retardation.

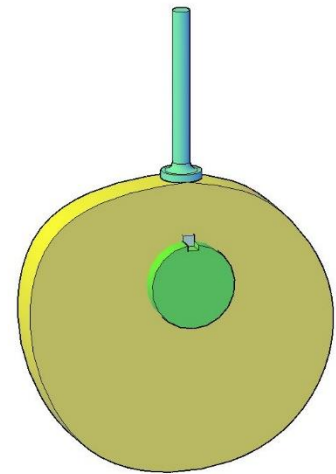


Figure 1a

- Copy Figure 1b. (1)
- Construct the follower displacement graph. (6)
- Draw the profile of the cam. (6)

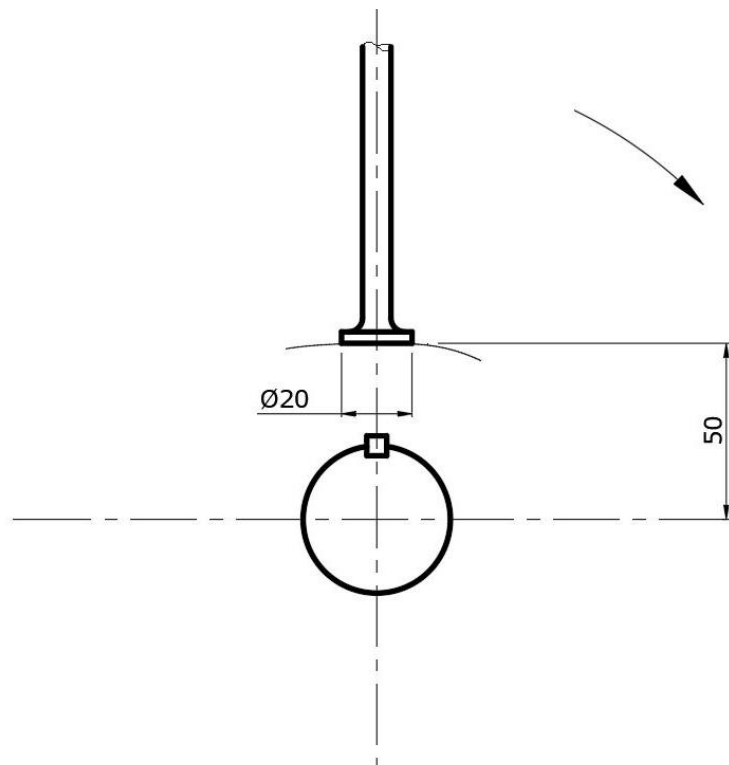


Figure 1b

(Total: 13 marks)

Question 2.

An illustration of a funnel attached to a square drainpipe is shown in Figure 2a.

The funnel, shown in detail in Figure 2b, consists of a truncated right cone 'A' and a truncated oblique cone 'B'.

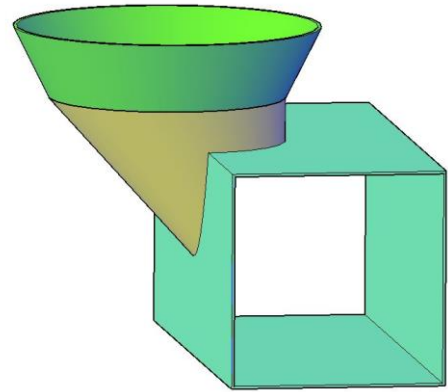


Figure 2a

- Copy Figure 2b. (1)
- Project the plan. (1)
- Draw the necessary generators on both cones. (1)
- Construct a half surface development of cone 'A'. (2)
- Construct the true lengths of cone 'B'. (2)
- Construct a half surface development of cone 'B'. (6)

(Total: 13 marks)

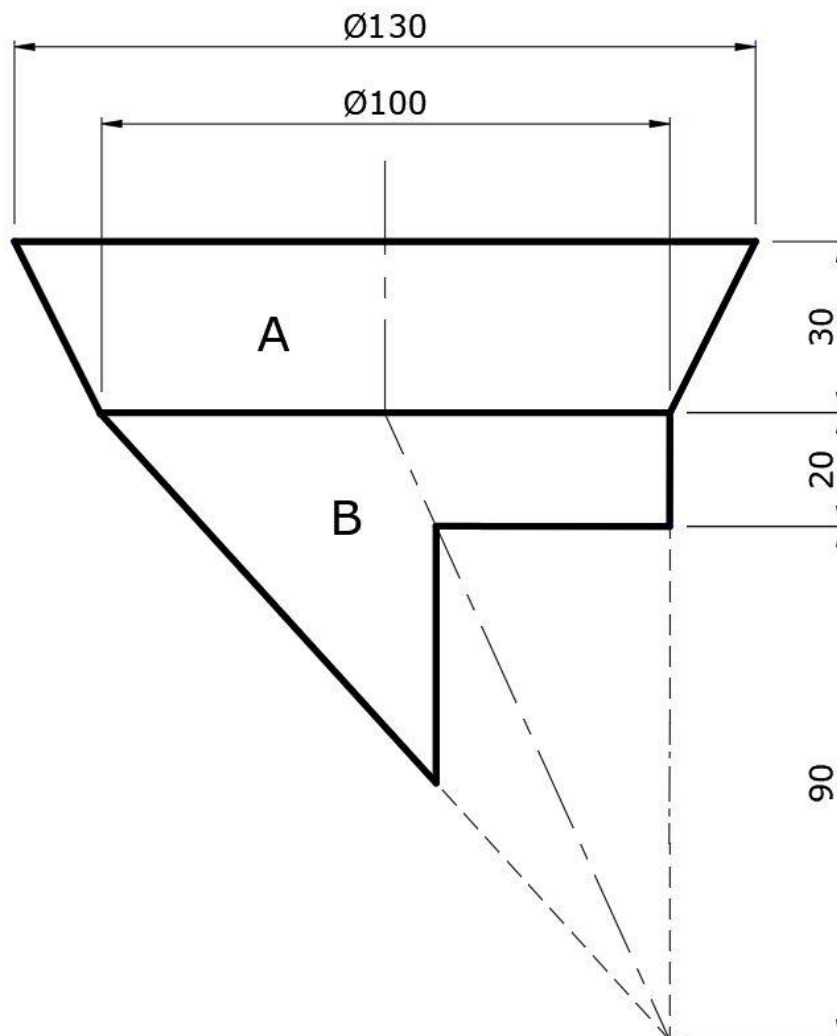


Figure 2b

Please turn the page.

Question 3.

An octagonal pyramid intersected by an equilateral triangular prism is shown in Figure 3a.

Figure 3b shows an incomplete front elevation, an incomplete plan, and an auxiliary view of the intersecting solids.

- Copy the given views.
- Complete the front elevation.
- Complete the plan.

Note:

- Show hidden details in all views.
- Show clearly the lines of intersection.

(4)

(4)

(5)

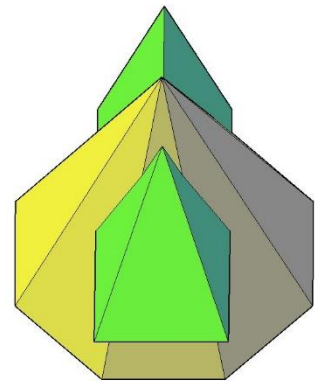


Figure 3a

(Total: 13 marks)

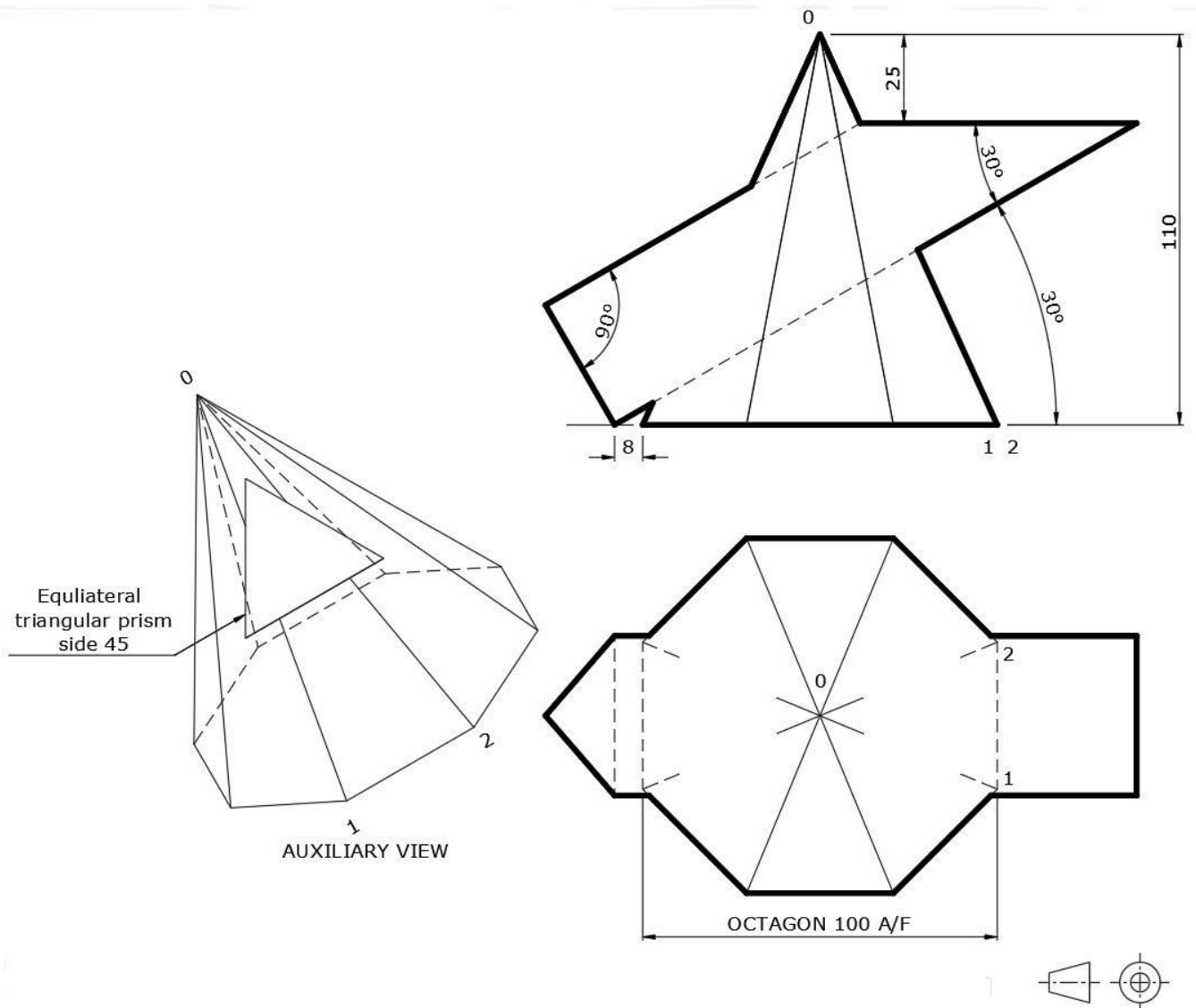


Figure 3b

Question 4.

An illustration of an involute spur gear is given in Figure 4a. The gear has 16 teeth, a module of 20 and a pressure angle of 20° . Figure 4b shows the suggested solution layout.

- Calculate the required data and present the values in tabulated form. (4)
- Construct the tooth profile showing clearly how the involute form is derived. (4)
- Complete **THREE** teeth profiles. The teeth flank faces may be drawn by using the approximate method. (5)

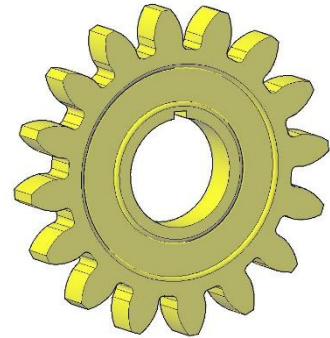


Figure 4a

(Total: 13 marks)

GIVEN DATA:

.....

.....

.....

CALCULATIONS		

Figure 4b

Please turn the page.

Question 5.

Figure 5 shows a loaded beam overhanging two supports. The support reactions are 9.7 kN (R_R) and 6.3 kN (R_L). Load P applied at the right end of the beam is unknown. The distance of R_L from the left end of the beam is also unknown.

- Copy the setup using a space diagram with scale of 10 mm = 1 m. (1)
- Apply Bow's notation. Space A has been set for you. (1)
- Draw the load line using a scale of 10 mm = 1 kN to determine load P . State the value. (2)
- Draw the polar diagram (polar distance = 140 mm). (2)
- Construct the link polygon. (2)
- Determine the position of R_L (distance X). (3)
- Draw the shear force diagram. (2)

Note:

Do not scale distance X

(Total: 13 marks)

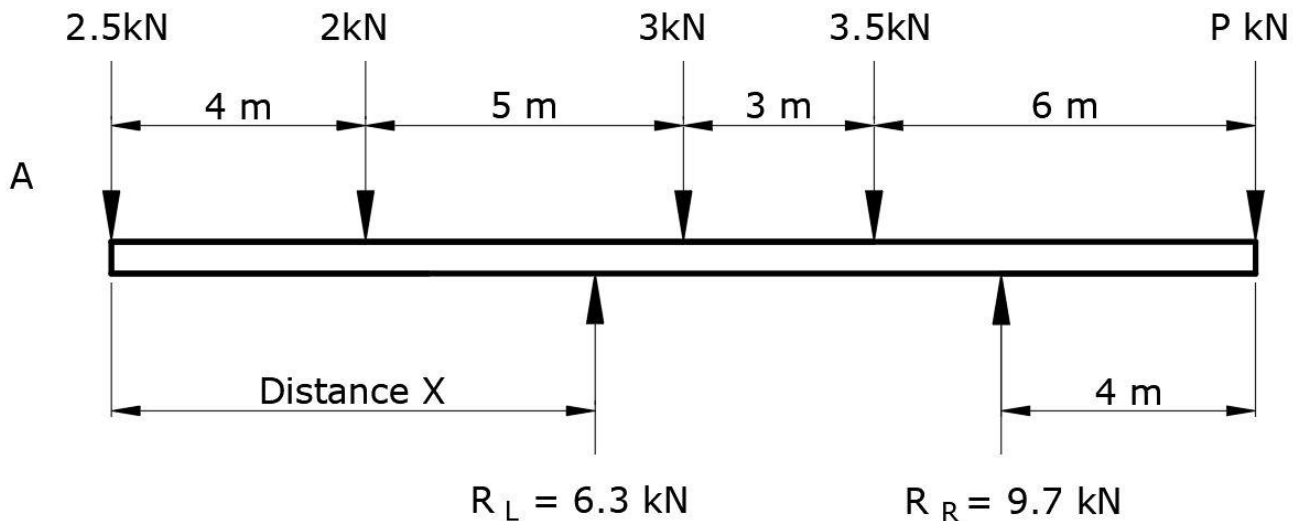


Figure 5

SECTION B

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

Question 6

An assembled three-dimensional view of a Machinists' Jack is shown in Figure 6a. Detailed dimensions of the parts of the jack and an items list are provided in Figure 6b on the A3 paper attached. The Machinists' Jack is assembled as follows:

- The swivel (Item 2) is attached to the base (Item 1) through the 24 mm diameter hole using the bolt (Item 7) and nut (Item 8).
- The screw (Item 4) is threaded into the lock nut (Item 3) and the swivel. The lock nut can be tightened to the swivel to lock the screw in place.
- The Tommy bar (Item 5) is inserted into the hole of the screw and the collar (Item 6) is held in place at its edge by a press fit pin (Item 9).

Draw a sectional front elevation on the cutting plane X-X.

Note:

- Place the bottom of the Screw 30 mm above the centre line of the bolt.
- Place the tommy bar centrally inside the screw.

(Total: 24 marks)

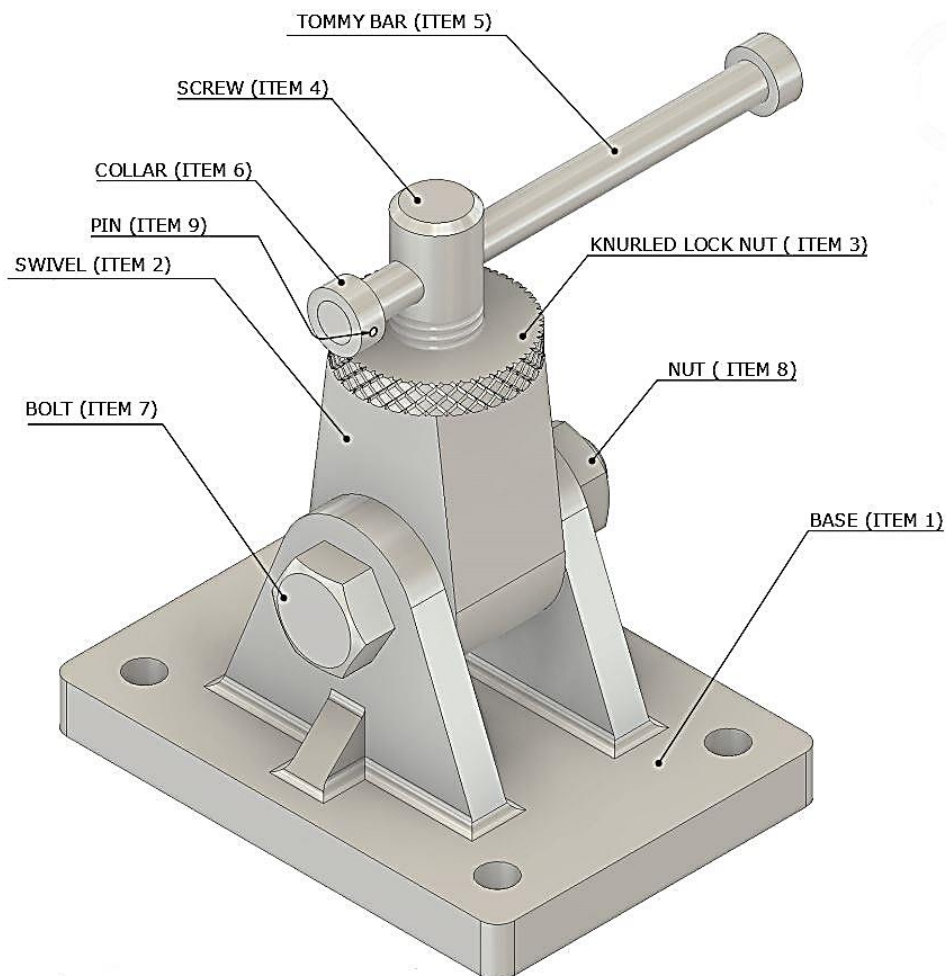


Figure 6a

Please turn the page.

Question 7

A detailed dimensioned drawing of a machined shaft is given in Figure 7.

Draw:

- A scaled down freehand pictorial sketch of the shaft in a square 140 mm X 140 mm. (4)
- A full-size isometric drawing of the shaft placing corner C in the lowermost position. (20)

Notes:

- The isometric scale is **not** required.
- The thread is to be represented by means of freehand isometric arcs 3 mm apart.

(Total: 24 marks)

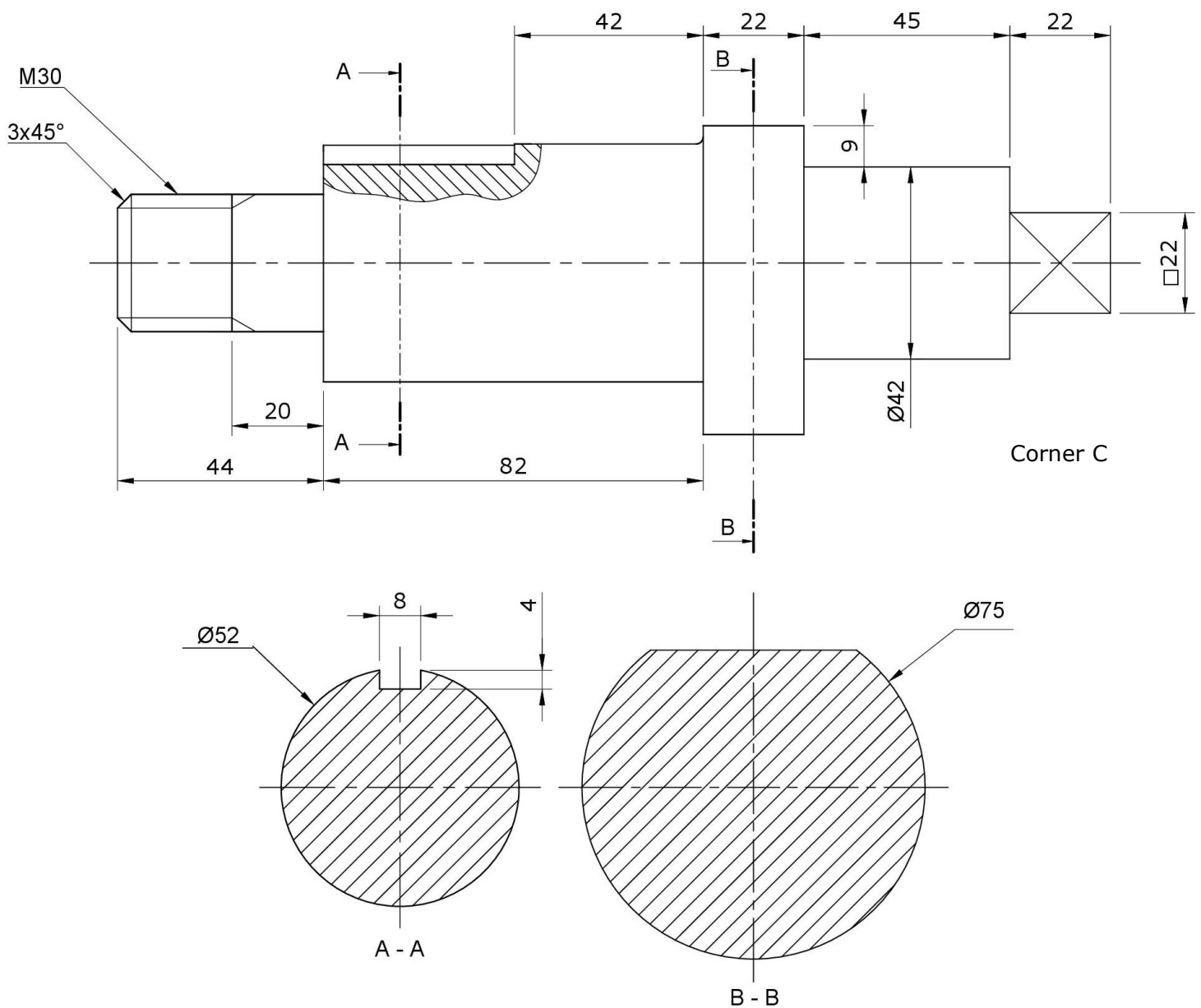


Figure 7

SECTION C

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

Question 8

A group of students wanted to start a small business enterprise, and they came up with the idea of producing cardboard hexagonal chocolate boxes. The students constructed the box surface development using CAD software. Figure 8a shows the surface development of the hexagonal box, while Figure 8b shows the final assembled product. The students wrote the following step-by-step textual instructions to produce the chocolate box:

1. Print the hexagonal box development onto the cardboard sheet.
2. Cut out the development using scissors.
3. Score (groove) the folding lines using a ruler and blunt tool.
4. Fold along all scored lines to form the box sides and flaps.
5. Apply glue to the flaps.
6. Join the sides to form the hexagonal box and allow it to dry for fifteen minutes.
7. Fill the box with chocolates.
8. Close and seal the box, ready for sale.

Apart from the textual instructions, the students wanted to add visual instructions to ensure that the message comes across in a clear manner.

- a. Design a pictorial instruction chart titled: **Artisan chocolate**, to present all the step-by-step instructions in a graphic format. (16)
- b. Use suitable layout, typography, direction arrows and colour rendering to enhance the chart. (8)

Note:

Measurements are to be estimated.

(Total: 24 marks)

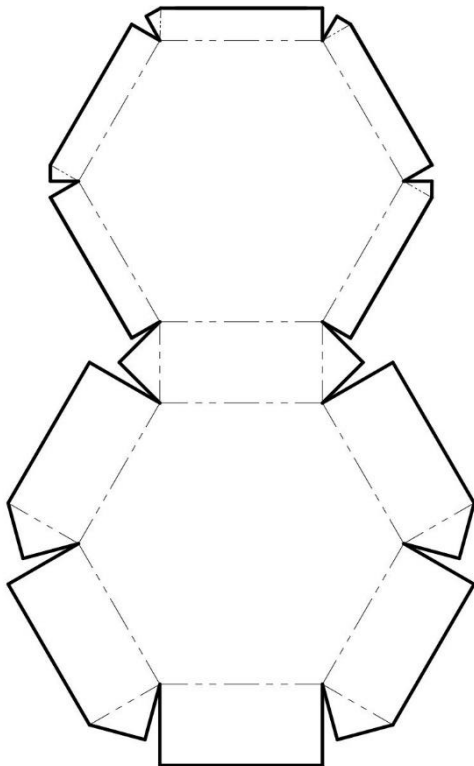


Figure 8a



Figure 8b

Please turn the page.

Question 9

An outdoor stone kitchen with a traditional wood-fired oven is shown in Figure 9b. The entire kitchen sits underneath a wooden canopy as shown in Figure 9a. Orthographic views of the kitchen are shown in Figure 9c.

- Use the dimensions given in the orthographic projection to construct an estimated one-point perspective drawing of the outdoor kitchen. The required vanishing point and the viewing direction are given on the front view and plan of the orthographic projection. (21)
- Render in colour elements of the drawing to enhance its presentation. (3)

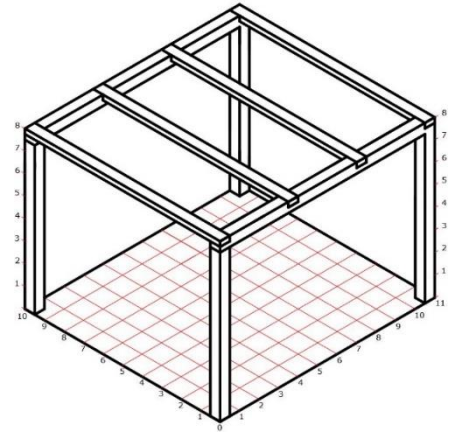


Figure 9a

Note:

Some of the wooden beams in the isometric and orthographic views have been cut for clarity purposes.

(Total: 24 marks)

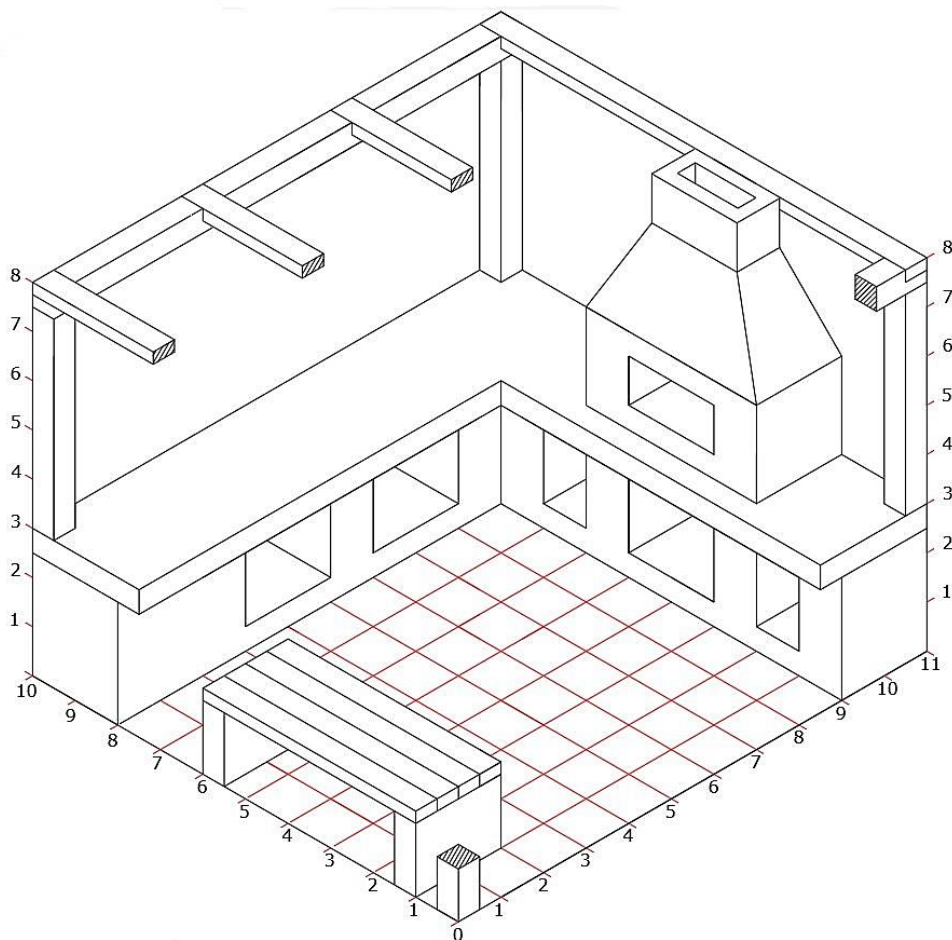


Figure 9b

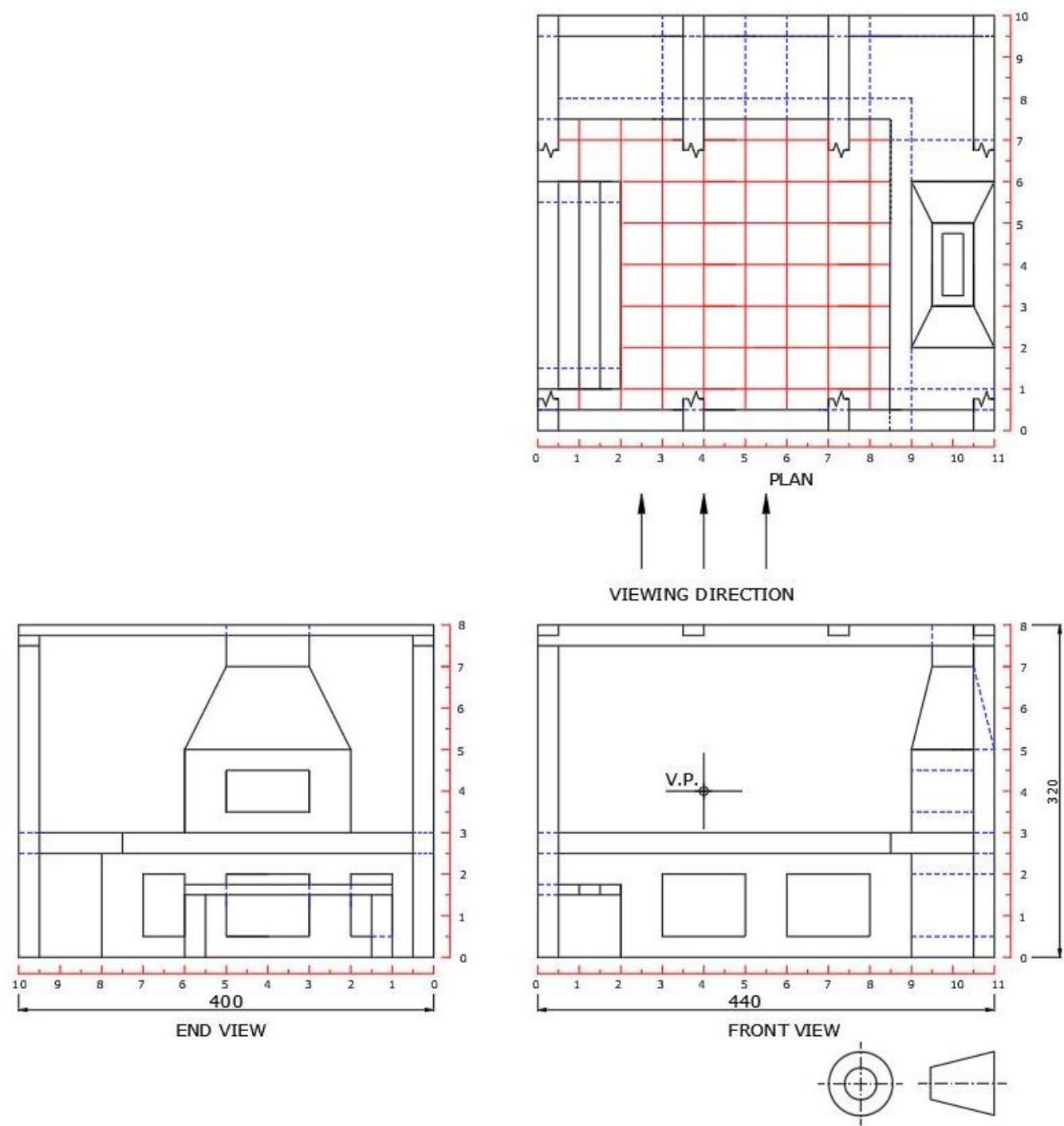
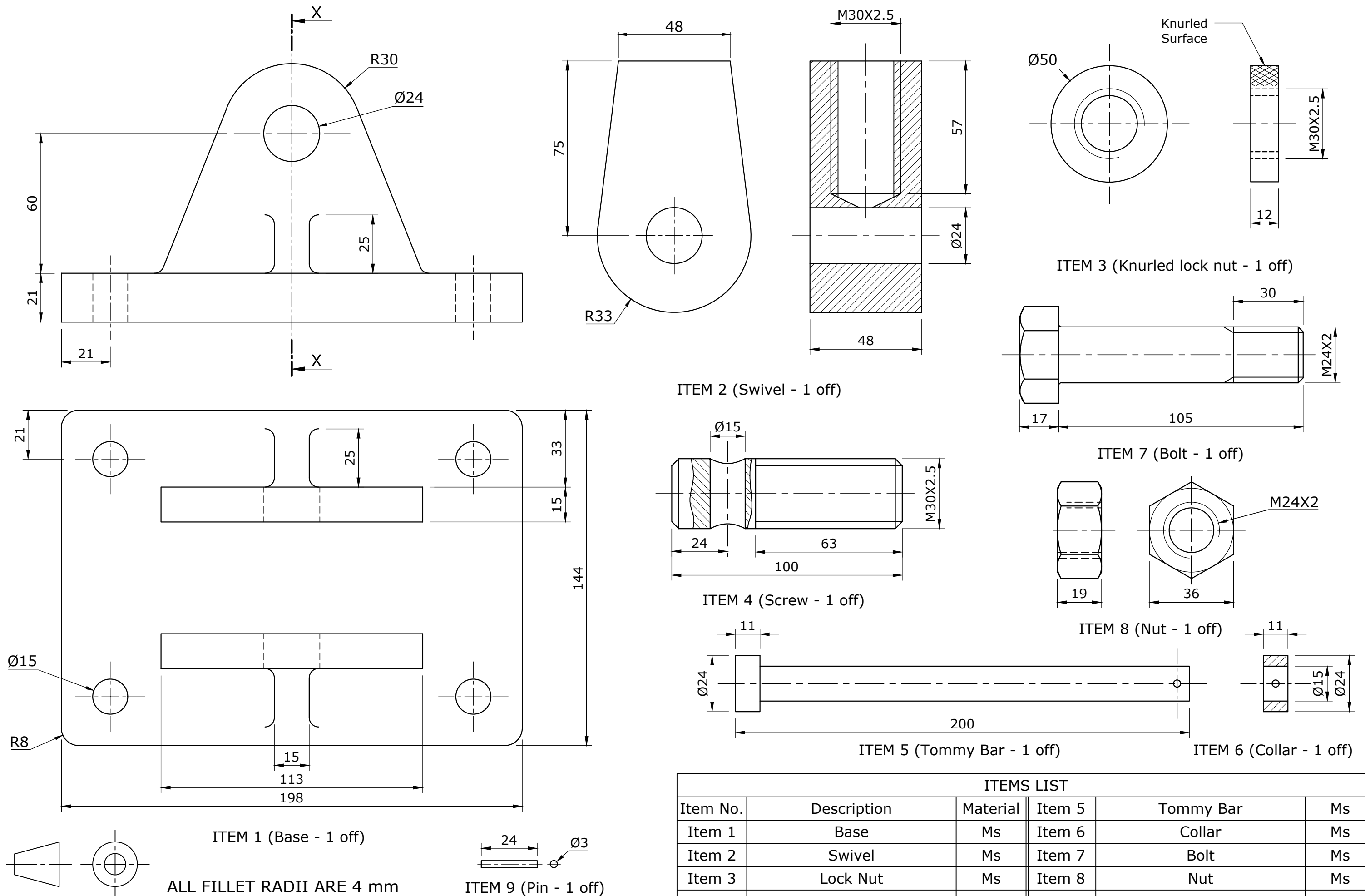


Figure 9c



ITEMS LIST					
Item No.	Description	Material	Item 5	Tommy Bar	Ms
Item 1	Base	Ms	Item 6	Collar	Ms
Item 2	Swivel	Ms	Item 7	Bolt	Ms
Item 3	Lock Nut	Ms	Item 8	Nut	Ms
Item 4	Screw	Ms	Item 9	Pin	Ms