



Province of the
EASTERN CAPE
DEPARTMENT OF EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 12



ENGINEERING GRAPHICS AND DESIGN P2

SEPTEMBER 2024

PREPARATORY EXAMINATION

MARKS: 200

TIME: 3 hours

This question paper consists of 6 pages.

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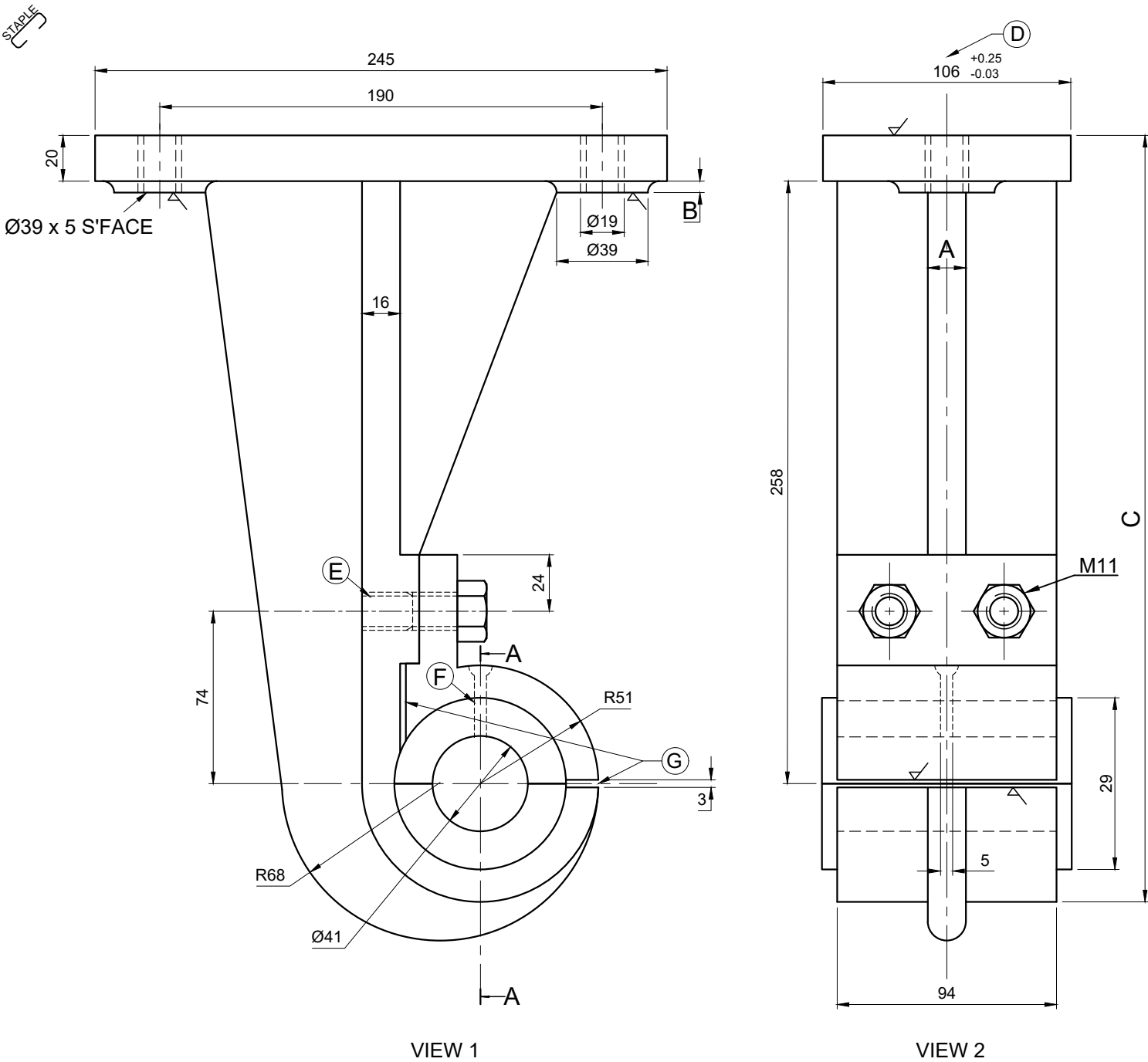
INSTRUCTIONS AND INFORMATION

1. The question paper consists of FOUR questions.
2. Answer ALL the questions.
3. ALL drawings must be drawn to scale 1 : 1, unless otherwise stated.
4. ALL the questions must be answered on the answer sheets provided.
5. ALL the answer sheets must be re-stapled in numerical sequence and handed in irrespective of whether the question was attempted or not.
6. Careful time management is essential in order to complete all the questions.
7. Print your name in the block provided on every ANSWER SHEET.
8. ALL answers must be drawn accurately and neatly.
9. Any details or dimensions not given must be estimated in good proportion.
10. ALL drawings are in third angle orthographic projection, unless otherwise stated.

FOR OFFICIAL USE ONLY									
								MODERATED MARK	
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2									
3									
4									
TOTAL									
2				0				2	0
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FINAL CONVERTED MARK	CHECKED BY
100	

COMPLETE THE FOLLOWING:	
NAME	
NAME	
EXAMINATION CENTRE	
SCHOOL	



QUESTION 1: ANALYTICAL (MECHANICAL)

Given:
A detailed drawing of a bracket bearing, a title block and table of questions. The drawings are not presented to the indicated scale.

Instructions:
Complete the table below by neatly answering the questions, which all refer to the accompanying drawings, the title block and mechanical content. **[30]**

QUESTIONS		ANSWERS		
1	Who approved the drawing?		1	
2	How many revisions have been done on the drawing?		1	
3	Which drawing program was used to create these drawings?		1	
4	How many parts are used to manufacture the bracket?		1	
5	What material is the bracket made of?		1	
6	What does the abbreviation 'S'FACE' stand for?		1	
7	Name the convention at E.		1	
8	What would VIEW 2 be called?		2	
9	What is the feature at F?		1	
10	What is the purpose of the gaps indicated by G?		1	
11	How many threaded holes are there in the assembly?		1	
12	Determine the complete dimensions at : A: B: C:		3	
13	What SI unit is the dimensions presented in?		1	
14	How many surfaces need to be machined?		1	
15	With reference to the tolerance, determine the maximum and minimum dimension at D.		4	
16	In the space provided below, draw, in neat freehand, the convention for a spur gear.		5	
17	In the space below, draw, in neat freehand, the SANS symbol for the projection system used.		4	
TOTAL			30	

APPROVED:	SAM	2024/01/21	2.	
CHECKED:	KYLE	2023/11/19	1. INSERT OIL HOLE	2024/01/11
DRAWN:	SISIPHO	2023/01/02	REVISIONS	DATE

JWA ENGINEERING		6 OAK DRIVE WILLOW PARK 3132 046 821 4911		PARTS LIST		
TITLE:		SCALE: 1 : 4		PART	MATERIAL	QUANTITY
BRACKET BEARING				1. BRACKET	CAST IRON	1
ALL DIMENSIONS ARE IN MILLIMETRES				2. CAP	STAINLESS STEEL	1
PROGRAMME: AUTOCAD 2023				3. LOWER BEARING	MILD STEEL	1
FILE NAME: RVH-2024-189.dwg				4. UPPER BEARING	MILD STEEL	1
DRAWING NO: 5				5. M20 STUD	MILD STEEL	4
QUANTITY: 1 000				6. M20 NUT	MILD STEEL	4

ANSWER 16

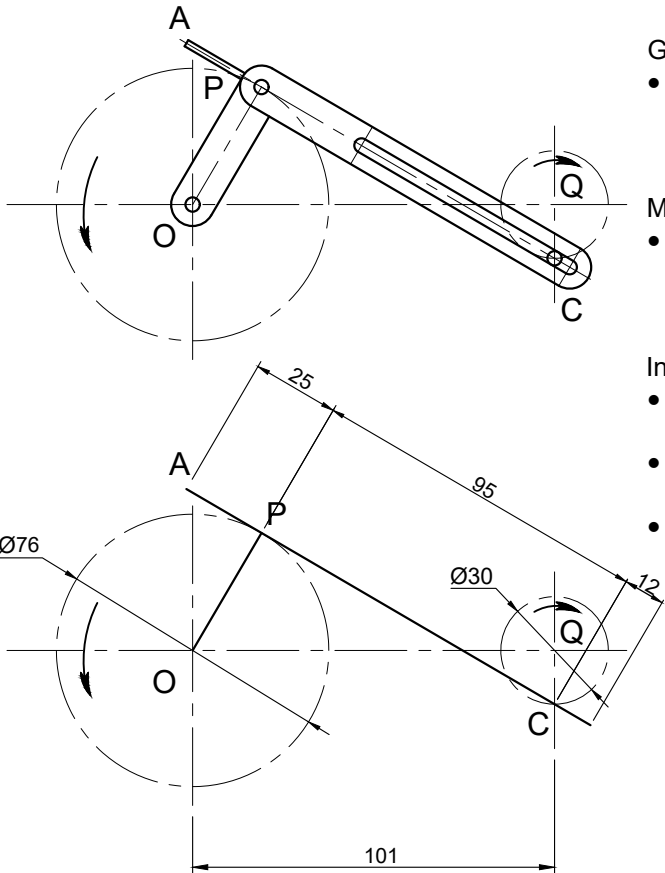
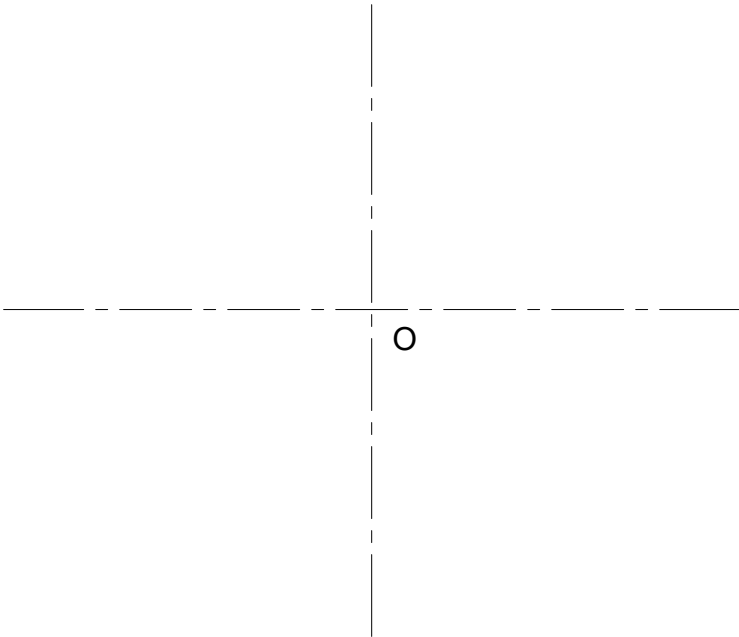
ANSWER 17

NAME

NAME

2

STABLE



QUESTION 2.1: LOCI (MECHANISM)

- Given:
- A mechanism consisting of a crank OP that is pin joined to a slotted link AC. The slotted link slides over a fixed pin C, that is located on the circumference of a wheel, with centre Q.
- Motion:
- Crank OP rotates in an anti-clockwise direction while the wheel, with centre Q , rotates at the same speed in a clockwise direction. The slotted link AC, slides over pin C, as they both rotate.
- Instructions:
- Draw to scale 1 : 1, the given schematic diagram, using point O as given reference point.
 - Trace the loci generated by point A, located on the link AC, as OP completes one revolution.
 - Show all necessary constructions.
- [18]

ASSESSMENT CRITERIA			
1	GIVEN	6	
2	CONSTRUCTION OF DIAGRAM	6	
3	CONSTRUCTION OF LOCI	6	
PENALTY (-)			
SUB-TOTAL		18	

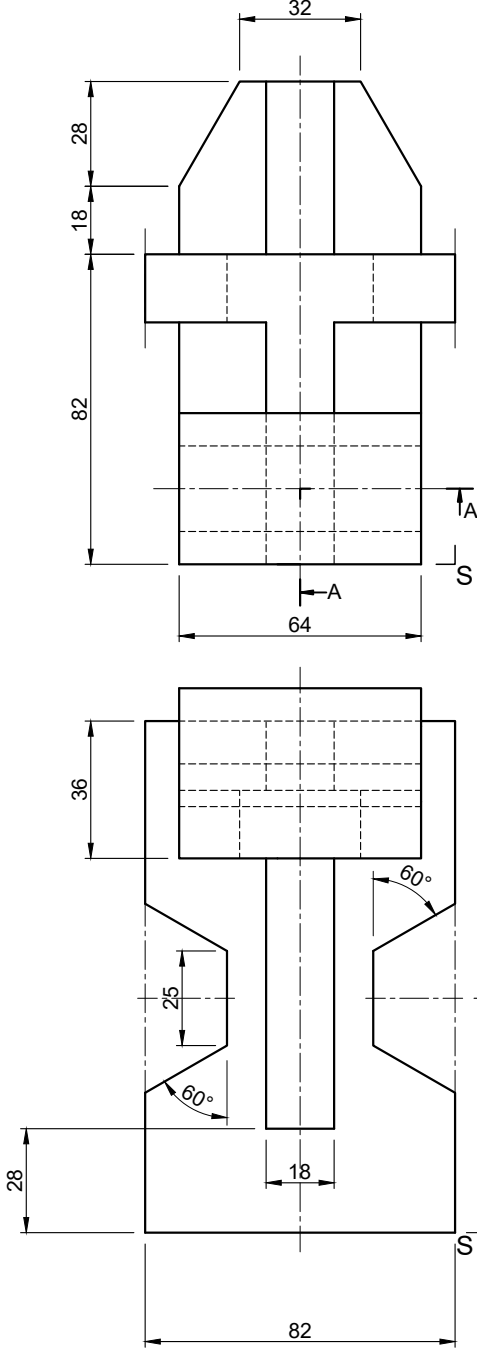
QUESTION 2.2: LOCI (CAM)

- Given:
- The starting position D of the displacement diagram for a cam.
- Specifications:
- The cam imparts the following motion to the follower:
- It dwells for a period of 60°.
 - It rises 50 mm with simple harmonic motion for a period of 90°.
 - It rises 40 mm with uniform motion for a period of 30°.
 - It then dwells for a period of 45°.
 - It returns to the original position with uniform acceleration and retardation for the last 135°.
- Instructions:
- Draw, to a displacement scale of 1 : 1 and horizontal scale of 360° = 132 mm, the complete displacement graph for the required motion.
 - Label the graph and indicate the scale.
 - Show ALL necessary construction.
- [20]

ASSESSMENT CRITERIA			
1	GRAPH CONSTRUCTION	8	
2	DISPLACEMENT GRAPH	10	
3	LABEL AND SCALE	2	
PENALTY (-)			
SUB-TOTAL		20	
TOTAL		38	



NAME	
NAME	3



QUESTION 3: ISOMETRIC

- Given:**
- Three views of a SUPPORT BRACKET in third angle orthographic projection.
 - Cutting plane A-A as seen in the top view.
 - Starting point S.

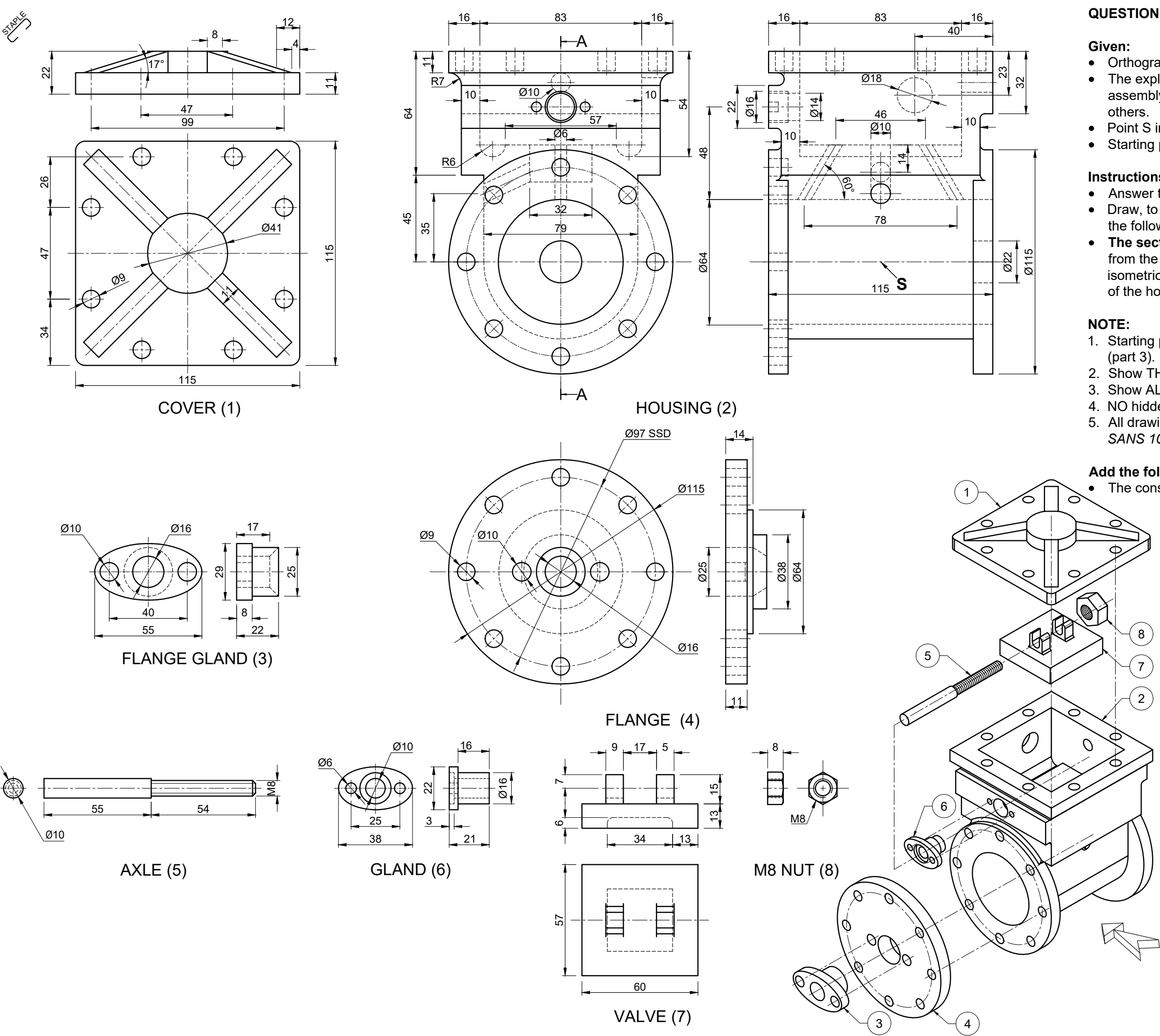
- Instructions:**
- Draw, to scale 1 : 1, a sectional isometric view of the SUPPORT BRACKET.
 - Make point S the lowest point of the drawing.
 - Show ALL necessary construction.
 - NO hidden detail is required.

[40]

S

ASSESSMENT CRITERIA			
1	CONSTR' + PLACEMENT	2½	
2	ISO'- + NON ISO' LINES	19	
3	HALF HEXAGON	4	
4	HALF CIRCLE + CL'S	4	
5	SQUARE	1	
6	SECTION A-A	9½	
TOTAL		40	

NAME	
NAME	4



QUESTION 4: MECHANICAL ASSEMBLY

Given:

- Orthographic views of each of the parts of the steam chest.
- The exploded isometric drawing of the parts of a steam chest assembly, showing the position of each part relative to the others.
- Point S in the front view of the housing.
- Starting point S on the answer sheet, page 6.

Instructions:

- Answer this question on page 6.
- Draw, to scale 1 : 1 and in third angle orthographic projection, the following views of the assembled parts of the safety valve.
- **The sectional front view**, on cutting plane A-A, as seen from the direction of the arrow shown on the exploded isometric drawing. The cutting plane is shown on the left view of the housing (part 2).

- NOTE:**
1. Starting point S is indicated on the front view of the housing (part 3).
 2. Show THREE faces of the M18 nut in the sectional front view.
 3. Show ALL construction.
 4. NO hidden detail is required.
 5. All drawings must comply with the guidelines contained in SANS 10111.

Add the following features on the drawing:

- The construction method for the M8 nut.

[92]

TITLE: <div>STEAM CHEST</div>		
<div>PORTFOMATION</div> <div>INC.</div>		<div>1 SUPIRO RD.</div> <div>BUPIROBAN</div> <div>9347</div> <div>☎ 045 730 5801</div>
ALL DIMENSIONS ARE IN MILLIMETRES		
ALL UNSPECIFIED RADII ARE R3		
<div>LIST OF PARTS</div>		
PART	MATERIAL	QUANTITY
1. COVER	CAST IRON	1
2. HOUSING	CAST IRON	1
3. FLANGE GLAND	MILD STEEL	1
4. FLANGE	MILD STEEL	1
5. AXLE	STAINLESS STEEL	1
6. GLAND	BRONZE	1
7. VALVE	CAST IRON	1
8. M8 NUT	STAINLESS STEEL	1

5



NAME	
NAME	6