STAPLE

EXAMINATION	NATIONAL SENIOR CERTIFICATE
DATE	NOVEMBER 2025
SUBJECT	ENGINEERING GRAPHICS AND DESIGN
PAPER	2
MARK TOTAL	100
DURATION (HOURS)	3
NUMBER OF PAGES	6

SOUTH AFRICAN COMPREHENSIVE ASSESSMENT INSTITUTE
SUID-AFRIKAANSE KOMPREHENSIEWE ASSESSERINGSINSTITUUT

EXAMINATION STICKER

INSTRUCTIONS AND INFORMATION

1. This paper consists of FOUR questions.
2. Answer ALL the questions.
3. ALL drawings are in third-angle orthographic projection, unless otherwise stated.
4. ALL drawings must be prepared using pencil and instruments, unless otherwise stated.
5. ALL answers must be drawn accurately and neatly.
6. ALL questions must be answered on the question paper, as instructed.
7. ALL pages must be placed in numerical order and stapled in ONLY the TOP LEFT CORNER once completed, regardless whether the question was answered or not.
8. Time management is essential in order to complete all the questions.
9. Print script your examination number in the block provided on each page.
10. Any detail or dimensions not given must be assumed in good proportion.

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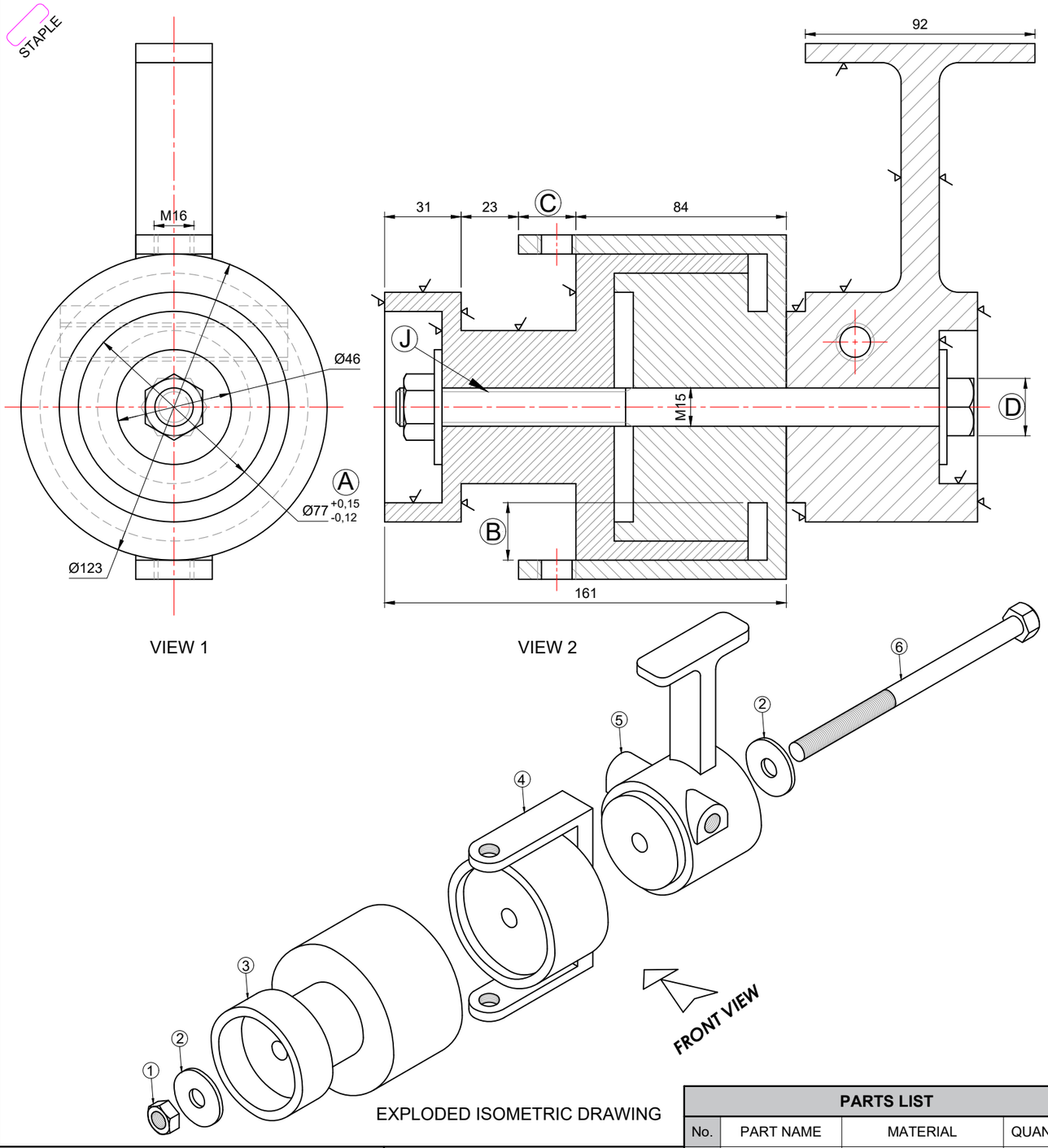
QUESTION	MARK OBTAINED	½	SIGN	MODERATED	½	SIGN	RE-MARKING	½	SIGN
1									
2									
3									
4									
TOTAL:									
	200			200			200		

FINAL CALCULATED MARK	CHECKED
/100	

CENTRE NUMBER
CENTRE NUMBER IDENTIFICATION NUMBER
IDENTIFICATION NUMBER EXAMINATION NUMBER
EXAMINATION NUMBER 1

STAPLE



EXPLODED ISOMETRIC DRAWING

QUESTION 1: MECHANICAL ANALYTICAL

Given:
Two views and an exploded isometric drawing of an FISHING REEL ASSEMBLY, a parts list, a title block and a table of questions.

Instructions:
Complete the table below by neatly answering the questions, which refer to the accompanying drawing, title block, parts list and mechanical content. **[25]**

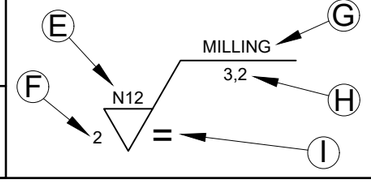
	QUESTIONS	ANSWERS			
1	What is the title of the drawing?		1		
2	Who approved the drawing?		1		
3	On what date was the drawing checked?		1		
4	What does the abbreviation NTS stand for?		1		
5	From what material is part 3 made of?		1		
6	How many parts makes up the fishing reel assembly?		1		
7	With reference to the tolerance at A, determine the minimum dimension.		1		
8	What is the thickness of the NUT?		1		
9	How many surfaces of part 5 must be machined?		1		
10	What would VIEW 1 be called?		1		
11	Determine the complete dimensions at:	B:	1		
		C:	1		
		D:	1		
12	With reference to the machining symbol below (QUESTION 12), match the letter on the symbol with the correct label in the column to the right of this question.	PRODUCTION METHOD	1		
		ROUGHNESS VALUE	1		
		DIRECTION OF LAY	1		
		MACHINING ALLOWANCE	1		
13	Name the feature at J.		1		
14	In the space below (ANSWER 14), draw in neat **freehand**, the symbol for the projection system used.		4		
15	Insert the cutting plane for VIEW 2 on VIEW 1 and label the cutting plane A-A.		3		
			25		

ANSWER 14: PROJECTION SYMBOL

PARTS LIST

No.	PART NAME	MATERIAL	QUANTITY
1	NUT	STAINLESS STEEL	1
2	WASHER	STAINLESS STEEL	2
3	SPOOL	GRAPHITE	1
4	LINE ROLLER	ALUMINIUM	1
5	REEL FOOT	GRAPHITE	1
6	BOLT	STAINLESS STEEL	1

QUESTION 12: MACHINING SYMBOL



FISH ENGINEERING
15 BELLA STREET,
JOHANNESBURG, 5680
☎ 071 582 5490
www.fishengineering.co.za

TITLE:
FISHING REEL ASSEMBLY

DRAWN:	AMIRAH	DATE:	07/02/2025
CHECKED:	JAN	DATE:	15/05/2025
APPROVED:	CALEB	DATE:	06/07/2025
UNLESS OTHERWISE SPECIFIED, ALL TOLERANCES ARE ±0,2		ALL DIMENSIONS ARE IN MILLIMETRES	
DRAWING PROGRAM: AUTOCAD 2025		QUANTITY: 500 FISHING REELS	
DRAWING NUMBER: EGD-P2		SCALE: NTS	

EXAMINATION NUMBER

EXAMINATION NUMBER 2

STAPLE

QUESTION 2: LOCI

NOTE: Answer QUESTIONS 2.1 and 2.2

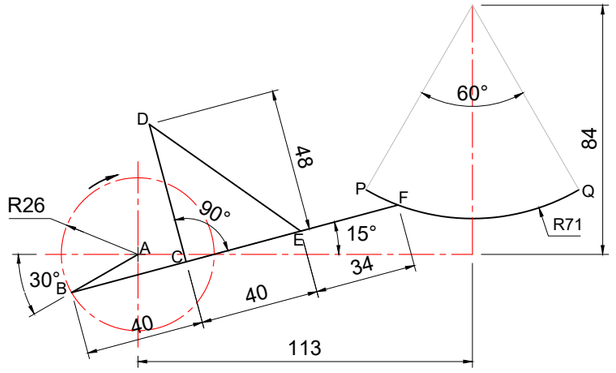
2.1 MECHANISM

Given:
- A schematic drawing of a mechanism consisting of crank AB, sliding rod BF, connecting rods CDE and curve rod PQ.
- The position of centre point A on the answer sheet.

Specifications:
- The positions of centre point A and curve rod PQ are fixed.
- Rod BF is 114mm.
- The radius of the curve rod PQ is 71mm.
- C and E are pin-jointed to sliding rod BF.

Motion:
As crank AB rotates clockwise, point F reciprocates along the curve PQ.

Instructions:
- Using centre point A on the drawing sheet, draw, to a scale of 1 : 1, the schematic drawing of the mechanism.
- Trace the loci generated by point C and D for ONE complete clockwise rotation of crank AB.
- Show ALL necessary construction. **[25]**



A

ASSESSMENT CRITERIA						
1	GIVEN	8				
2	LOCI OF C + CONSTRUCTION	8½				
3	LOCI OF E + CONSTRUCTION	8½				
	PENALTIES(-):					
	SUBTOTAL:	**25**				

2.2 CAM

Given:
The top left-hand corner of the displacement graph, marked 0°, on the drawing sheet.

Motion:
A cam rotates at constant velocity imparting the following motion to a follower:
- The follower falls 50mm with uniform acceleration and retardation over the first 180°.
- The follower falls another 13mm over the next 30° with uniform motion.
- There is a dwell period for the next 15°.
- It rises 25mm with uniform motion for the next 45°.
- The follower returns to its original starting position with simple harmonic motion.

Instructions:
- Draw to a rotational scale of 30°=10mm and a displacement scale of 1:1, the complete displacement graph for the required motion.
- Label the displacement graph.
- Show ALL necessary construction. **[15]**

0°

ASSESSMENT CRITERIA						
1	LABELS + CONSTRUCTION	5				
2	DISPLACEMENT GRAPH	10				
	PENALTIES(-):					
	2.2 SUBTOTAL:	**15**				
	2.1 SUBTOTAL:	**25**				
	TOTAL:	**40**				

EXAMINATION NUMBER	
EXAMINATION NUMBER	3

STAPLE

QUESTION 3: ISOMETRIC DRAWING

Given:

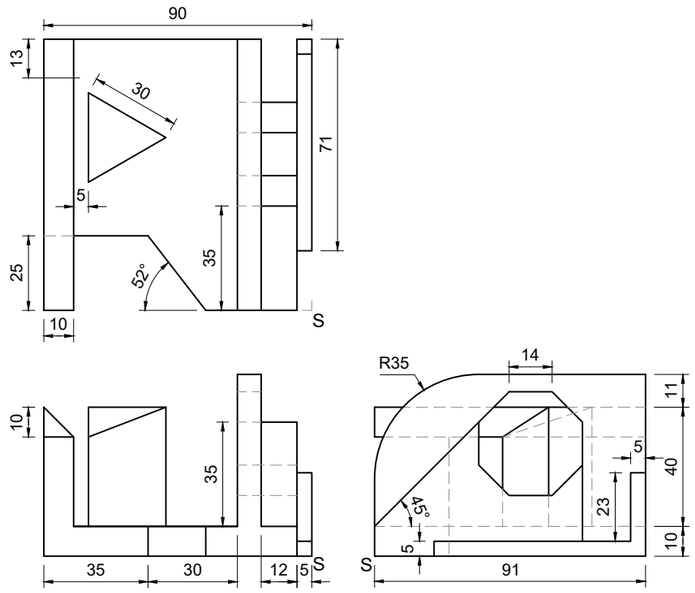
- The front view, top view and right view of a casting.
- The position of point S on the drawing sheet.

Instructions:

Using scale 1 : 1, convert the orthographic views of the casting into an isometric drawing.

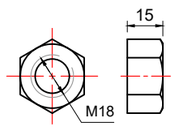
- Use point S as the starting point and lowest point of the drawing.
- Show ALL necessary construction.
- NO hidden detail is required.

[40]

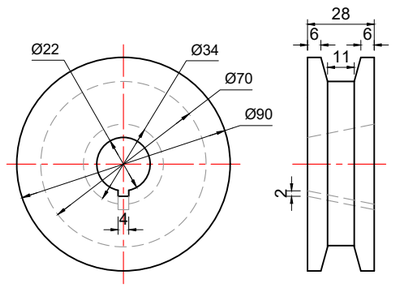


S

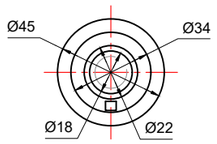
ASSESSMENT CRITERIA					
1	AUXILIARY VIEWS + PLACEMENT + ORIENTATION	4			
2	OCTAGON + NON ISOMETRIC LINES	11			
3	CIRCLE + CIRCLE CONSTRUCTIONS + CENTRE LINES	3			
4	ISOMETRIC LINES	22			
	PENALTIES(-):				
	TOTAL:	**40**			
EXAMINATION NUMBER					
EXAMINATION NUMBER					4

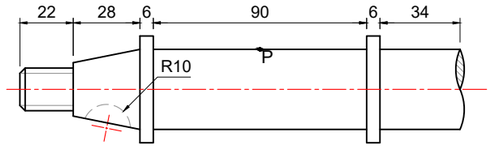


M16 NUT (1)

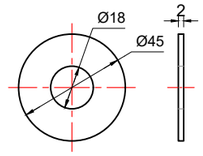


PULLEY (3)

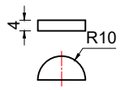




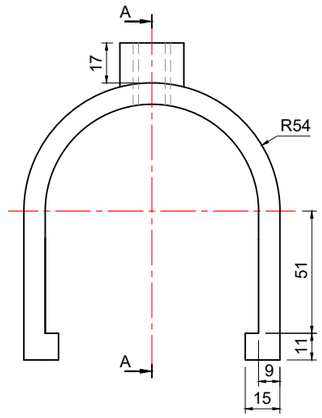
SHAFT (4)

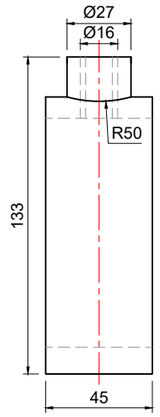


WASHER (2)

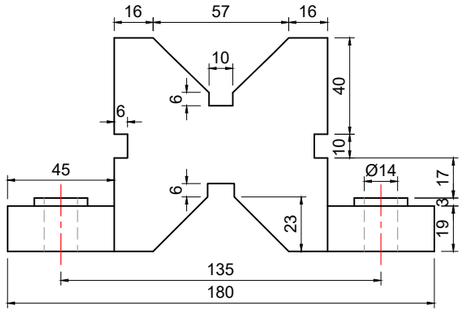


KEY (5)





CLAMP (7)



V-BLOCK (6)

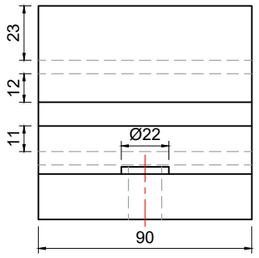
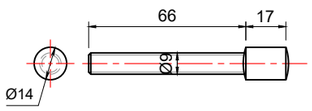
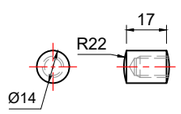


FIGURE A

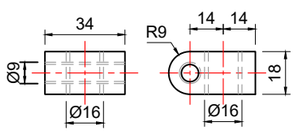
EXPLODED ISOMETRIC DRAWING



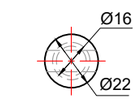
HANDLE SHAFT (8)

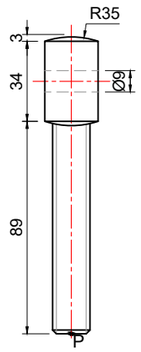


HANDLE CAP (9)



HANDLE BASE (10)





SCREW (11)

QUESTION 4: MECHANICAL ASSEMBLY

Given:

- The exploded isometric drawing of the parts of a clamp assembly, showing the position of each part relative to all the others.
- Orthographic views of each part of the clamp assembly.
- A parts list.

Instructions:

- Answer this question on page 6,
- Draw, to scale of 1 : 1 and in third angle orthographic projection, the following views of the assembled parts of the clamp assembly:
  - 4.1 **A full sectional front view** on cutting plane A-A, as seen from the direction of the arrow on the exploded isometric drawing. The cutting plane, which passes through the vertical centre line of the assembly, is shown on the front view of the clamp (part 7).
  - 4.2 **The left view**. Show only the right half of the view by applying the convention for the representation of a symmetrical object.

NOTE:

- Planning is essential.
- ALL drawings must comply with the guidelines contained in the *SANS 10111*.
- Point P on the screw (part 11) must align and touch point P on the shaft (part 4).
- Show three faces of the M16 nut in the front view.
- NO hidden detail is required.
- HINT: The key fits centrally on the pulley.
- HINT: The shaft fits centrally on the V-block. See FIGURE A.

[95]

PARTS LIST

No.	PART NAME	QUANTITY
1	NUT	1
2	WASHER	1
3	PULLEY	1
4	SHAFT	1
5	KEY	1
6	V - BLOCK	1
7	CLAMP	1
8	HANDLE SHAFT	1
9	HANDLE CAP	1
10	HANDLE BASE	1
11	SCREW	1

MBEKI
DRAUGHTING

PIETERMARITZBURG
P.O. BOX 0024
☎ 012 014 5862

CLAMP ASSEMBLY

ALL DIMENSIONS ARE IN MILLIMETRES

Please turn over

STAPLE

FOR OFFICIAL USE ONLY	
INCORRECT ORTHOGRAPHIC PROJECTION	
INCORRECT OVERALL SCALE	
INCORRECT HATCHING	
PARTS NOT ASSEMBLED	
TOTAL:	

ASSESSMENT CRITERIA					
LEFT VIEW					
1	NUT	2			
2	WASHER	½			
3	PULLEY	1½			
4	SHAFT	3			
5	KEY	1			
6	V - BLOCK	7½			
7	CLAMP	4			
8	HANDLE SHAFT	5			
9	HANDLE BASE	1½			
10	SCREW	7½			
	SUBTOTAL:	**33½**			
FULL SECTIONAL FRONT VIEW					
1	NUT	3½			
2	WASHER	1			
3	PULLEY	7½			
4	SHAFT	11½			
5	KEY	1½			
6	V - BLOCK	4½			
7	CLAMP	6			
8	HANDLE SHAFT	1			
9	HANDLE BASE	2½			
10	SCREW	5½			
	SUBTOTAL:	**44½**			
GENERAL					
1	CENTRE LINES - ℄	4			
2	ASSEMBLY	10			
3	CUTTING PLANE AND SYMMETRY	3			
	SUBTOTAL:	**17**			
	TOTAL:	**95**			
	PENALTIES(-):				
	GRAND TOTAL:				

EXAMINATION NUMBER	
EXAMINATION NUMBER	6

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