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Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATIONS/
NATIONAL SENIOR CERTIFICATE EXAMINATIONS

ENGINEERING GRAPHICS AND DESIGN P2

MAY/JUNE 2026

MARKS: 100

TIME: 3 hours

This question paper consists of 6 pages.

Barcode label

INSTRUCTIONS AND INFORMATION

1. This question 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 the questions must be answered on the QUESTION PAPER, as instructed.
7. ALL the pages, irrespective of whether the question was attempted or not, must be re-stapled in numerical sequence in the TOP LEFT-HAND CORNER ONLY.
8. Time management is essential in order to complete all the questions.
9. Print your examination number in the block provided on every page.
10. Any details or dimensions not given must be assumed in good proportion.

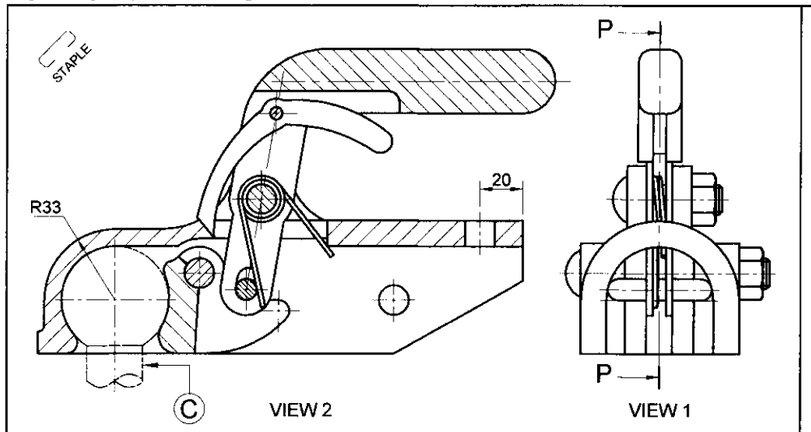
FOR OFFICIAL USE ONLY											
QUESTION	MARKS OBTAINED	½	SIGN	MODERATED	½	SIGN	RE-MARKING	½	SIGN
1											
2											
3											
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TOTAL											
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FINAL CONVERTED MARK	CHECKED BY
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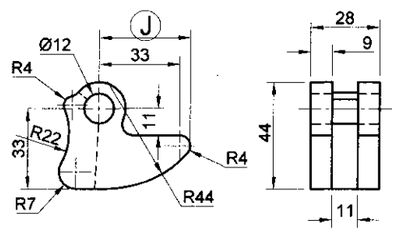
COMPLETE THE FOLLOWING: .
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EXAMINATION NUMBER

DO NOT FOLD THE QUESTION PAPER IN HALF.

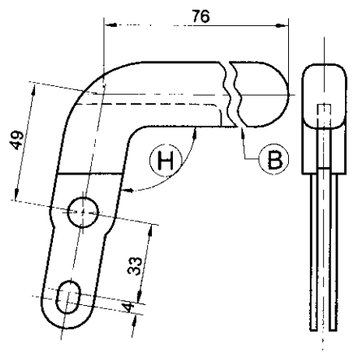
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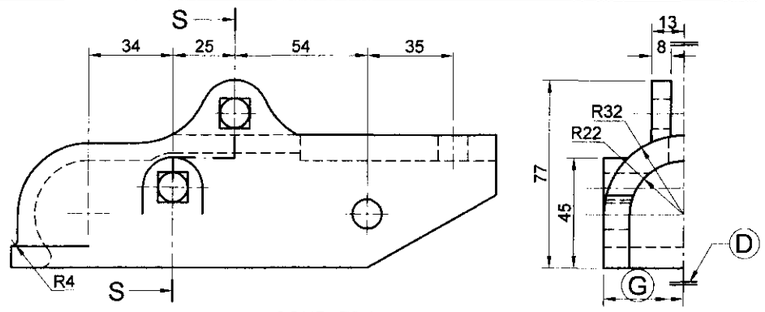
VIEW 2 VIEW 1



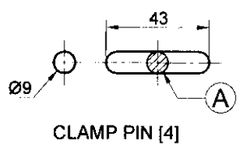
CLAMP [2]



CLAMP LEVER [3]

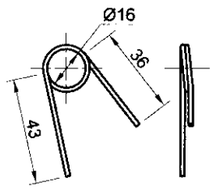


COUPLER HOUSING [1]

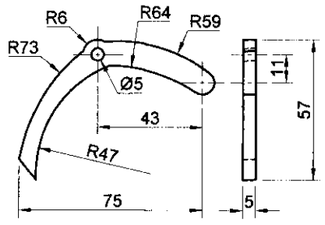


LOCK PIN [7]

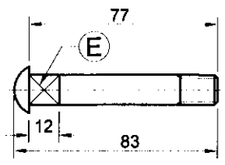
CLAMP PIN [4]



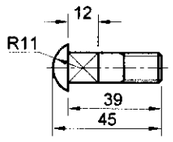
CLAMP SPRING [5]



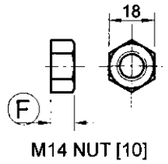
LOCK LEVER [6]



M14 x 77
BOLT [8]



M14 x 39
BOLT [9]



M14 NUT [10]

PARTS LIST

NO.	PART	QUANTITY	MATERIAL	NO.	PART	QUANTITY	MATERIAL
1	COUPLER HOUSING	1	CAST IRON	6	LOCK LEVER	1	SILVER STEEL
2	CLAMP	1	CAST STEEL	7	LOCK PIN	1	STEEL
3	CLAMP LEVER	1	STEEL	8	M14 x 77 BOLT	1	STEEL
4	CLAMP PIN	1	STEEL	9	M14 x 39 BOLT	1	STEEL
5	CLAMP SPRING	1	SPRING STEEL	10	M14 NUT	2	STEEL

FILE NAME: SC-10810	QUANTITY: 350 TRAILER HITCHES	ALL UNSPECIFIED RADII ARE 4 mm.	TOLERANCE: +0,55 -0,45
DRAWING No. 025	SCALE: 1 : 5		
CLIENT: LBJ TRAILER DESIGN, SOMERSET EAST	DRAWING PROGRAMME: AUTOCAD 2026	ALL DIMENSIONS ARE IN MILLIMETRES.	
LYNX DRAUGHTING CC 75 BHACA LANE, CRADOCK 5880	www.rooikatdraw.co.za ☎ 023 685 1857	DRAWN: JRC	DATE: 21/05/2025
		CHECKED: MAURIZIO	DATE: 25/05/2025
TITLE: TRAILER HITCH		APPROVED: JOHN	DATE: 27/05/2025

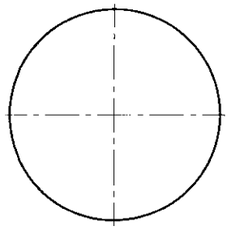
QUESTION 1: ANALYTICAL (MECHANICAL)

Given:
Two views of a trailer hitch assembly, views of the individual parts of the trailer hitch, a parts list, a title block and a table of questions. The drawings are not presented to the indicated scale.

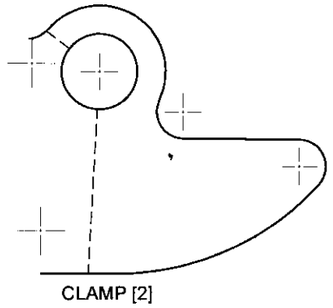
Instructions:
Complete the table below by neatly answering the questions, which refer to the accompanying drawings, title block and mechanical content. Abbreviations may not be used, unless otherwise stated. **[30]**

	QUESTIONS	ANSWERS	
1	What did John do?		1
2	What was done on 25/05/2025?		1
3	What is the client's name?		1
4	What material is required for the clamp lever?		1
5	What scale is indicated for the drawing?		1
6	How many parts are required for ONE complete trailer hitch?		1
7	How many M14 nuts are required for the full order?		1
8	If VIEW 1 is the right view, what is the full name for VIEW 2?		1
9	Name the type of section shown at A.		1
10	Name the section that would be produced by cutting plane S-S.		1
11	What conventional representation is indicated by the break lines at B?		1
12	What does the double-dash chain line at C indicate?		1
13	What is indicated by the parallel lines at D?		1
14	What is indicated by the cross at E?		1
15	Determine the complete dimensions at: F: G:		2
16	Measure the angle at H. H:		1
17	With reference to the tolerance, determine the **maximum** size for the dimension at J. Show the calculations.		1
18	In the space below (ANSWER 18), draw, in neat freehand on the given disc, the *SANS 10111* conventional representation for 6 holes on a circular pitch.		3
19	In the space below (ANSWER 19), complete, with instruments and to **scale 1 : 1**, the view of the clamp. Show ALL construction.		4
20	With reference to the table and the welding symbol below (ANSWER 20), match the encircled number on the symbol with the correct label in the table.		5
		TOTAL	**30**

ANSWER 18



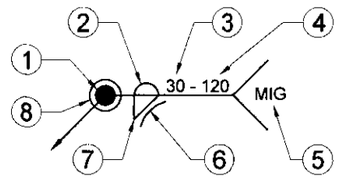
ANSWER 19



CLAMP [2]

DESCRIPTION	
WELD ALL AROUND	
PITCH OF WELD	
FILLET WELD	
LENGTH OF WELD	
WELDING PROCESS	

ANSWER 20



EXAMINATION NUMBER	
EXAMINATION NUMBER	2

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S 0°

QUESTION 2: LOCI

NOTE: Answer QUESTIONS 2.1 and 2.2.

2.1: CAM

Given:
The bottom left-hand corner of the displacement graph, marked S, on the drawing sheet

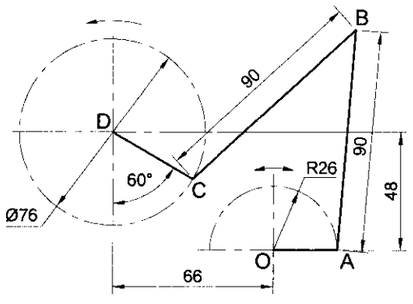
Motion:
A cam starts at the **minimum** displacement and imparts the following motion:
- There is a dwell period for the first 45°.
- It rises 18 mm over the next 15° with uniform motion.
- It rises a further 64 mm over the next 90° with simple harmonic motion.
- It descends 48 mm over the next 120° with uniform acceleration and retardation.
- Over the next 75° it descends to the minimum displacement with uniform motion.
- It returns to its original position over the last 15°.

Instructions:
- Start at corner S and draw, to a rotational scale of 156 mm = 360° and a displacement scale of 1 : 1, the displacement graph for the given motion.
- Label the displacement graph and include the rotational scale.
- Show ALL construction. **[17½]**

ASSESSMENT CRITERIA 2.1					
1	GRAPH CONSTRUCTION	6			
2	POINTS + CURVES	10½			
3	LABELS	1			
PENALTIES (-)					
	SUBTOTAL	**17½**			

2.2: MECHANISM

Given:
- A schematic diagram of a mechanism consisting of crank OA, connecting rod AB, connecting rod BC and crank DC
- The position of centre point O on the drawing sheet



Specifications:
- The positions of centre point O and centre point D are fixed.
- Connecting rod AB is pin-jointed to crank OA at A.
- Connecting rod BC is pin-jointed to connecting rod AB at B.
- Connecting rod BC is pin-jointed to crank DC at C.

Motion:
As crank OA oscillates through 180° on centre point O, crank DC rotates in an anti-clockwise direction at the same speed.

Instructions:
- Using centre point O, draw, to scale 1 : 1, the given schematic diagram of the mechanism and label ALL the given points.
- Trace the locus generated by point B for ONE complete motion of crank OA and crank DC.
- Show ALL construction. **[21½]**

O

ASSESSMENT CRITERIA 2.2					
1	GIVEN	7½			
2	CONSTRUCTION	5			
3	POINTS + CURVE	9			
PENALTIES (-)					
	SUBTOTAL 2.2	**21½**			
	SUBTOTAL 2.1	**17½**			
	TOTAL	**39**			

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QUESTION 3: ISOMETRIC DRAWING

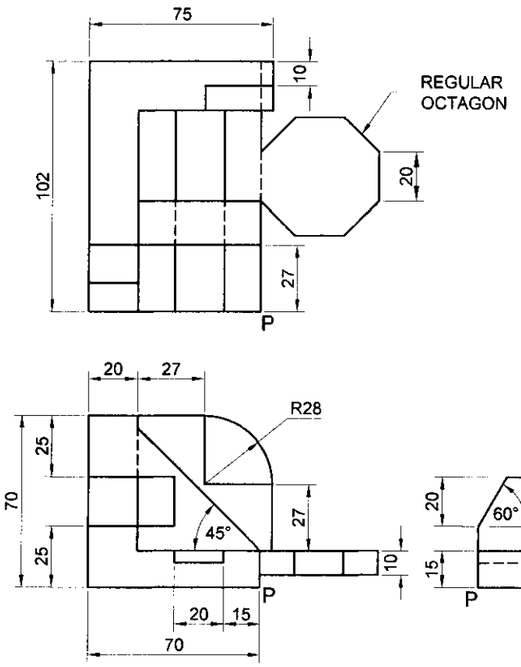
Given:

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

Instructions:

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

- Use P as the starting point and lowest point of the drawing.
- Show ALL construction.
- NO hidden detail is required. **[41]**

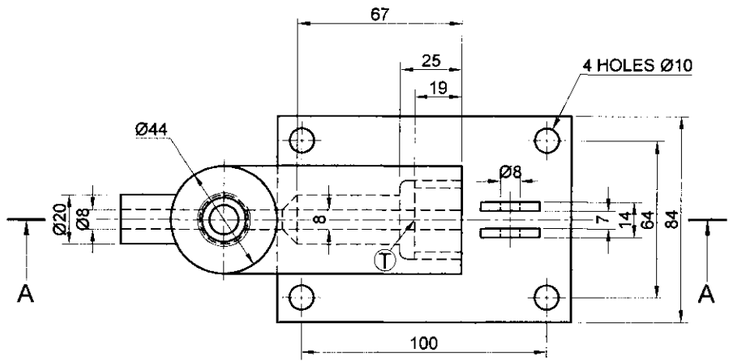


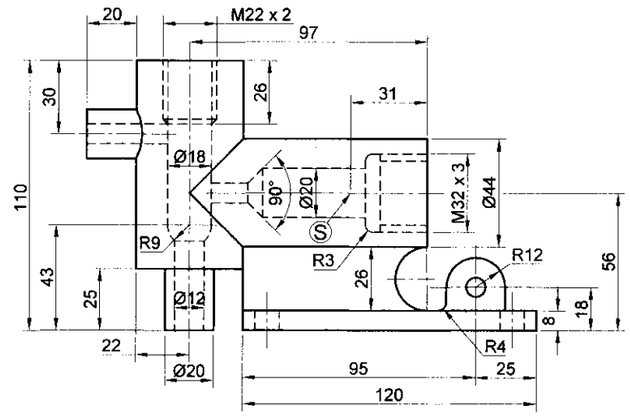
P

ASSESSMENT CRITERIA					
1	PLACING + AUX. VIEW	2½			
2	BASE	12½			
3	UPPER PORTION	17½			
4	ARCS + CONSTRUCTION	2½			
5	OCTAGON	6			
PENALTIES (-)					
	TOTAL	41			

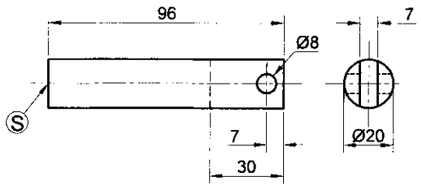
EXAMINATION NUMBER	
EXAMINATION NUMBER	4

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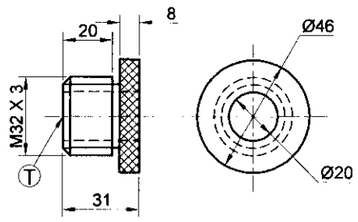




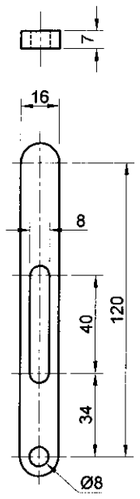
PUMP HOUSING [1]



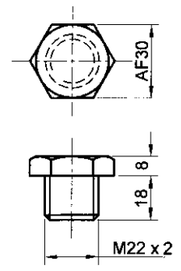
PLUNGER [2]



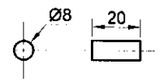
PLUNGER GUIDE [5]



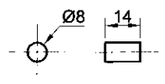
LEVER [3]



CAP SCREW [4]



PIN 1 [6]



PIN 2 [7]

O-RING [8]



VALVE BALL [9]

EXPLODED ISOMETRIC DRAWING

QUESTION 4: MECHANICAL ASSEMBLY

Given:

- Orthographic views of each part of a manual pump assembly
- The exploded isometric drawing of the parts of the manual pump assembly, showing the position of each part relative to all the others

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 manual pump assembly:
  - 4.1 **A sectional front view** on cutting plane A-A, as seen from the direction of the arrow on the exploded isometric drawing. The cutting plane is shown on the top view of the pump housing (part 1).
  - 4.2 **The top view**

NOTE:

- Planning is essential.
- The drawing must comply with the *SANS 10111* guidelines.
- The convention of symmetry may NOT be applied.
- Show THREE faces of the hexagonal head of the cap screw (part 4).
- Align point **S** on the plunger (part 2) with point **S** in the pump housing (part 1).
- Align point **T** on the plunger guide (part 5) with point **T** in the pump housing (part 1).
- Show the convention for diamond knurling on the top view of the plunger guide (part 5).
- Add cutting plane A-A.
- NO hidden detail is required. **[90]**

PARTS LIST

	PART	QUANTITY	MATERIAL
1	PUMP HOUSING	1	CAST IRON
2	PLUNGER	1	BRASS
3	LEVER	1	MILD STEEL
4	CAP SCREW	1	BRASS
5	PLUNGER GUIDE	1	BRASS
6	PIN 1	1	MILD STEEL
7	PIN 2	1	MILD STEEL
8	O-RING	1	RUBBER
9	VALVE BALL	1	STAINLESS STEEL

PUMP JOCK ENGINEERING CC
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MANUAL PUMP

ALL DIMENSIONS ARE IN MILLIMETRES.

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FOR OFFICIAL USE ONLY	
INCORRECT ORTHOGRAPHIC PROJECTION	
INCORRECT OVERALL SCALE	
INCORRECT HATCHING	
PARTS NOT ASSEMBLED	
TOTAL PENALTIES (-)	

ASSESSMENT CRITERIA

TOP VIEW

		POSSIBLE	OBTAINED	SIGN	MODERATED
1	PUMP HOUSING	8 ½			
2	PLUNGER	2 ½			
3	LEVER	1 ½			
4	CAP SCREW	2 ½			
5	GUIDE + KNURLING	5			
SUBTOTAL		**20**			

SECTIONAL FRONT VIEW

1	PUMP HOUSING	26			
2	PLUNGER	6			
3	LEVER + ANGLE	5			
4	CAP SCREW	6 ½			
5	GUIDE	7			
6	O-RING	2 ½			
7	PINS	2			
8	BALL VALVE	1			
SUBTOTAL		**56**			

GENERAL

1	CENTRE LINES	3			
2	CUTTING PLANE	3			
3	ASSEMBLY	8			
SUBTOTAL		**14**			
TOTAL		**90**			
PENALTIES (-)					
GRAND TOTAL					

EXAMINATION NUMBER

EXAMINATION NUMBER 6

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