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basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATIONS/ NATIONAL SENIOR CERTIFICATE EXAMINATIONS

ENGINEERING GRAPHICS AND DESIGN P2

2021

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			$\frac{1}{2}$	SIGN	MODERATED			$\frac{1}{2}$	SIGN	RE-MARKING			$\frac{1}{2}$	SIGN
1															
2															
3															
4															
TOTAL															
	2	0	0			2	0	0			2	0	0		

FINAL CONVERTED MARK

100

CHECKED BY

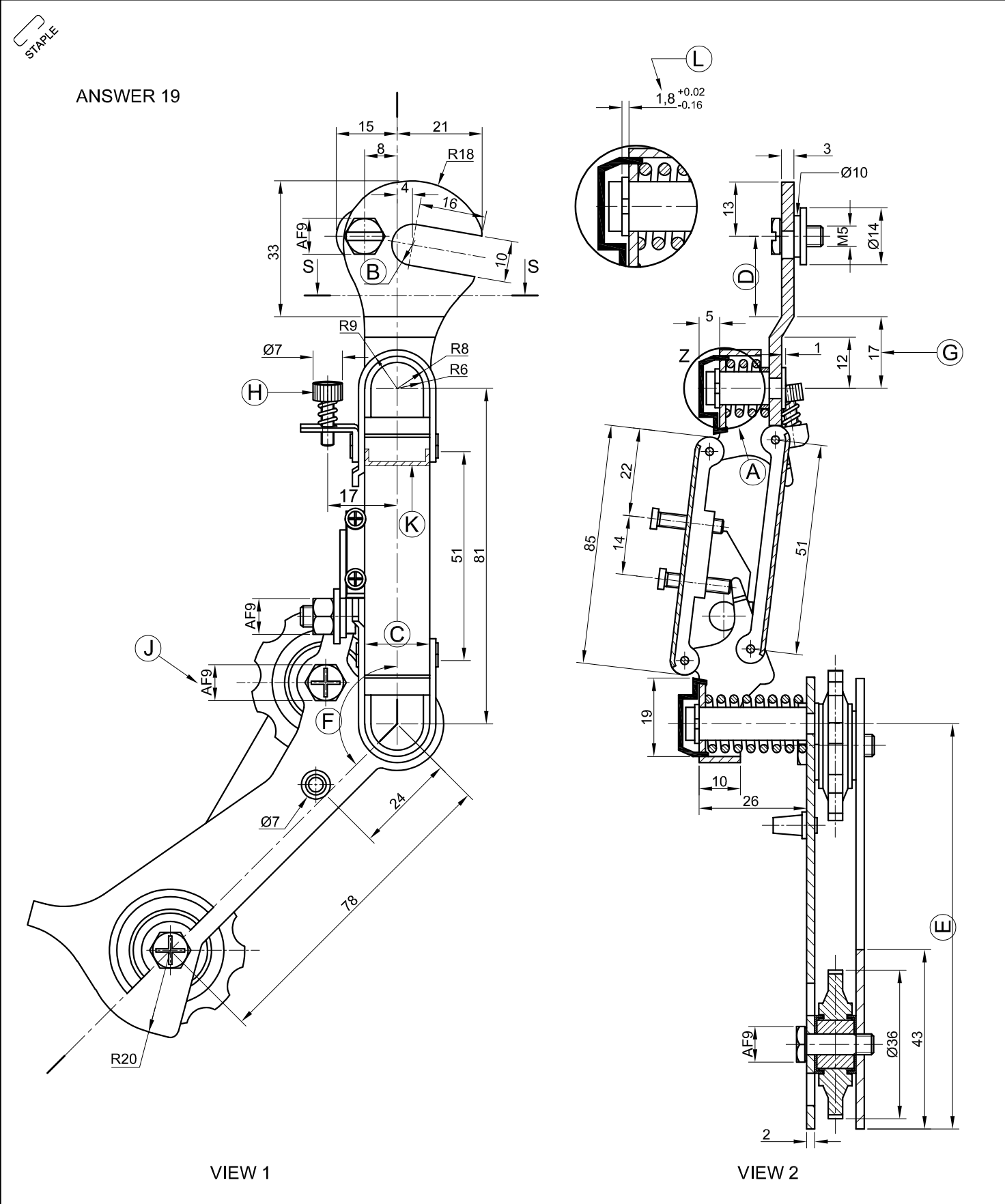
COMPLETE THE FOLLOWING:

CENTRE NUMBER

CENTRE NUMBER

EXAMINATION NUMBER

EXAMINATION NUMBER



QUESTION 1: ANALYTICAL (MECHANICAL)

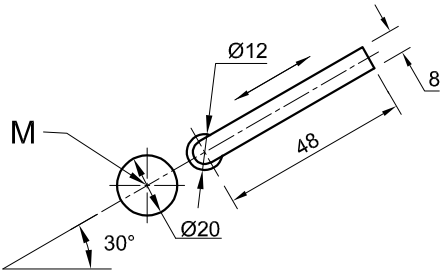
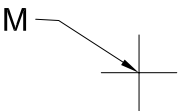
Given:
Two views of a rear derailleur assembly for a bicycle, a detailed enlargement, a title block and a table of questions.
The drawing is not presented to the indicated scale.

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

QUESTIONS		ANSWERS		
1	What is the title of the drawing?	1		
2	In which street is the engineering company situated?	1		
3	How many sets of drawings are there for this assembly?	1		
4	Who checked the drawing?	1		
5	What is the file name?	1		
6	If VIEW 1 is the front view, what is VIEW 2 called?	2		
7	Label the detailed enlargement of the encircled area at A on the given drawing.	1		
8	How many coil springs are there in the assembly?	1		
9	Determine the complete dimensions at: B: C: D: E:	4		
10	Measure the angle at F.	1		
11	If scale 1 : 2 was used, what would the dimension at G read?	1		
12	Name the type of finish at H.	1		
13	What does the abbreviation AF at J stand for?	1		
14	Name the type of section at K.	1		
15	Complete the cutting plane in VIEW 1 by inserting the arrows. Label the cutting plane P-P.	3		
16	Name the type of section produced by cutting plane P-P.	1		
17	With reference to the tolerance, determine the complete minimum dimension at L.	2		
18	In the space below (ANSWER 18), draw, in neat freehand, the SANS 10111 conventional representation of a BEARING.	3		
19	In the space to the left of VIEW 1, under ANSWER 19, draw and label, in proportion and in neat freehand, a removed section according to cutting plane S-S.	3		
TOTAL		30		

FILE NAME: VBJW031	DRAWING No: JOP12	DRAWING SET: 1 OF 3	VERY BEST JOCKEY WHEELS ENGINEERING (VBJW)		18 SPEED STREET CHAINVILLE 0110	
DRAWING PROGRAM: AUTOCAD 2019		SCALE 1 : 1				
DRAWN BY:	REINHARD	DATE: 02/03/2020	www.bicycleparts.sa	CELL: 098 765 4321		
CHECKED BY:	MAFIKA	DATE: 03/03/2020	TITLE REAR DERAILLEUR ASSEMBLY			
APPROVED BY:	TSUMI	DATE: 09/03/2020				





ROLLER-FOLLOWER AND
CAMSHAFT DETAIL

QUESTION 2: LOCI (CAM)

- Given:**
- The detail of a camshaft and a roller-follower at the minimum distance from the camshaft centre
 - The position of centre point M on the drawing sheet

- Specifications:**
- The roller-follower reciprocates on a 30° centre line that passes through the centre of the camshaft
 - The minimum distance from the centre of the roller of the follower to the centre of the camshaft = 22 mm
 - Rotation = clockwise

- Motion:**
- The cam imparts the following motion to the roller-follower:
- It moves 48 mm outwards from its given position with uniform motion over the first 60°
 - There is a dwell period for the next 45°
 - It moves a further 12 mm outwards with uniform motion over the next 75°
 - It returns to its original position with uniform acceleration and retardation over the remainder of the rotation

- Instructions:**
- Draw, to scale 1 : 1, the camshaft and the roller-follower in the given position.
 - Draw, to a rotational scale of 30° = 8 mm and a displacement scale of 1 : 1, the complete displacement graph for the required motion.
 - Label the displacement graph and include the rotational scale.
 - Using the given position of the roller-follower as the 0° axis, project and draw the cam profile from the displacement graph.
 - Show the direction of rotation on the cam profile.
 - Show ALL construction and projection. **[38]**

ASSESSMENT CRITERIA				
1	GIVEN + MINIMUM DISTANCE + CENTRE LINES	5		
2	GRAPH CONSTRUCTION	5 ¹ / ₂		
3	DISPLACEMENT GRAPH	6		
4	CAM CONSTRUCTION	6		
5	CAM + CURVE QUALITY	15 ¹ / ₂		
PENALTIES				
TOTAL		38		
EXAMINATION NUMBER				
EXAMINATION NUMBER				3



QUESTION 3: ISOMETRIC DRAWING

Given:

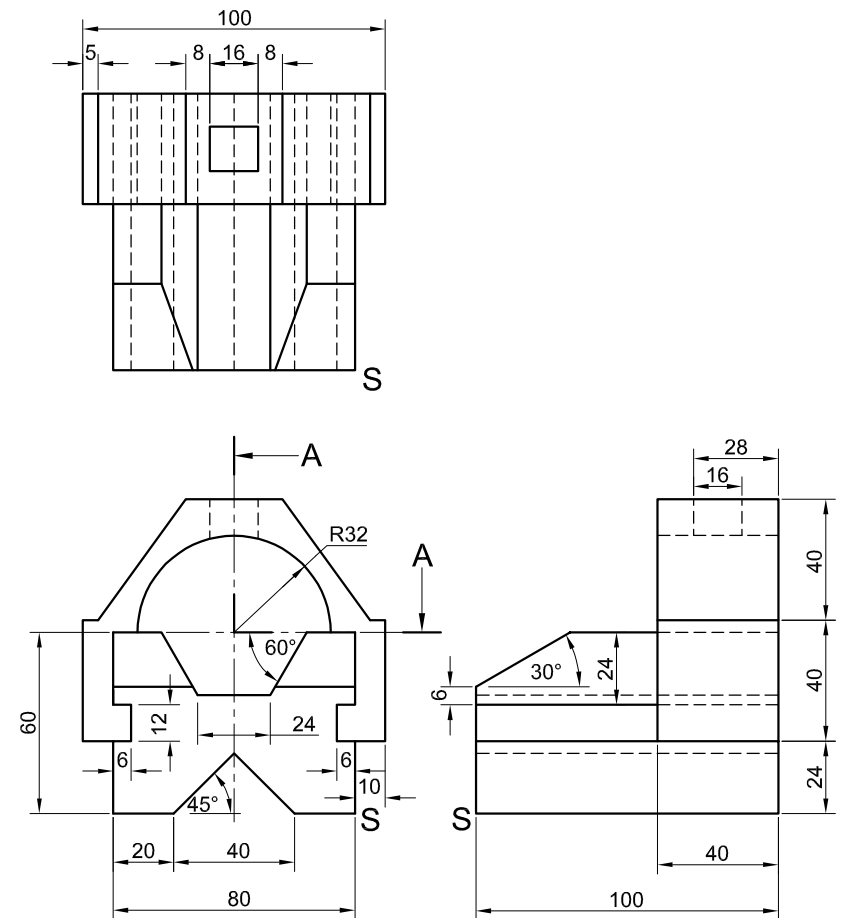
- The front view, top view and right view of a groove block and slider assembly
- The position of point S on the drawing sheet

Instructions:

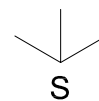
Using scale 1 : 1, convert the orthographic views of the groove block and slider assembly into a sectional isometric drawing on cutting plane A-A.

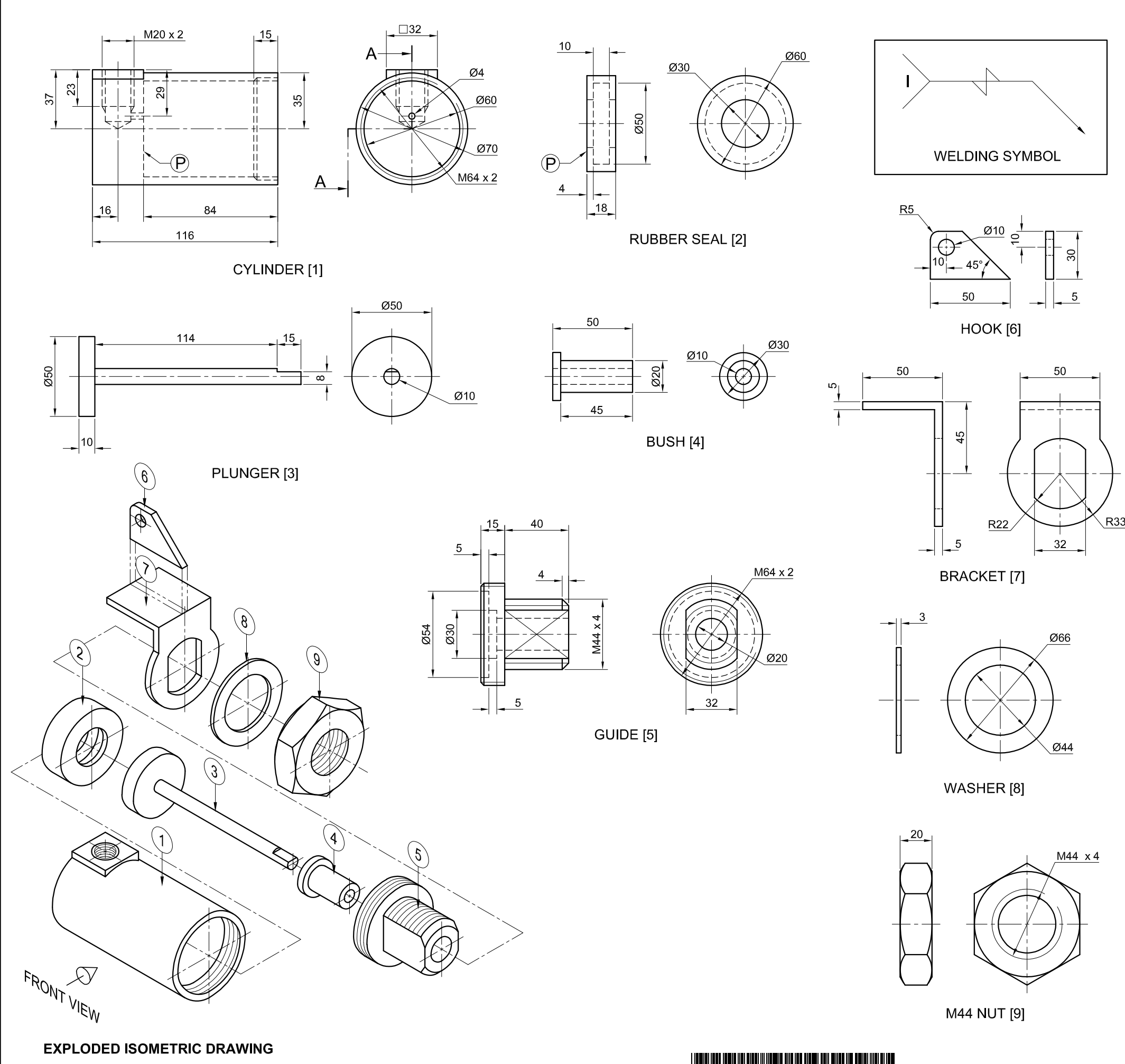
- Make S the lowest point of the drawing.
- Show ALL construction.
- NO hidden detail is required.

[42]



ASSESSMENT CRITERIA				
1	AUX. VIEW + PLACING	2		
2	LOWER PORTION	15		
3	UPPER PORTION	14		
4	SECTION	8		
5	ISO CIRCLES + CIRCLE CONSTR' + CENTRE LINES	3		
PENALTIES				
TOTAL		42		
EXAMINATION NUMBER				
EXAMINATION NUMBER				4





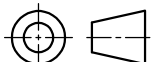
QUESTION 4: ASSEMBLY DRAWING

- Given:**
- The exploded isometric drawing of the parts of a pressure pump assembly, showing the position of each part relative to all the others
 - Orthographic views of each of the parts of the pressure pump assembly
 - A welding symbol

- 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 pressure pump assembly:
 - 4.1 A half-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 right view of the cylinder (part 1).
 - 4.2 The top view**
 - 4.3 The right view**

- NOTE:**
- Planning is essential.
 - The drawing must comply with the guidelines as contained in the SANS 10111.
 - The convention of symmetry may NOT be applied.
 - Place the head of the plunger (part 3) inside the rubber seal (part 2).
 - Place surface P on the rubber seal (part 2) against surface P on the inside of the cylinder (part 1).
 - Show THREE faces of the M44 nut (part 9) in the front view.
 - The hook (part 6) must be welded onto the bracket (part 7). Draw, to the given size, the complete welding symbol in the correct position on the right view.
 - NO hidden detail is required.

[90]

PARTS LIST			
PART		QUANTITY	MATERIAL
1	CYLINDER	1	ALUMINIUM
2	RUBBER SEAL	1	RUBBER
3	PLUNGER	1	MILD STEEL
4	BUSH	1	BRASS
5	GUIDE	1	ALUMINIUM
6	HOOK	1	MILD STEEL
7	BRACKET	1	MILD STEEL
8	WASHER	1	MILD STEEL
9	M44 NUT	1	MILD STEEL
WESTO PUMPS		102 OAK STREET	
ENGINEERING (PTY) LTD		DINALEDI PARK 1020	
		www.westopumps.za	
PRESSURE PUMP			
ALL DIMENSIONS ARE IN MILLIMETRES		ALL UNSPECIFIED RADII ARE 3 mm	

5

STAPLE

FOR OFFICIAL USE ONLY					
INCORRECT OVERALL SCALE					
INCORRECT HATCHING					
PARTS NOT ASSEMBLED					
TOTAL PENALTIES (-)					
ASSESSMENT CRITERIA					
RIGHT VIEW					
		POSSIBLE	OBTAINED	SIGN	MODERATED
1	SHAFT + BUSH	1 1/2			
2	CYLINDER + BRACKET + HOOK	4			
3	M44 NUT + GUIDE	6			
SUBTOTAL		11 1/2			
HALF-SECTIONAL FRONT VIEW					
1	CYLINDER	12			
2	RUBBER SEAL	2 1/2			
3	PLUNGER	5			
4	BUSH	2 1/2			
5	GUIDE	11 1/2			
6	BRACKET + HOOK	6			
7	M44 NUT + WASHER	6 1/2			
SUBTOTAL		46			
TOP VIEW					
1	CYLINDER	5 1/2			
2	BRACKET + HOOK	3 1/2			
3	GUIDE + SHAFT	4 1/2			
4	M44 NUT + WASHER	4			
SUBTOTAL		17 1/2			
GENERAL					
1	CENTRE LINES	3			
2	ASSEMBLY	8			
3	WELDING SYMBOL	4			
SUBTOTAL		15			
TOTAL		90			
PENALTIES (-)					
GRAND TOTAL					
EXAMINATION NUMBER					
EXAMINATION NUMBER					6