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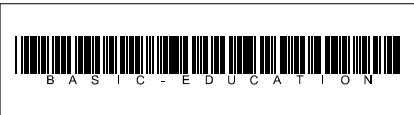
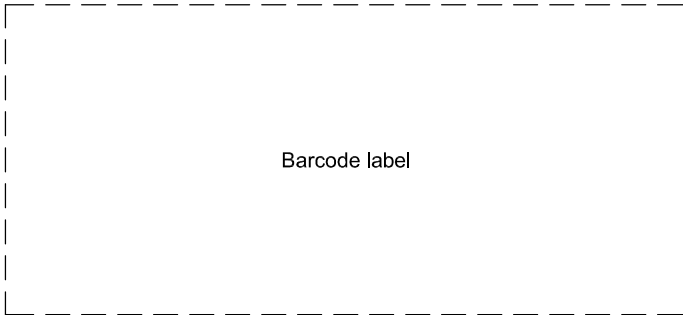
**SENIOR CERTIFICATE EXAMINATIONS/
NATIONAL SENIOR CERTIFICATE EXAMINATIONS**

ENGINEERING GRAPHICS AND DESIGN P2
2021

MARKS: 100

TIME: 3 hours

This question paper consists of 6 pages.



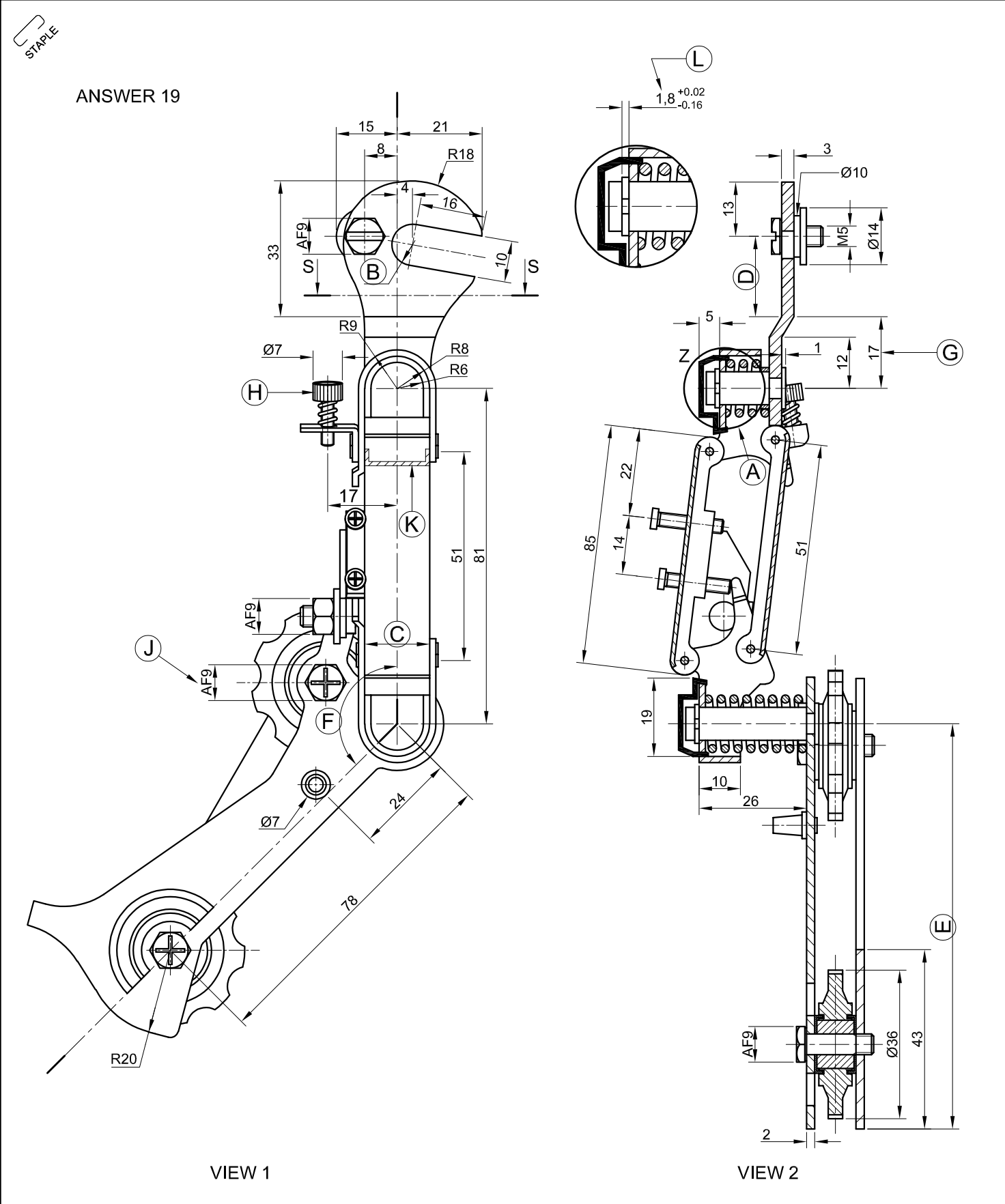
INSTRUCTIONS AND INFORMATION

- 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	CHECKED BY
100	

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	

ANSWER 18:

EXAMINATION NUMBER

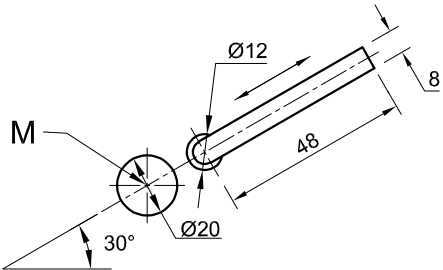
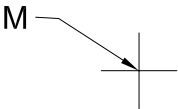
EXAMINATION NUMBER

2

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				



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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



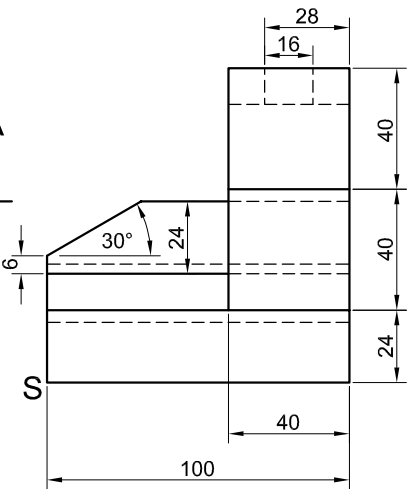
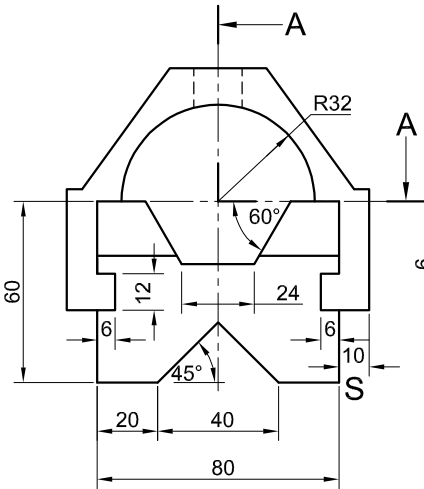
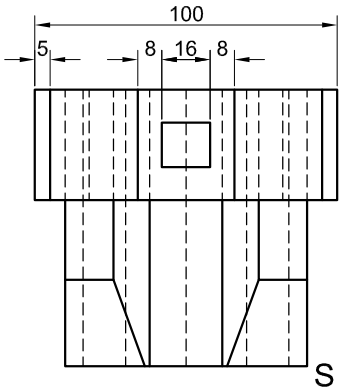
QUESTION 3: ISOMETRIC DRAWING

- 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.

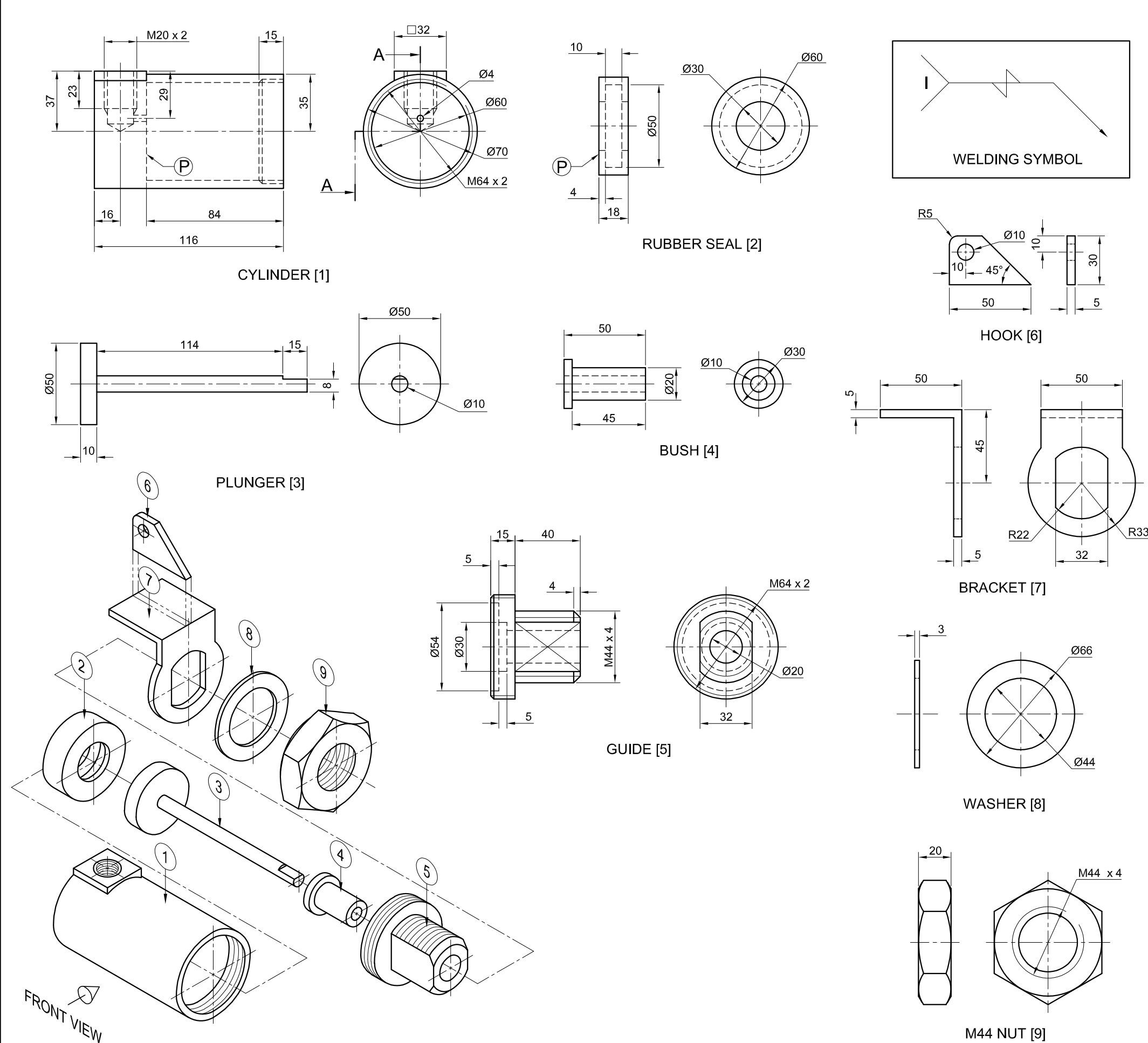
- Make S the lowest point of the drawing.
- Show ALL construction.
- NO hidden detail is required.

[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





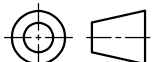
QUESTION 4: ASSEMBLY DRAWING

- 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



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

