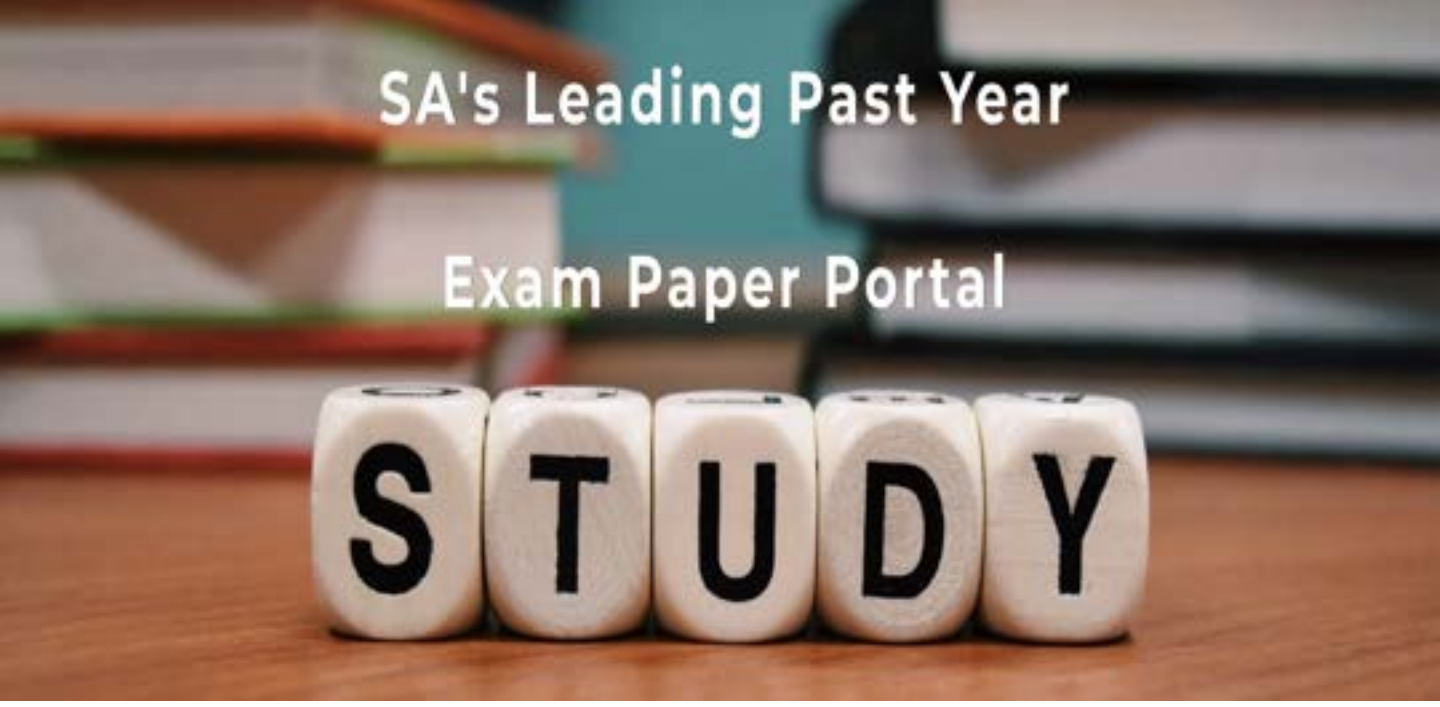

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GRADE 12

ENGINEERING GRAPHICS AND DESIGN P2

SEPTEMBER 2020

PREPARATORY EXAMINATION

MARKS: 200

TIME: 3 hours

This question paper consists of 6 pages.

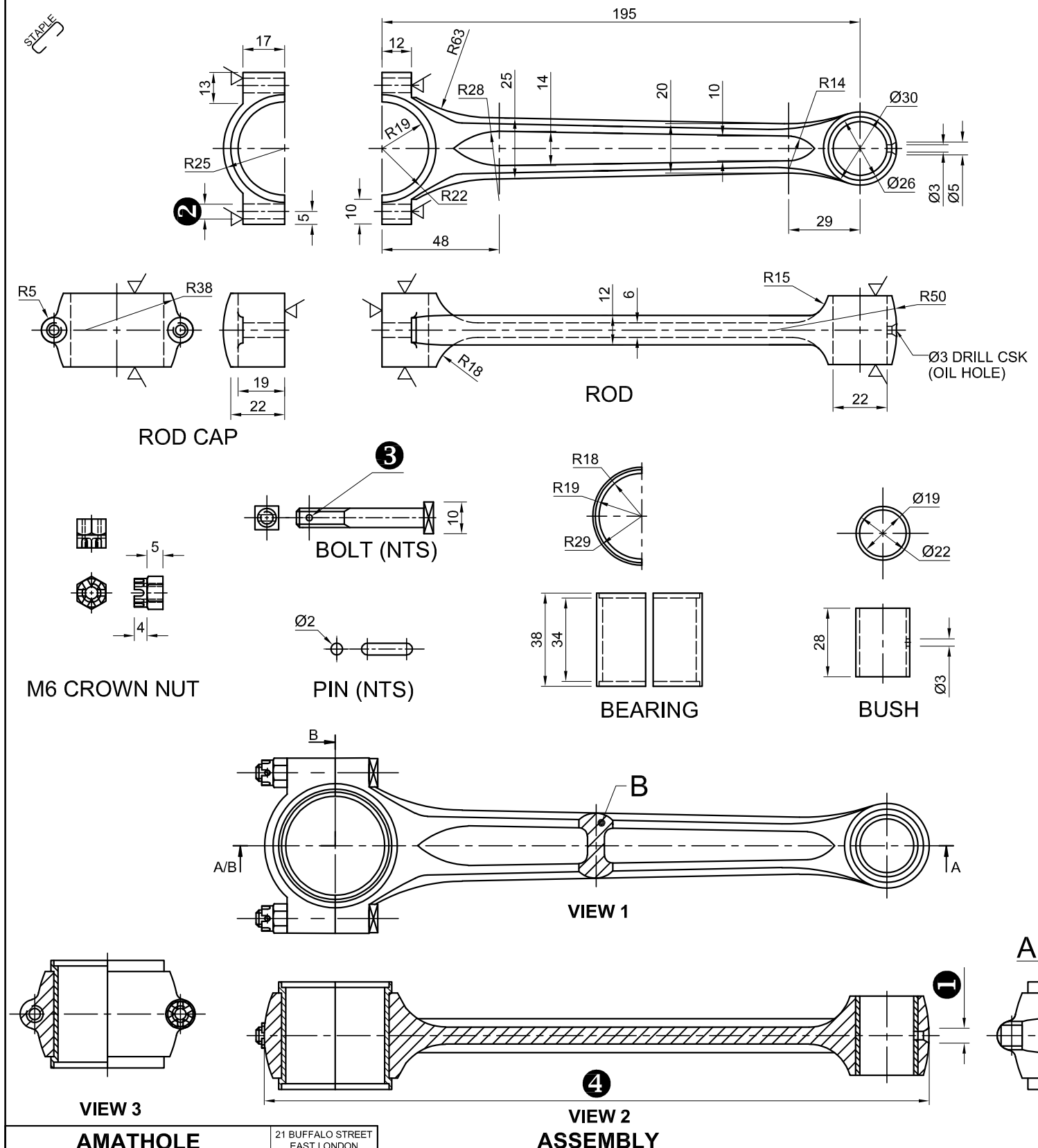
INSTRUCTIONS AND INFORMATION

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 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			
1								
2								
3								
4								
TOTAL								
	2	0	0		2	0	0	

FINAL CONVERTED MARK	CHECKED BY
100	

COMPLETE THE FOLLOWING:
NAME
NAME
EXAMINATION CENTRE
SCHOOL



QUESTION 1: ANALYTICAL (MECHANICAL)

Given:
A detail drawing of a connecting rod, a title block, assembled views and a table of questions. The drawings have not been prepared to the indicated scale.

Instructions:
Complete the table below by neatly answering the questions, which all refer to the accompanying drawings and the title block. **[29]**

	QUESTIONS		ANSWERS		
1	What is the name of the manufacturing company?			1	
2	What is the telephone number of the company?			1	
3	How many rods, in total, must be manufactured?			1	
4	Who checked the drawing?			1	
5	What did the draughtsman have to change on the design?			1	
6	What does the abbreviation "CSK" stand for?			1	
7	What is the purpose of the hole at A in VIEW 4?			1	
8	What shape is the head of the bolt?			1	
9	What type of material is used for the BUSH?			1	
10	How many surfaces must be machined?			1	
11	What is VIEW 1 called?	VIEW 1		2	
12	What type of section resulted from cutting plane A-A?	VIEW 2		2	
13	What type of section resulted from cutting plane B-B?	VIEW 3		2	
14	Name the type of section at B.			1	
15	Determine the complete dimensions at:	❶		2	
		❷		2	
		❸		2	
		❹		2	
16	In the space below (Answer 16), draw, in neat freehand, the SANS symbol for the projection system used.			4	
			TOTAL	29	

AMATHOLE ENGINEERING MANUFACTURES	21 BUFFALO STREET EAST LONDON 5201 ☎ 043 7640 488
TITLE: **CONNECTING ROD**	
ALL UNDIMENSIONED RADII ARE R3.	
ALL DIMENSIONS ARE MILLIMETRES.	SCALE 1 : 2
PROGRAMME: AUTOCAD 2020	FINISH:
FILE NAME: rod120.dwg	MACHINED 0.05 C
DRAWING NO.: NCS-20	
QUANTITY: 120	

ASSEMBLY

REVISIONS		DATE
4.		
3.		
2.		
1. CSK Ø3 HOLE IN ROD		2020/02/24
DRAWN:	LOUW	2020/02/20
CHECKED:	REDDY	2020/02/22
APPROVED:	TISHELA	2020/03/30

PARTS LIST

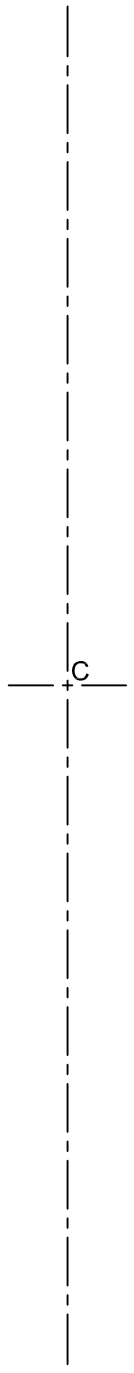
PART	MATERIAL	QUANTITY
1. ROD	FS	1
2. ROD CAP	FS	1
3. BEARING	GM	1
4. BUSH	BRONZE	1
5. BOLT	MCS	2
6. CROWN NUT	MCS	2

ANSWER 16

NAME

NAME 2

STAPLE



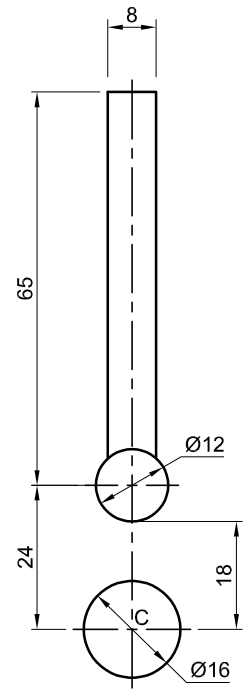
QUESTION 2: CAM

Given:
- The detail of the camshaft and a roller-ended follower in its lowest point.
- The vertical centre line of the cam profile.

Specifications:
- The follower reciprocates on the vertical centre line of the camshaft.
- Minimum distance from the cam profile to the centre of the camshaft = 18 mm.
- Rotation = clockwise

Motion:
The cam imparts the following motion to the follower:
- It rises 42 mm with uniform acceleration and retardation over the first 120°.
- There is a dwell period for the next 30°.
- It rises 21 mm with uniform motion over the next 30°.
- It returns to the original position with simple harmonic motion over the rest of the rotation.

Instructions:
- Draw the camshaft and the follower detail.
- Use an arrow to indicating the direction of rotation.
- Draw, with a vertical scale of 1 : 1 and a horizontal scale of 30° = 7 mm, the complete displacement graph for the required motion.
- Label the graph and indicate the scale.
- Project and draw the cam profile that would generate the given motion.
- Show ALL necessary construction. **[37]**



ASSESSMENT CRITERIA				
1	GIVEN + MINIMUM DISTANCE + CL	4½		
2	GRAPH CONSTRUCTION	2½		
3	UNIFORM ACCEL. AND RETARDATION MOTION	7½		
4	DWELL + UNIFORM MOTION	1		
5	SIMPLE HARMONIC MOTION	4½		
6	GRAPH LABEL + SCALE	1		
7	CAM CONSTRUCTION	6		
8	CAM + CURVE QUALITY	10		
	TOTAL	**37**		

NAME

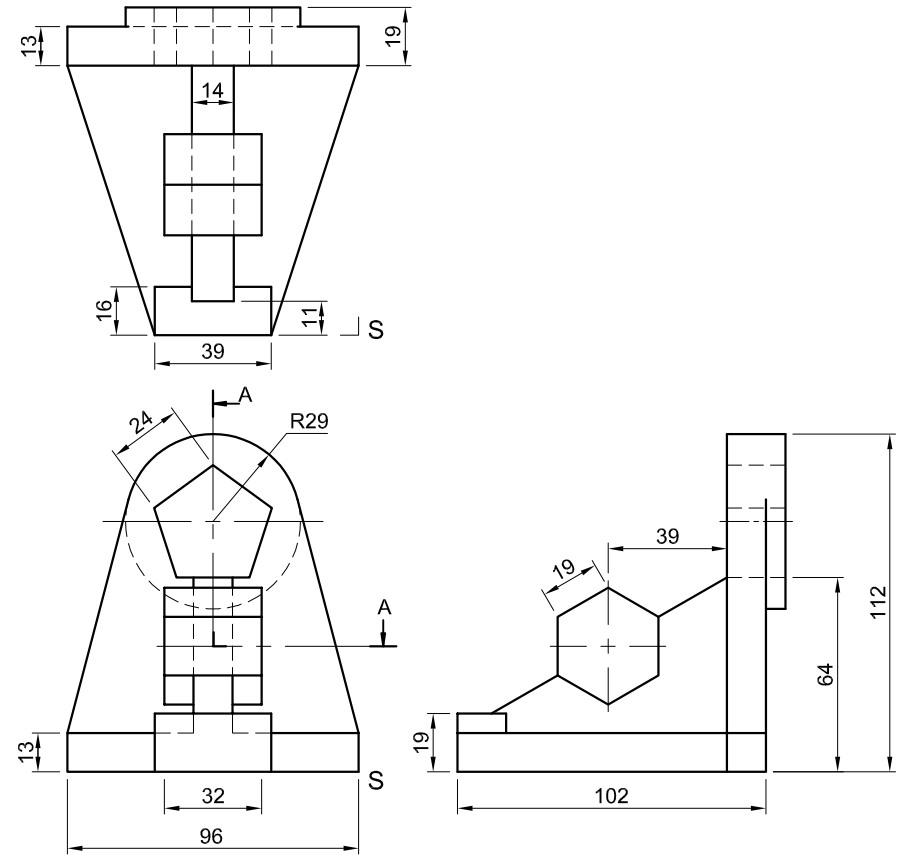
NAME 3

STAPLE

QUESTION 3: ISOMETRIC

Given:
- Three views of a 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 BRACKET.
- Make point S the lowest point of the drawing.
- Show ALL necessary construction.
- NO hidden detail is required. **[42]**



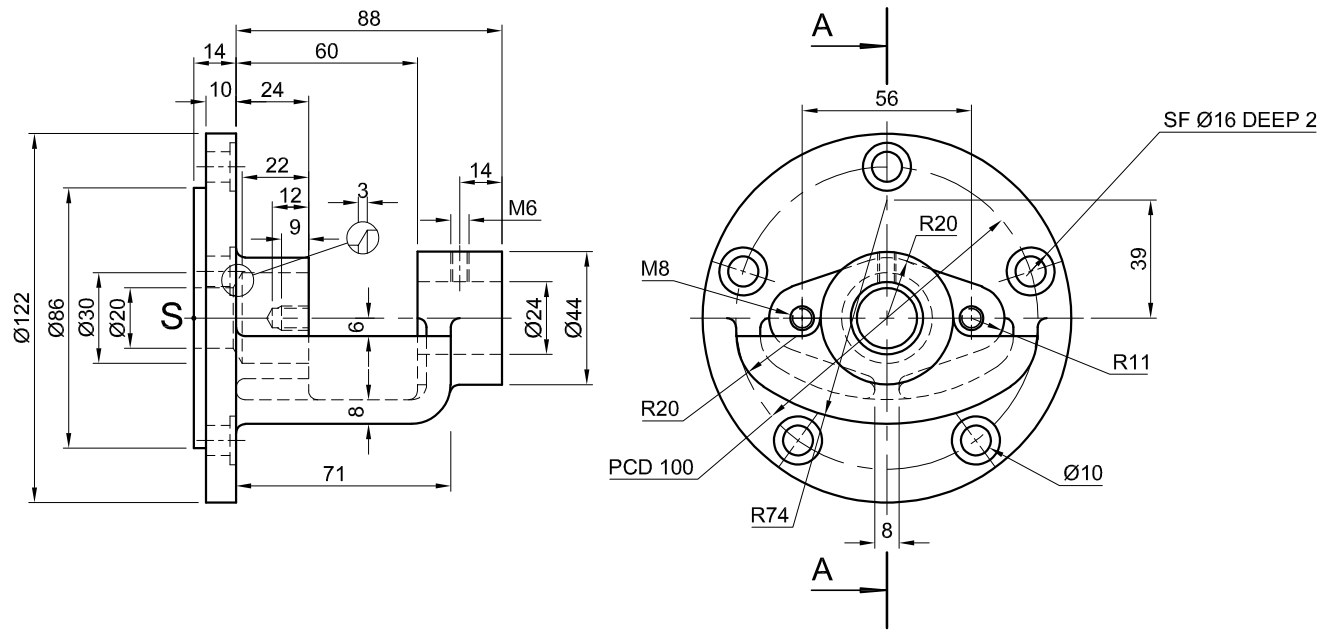
S

ASSESSMENT CRITERIA				
1	CONSTR' + PLACEMENT	3		
2	ISOMETRIC LINES	$9\frac{1}{2}$		
3	RIB	$4\frac{1}{2}$		
4	HEXAGON	$5\frac{1}{2}$		
5	CIRCLE + PENTAGON	6		
6	SECTION + HATCHING	$13\frac{1}{2}$		
	TOTAL	**42**		

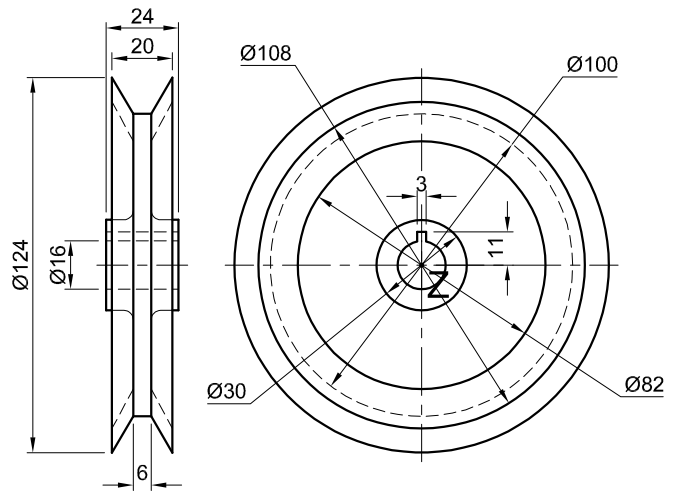
NAME

NAME 4

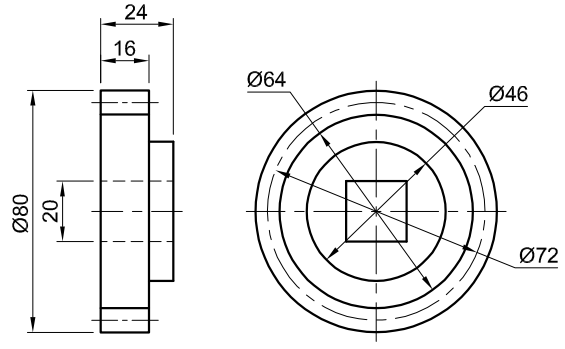
STAPLE



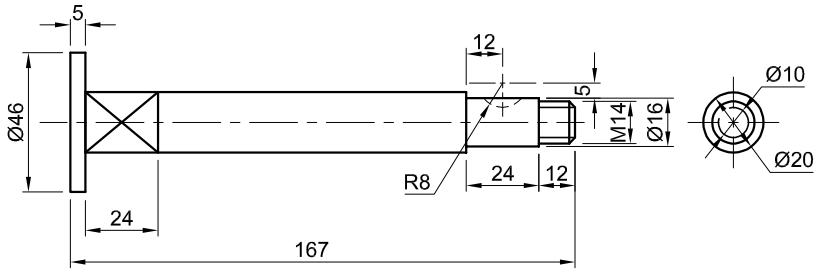
HOUSING (1)



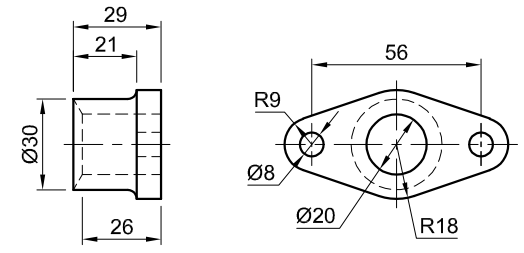
PULLEY (2)



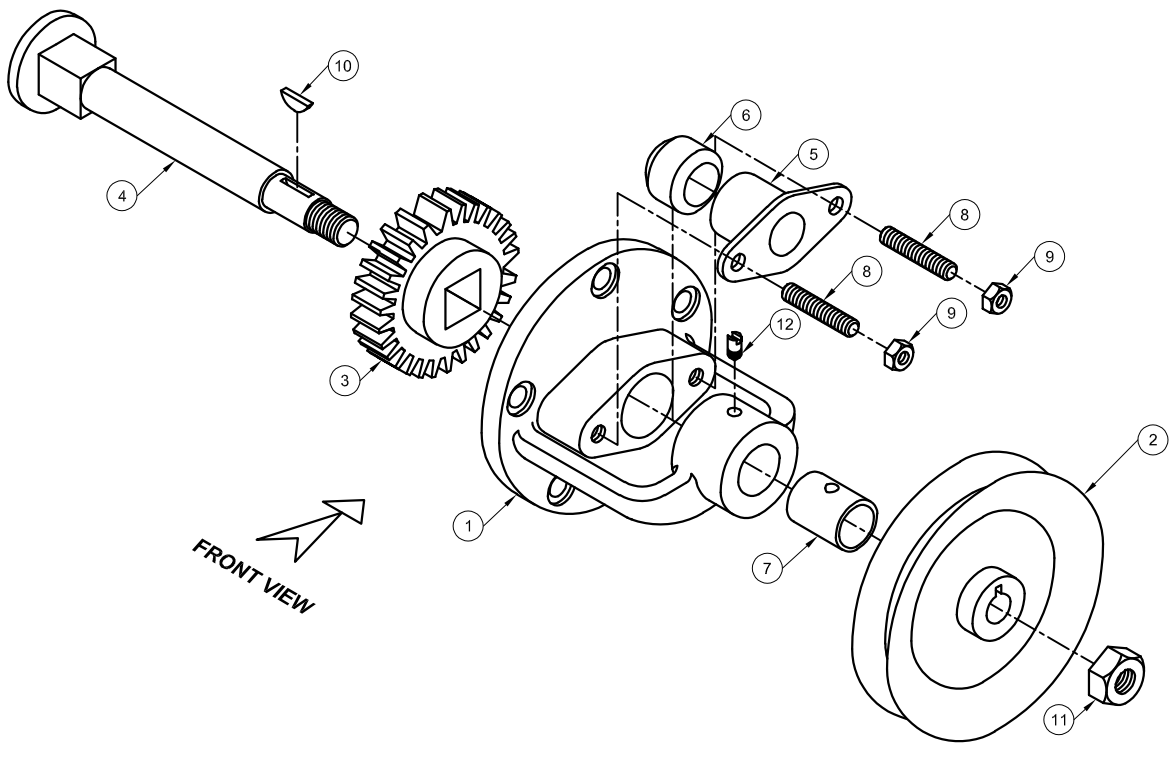
GEAR (3)

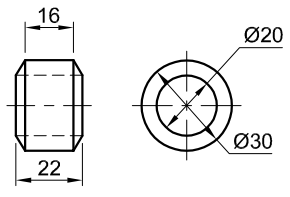


SHAFT (4)

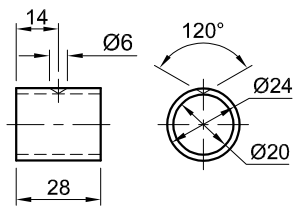


SUPPORT (5)

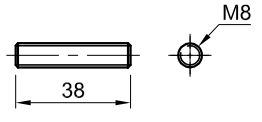




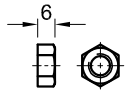
PACKAGE (6)



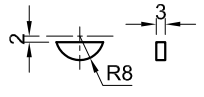
BUSH (7)



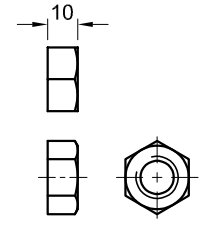
STUD (8)



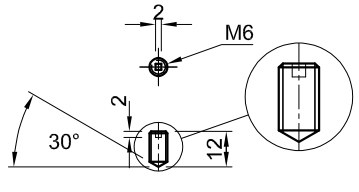
M8 NUT (9)



KEY (10)



M14 NUT (11)



GRUB SCREW (12)

QUESTION 4: MECHANICAL ASSEMBLY

Given:

- The exploded isometric drawing of the parts of a v-belt drive assembly, showing the position of each part relative to the others.
- Orthographic views of each of the parts or the v-belt drive.
- Starting point S and Z respectively indicated on the front view of the housing (part 1) and right view of the pulley (part 2) as well as 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 v-belt drive.
  - **4.1 The sectional front view** of the v-belt drive assembly, 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 right view of the housing (part 1).
  - **4.2 A right view** without any hidden detail.

NOTE:

- Planning of the layout of the views is essential.
- All drawings must comply with the guidelines contained in *SANS 10111*.
- Show, in the sectional front view, THREE faces of the M14 nut.
- Show ALL nut constructions.
- NO hidden detail is required.

Add the following features on the drawing:

- The cutting plane A-A. **[92]**

PARTS LIST

PART	MATERIAL	QUANTITY
1. HOUSING	CAST IRON	1
2. PULLEY	ALUMINIUM	1
3. GEAR	STEEL	1
4. SHAFT	STEEL	1
5. SUPPORT	CAST IRON	1
6. PACKAGE	MCS	1
7. BUSH	BRONZE	1
8. STUD	STD	2
9. M8 NUT	STD	2
10. KEY	STEEL	2
11. M14 NUT	STD	2
12. GRUB SCREW	STD	1

TITLE:

V-BELT DRIVE

AMATHOLE
ENGINEERING MANUFACTURERS

21 BUFFALO STREET
EAST LONDON
5201
☎ 043 7640 488

ALL DIMENSIONS ARE MILLIMETRES.

ALL UNSPECIFIED RADII ARE R3.

Please turn over

STAPLE

S

Z

PENALTIES		
1	WRONG SCALE -2	
2	WRONG PLACING OF VIEWS -2	
3	PARTS NOT ASSEMBLED -2	
4	WRONG HATCHING -2	
TOTAL PENALTIES (-)		

ASSESSMENT CRITERIA				
SECTIONAL FRONT VIEW				
1	HOUSING	20		
2	PULLEY	$17\frac{1}{2}$		
3	GEAR	6		
4	SHAFT	$9\frac{1}{2}$		
5	SUPPORT + PACKAGE	8		
6	BUSH	2		
7	M14 NUT + SCREW	$10\frac{1}{2}$		
8	KEY	1		
9	CENTRE LINES	$2\frac{1}{2}$		
10	ASSEMBLY	$4\frac{1}{2}$		
SUB-TOTAL		**$81\frac{1}{2}$**		
RIGHT VIEW				
1	PULLEY	2		
2	M14 NUT	5		
3	CUTTING PLANE	$3\frac{1}{2}$		
SUB-TOTAL		**$10\frac{1}{2}$**		
TOTAL		**92**		
PENALTIES (-)				
TOTAL				
NAME				
NAME				6