

ISEBE LEMFUNDO LEMPUMA KOLONI
 EASTERN CAPE EDUCATION DEPARTMENT
 OOS-KAAP ONDERWYSDEPARTEMENT

**NATIONAL
 SENIOR CERTIFICATE**

GRADE 12

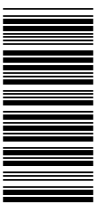
**ENGINEERING GRAPHICS AND DESIGN P2
 SEPTEMBER 2017
 PREPARATORY EXAMINATION**

MARKS: 200

TIME: 3 hours

This question paper consists of 6 pages.

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INSTRUCTIONS AND INFORMATION

1. The paper consists of FOUR questions.
2. Answer ALL the questions.
3. All drawings must be drawn to scale 1 : 1, unless otherwise stated.
4. The questions must be answered on the answer sheets provided.
5. All the answers 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.

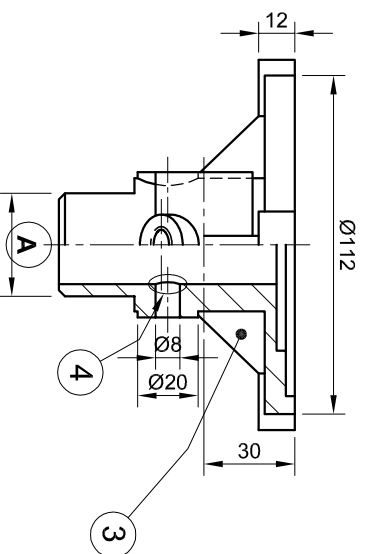
FOR OFFICIAL USE ONLY

		MODERATED MARK			
1					
2.1					
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3					
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TOTAL					
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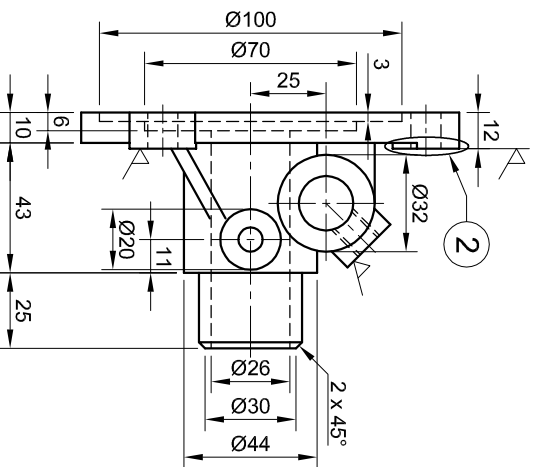
FINAL CONVERTED MARK	CHECKED BY
100	

COMPLETE THE FOLLOWING:

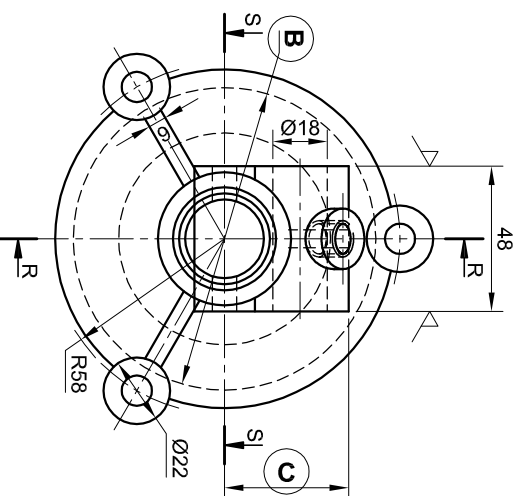
NAME	
NAME	
EXAMINATION CENTRE	
EXAMINATION CENTRE	



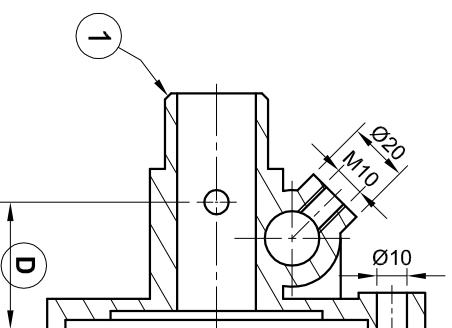
VIEW 2



VIEW 1



FRONT VIEW



VIEW 3

ALL UNDIMENSIONED RADII ARE R 3.

ALL DIMENSIONS ARE IN MILLIMETRES.

SCALE: 2 : 1

PROGRAMME: AUTOCAD 2016

MATERIAL: CAST IRON

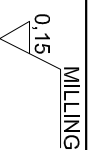
FILE NAME: steering4.dwg

QUANTITY: 2500 UNITS

DRAWING No. SBS-12

TREATMENT: NONE

FINISH: REMOVE ALL BURRS AND SHARP EDGES



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TITLE
STEERING SUPPORT

2. BASE HOLES Ø10	2016/05/22
1. INSERT WEB	2016/05/12
REVISIONS	
DRAWN: PETER	2016/05/10
CHECKED: CARL	2016/05/15
APPROVED: JACK	2016/06/25

QUESTION 1: ANALYTICAL (MECHANICAL)

Given:
A detailed drawing of a steering support, a title block 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. [27]

QUESTIONS		ANSWERS			
1	On what date was the drawing approved?				1
2	What is the name of the engineering firm?				1
3	Which indicated scale has been used?				1
4	How many steering brackets must be produced?				1
5	On what date was the base holes revised?				1
6	What is the file name?				1
7	What would view 1 be called?				1
8	How many surfaces need to be machined?				1
9	What roughness value is required on the machined surfaces?				1
10	What is the depth of the thread on a standard M10 nut?				1
11	How many threaded holes are there on the steering bracket?				1
12	What type of section did cutting plane S-S produce?				2
13	What type of feature is shown at 1?				1
14	Name the encircled feature at 2.				1
15	What is the thickness of the feature at 3?				2
16	Name the feature at 4.				2
17	Determine the complete dimensions: A B C D				4
18	In the box below, draw, in neat freehand, the symbol for the projection system used.				4
TOTAL					27

ANSWER 18

NAME	
NAME	
SYMBOL	
NAME	
NAME	
2	



QUESTION 2.1: LOCI (MEGANISM)

- Given:**
- A and E are two fixed centre points, AB and DE are two cranks and BC and CD are two links which pivot at B, C and D.

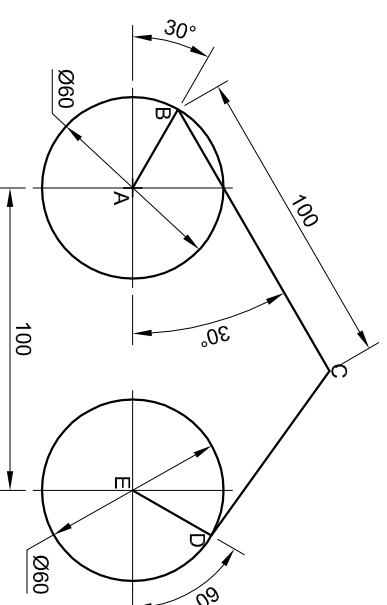
Instructions:

- Copy, to scale 1 : 1, the given view.
- Construct the locus of point C for one complete revolution of the two cranks.

Note:

- Show ALL necessary constructions.

[19]



ASSESSMENT CRITERIA				
1	COPY GIVEN AND CIRCLE DIVISION	7		
2	CONSTRUCTION LINES	4		
3	PLOTTING POINTS AND CURVE	8		
	TOTAL	19		

QUESTION 2.2: HELIX

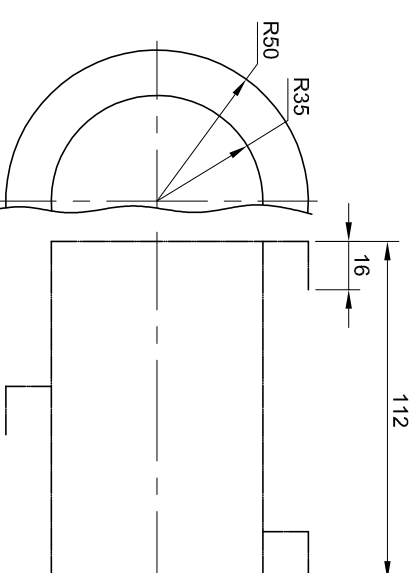
- Given:**
- The incomplete right view of a helical shute.
 - The incomplete profile of the front view.

Specification:

- Right-handed
- One revolution
- Pitch = 96 mm

Instructions:

- Using the given information, draw a front view of the complete helical shute.
 - Show the centre lines.
 - Show ALL necessary construction.
 - NO hidden detail is required.
- [22]**



ASSESSMENT CRITERIA				
1	CONSTR AND DIVISIONS	5½		
2	OUTER CURVE	10½		
3	INNER CURVE	3½		
4	DIRECTION AND CORE	2½		
	TOTAL	22		

NAME		
NAME		3



QUESTION 3: ISOMETRIC DRAWING

Given:

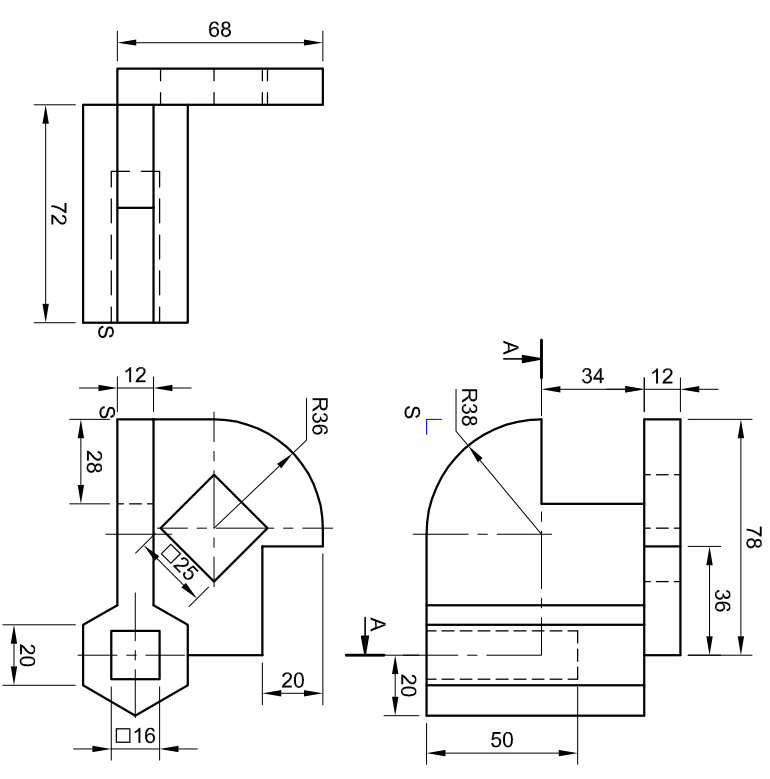
- The front view, top view and left view of a bracket
- The position of point S on the drawing sheet

Instructions:

Using scale 1 : 1, convert the orthographic views of the bracket to a sectional isometric drawing.

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

[35]



↙ S

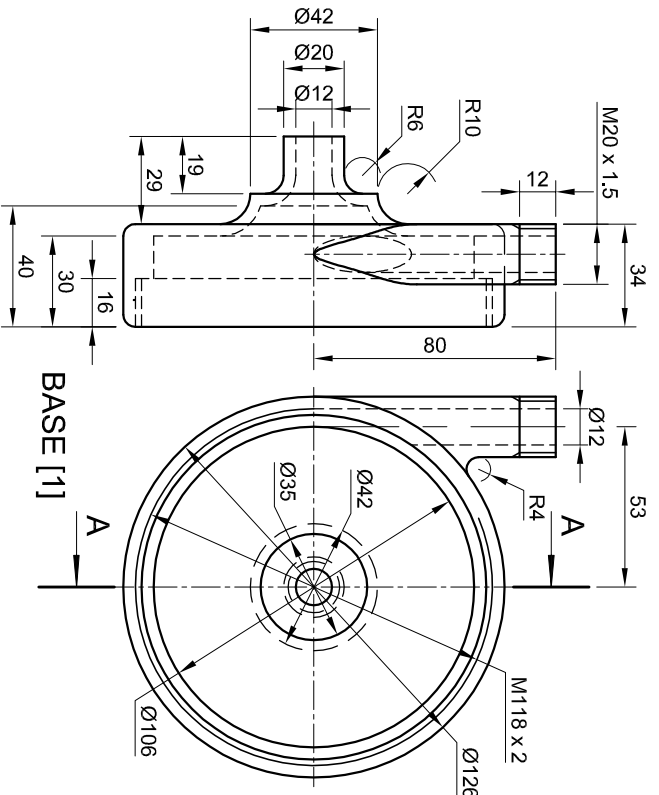
ASSESSMENT CRITERIA

1	AUX' VIEWS + PLACING	3		
2	ISO' LINES	7½		
3	CIRCLE + CONSTR	4		
4	SQUARE	2½		
5	HEXAGON AND SQUARE	7½		
6	SECTION	11		
TOTAL		35½		

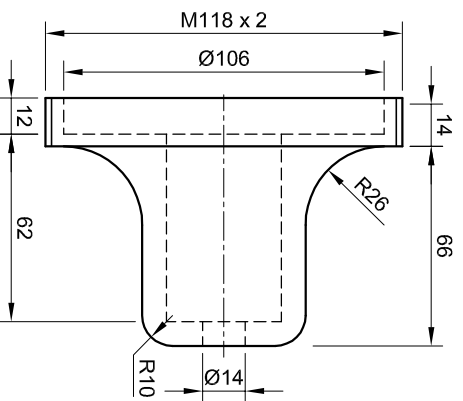
NAME

NAME

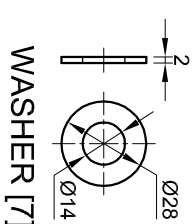
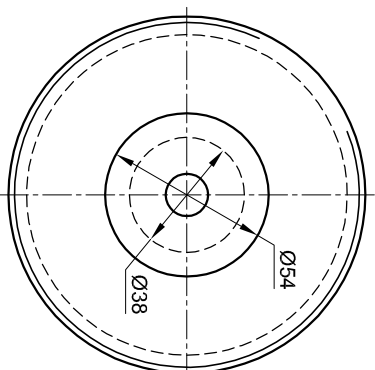
4



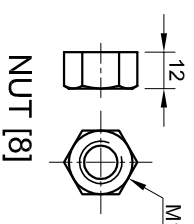
BASE [1]



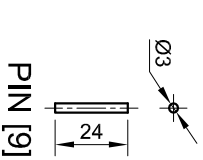
CAP [6]



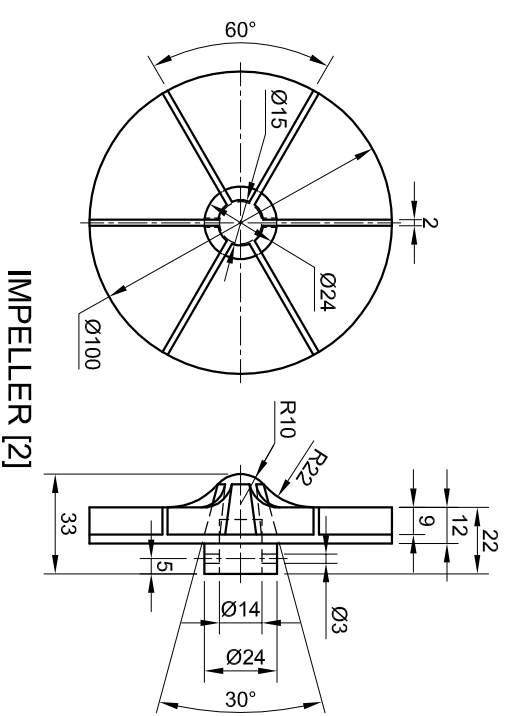
WASHER [7]



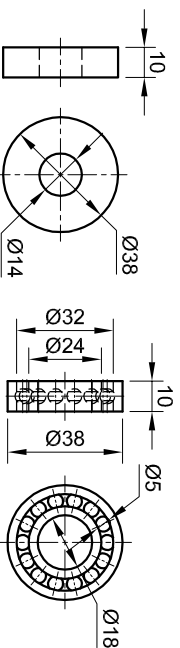
NUT [8]



PIN [9]

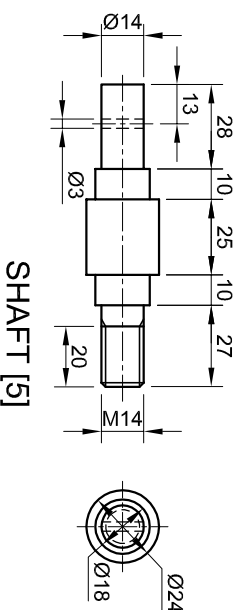


IMPELLER [2]

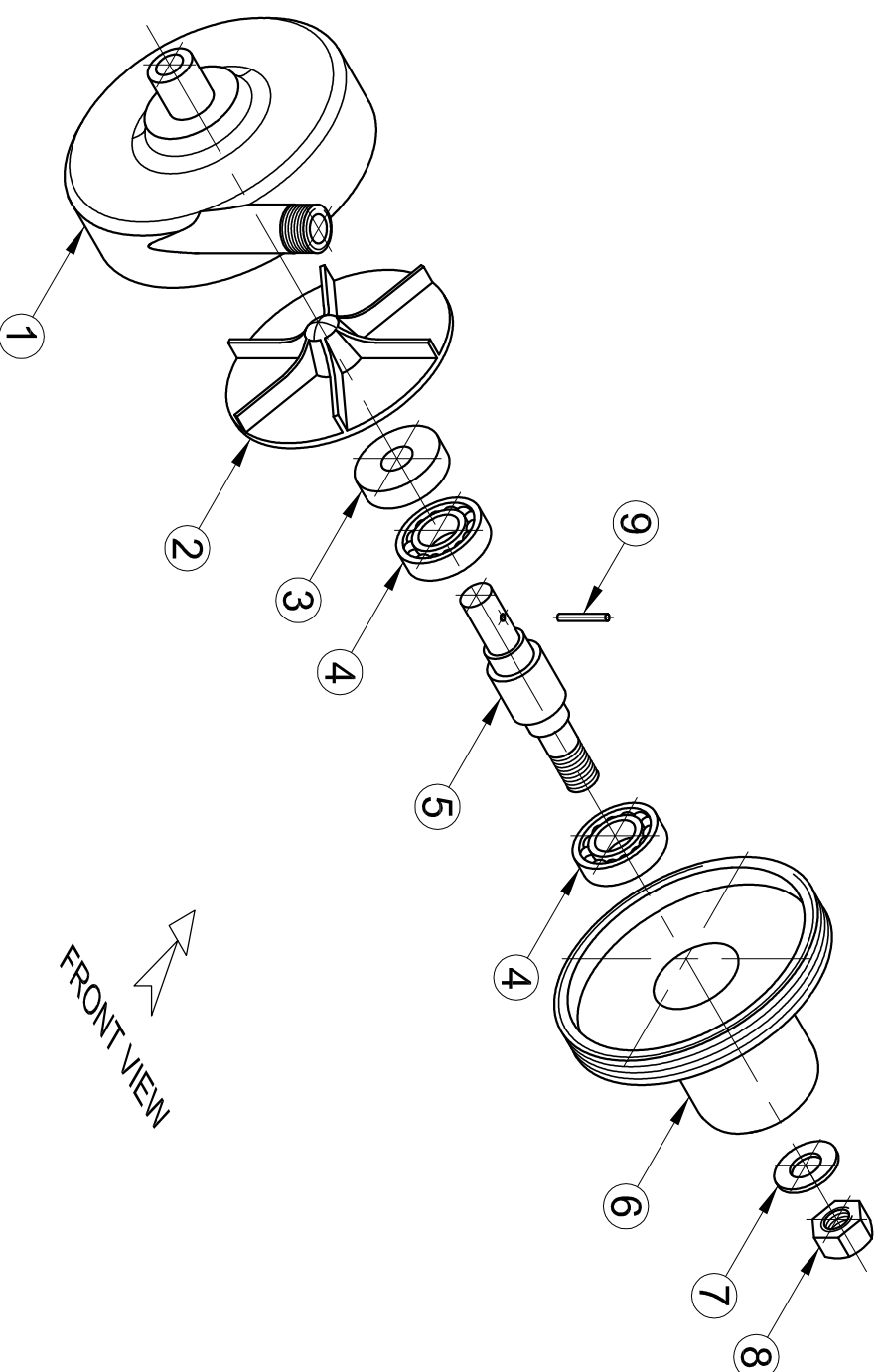


SEAL [3]

BEARING [4]



SHAFT [5]



FRONT VIEW

EXPLODED ISOMETRIC DRAWING

QUESTION 4: MECHANICAL ASSEMBLY

Given:

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

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 water pump assembly:

- 4.1 The **sectional front view** of the water pump assembly, on cutting plane A-A as seen from the direction of the arrow shown on the exploded isometric drawing. The cutting plane, that runs vertically through the centre of the assembly, is shown on the right view of the base (part 1).
 - 4.2 A **right view** without any hidden detail.
- ALL drawings must comply with the guidelines contained in the SANS 10111.

NOTE:

- Show, in the sectional front view, THREE faces of the M14 nut and ALL necessary construction.
- NO hidden detail is required.

Add the following features to the drawing: [96¹]

- The cutting plane A-A

PARTS LIST

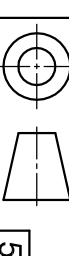
PART	QUANTITY	MATERIAL
1. BASE	1	MILD STEEL
2. IMPELLER	1	CAST IRON
3. SEAL	1	RUBBER
4. BEARING	2	MILD STEEL
5. SHAFT	1	MILD STEEL
6. CAP	1	CAST IRON
7. WASHER	1	MILD STEEL
8. NUT	1	MILD STEEL
9. PIN	1	MILD STEEL

PUMP ASSEMBLY

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ALL DIMENSIONS ARE IN MILLIMETRES. ALL UNSPECIFIED RADII ARE R4.





ASSESSMENT CRITERIA			
SECTIONAL FRONT VIEW			
1	BASE	17 $\frac{1}{2}$	
2	IMPELLER	9	
3	SEAL	2	
4	BEARING	4	
5	SHAFT	15	
6	CAP	11	
7	WASHER	2	
8	NUT	6 $\frac{1}{2}$	
9	PIN	1 $\frac{1}{2}$	
SUB-TOTAL		68$\frac{1}{2}$	

ASSESSMENT CRITERIA			
RIGHT VIEW			
1	BASE	6	
2	CAP	3	
3	WASHER	1	
4	NUT	4	
5	SHAFT	3	
6	CUTTING PLANE	3	
7	ASSEMBLY	8	
SUB-TOTAL		28	
TOTAL		96$\frac{1}{2}$	
NAME			
NAME			
NAME			
NAME			6