STAPLE

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

NATIONAL SENIOR CERTIFICATE

GRADE 12

GRDSE2

ENGINEERING GRAPHICS AND DESIGN P2

SEPTEMBER 2018

PREPARATORY EXAMINATION

MARKS: 200

TIME: 3 hours

This question paper consists of 6 pages.

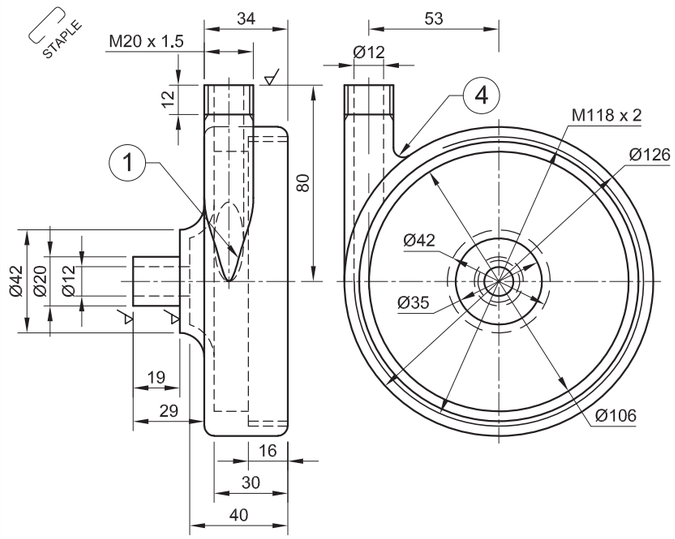
INSTRUCTIONS AND INFORMATION

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.

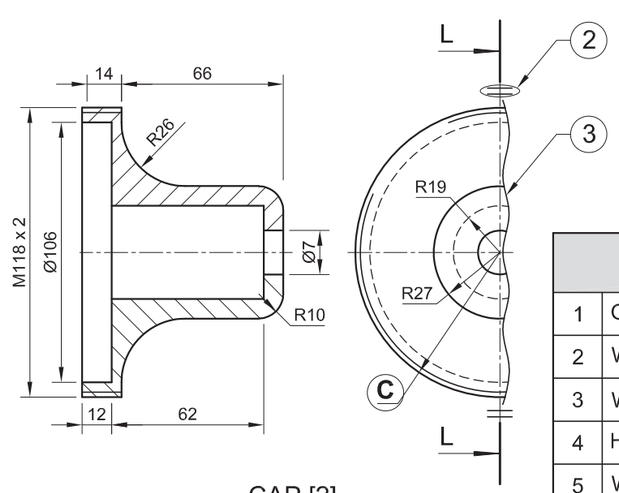
FOR OFFICIAL USE ONLY							
					MODERATED MARK		
1							
2							
3							
4							
TOTAL							
	2	0	0				

FINAL CONVERTED MARK	CHECKED BY
100	

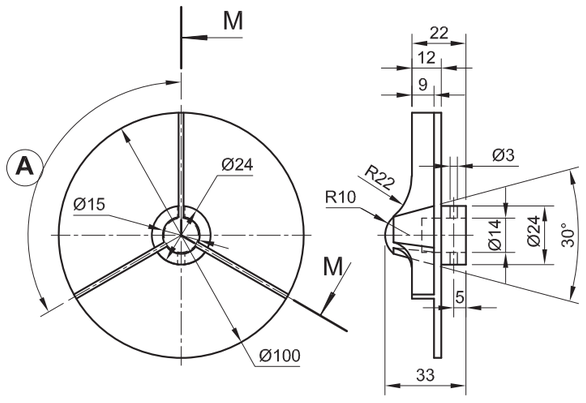
COMPLETE THE FOLLOWING:
NAME
NAME
EXAMINATION CENTRE
EXAMINATION CENTRE



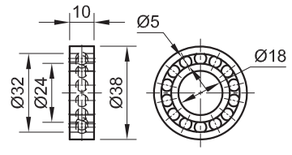
BASE [1]



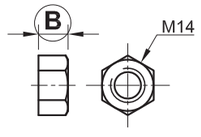
CAP [2]



IMPELLER [3]



BEARING [4]



NUT [5]

QUESTION 1: ANALYTICAL (MECHANICAL)

Given:
A detailed drawing of a water pump, 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. **[26]**

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 water pumps must be produced?		1	
5	What had to be changed before the drawing was approved?		1	
6	What is the file name?		1	
7	What roughness value is required on the machined surfaces?		1	
8	How many surfaces, on the BASE, need to be machined?		1	
9	Name the type of section the cutting plane L-L produced.		1	
10	Name the type of section cutting plane M-M would produce.		1	
11	Name the type of feature shown at 1.		1	
12	What does the encircled feature at 2 indicate.		1	
13	What does the feature (line) at 3 indicate?		1	
14	Name the feature at 4.		1	
15	What does the "x 2" indicate in the M18 x 2 dimension on the CAP?		1	
16	What mistake was made with the sectioning of the CAP?		1	
17	Determine the complete dimensions: A	B	$2\frac{1}{2}$	
18	Determine the complete radius at C.		$1\frac{1}{2}$	
19	In the box below, draw, in neat freehand, the SANS symbol for a bearing.		6	
		TOTAL	**26**	

ALL UNDIMENSIONED RADII ARE R 3.	
ALL DIMENSIONS ARE IN MILLIMETRES.	SCALE: 1 : 2
PROGRAMME: AUTOCAD 2018	MATERIAL: CAST IRON
FILE NAME: pump3.dwg	QUANTITY: 300 UNITS
DRAWING No. P3A-08	TREATMENT: NONE
FINISH: POLISHED	MILLING 0,10

1. CHANGE INLET SIZE	2017/10/20
REVISIONS	**DATE**
DRAWN: MdT	2017/09/10
CHECKED: LP	2017/09/13
APPROVED: DW	2017/10/25

DW
ENGINEERING WORKS
160 HUNTER STREET
PORT ELIZABETH
6001
041 487 2188

TITLE
WATER PUMP

ANSWER 19

NAME

NAME 2

STAPLE

QUESTION 2: LOCI (CAMS)

Given:

- The shaft and follower detail of an industrial cam with follower shown at its lowest position.
- The vertical centre line of the cam shaft as reference on the drawing sheet.

The specifications for the movement are as follows:

- The cam shaft rotates anti-clockwise at constant velocity for the first 270°:
  - Over the first 60° the follower rises 27 mm.
  - There is a dwell period for the next 45°.
  - Over the next 45° the follower rises a further 28 mm.
  - There is a dwell period for the next 30°.
  - Over the next 60° the follower drops 15 mm.
  - There is a dwell period for the next 30°.
- Over the final 90° the follower returns to its original position with simple harmonic motion.

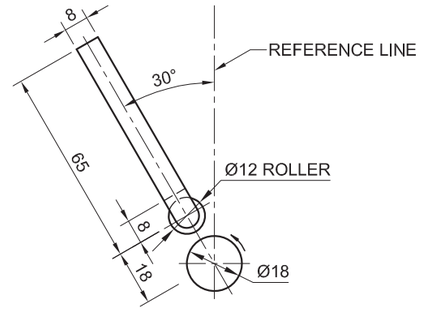
Instructions:

2.1 Draw, to scale 1 : 1, the given view of the cam shaft and follower using the vertical centre line as reference. The arrow indicating the direction of rotation must be shown.

2.2 Draw a displacement graph with a scale of 30° equal to 10 mm and a follower displacement scale 1 : 1 for the given motions. Label the graph.

2.3 Project and draw the cam profile that would generate the given motion.

- Show ALL construction. **[39]**



CAM SHAFT AND FOLLOWER DETAIL

ASSESSMENT CRITERIA						
1	GRAPH	12				
2	FOLLOWER + SHAFT + ARROW + CL	8				
3	CONSTRUCTION	4				
4	CAM POINTS	8				
5	CURVE + QUALITY	7				
	TOTAL	**39**				

NAME

NAME

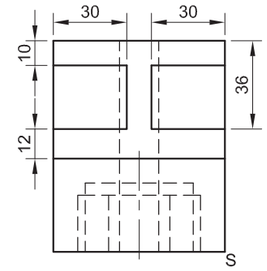
STAPLE

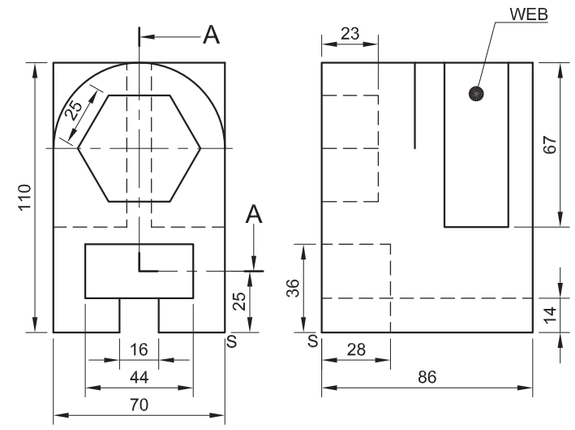
QUESTION 3: ISOMETRIC DRAWING

Given:
The front view, top view and right view of a jig bracket and cutting plane A-A.
The position of point S on the drawing sheet.

Instructions:
Using scale 1 : 1, convert the orthographic views of the jig bracket into a sectional isometric drawing on cutting plane A-A.

- Make corner S the lowest point of the drawing.
- Show ALL construction.
- NO hidden detail is required. **[37]**



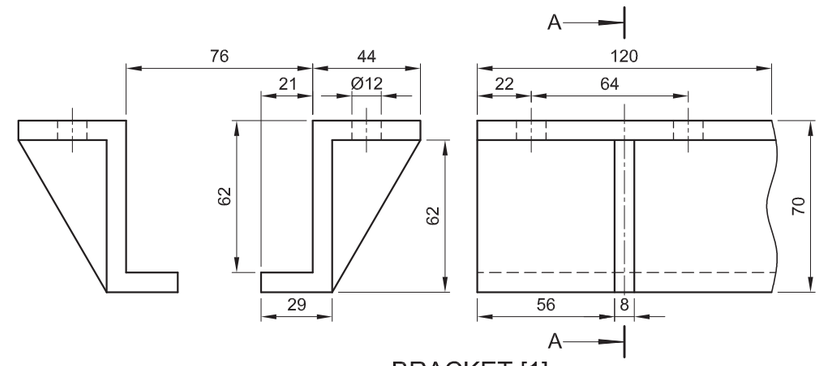


S

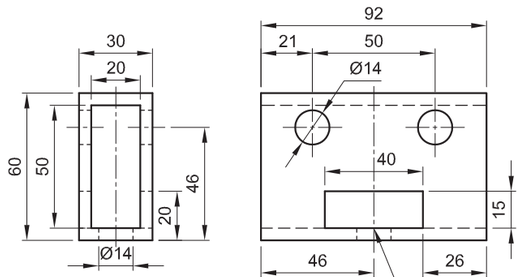
ASSESSMENT CRITERIA						
1	AUX' VIEW + PLACING	2				
2	ISOMETRIC LINES	$13\frac{1}{2}$				
3	HEXAGON	4				
4	CIRCLE + CL	5				
5	SECTIONED SURFACE	$12\frac{1}{2}$				
TOTAL		**37**				

NAME

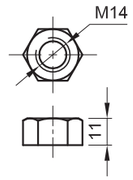
NAME 4



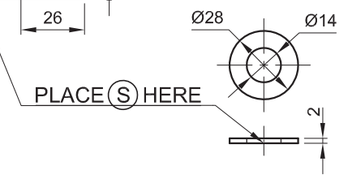
BRACKET [1]



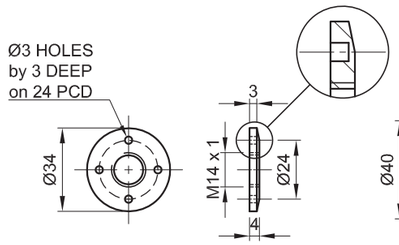
HOLDER [2]



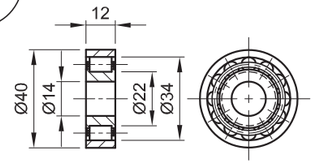
M14 NUT [7]



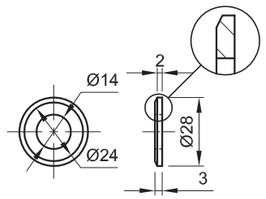
WASHER [8]



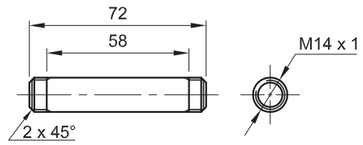
THREADED COLLAR [6]



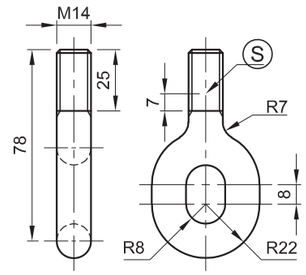
BEARING [5]



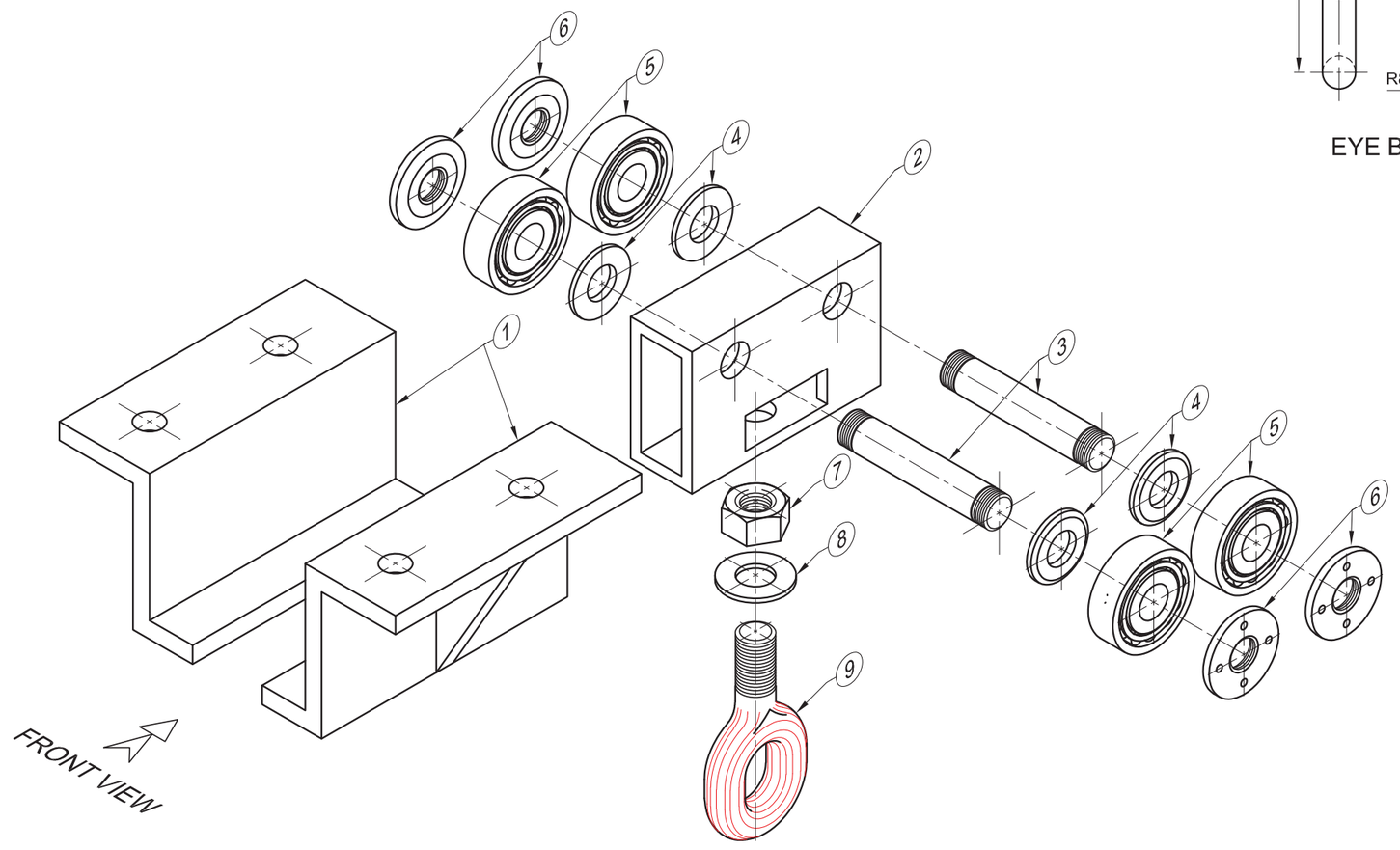
SPACER [4]



SHAFT [3]



EYE BOLT [9]



EXPLODED ISOMETRIC DRAWING

QUESTION 4: MECHANICAL ASSEMBLY

Given:

- The exploded isometric drawing of the parts of a overhead pulley assembly, showing the position of each part relative to all the others.
- Orthographic views of each of the parts of the overhead pulley 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 overhead pulley assembly:
  - **4.1 The half sectional front view** of the over head pulley assembly, on cutting plane A-A as seen from the direction of the arrow shown on the exploded isometric drawing. The left side of the front view must be cut. The cutting plane, that runs vertically through the centre of the assembly, is shown on the right view of the bracket (part 1) and cuts through point S.
  - **4.2 A right view** without any hidden detail.
- ALL drawings must comply with the guidelines contained in the *SANS 10111.*

NOTE:

- As indicated, align point S on the washer with point S on the holder and point S on the eye bolt.
- Planning of the layout of the views is important.
- Show, in the sectional front view, THREE faces of the M14 nut and ALL constructions.
- NO hidden detail is required.

Add the following features to the drawing:

- The cutting plane A-A. **[98]**

PARTS LIST

PARTS	QUANTITY	MATERIAL
1. BRACKETS	2	MILD STEEL
2. HOLDER	1	MILD STEEL
3. SHAFTS	2	MILD STEEL
4. SPACERS	4	MILD STEEL
5. BEARINGS	4	MILD STEEL
6. THREADED COLLARS	4	MILD STEEL
7. M14 NUT	1	MILD STEEL
8. WASHER	1	MILD STEEL
9. EYE BOLT	1	CAST IRON

TITLE

OVERHEAD PULLEY

DW
ENGINEERING WORKS

160 HUNTER STREET
PORT ELIZABETH
6001
041 487 2188

ALL DIMENSIONS ARE IN MILLIMETRES.

ALL UNSPECIFIED RADII ARE R4.

Please turn over

STAPLE

ASSESSMENT CRITERIA					
SECTIONAL FRONT VIEW					
1	BRACKETS	10			
2	HOLDER	$7\frac{1}{2}$			
3	SHAFT	$7\frac{1}{2}$			
4	SPACERS	4			
5	BEARINGS	6			
6	THREADED COLLARS	10			
7	NUT	$4\frac{1}{2}$			
8	WASHER	$1\frac{1}{2}$			
9	EYE BOLT	11			
SUB-TOTAL		**62**			
ASSESSMENT CRITERIA					
RIGHT VIEW					
1	BRACKET	4			
2	HOLDER	3			
3	NUT	3			
4	WASHER	$1\frac{1}{2}$			
5	EYE BOLT	$9\frac{1}{2}$			
6	CUTTING PLANE	3			
7	ASSEMBLY	12			
SUB-TOTAL		**36**			
TOTAL		**98**			
NAME					
NAME					6