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

NATIONAL SENIOR CERTIFICATE

GRADE 11

ENGINEERING GRAPHICS AND DESIGN P2

NOVEMBER 2017

EXAMINATION

MARKS: 200

TIME: 3 hours

This question paper consists of 6 pages.

IGRDSE2

INSTRUCTIONS AND INFORMATION

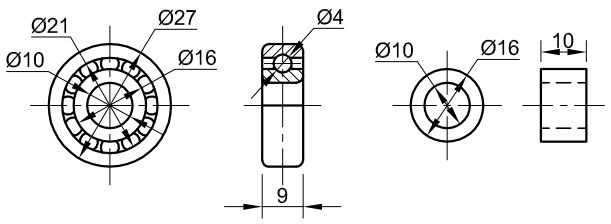
1. The paper consists of FOUR questions.
2. Answer ALL the questions.
3. All drawings must be drawn to scale 1:1, unless otherwise stated.
4. All questions must be answered on the answer sheets provided.
5. All the answers sheets must be re-stapled in numerical sequence and handed in irrespective of 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	

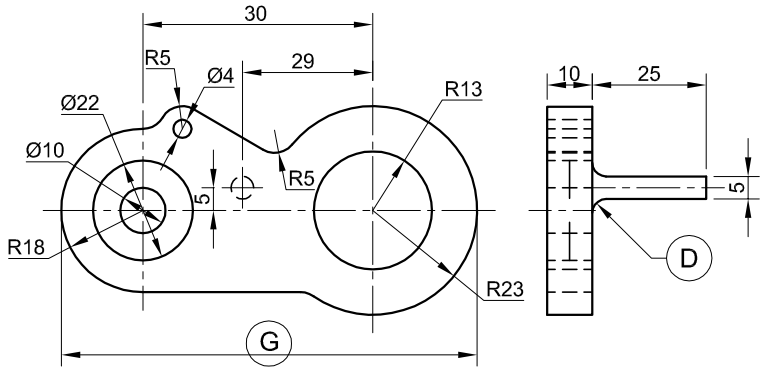
COMPLETE THE FOLLOWING:
NAME
NAME
SCHOOL
SCHOOL

STAPLE

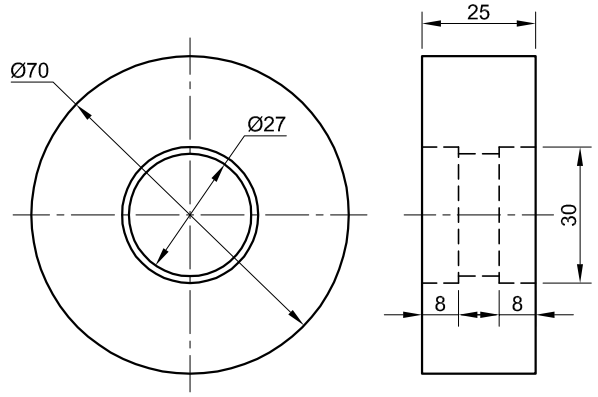


BEARING

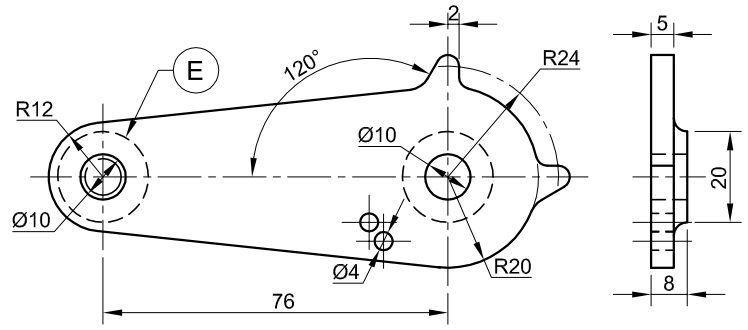
BUSH



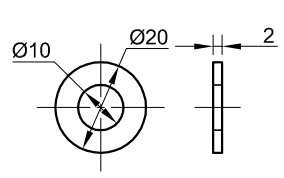
BASE



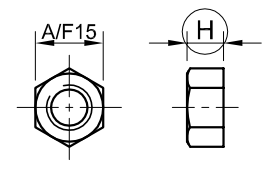
PULLEY



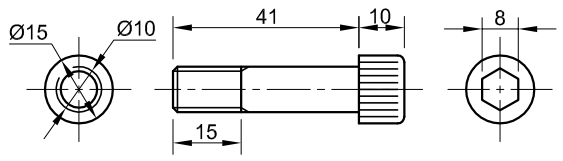
ARM



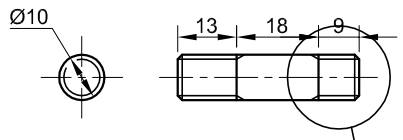
WASHER



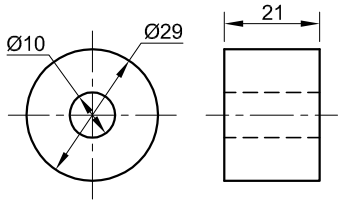
M10 NUT



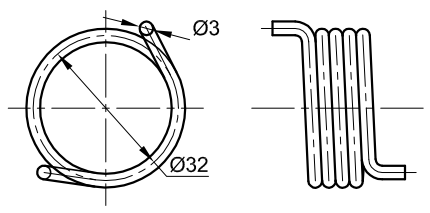
SHAFT



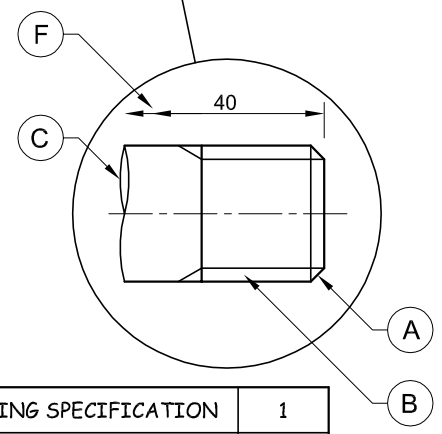
PART A



SPACER



SPRING



QUESTION 1: ANALYTICAL (MECHANICAL)

Given:
Parts of a pulley tensioner with a title block and a table of questions.

Instructions:
Complete the table below by neatly answering the questions, which all refer to the accompanying drawings and title block.
Show all calculations. **[30]**

	QUESTIONS	ANSWERS		
1	What is the indicated scale of the drawing?		1	
2	From what material is the spring manufactured?		1	
3	Which drawing programme was used to create these drawings?		1	
4	What is the drawing file name?		1	
5	What is the website address of the company?		1	
6	What is the tolerance allowed on the dimensions?		1	
7	Why was the drawing revised?		1	
8	At what angle is feature A drawn?		1	
9	What is feature B called?		1	
10	What is feature C called?		1	
11	What is feature D called?		1	
12	What is the radius of the arc at D?		1	
13	Identify the line type at point E.		1	
14	What does the double arrows at F indicate?		1	
15	Determine the dimension at G.		2	
16	If a standard size M10 nut was used, calculate the thickness of the nut at H.		2	
17	What type of section is shown at the BEARING?		1	
18	What does A/F mean at the M10 nut?		1	
19	In the box below (ANSWER 19), draw, in neat freehand, the SANS convention for a BEARING.		6	
20	In the box below (ANSWER 20), draw, in neat freehand, the symbol for the projection system used.		4	
	TOTAL		**30**	

№	REVISION DESCRIPTION	CHANGED BY	DATE
1	CHANGE SPRING SPECIFICATION	SANJAY	24/03/17

ALL DIMENSIONS ARE IN MILLIMETRES.

UNLESS OTHERWISE SPECIFIED, TOLERANCES ON DIMENSIONS ARE ± 0,35.

ALL UNSPECIFIED RADII ARE R6.

DRAWING PROGRAM: AUTOCAD 2015

DRAWN BY: Keith
DATE: 15/02/2017
CHECKED BY: Ann
DATE: 18/03/2017
APPROVED BY: Peter
DATE: 28/03/2017
SCALE: 1 : 2

DRAWING SET NO. 1 OF 3
FILE NAME: TEN-53-2017
MATERIAL: VARIOUS
HEAT TREATMENT: NONE

PULLEY
MANUFACTURING

VAN NIEKERK STREET
MIDDELBURG
5900
www.pulley.co.za

PULLEY TENSIONER

PARTS LIST

PART	QUANTITY	MATERIAL	PART	QUANTITY	MATERIAL
1. BASE	1	CAST IRON	6. SPRING	1	SPRING STEEL
2. ARM	1	CAST IRON	7. SPACER	1	MILD STEEL
3. PULLEY	1	CAST IRON	8. SHAFT	1	MILD STEEL
4. BUSH	1	MILD STEEL	9. BEARING	1	MILD STEEL
5. WASHER	3	MILD STEEL	10. M10 NUT	2	MILD STEEL

ANSWER 19

CONVENTION FOR BEARING

ANSWER 20

SYMBOL

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 minimum cam radius is 16 mm.

The specifications for the movement is as follows:

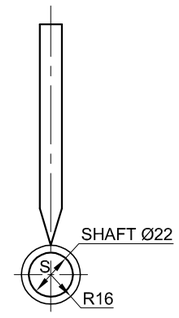
- The cam shaft rotates clockwise at uniform velocity.
- Over the first 30°, the follower is at rest;
- Over the next 60°, the follower rises 60 mm;
- There is a dwell period for the next 30°;
- Over the next 60°, the follower falls 35 mm;
- There is a dwell period for the next 30°;
- Over the next 45°, the follower rises 25 mm.
- There is a dwell period for the next 30°.
- Over the final 75°, the follower returns to its original position.

Instructions:

2.1 Draw, to scale 1:1, a displacement graph with a scale of 30° equal to 8 mm and a follower displacement scale of 1:1 for the given motion. Indicate the degrees below the graph. Label the graph.

2.2 Project and draw the cam profile that would generate the given motion. Indicate the degrees on the cam profile. The arrow indicating the direction of rotation must be shown.

- Show **ALL** necessary construction.
- Do not show the cam follower. **[38]**



ASSESSMENT CRITERIA				
1. GRAPH + LABEL	11			
2. ARROW + SHAFT + MIN RADIUS + DEGREE + C L	6			
3. CONSTRUCTION	7			
4. CAM POINTS	8			
5. CURVE + QUALITY	6			
TOTAL	**38**			

NAME	
NAME	3

STAPLE

QUESTION 3: ISOMETRIC DRAWING

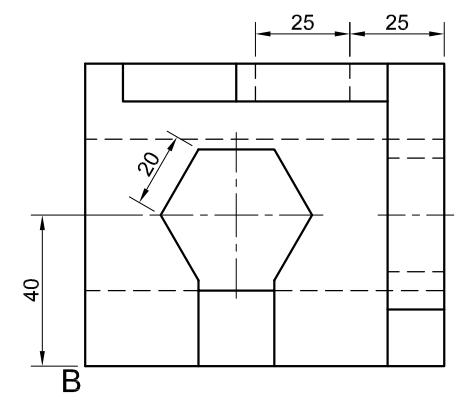
Given:

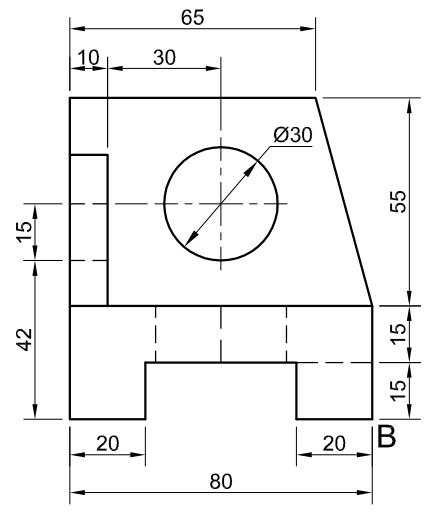
- The front view, top view and left view of a sliding guide.
- The position of point B on the drawing sheet.

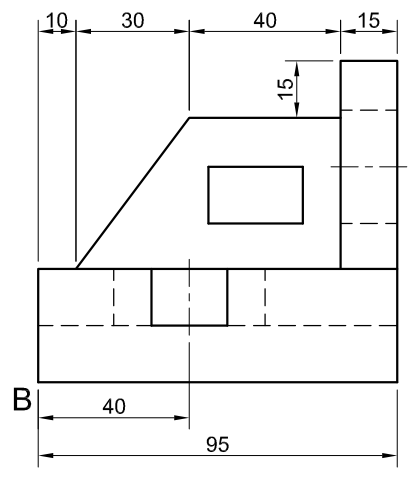
Instructions:

Convert the orthographic views of the sliding guide into a scale 1 : 1 isometric drawing.

- Make corner B the lowest point of the drawing.
- Show ALL necessary circle and other construction.
- NO hidden detail is required. **[42]**



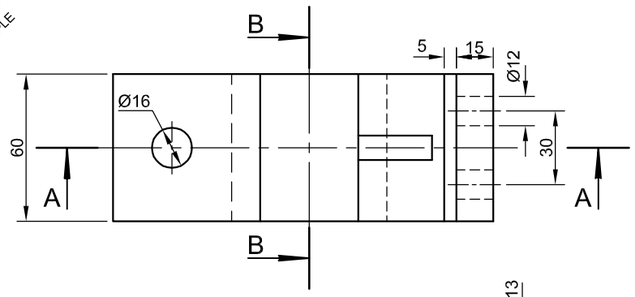


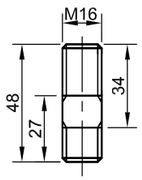


B

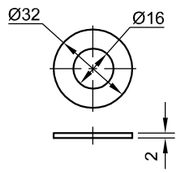
ASSESSMENT CRITERIA				
1. AUX. VIEW + PLACING	3			
2. ISO' & NON ISO LINES	$24\frac{1}{2}$			
3. HEXAGON	$6\frac{1}{2}$			
4. ISO' CIRCLES + CL	8			
TOTAL	**42**			
NAME				
NAME				4

STAPLE

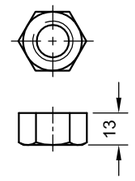




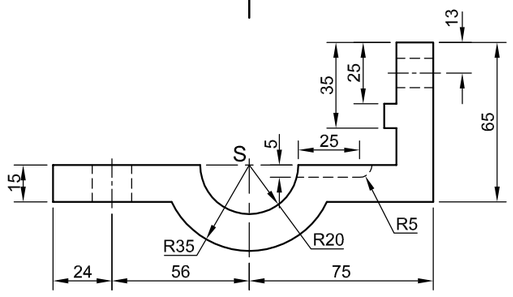
M16 STUD (5)



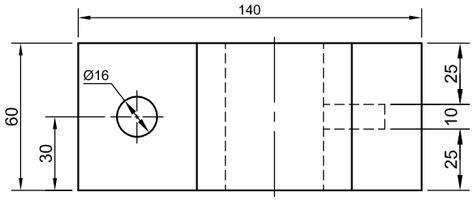
WASHER (6)

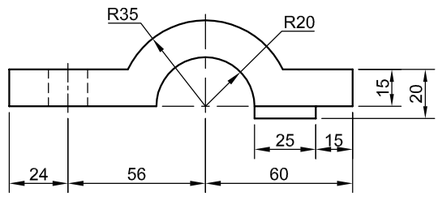


M16 NUT (7)

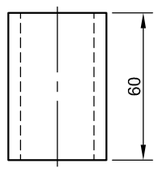


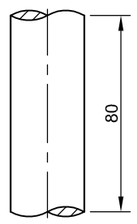
BASE (1)

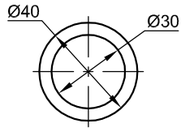




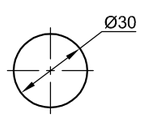
BEARING CAP (2)



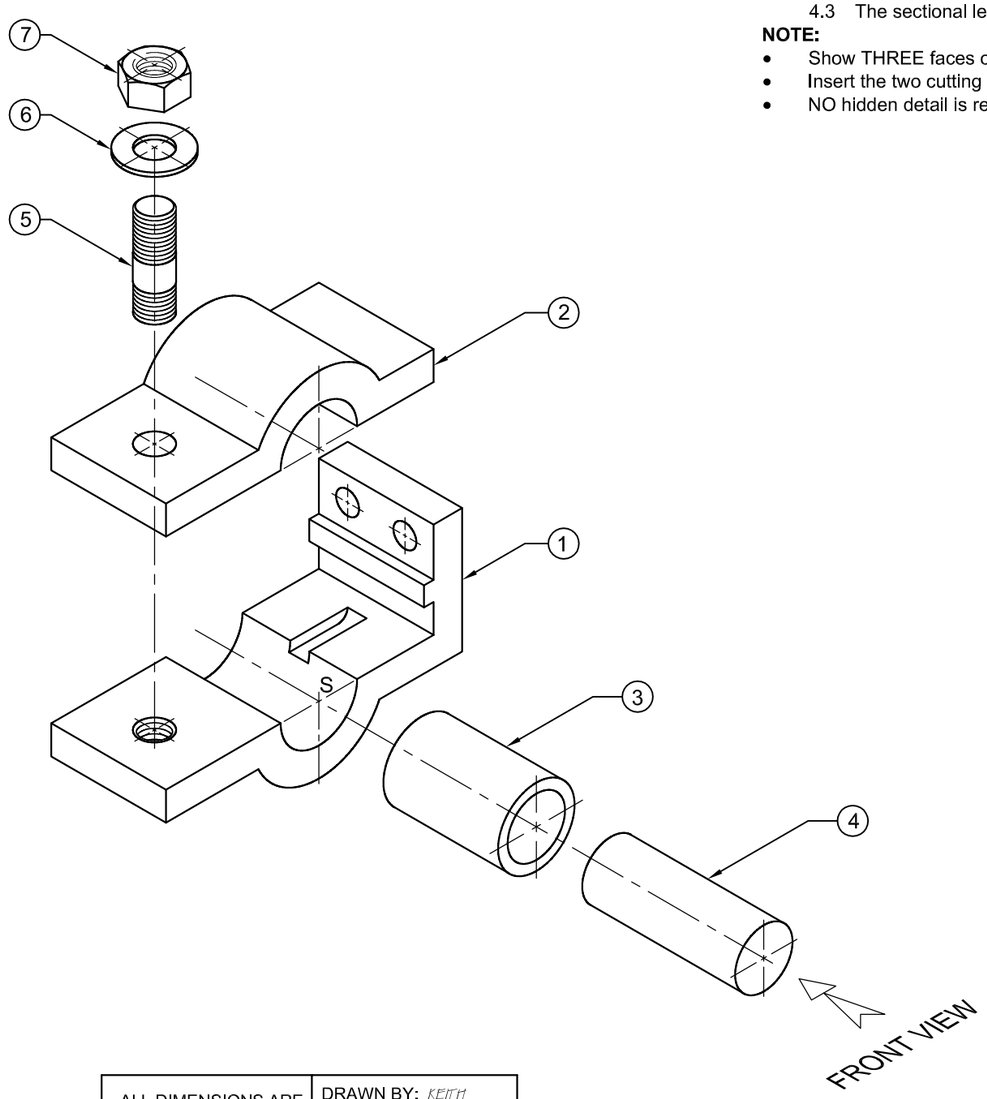




BUSH (3)



SHAFT (4)



FRONT VIEW

QUESTION 4

Given:

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

Instructions:

- Answer this question on page 6.
- Draw, to scale 1:1 and in third-angle orthographic projection, the following views:
  - 4.1 The sectional front view on cutting plane A-A, as seen from the direction of the arrow shown on the exploded isometric drawing. The cutting plane passes through the vertical centre line of the assembly, is shown on the top view of the base (part 1).
  - 4.2 The top view without hidden detail.
  - 4.3 The sectional left view on cutting plane B-B.

NOTE:

- Show THREE faces of the M16 nut and ALL necessary construction.
- Insert the two cutting planes on the relevant view.
- NO hidden detail is required. **[90]**

PARTS LIST		
PART	QUANTITY	MATERIAL
1. BASE	1	CAST IRON
2. BEARING CAP	1	CAST IRON
3. BUSH	1	MILD STEEL
4. SHAFT	1	MILD STEEL
5. STUD	1	MILD STEEL
6. WASHER	1	MILD STEEL
7. M16 NUT	1	MILD STEEL

ALL DIMENSIONS ARE IN MILLIMETRES.	DRAWN BY: KEITH	BEARING MANUFACTURING	VAN NIEKERK STREET MIDDELBURG 5900 www.bearing.co.za
	DATE: 20/01/2017		
ALL UNSPECIFIED RADII ARE R3.	CHECKED BY: ANN		EASTERN CAPE DEPARTMENT BASIC EDUCATION GRADE 11 NOVEMBER 2017
	DATE: 27/02/2017		
DRAWING PROGRAM: CAD 2017	APPROVED BY: PETER	TITLE BEARING HOUSING	
	DATE: 27/03/2017		

Please turn over

STAPLE

ASSESSMENT CRITERIA				
SECTIONAL LEFT VIEW				
1. BASE	8			
2. BEARING CAP	$1\frac{1}{2}$			
3. BEARING	$1\frac{1}{2}$			
4. SHAFT	5			
ASSEMBLY	6			
3rd ANGLE PROJ	2			
SUB TOTAL	**24**			
TOP VIEW				
1. BASE	$1\frac{1}{2}$			
2. BEARING CAP	$2\frac{1}{2}$			
3. SHAFT	5			
4. M16 NUT & STUD	$6\frac{1}{2}$			
5. WASHER	1			
6. CUTTING PLANE	7			
SUB TOTAL	**$23\frac{1}{2}$**			
SECTIONAL FRONT VIEW				
1. BASE	13			
2. BEARING CAP	6			
3. BUSH & SHAFT	$2\frac{1}{2}$			
4. M16 NUT	7			
5. WASHER	2			
6. STUD	12			
SUB TOTAL	**$42\frac{1}{2}$**			
TOTAL	**90**			
NAME				
NAME				6