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

NATIONAL SENIOR CERTIFICATE

GRADE 12

ENGINEERING GRAPHICS AND DESIGN P2

SEPTEMBER 2015

PREPARATORY EXAMINATION

MARKS: 200

TIME: 3 hours

This question paper consists of 6 pages.

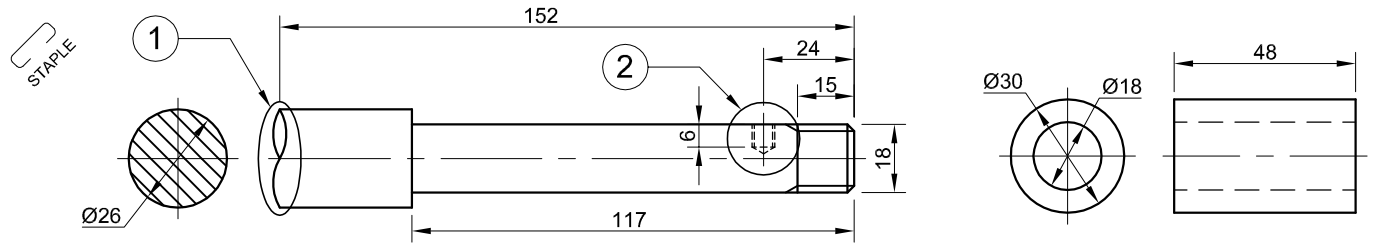
INSTRUCTIONS AND INFORMATION

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					

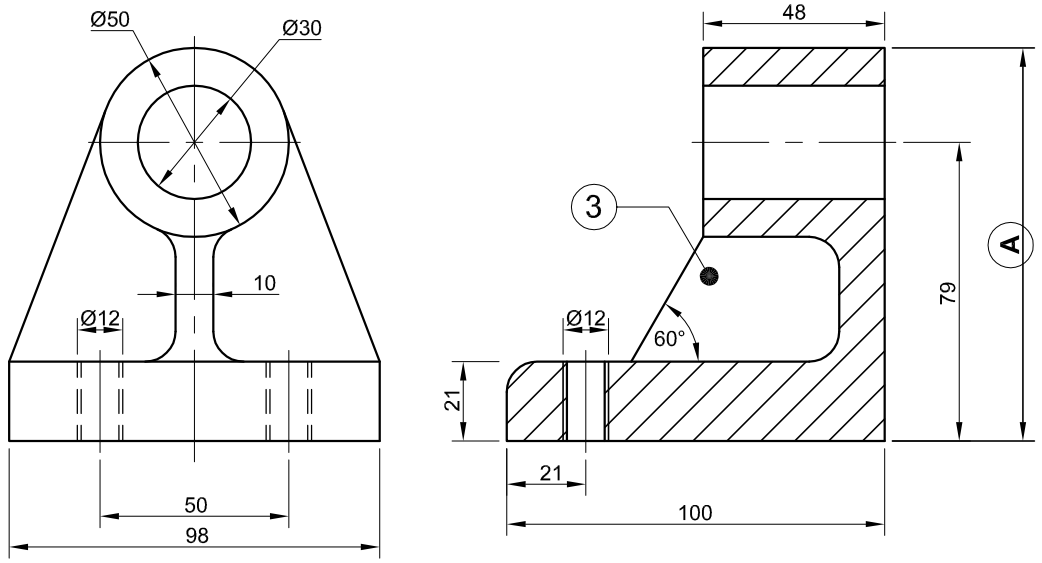
FINAL CONVERTED MARK	CHECKED BY
100	

COMPLETE THE FOLLOWING:
NAME
NAME
EXAMINATION CENTRE
EXAMINATION CENTRE

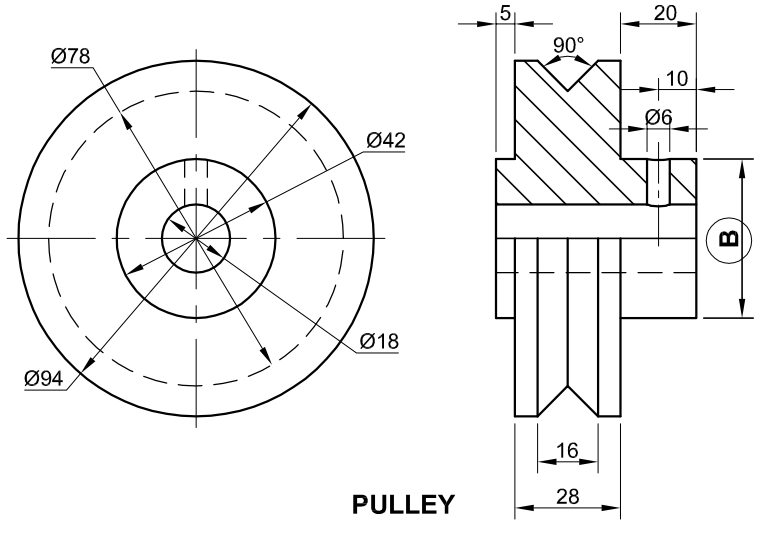


SHAFT

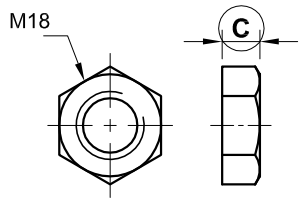
BUSH



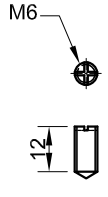
BODY



PULLEY



M18 NUT



PART 4

QUESTION 1: ANALYTICAL (MECHANICAL)

Given:
Detailed drawings showing parts of a bearing bracket, a title block and a table of questions. The drawings have not been prepared according to the indicated scale.

Instructions:
Complete the table below by neatly answering the questions, which all refer to the accompanying detailed drawings and the title block. **[27]**

QUESTIONS		ANSWERS		
1	On what date was the drawing approved?		1	
2	What is the name of the company that designed the bearing bracket?		1	
3	Which drawing method was used to create these drawings?		1	
4	How many sets of drawings are there?		1	
5	What is the tolerance allowed on the dimensions?		1	
6	What indicated scale has been used for the drawing?		1	
7	How many parts make up the assembly?		1	
8	What is feature 1 called?		1	
9	What is feature 2 called?		1	
10	What is feature 3 called?		1	
11	What type of section is shown on the PULLEY?		1	
12	Determine the dimensions at: A) B) C)		4	
13	What is part 4 called?		1	
14	How many external screw threads are there in the assembly?		1	
15	Complete the cutting plane on the front view of the BASE and label it A-A.		3	
16	In the box below (ANSWER 16), draw, in neat freehand, the symbol for the projection system used.		4	
17	In the box below (ANSWER 17), draw, in neat freehand, the front view and side view of a Woodruff key.		3	
		TOTAL	**27**	

			2			
15/07/14	ANDREW	REMOVE KEY WAY	1	DRAWING SET: 2 OF 3		
DATE	CHANGED BY	REVISION DESCRIPTION	No.	DRAWING PROGRAM: AutoCAD 2014	DRAWN: PETER	01/07/14
BEARING BRACKET				DRAWING №. BEARING/98/2015	CHECKED: JOHN	08/07/14
				FILE NAME: bearing4.dwg	APPROVED: ILSE	30/07/14
CENTAUR ENGINEERS (SA) (Pty) Ltd	72 MIDDLE STREET PORT ELIZABETH 6001 www.centaur.co.za ☎ 041 959 5432			UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MILLIMETRES WITH A TOLERANCE OF: 0,25 UNLESS OTHERWISE SPECIFIED ALL SURFACES TEXTURE FINISHES:	MATERIAL: CAST IRON	
					HEAT TREATMENT: NONE	
					SCALE: 1:2	
					QUANTITY: 60	

ANSWER 16

ANSWER 17

NAME

NAME 2

STAPLE

QUESTION 2: LOCI (CAMS)

Given:

- The incomplete displacement diagram.
- The vertical centre line of the cam shaft as reference on the drawing sheet.

The specifications for the movement are as follows:

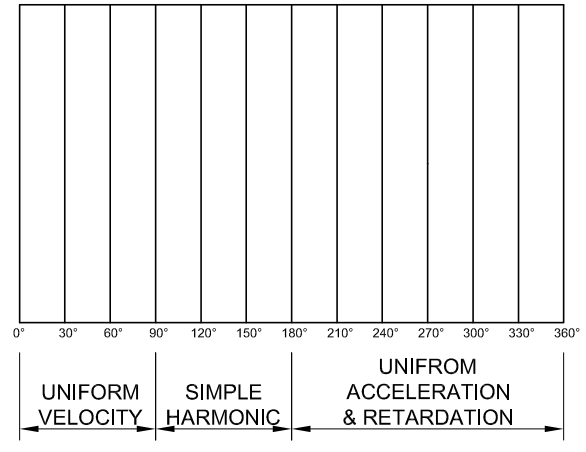
- The cam shaft rotates clockwise.
- Over the first 60°, the follower rises 36 mm at an uniform velocity.
- There is a dwell period for the next 30°.
- Over the next 90°, the follower rises a further 34 mm at simple harmonic velocity.
- Over the final 180°, the follower returns to its original position at uniform acceleration & retardation.
- Minimum distance from cam profile to cam shaft centre is 10 mm.

Instructions:

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

2.2 Project, to scale 1:1, and draw the cam profile that the displacement diagram would generate using the vertical centre line as reference. The arrow indicating the direction of rotation must be shown.

- Show ALL necessary construction. **[36]**



ASSESSMENT CRITERIA						
1	GRAPH DIVISIONS + CONSTR GRAPH	4				
2	PLOTTING POINTS & CURVE	13				
3	MIN. DIST, C'LINES + ARROW	3				
4	CONSTRUCTION	3				
5	PLOTTING	$7\frac{1}{2}$				
6	CURVE	$4\frac{1}{2}$				
7	LABEL	1				
	TOTAL	**36**				

NAME

NAME 3

STAPLE

QUESTION 3: ISOMETRIC DRAWING

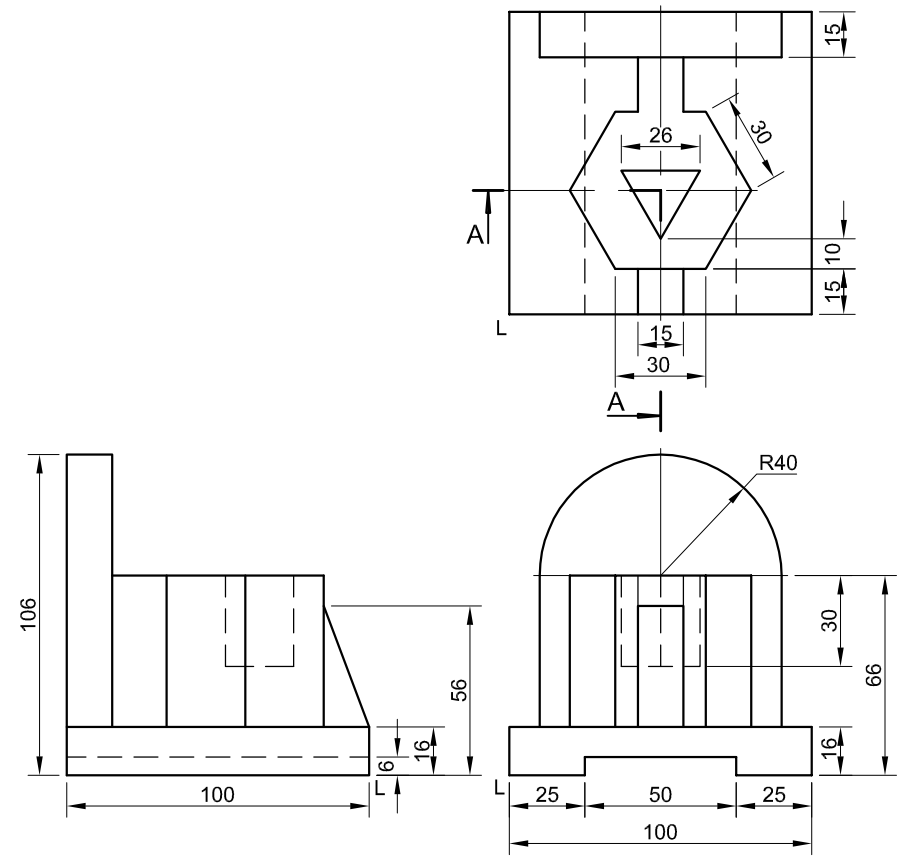
Given:

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

Instructions:

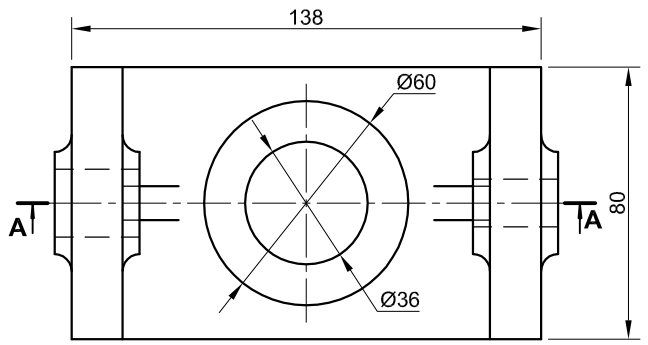
Using scale 1 : 1, convert the orthographic views of the sliding guide into a sectional isometric drawing on cutting plane A-A.

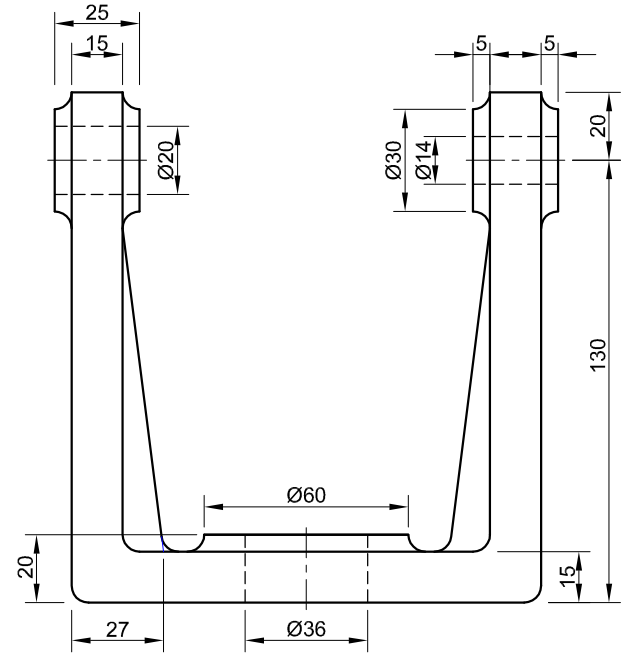
- Make L the lowest point of the drawing.
- Show ALL necessary constructions.
- NO hidden detail is required. **[44]**



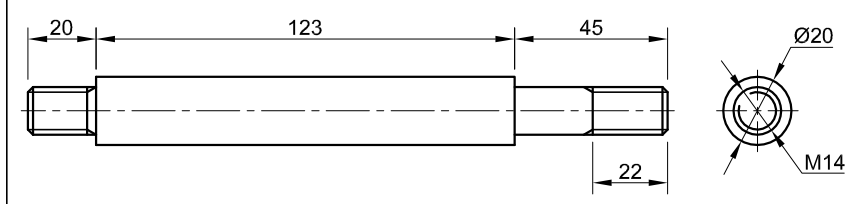
L

ASSESSMENT CRITERIA						
1	AUX' VIEWS + PLACING	3				
2	ISO' LINES	24				
3	NON ISO' LINES	8				
4	CIRCLE + CONSTR	6				
H	SECTIONING	3				
TOTAL		**44**				
NAME						
NAME						4

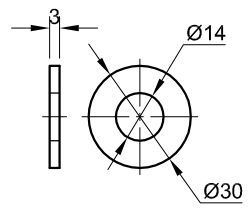




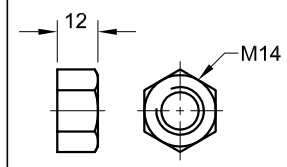
BASE



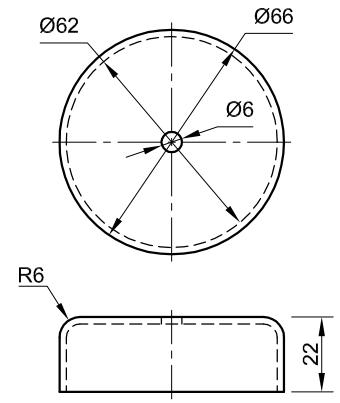
SHAFT



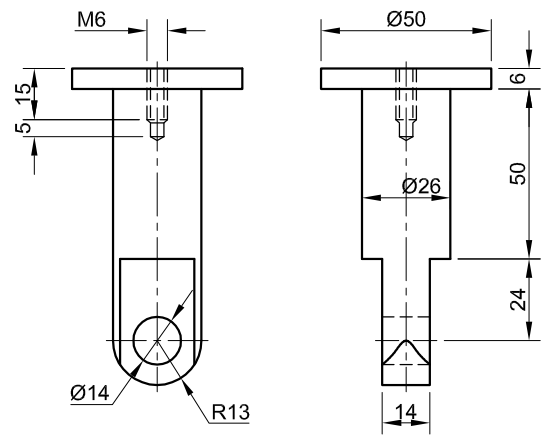
WASHER



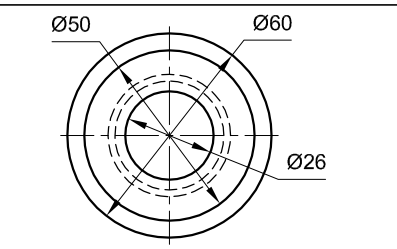
NUT

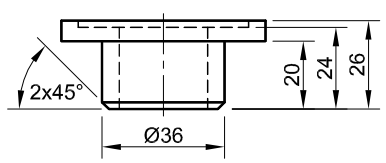


CAP

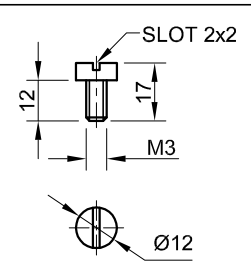


PIN

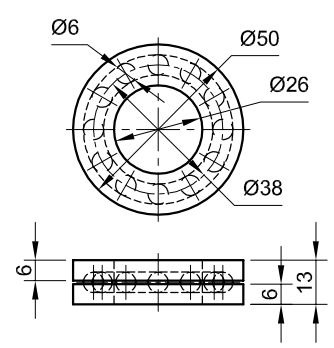




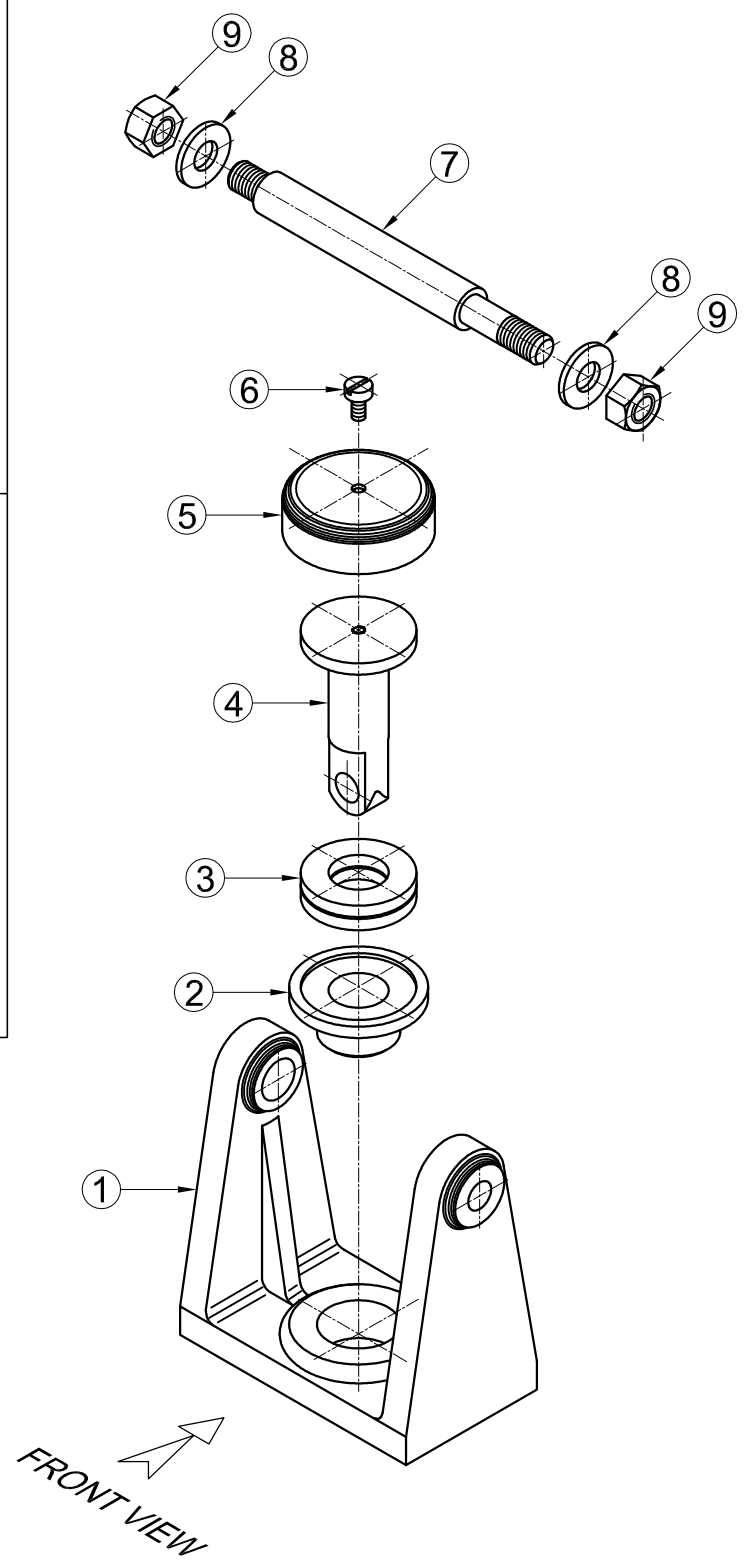
BUSH



SCREW



BEARING



EXPLODED ISOMETRIC DRAWING

QUESTION 4: MECHANICAL ASSEMBLY

Given:

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

Instructions:

- Answer this question on page 6.
- Draw, to scale 1 : 1, the **sectional front view**, of the hanging pin assembly, on cutting plane A-A, as seen from the direction of the arrow shown on the exploded isometric drawing. The cutting plane, which passes vertically through the centre of the assembly, is shown on the top view of the base (part 1).
- ALL drawings must comply with the guidelines contained in the *SABS 0111.*

NOTE:

- Show THREE faces on the right hand side nut, and TWO faces on the left hand side nut, in the front view and ALL necessary construction.
- NO hidden detail is required. **[93]**

PARTS LIST

PART	QUANTITY	MATERIAL
1. BASE	1	CAST IRON
2. BUSH	1	BRASS
3. BEARING	1	MILD STEEL
4. HANGING PIN	1	CAST IRON
5. CAP	1	MILD STEEL
6. SCREW	1	MILD STEEL
7. SHAFT	1	MILD STEEL
8. WASHER	2	MILD STEEL
9. NUT	2	MILD STEEL

IBAYHI STEEL
MANUFACTURING

OLD CAPE ROAD
GREENBUSHES
6025
www.ibayhisteel.co.za

TITLE

HANGING PIN ASSEMBLY

ALL DIMENSIONS ARE IN MILLIMETRES.

ALL UNSPECIFIED RADII ARE R3.

Please turn over

STAPLE

ASSESSMENT CRITERIA					
SECTIONAL FRONT VIEW					
1	BASE	19			
2	BUSH	7			
3	BEARING	5			
4	HANGING PIN	6			
5	CAP	7			
6	SCREW	12			
7	SHAFT	14			
8	WASHERS	5			
9	NUTS	11			
10	CENTRE LINES	2			
	ASSEMBLY	5			
TOTAL		**93**			

NAME	
NAME	6