

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

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**



**ENGINEERING GRAPHICS AND DESIGN P2**

**SEPTEMBER 2018**

**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									
3									
4									
TOTAL									
	2	0	0						

FINAL CONVERTED MARK	CHECKED BY
100	

COMPLETE THE FOLLOWING:
NAME
NAME
EXAMINATION CENTRE
EXAMINATION CENTRE





## 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:**

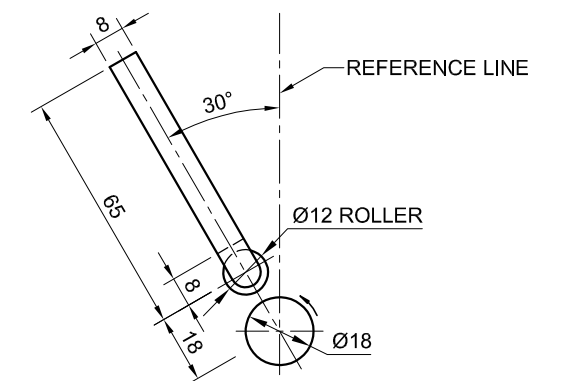
- The cam shaft rotates anti-clockwise at constant velocity for the first 270°:
  - Over the first 60° the follower rises 27 mm.
  - There is a dwell period for the next 45°.
  - Over the next 45° the follower rises a further 28 mm.
  - There is a dwell period for the next 30°.
  - Over the next 60° 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  $30^\circ$  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			
	<b>TOTAL</b>	<b>39</b>			
NAME					
NAME					3



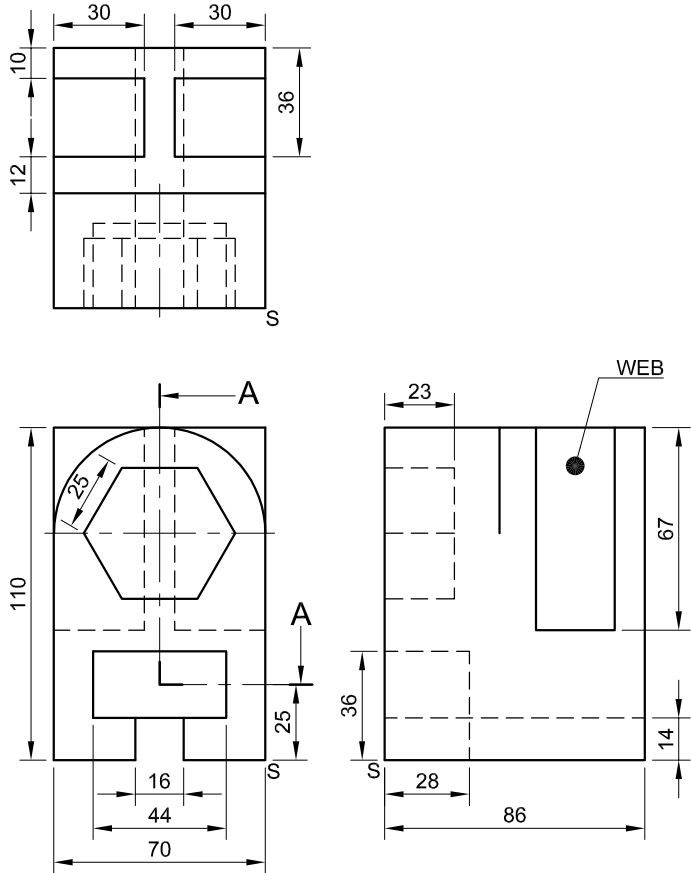
QUESTION 3: ISOMETRIC DRAWING

**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.

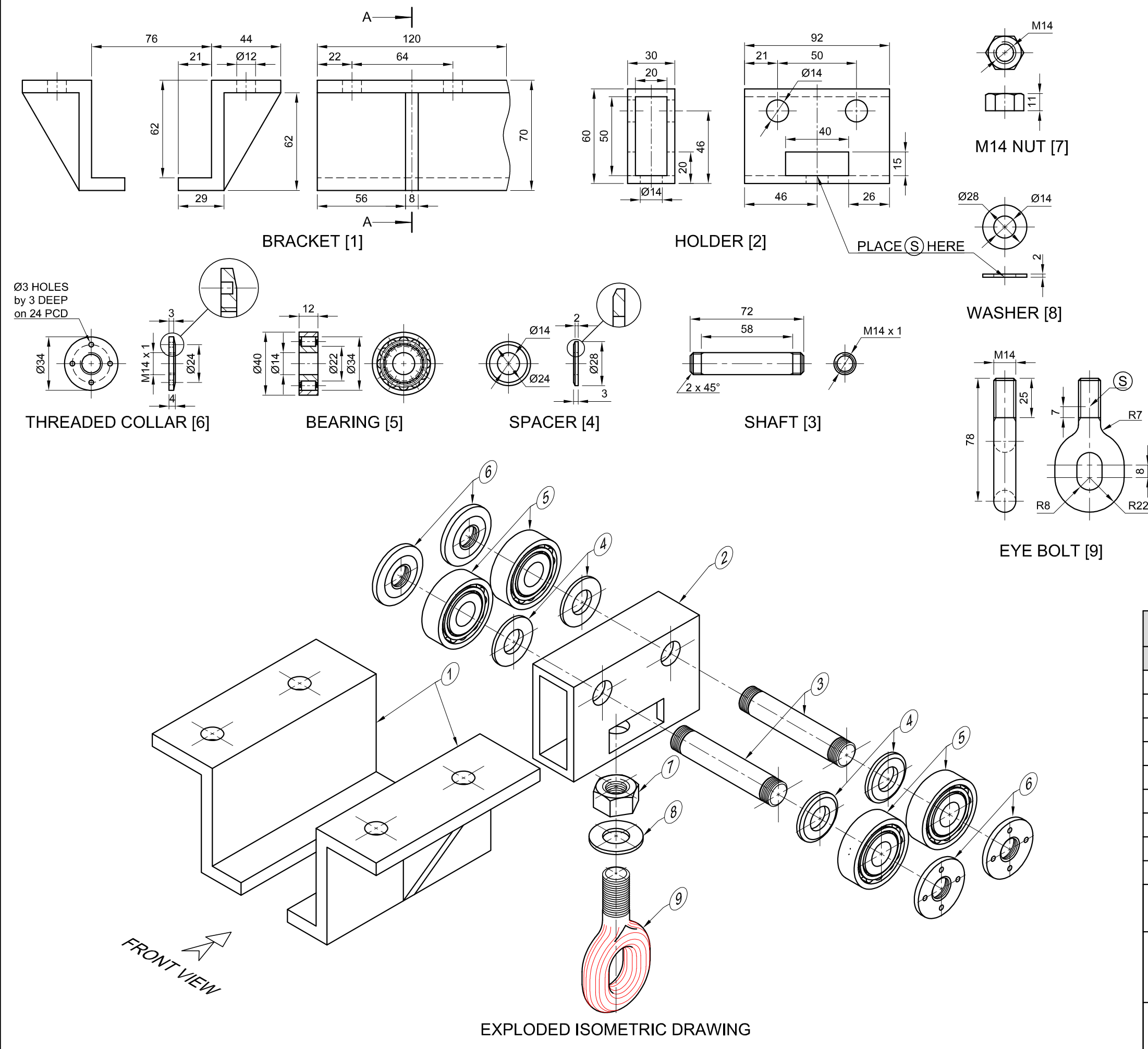
- Make corner S the lowest point of the drawing.
- Show ALL construction.
- NO hidden detail is required.

[37]



↙  
S

ASSESSMENT CRITERIA					
1	AUX' VIEW + PLACING	2			
2	ISOMETRIC LINES	13½			
3	HEXAGON	4			
4	CIRCLE + CL	5			
5	SECTIONED SURFACE	12½			
TOTAL		37			
NAME					
NAME					4



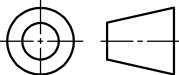
QUESTION 4: MECHANICAL ASSEMBLY

- 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		160 HUNTER STREET PORT ELIZABETH 6001
ENGINEERING WORKS		041 487 2188
ALL DIMENSIONS ARE IN MILLIMETRES.	ALL UNSPECIFIED RADII ARE R4.	



ASSESSMENT CRITERIA					
SECTIONAL FRONT VIEW					
1	BRACKETS	10			
2	HOLDER	7½			
3	SHAFT	7½			
4	SPACERS	4			
5	BEARINGS	6			
6	THREADED COLLARS	10			
7	NUT	4½			
8	WASHER	1½			
9	EYE BOLT	11			
SUB-TOTAL		62			
ASSESSMENT CRITERIA					
RIGHT VIEW					
1	BRACKET	4			
2	HOLDER	3			
3	NUT	3			
4	WASHER	1½			
5	EYE BOLT	9½			
6	CUTTING PLANE	3			
7	ASSEMBLY	12			
SUB-TOTAL		36			
TOTAL		98			
NAME					
NAME					6