



**EASTERN CAPE EDUCATION DEPARTMENT**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**ENGINEERING GRAPHICS AND DESIGN P2**  
**SEPTEMBER 2012**  
**PREPARATORY EXAMINATIONS**

**MARKS: 200**

**TIME: 3 hours**

**This question paper consists of 6 pages.**

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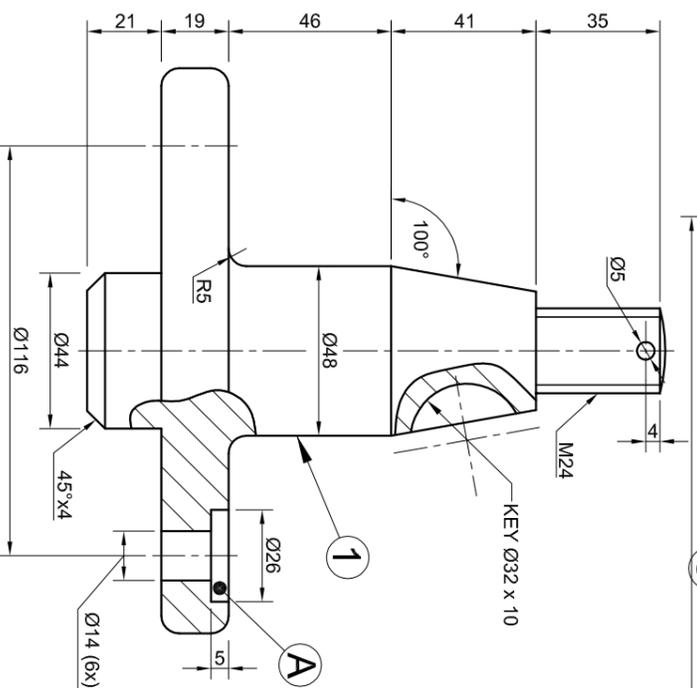
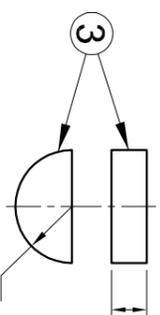
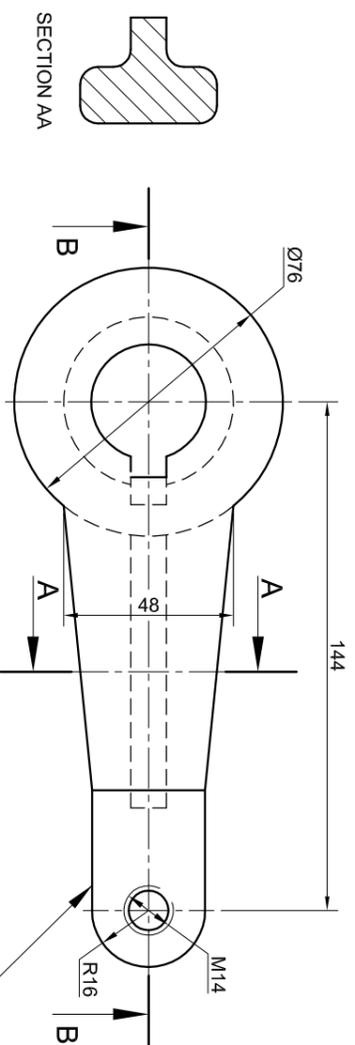
**INSTRUCTIONS AND INFORMATION**

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 answer 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



**QUESTIONS**

**ANSWERS**

1	By who was the drawing approved?	1	
2	What SI unit is used for the dimensions?	1	
3	What is the file name of this drawing?	1	
4	In which street is the manufacturing company situated?	1	
5	What is the tolerance allowed on the dimensions?	1	
6	What is feature A called?	1	
7	What is feature B called?	1	
8	What is the total length (C) of the arm?	1	
9	Determine the degree of the internal angle of the taper (D)?	1	
10	Determine the dimensions at E.	1	
11	What type of section is shown on part 1?	1	
12	What type of section is shown on part 2 (SECTION AA)?	1	
13	What is the name of the part that will be used to ensure that part 4 will not turn loose?	2	
14	What is the size of the chamfer on part 1?	1	
15	What is the purpose of feature B?	2	
16	Complete the parts list by printing the names for parts 3 and 4.	2	
17	Insert the correct dimensions for part 3.	2	
18	In the box below (ANSWER 18), draw, in neat freehand, the symbol for the projection system used.	4	
<b>TOTAL</b>		<b>25</b>	

**QUESTION 1: ANALYTICAL (MECHANICAL)**

**Given:**  
Four parts of a torsion arm 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. [25]

26/10/2011	RODNEY	CHANGE SIZE OF THREADED HOLE	A
DATE	CHANGED BY	REVISION DESCRIPTION	№
DRAWING SET NO. 2 OF 3		MATERIAL: CAST IRON & MILD STEEL	
FILE NAME: SE-25/2011		HEAT TREATMENT: NONE	

ALL DIMENSIONS ARE IN MILLIMETRES.			
DRAWN BY: RIAAN		DATE: 15/09/2011	
CHECKED BY: IAN		DATE: 28/09/2011	
UNLESS OTHERWISE SPECIFIED, TOLERANCES ON DIMENSIONS ARE ± 0,25.			
ALL UNSPECIFIED RADII ARE R3.			

DRAWING PROGRAM: AUTOCAD 2011		DATE: 19/10/2011	
SCALE: 1 : 2		APPROVED BY: ANDY	
DIRK WELDING ENGINEERING		VICTORIA STREET GRADOCK 5880 www.dirkweld.co.za	
<b>TORSION ARM</b>			

**PARTS LIST**

PART	QUANTITY	MATERIAL	ANSWER 18
1. SPINDLE	1	CAST IRON	
2. ARM	1	MILD STEEL	
3.	1	MILD STEEL	
4.	1	MILD STEEL	
			<b>EXAMINATION NUMBER</b>
			<b>EXAMINATION NUMBER</b>
			<b>2</b>



**QUESTION 2: LOCI (CAMS)**

**Given:**

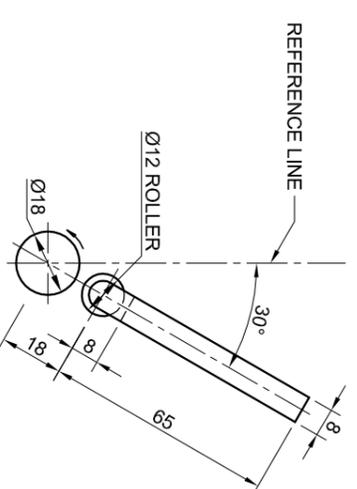
- The shaft and follower detail of an industrial cam with follower shown at its lowest position.
- The vertical centre line of the cam shaft as reference on the drawing sheet.

**The specifications for the movement are as follows:**

- The cam shaft rotates anti-clockwise at constant velocity.
- Over the first 60° the follower rises 27 mm.
- There is a dwell period for the next 60°.
- Over the next 30° the follower rises a further 28 mm.
- There is a dwell period for the next 45°.
- Over the next 45° the follower drop 15 mm.
- There is a dwell period for the next 45°.
- Over the final 75° the follower returns to its original position.

**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 of 1:1 for the given motion. Label the graph.
  - 2.3 Project and draw the cam profile that would generate the given motion.
- Show ALL necessary construction. **[38]**



CAM SHAFT AND FOLLOWER DETAIL

ASSESSMENT CRITERIA	
1 GRAPH	10
2 FOLLOWER + SHAFT + ARROW + CLS	10
3 CONSTRUCTION	4
4 CAM POINTS	7
5 CURVE + QUALITY	7
<b>TOTAL</b>	<b>38</b>
EXAMINATION NUMBER	
EXAMINATION NUMBER	
EXAMINATION NUMBER	<b>3</b>



**QUESTION 3: ISOMETRIC DRAWING**

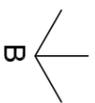
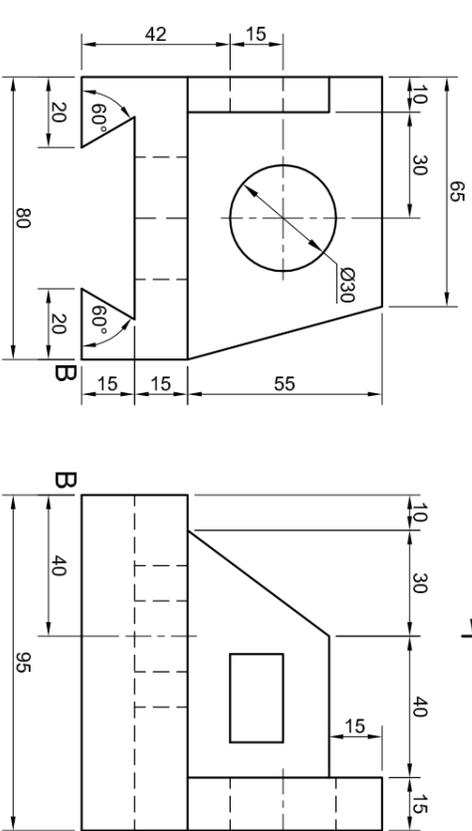
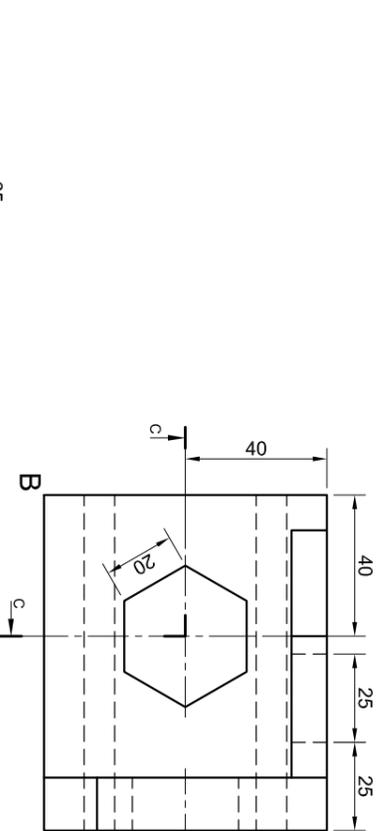
**Given:**

- The front view, top view and left view of a sliding jig that is cut by cutting plane C-C.
- The position of point B on the drawing sheet.

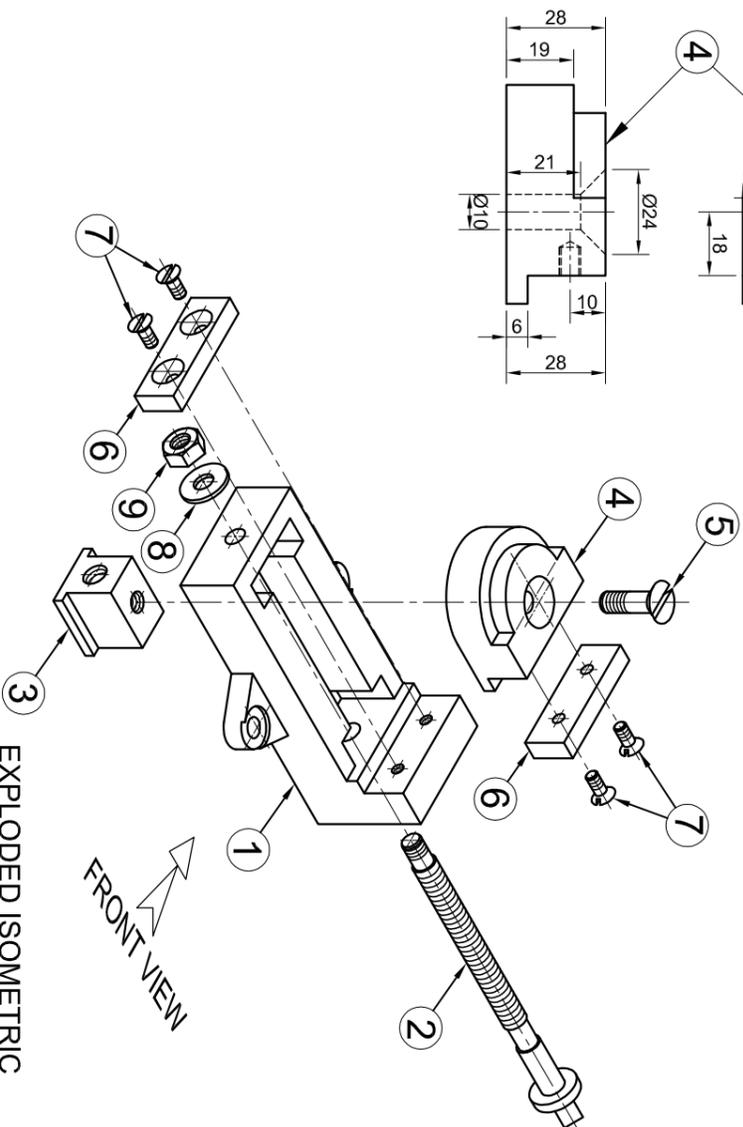
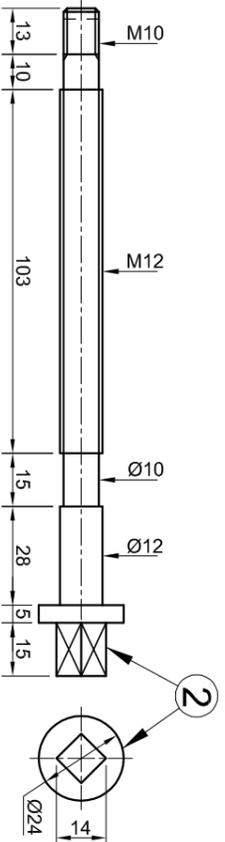
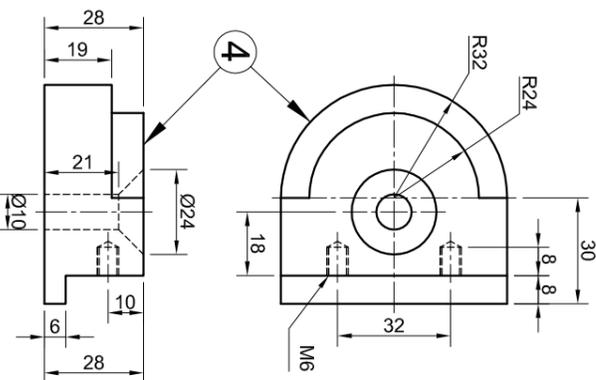
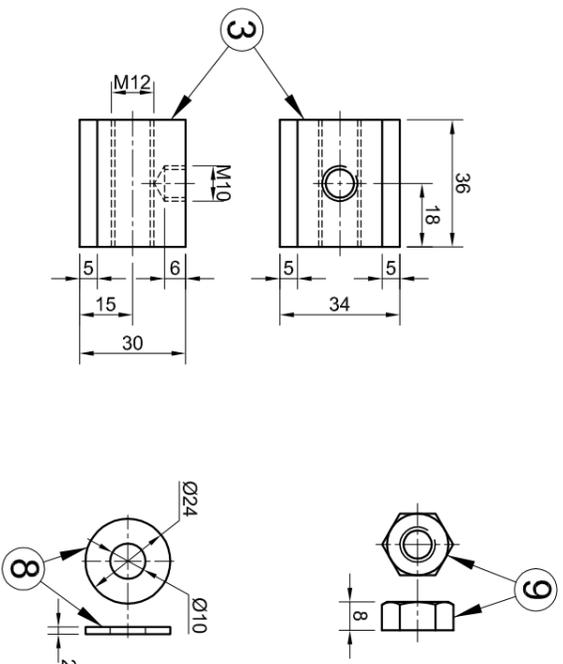
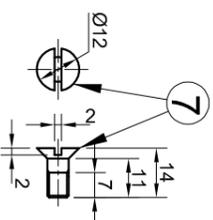
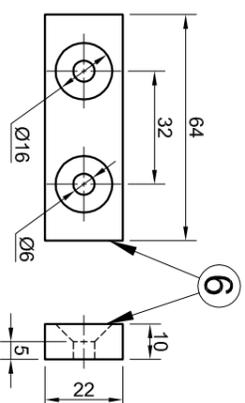
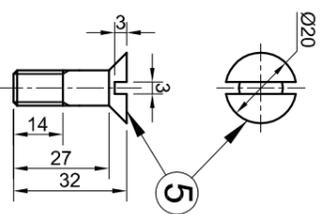
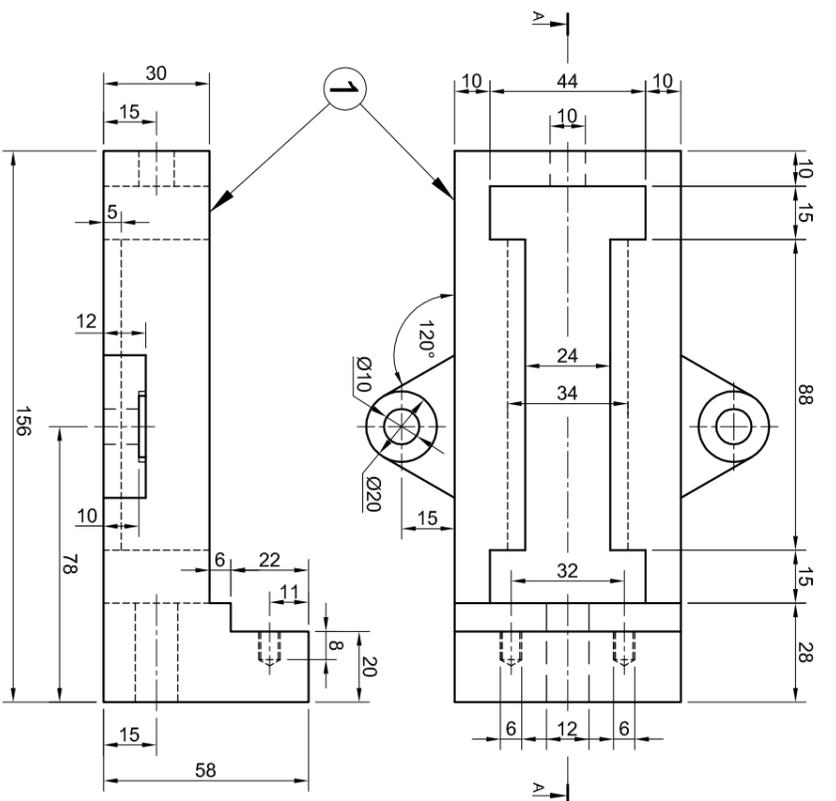
**Instructions:**

Convert the orthographic views of the sliding jig into a scale 1 : 1 sectional isometric drawing on C-C.

- Make corner B the lowest point of the drawing so that the sectional surfaces are visible.
- Show ALL necessary circle and other construction.
- NO hidden detail is required. **[40]**



ASSESSMENT CRITERIA			
1. AUX. VIEW + PLACING	3		
2. ISOMETRIC LINES	22		
3. NON-ISOMETRIC LINES	5½		
4. ISOMETRIC CIRCLES	5		
5. CIRCLE CONSTRUCTION	1½		
6. CENTRE LINES	2		
7. HATCHING	1		
<b>TOTAL</b>	<b>40</b>		
EXAMINATION NUMBER			
EXAMINATION NUMBER			
EXAMINATION NUMBER			<b>4</b>



EXPLODED ISOMETRIC

**QUESTION 4: MECHANICAL ASSEMBLY**

**Given:**

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

**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 machine vice assembly:

- 4.1 A **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 is shown on the top view of the base (part 1).
- 4.2 **The top view**.

- ALL drawings must comply with the guidelines contained in the SABS 0171.

**NOTE:**

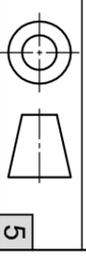
- The jaws of the vice must be drawn 55 mm apart in the open position.
- Show three faces of the M10 nut in the front view.
- No hidden detail is required.

**Add the following features to the drawing:**

- The cutting plane A-A
  - Label the sectional view: SECTION A-A
- [97]

PARTS LIST		
PART	QUANTITY	MATERIAL
1. BASE	1	CAST IRON
2. SHAFT	1	MILD STEEL
3. SLIDING BLOCK	1	CAST IRON
4. ROTATING BLOCK	1	CAST IRON
5. M10 SCREW	1	MILD STEEL
6. JAWS	2	MILD STEEL
7. M6 SCREW	4	MILD STEEL
8. WASHER	1	MILD STEEL
9. M10 NUT	1	MILD STEEL

ALL DIMENSIONS ARE IN MILLIMETRES.	DRAWN BY: LIS4	<p><b>MTHATHA</b></p> <p>KALIKA STREET</p> <p>MTHATHA</p> <p>5147</p> <p>www.meeeng.co.za</p>
ALL UNSPECIFIED RADII ARE R3.	CHECKED BY: THOMAS	
DRAWING PROGRAM: CAD 2011	DATE: 12/09/2011	
	DATE: 30/09/2011	<p><b>MACHINE VICE</b></p>
	APPROVED BY: PIERRE	
	DATE: 19/10/2011	<p>EASTERN CAPE</p> <p>DEPARTMENT BASIC EDUCATION</p> <p>GRADE 12 SEPTEMBER 2012</p>
	SCALE 1 : 2	





**ASSESSMENT CRITERIA**

TOP VIEW			
	POSSIBLE	OBTAINED	SIGN MODERATE
1. BASE	12		
2. SHAFT	13		
3. ROTATING BLOCK	3½		
4. M10 SCREW	1½		
5. WASHER	1½		
6. M10 NUT	3		
7. CENTRE LINES	3½		
8. SECTION AA	3		
<b>SUBTOTAL</b>	<b>41</b>		

**SECTIONAL FRONT VIEW**

THIRD ANGLE	2		
1. BASE	6½		
2. SHAFT	13½		
3. SLIDING BLOCK	3		
4. ROTATING BLOCK	6		
5. M10 SCREW	7½		
6. JAWS	2		
7. WASHER	1½		
8. M10 NUT	5		
9. CENTRE LINES	1		
10. HATCHING	7		
11. LABEL	1		
<b>SUBTOTAL</b>	<b>56</b>		
<b>TOTAL</b>	<b>97</b>		

EXAMINATION NUMBER

EXAMINATION NUMBER

6