EASTERN CAPE EDUCATION DEPARTMENT

# NATIONAL SENIOR CERTIFICATE

## GRADE 11

## ENGINEERING GRAPHICS AND DESIGN P2

## NOVEMBER 2012

**MARKS: 100**

**TIME: 2 hours**

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



* G R D D M 2 *

## 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 stated otherwise.
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 assumed in good proportion.
10. All drawings in TAP unless stated otherwise.

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

| FINAL CONVERTED MARK | CHECKED BY |
|---|---|
| 100 | |

| COMPLETE THE FOLLOWING: |
|---|
| NAME |
| |
| NAME |
| EXAMINATION CENTRE |
| |
| EXAMINATION CENTRE |

STAPLE

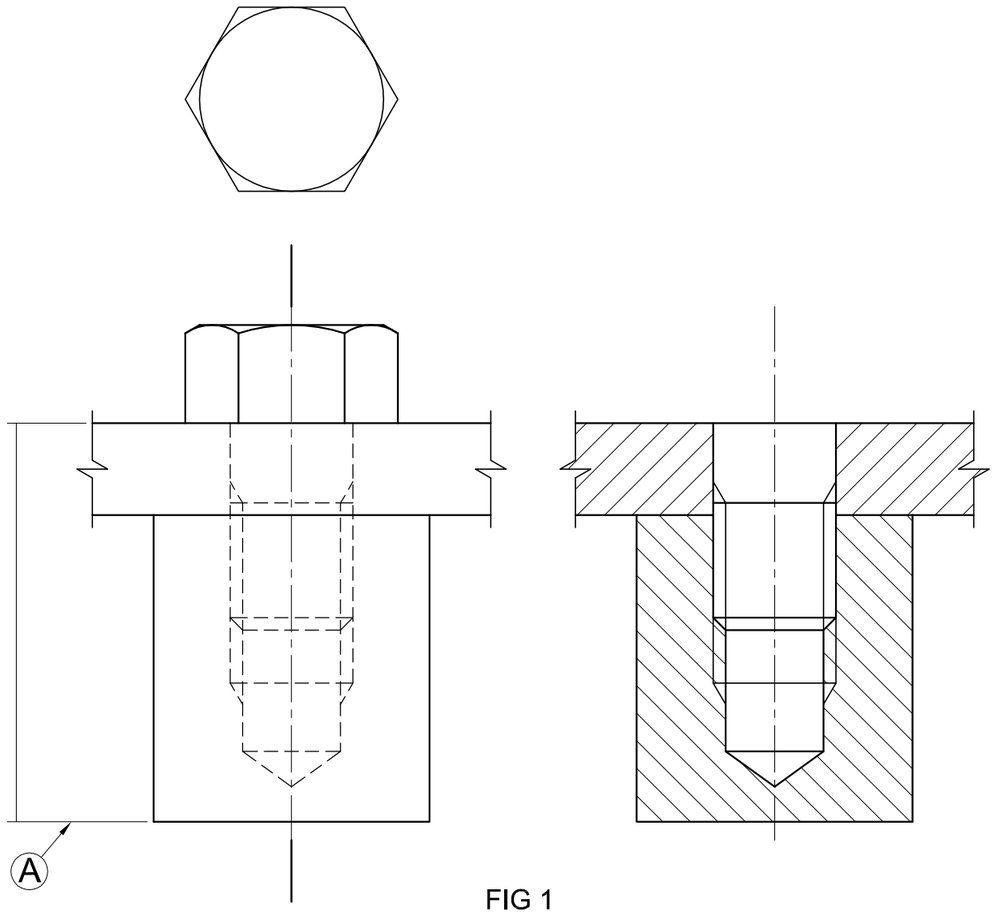



FIG 1

**QUESTION 1: ANALYTICAL (MECHANICAL)**

**Given:**
A front view and incomplete right view of a nut assembly, 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. **[12]**

| QUESTIONS | | | |
|---|---|---|---|
| 1 | Draw the arrows for the cutting plane located on the front view and label it A-A. | 2 | |
| 2 | Complete, with **drawing instruments,** the sectional right view on cutting plane A-A of the nut assembly. | 4 | |
| 3 | Neatly complete the dimension A. | 2 | |
| 4 | In the box below (ANSWER 4), draw, in neat **freehand**, the symbol for the projection system used. | 4 | |
| | **TOTAL** | **12** | |

ANSWER 4

| | | | | |
|---|---|---|---|---|
| | 05/07/2012 | PETER | SIZE OF HOLE FOR BOLT | A |
| ALL DIMENSIONS ARE IN MILLIMETRES. | DATE | CHANGED BY | REVISION DESCRIPTION | № |
| UNLESS OTHERWISE SPECIFIED, TOLERANCES ON DIMENSIONS ARE ± 0,25. | DRAWN BY: NKOZI | DRAWING SET NO. 2 OF 3 | MATERIAL: VARIOUS | |
| | DATE: 26/06/2012 | FILE NAME: NB-S1-2012 | HEAT TREATMENT: NONE | |
| ALL UNSPECIFIED RADII ARE R3. | CHECKED BY: BAZI<br>DATE: 29/06/2012 | McSTEEL MANUFACTURING | CURRY ROAD<br>EAST LONDON<br>5260<br>www.microsteel.co.za | |
| DRAWING PROGRAM: AUTOCAD 2012 | APPROVED BY: CHRIS<br>DATE: 10/07/2012 | SECTIONAL VIEWS | | |
| | SCALE: 1 : 2 | | | |

| EXAMINATION NUMBER | |
|---|---|
| | |
| EXAMINATION NUMBER | 2 |

STAPLE

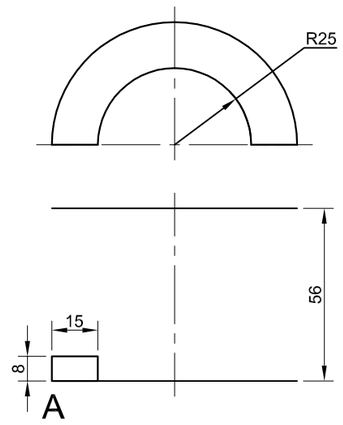
## QUESTION 2.1: LOCI - HELICS

**Given:**

- Specifications for a left-hand spiral spring made from rectangular material, with an internal diameter of 50 mm.
- The spring completes one revolution in 96 mm (pitch).
- A diagram that shows the starting position, the displacement and the size of the rectangle.
- The center line where the drawing must be drawn.

**Instructions:**

- Draw a half revolution of the spring from the starting point A, as shown on the diagram.
- Show ALL the necessary constructions.
- Do not show any hidden detail. **[13]**




| ASSESSMENT CRITERIA | | | | |
|---|---|---|---|---|
| 1. START + END | 4 | | | |
| 2. HELICS | 7 | | | |
| 3. CONSTRUCTION | 2 | | | |
| **SUB TOTAL 2.1** | **13** | | | |

## QUESTION 2.2: LOCI - CAMS

**Given:**

- Information on the movement of a wedge shaped cam follower that moves with uniform velocity.

**Instructions:**

- Draw ONLY the displacement diagram of the cam follower. Use a scale of 8 mm = 30°. The displacement height is 45 mm.
- 0° - 90° Start at minimum cam diameter and rise to maximum displacement.
- 90° - 135° Remain at rest.
- 135° - 180° Decent to half the displacement height.
- 180° - 240° Remain at rest.
- 240° - 360° Return to its original position.
- Supply the diagram with the following labels:
  CAM DISPLACEMENT DIAGRAM
  SCALE 8 mm = 30°
  DISPLACEMENT
- Display the degree intervals clearly. **[9]**


| ASSESSMENT CRITERIA | | | | |
|---|---|---|---|---|
| 1. LABELS | 2 | | | |
| 2. SCALE + HEIGHT | 1 | | | |
| 3. DIAGRAM | 6 | | | |
| **SUB TOTAL 2.2** | 9 | | | |
| **TOTAL** | **22** | | | |

EXAMINATION NUMBER

EXAMINATION NUMBER 3

STAPLE

## QUESTION 3: ISOMETRIC DRAWING

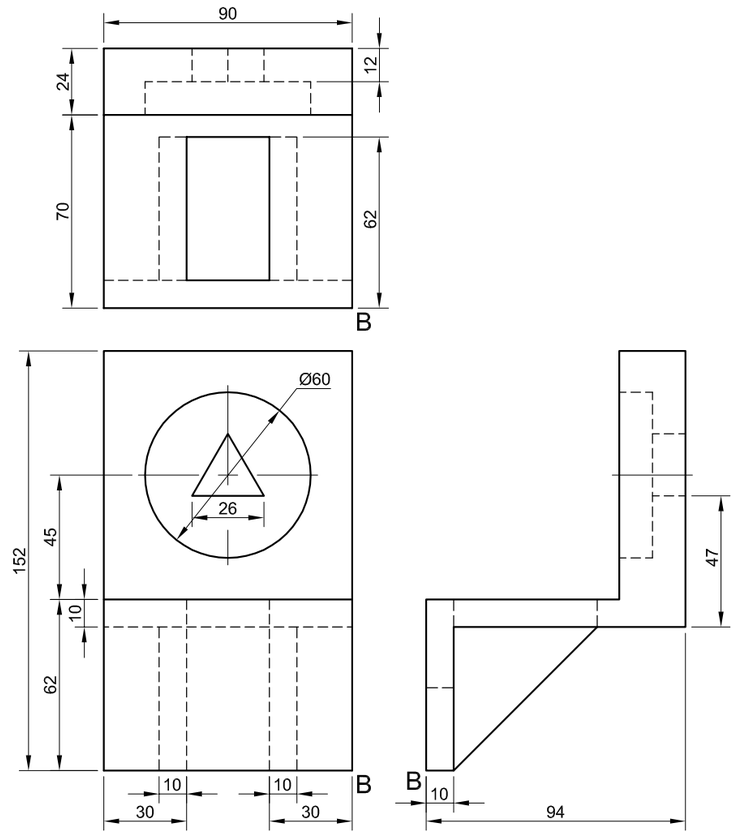
**Given:**

- The front view, top view and right view of a special tool
- The position of point B on the drawing sheet.

**Instructions:**

Convert the orthographic views of the special tool into a scale 1 : 1 isometric drawing.

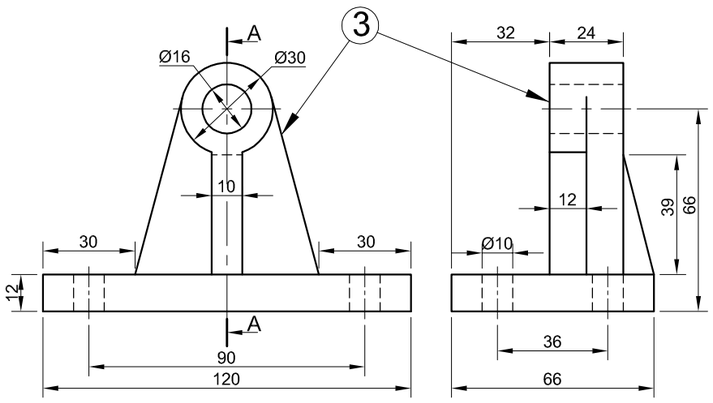
- Make corner B the lowest point of the drawing.
- Show ALL necessary circle and other construction.
- NO hidden detail is required. **[23]**

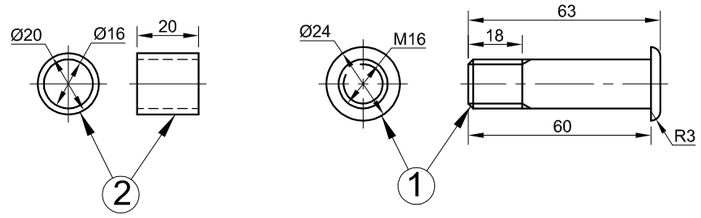


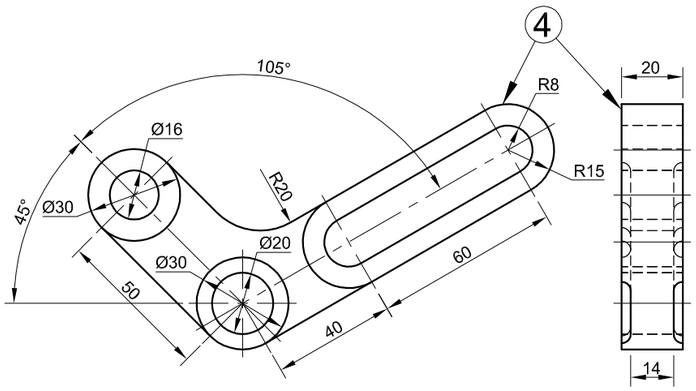

B

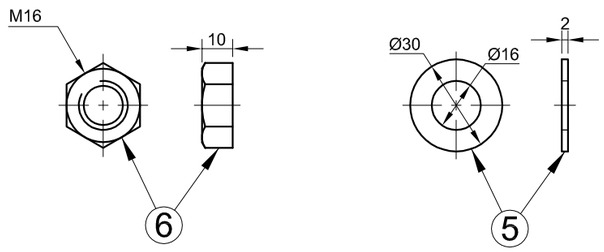
| ASSESSMENT CRITERIA | | | | |
|---|---|---|---|---|
| 1. PLACING | 1 | | | |
| 2. ISOMETRIC LINES | 13 | | | |
| 3. NON-ISOMETRIC LINES | $2\frac{1}{2}$ | | | |
| 4. ISOMETRIC CIRCLES | $3\frac{1}{2}$ | | | |
| 5. CIRCLE CONSTRUCTION | 2 | | | |
| 6. CENTRE LINES | 1 | | | |
| **TOTAL** | **23** | | | |
| EXAMINATION NUMBER | | | | |
| | | | | |
| EXAMINATION NUMBER | | | | 4 |

STAPLE



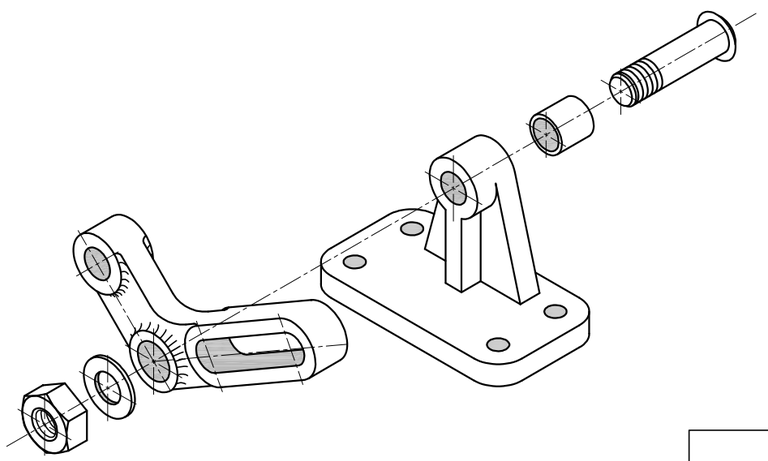









FRONT VIEW

EXPLODED ISOMETRIC

## QUESTION 4: MECHANICAL ASSEMBLY

**Given:**

- The exploded isometric drawing of the parts of a lever bracket, showing the position of each part relative to all the others.
- Orthographic views of each of the parts of the lever bracket.
- An incomplete front view of the assembled parts of the lever bracket on page 6.

**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 lever bracket assembly:
  - **4.1** Complete the **front view,** as seen from the direction of the arrow shown on the exploded isometric drawing.
  - **4.2 A sectional left view**, on cutting plane A-A. The cutting plane is shown on the front view of the base (part 3).
- ALL drawings must comply with the guidelines contained in the *SABS 0111.*

**NOTE:**

- No hidden detail is required.
- Show three faces of the M16 nut in the sectional left view. **[43]**

| PARTS LIST | | |
|---|---|---|
| PART | QUANTITY | MATERIAL |
| 1. SHAFT | 1 | HARDENED STEEL |
| 2. BUSH | 1 | BRONZE |
| 3. BASE | 1 | CAST IRON |
| 4. LEVER | 1 | CAST IRON |
| 5. WASHER | 1 | MILD STEEL |
| 6. M16 NUT | 1 | MILD STEEL |

| | | |
|---|---|---|
| ALL DIMENSIONS ARE IN MILLIMETRES. | DRAWN BY: KEITH | MACRO STEEL MANUFACTURING — NAPIER STREET, GRAAFF-REINET, 6280, www.macrosteel.co.za |
| | DATE: 25/06/2012 | |
| | CHECKED BY: JONES | |
| ALL UNSPECIFIED RADII ARE R3. | DATE: 05/07/2012 | TITLE: LEVER BRACKET |
| | APPROVED BY: SUSAN | |
| DRAWING PROGRAM: CAD 2012 | DATE: 15/07/2012 | EASTERN CAPE, DEPARTMENT BASIC EDUCATION, GRADE 11 November 2012 |
| | SCALE 1 : 2 | |





Please turn over

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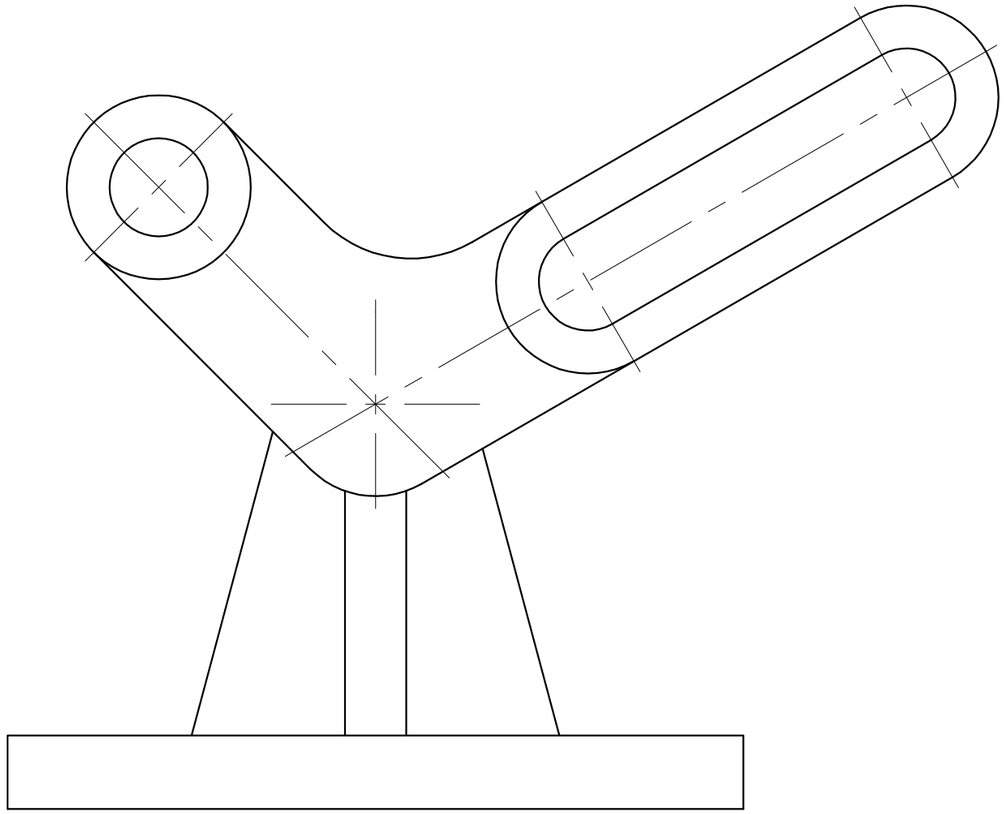

| ASSESSMENT CRITERIA | | | | |
|---|---|---|---|---|
| **SECTIONAL LEFT VIEW** | | | | |
| | POSSIBLE | OBTAINED | SIGN | MODERATE |
| 1. SHAFT | 9 | | | |
| 2. BUSH | 1 | | | |
| 3. BASE | $5\frac{1}{2}$ | | | |
| 4. LEVER | 8 | | | |
| 5. WASHER | $1\frac{1}{2}$ | | | |
| 6. M16 NUT | 5 | | | |
| 7. CENTRE LINES | 1 | | | |
| 8. HATCHING | 6 | | | |
| **SUB TOTAL** | **37** | | | |
| **FRONT VIEW** | | | | |
| | POSSIBLE | OBTAINED | SIGN | MODERATE |
| 1. WASHER | 1 | | | |
| 2. M16 NUT | 5 | | | |
| **SUB TOTAL** | **6** | | | |
| **TOTAL** | **43** | | | |

| EXAMINATION NUMBER | |
|---|---|
| | |
| EXAMINATION NUMBER | 6 |