education

Department:
Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

ENGINEERING GRAPHICS AND DESIGN P2

NOVEMBER 2009

MARKS: 100

TIME: 3 hours

This question paper consists of 6 pages.

INSTRUCTIONS AND INFORMATION

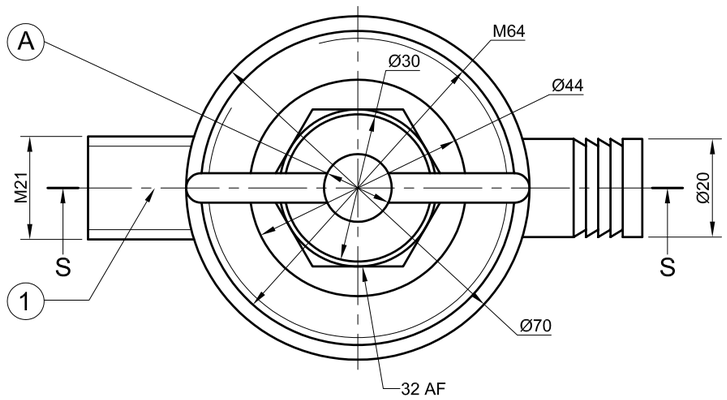
1. This question paper consists of FOUR questions.
2. Answer ALL the questions.
3. ALL drawings are in third-angle orthographic projection, unless stated otherwise.
4. ALL drawings must be drawn to scale 1:1, unless stated otherwise.
5. ALL the questions must be answered on the QUESTION PAPER as instructed.
6. ALL the pages must be restapled in numerical sequence, irrespective of whether the question was attempted or not.
7. Time management is essential in order to complete all the questions.
8. Print your examination number in the block provided on every page.
9. All the answers must be drawn accurately and neatly.
10. Any details or dimensions not given, must be assumed in good proportion.

FOR OFFICIAL USE ONLY										
QUESTION	MARKS OBTAINED			½	SIGN	MODERATED			½	SIGN	
1											
2											
3											
4											
TOTAL											
	2	0	0			2	0	0			

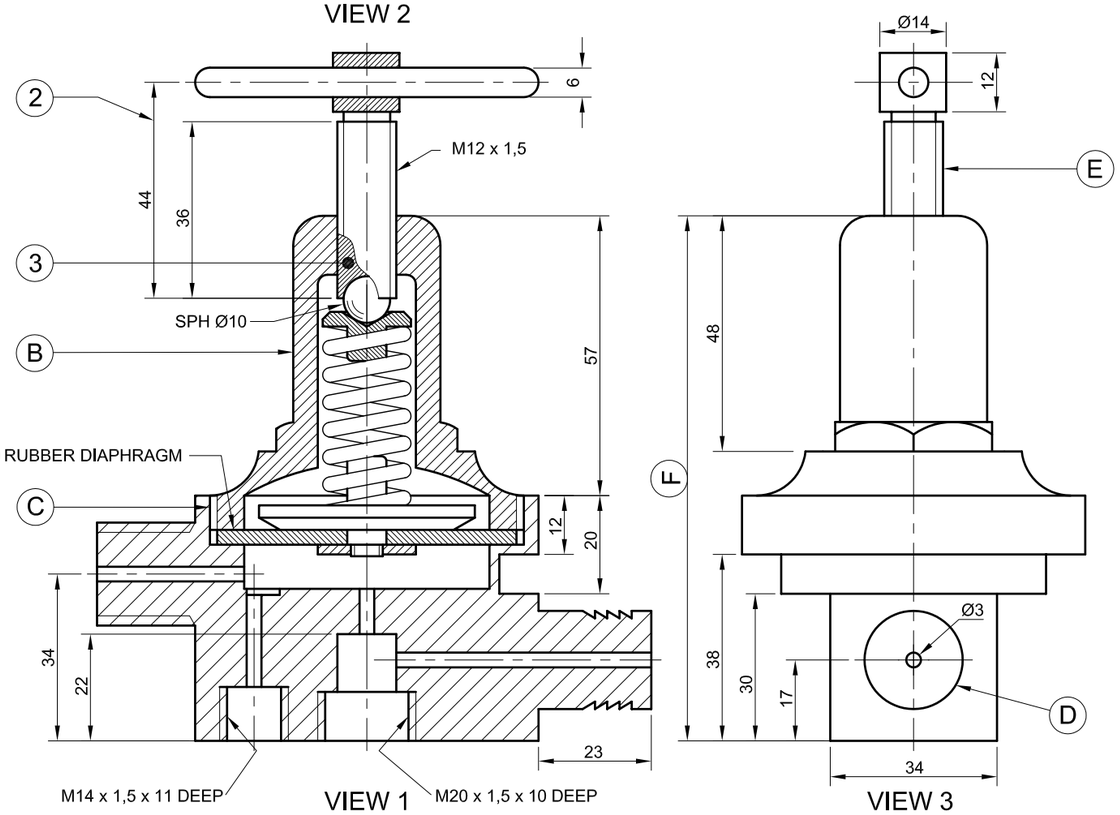
FINAL CONVERTED MARK	CHECKED BY
100	

COMPLETE THE FOLLOWING:
EXAMINATION NUMBER
EXAMINATION NUMBER
EXAMINATION CENTRE
EXAMINATION CENTRE

STAPLE



VIEW 2



VIEW 1

VIEW 3

QUESTION 1: ANALYTICAL (MECHANICAL)

Given:
The working drawings of a diaphragm regulator with a title block and a table of questions.

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

	QUESTIONS	ANSWERS	
1	On what date was the revision completed?		1
2	Who checked the drawing?		1
3	What is the title of the drawing?		1
4	What scale is indicated for the drawing?		1
5	From what material are the metal components of the regulator made?		1
6	How many internal screw threads are there in the assembly?		1
7	How many parts make up the assembly?		1
8	What orthographic projection system has been used?		1
9	What would VIEW 3 be called?		1
10	What would VIEW 2 be called?		1
11	What is the outer diameter of the rubber diaphragm?		1
12	What is the diameter of the sphere?		1
13	Determine the dimensions at: A B C D E F		6
14	What drawing feature is shown at 1?		1
15	What drawing feature is shown at 2?		1
16	What type of section is shown at 3?		1
17	What does the machining symbol √ mean?		2
18	In the block below, draw, in neat freehand, the simplified *SABS 0111* convention for a spring.		4
19	What is the permissible tolerance on the components of the regulator?		1
20	Determine the upper limit of tolerance for a dimension of 34 mm.		2
	TOTAL		**30**

12/05/09	MARIE	DIAMETER OF INLETS	A
DATE	CHANGED BY	REVISION DESCRIPTION	№

DIAPHRAGM REGULATOR

EGD ENGINEERING
(SA) (PTY) LTD

188 SCHOEMAN STREET
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0001
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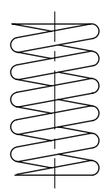
☎ 012 555 2345

DRAWING SYSTEM: AutoCAD 2009	DRAWN: MANDLA	20/03/09
DRAWING №. LFN/304/2009	CHECKED: CARLA	29/03/09
FILE NAME: D5-Y2	APPROVED: ROELF	03/04/09
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MILLIMETRES WITH A TOLERANCE OF 0,25.	MATERIAL: BRASS	
	HEAT TREATMENT: NORMALISE	
UNLESS OTHERWISE SPECIFIED, ALL SURFACE TEXTURE FINISHES ARE √	SCALE: 1:2	

18.



Convention for the spring

EXAMINATION NUMBER	
EXAMINATION NUMBER	2

STAPLE

O

QUESTION 2: LOCI (MECHANISMS)

Given:
A mechanism consisting of a crank OP that is pin-joined to a slotted link AB. The slotted link AB slides over a fixed pin R that is located on the circumference of a wheel, centre Q.
FIGURE 1: A detailed drawing of the mechanism
FIGURE 2: A schematic drawing of the mechanism

Motion:
Crank OP rotates in an anti-clockwise direction while the wheel, centre Q, rotates at the same speed in a clockwise direction. The slotted link AB slides over pin R during the rotation.

Instructions:
2.1 Draw, to scale 1:1, the given schematic drawing using point O as a reference point. Include ALL the labels.
2.2 Trace the locus generated by point A of the slotted link for one revolution.
2.3 Trace the locus generated by point B of the slotted link for one revolution.

- Show ALL necessary construction. **[33]**

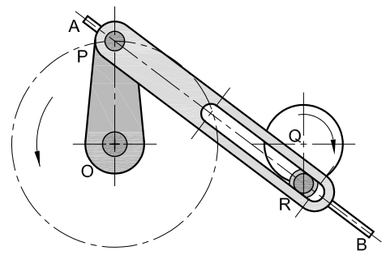


FIGURE 1

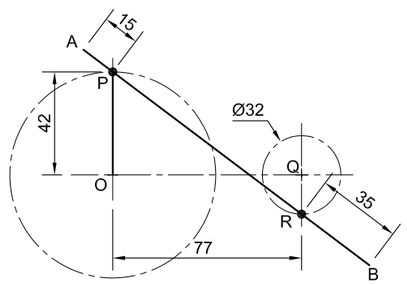


FIGURE 2

ASSESSMENT CRITERIA					
GIVEN + LABELS	5				
CONSTRUCTION	8				
LOCUS A + CURVE	10				
LOCUS B + CURVE	10				
TOTAL	**33**				

EXAMINATION NUMBER	
EXAMINATION NUMBER	3

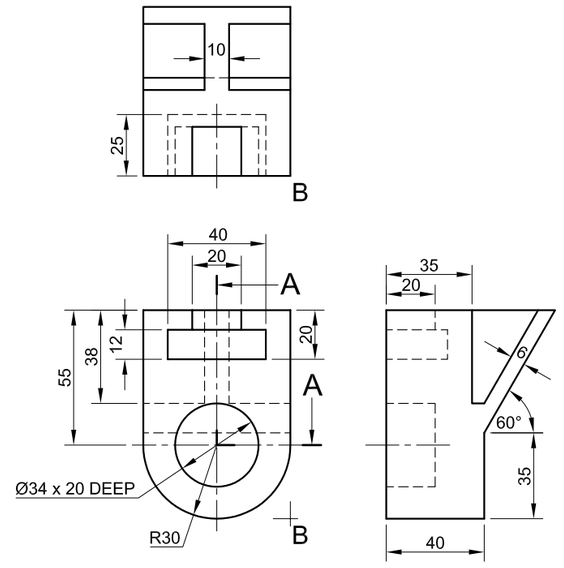
STAPLE

QUESTION 3: ISOMETRIC DRAWING

Given:
The front view, top view and right view of a jig bracket with a cutting plane A-A.
The position of point B on the drawing sheet.

Instructions:
Convert the orthographic views of the jig bracket into a sectional isometric drawing on cutting plane A-A.

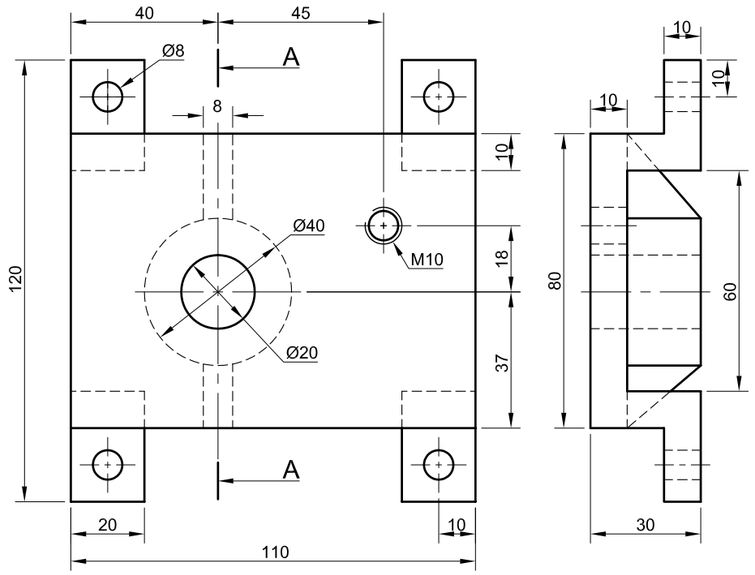
- Make corner B the lowest point of the drawing.
- Show ALL necessary construction.
- NO hidden detail is required. **[44]**



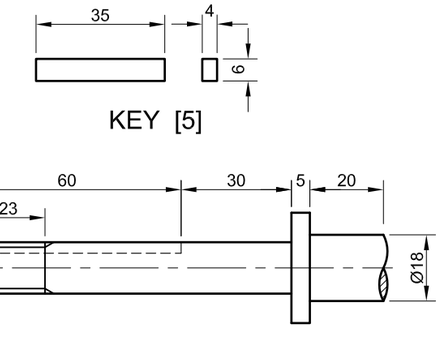
B

ASSESSMENT CRITERIA				
CONSTR' + AUX + B	8			
ISO' CIRCLES + CNTR LINES	8½			
ISO' + NON-ISO' LINES	12			
SECTIONED SURFACES	10½			
HATCHING	5			
TOTAL	**44**			

EXAMINATION NUMBER	
EXAMINATION NUMBER	4

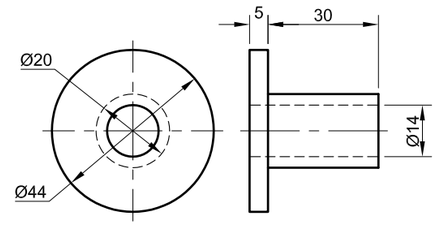


BASE [2]

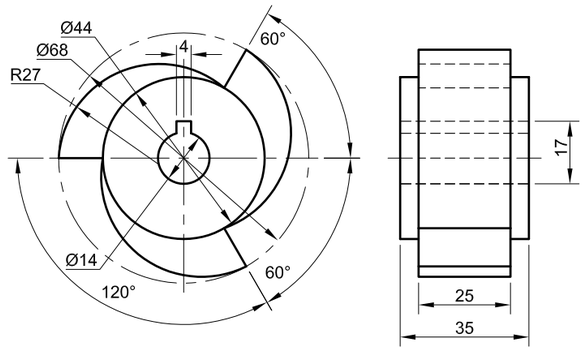


KEY [5]

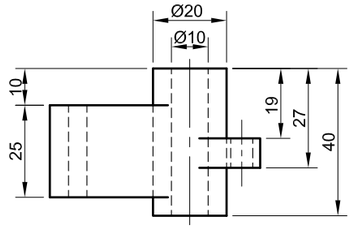
SHAFT [1]

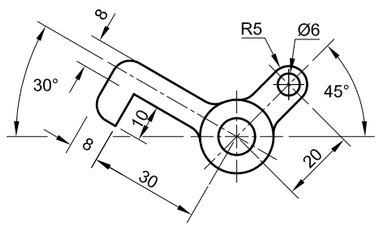


BUSH [3]

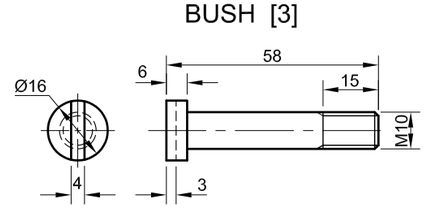


RATCHET [4]

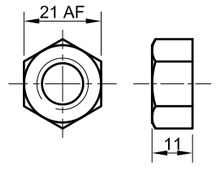




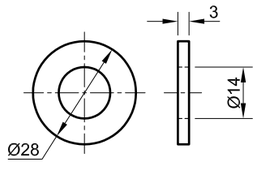
RATCHET ARM [9]



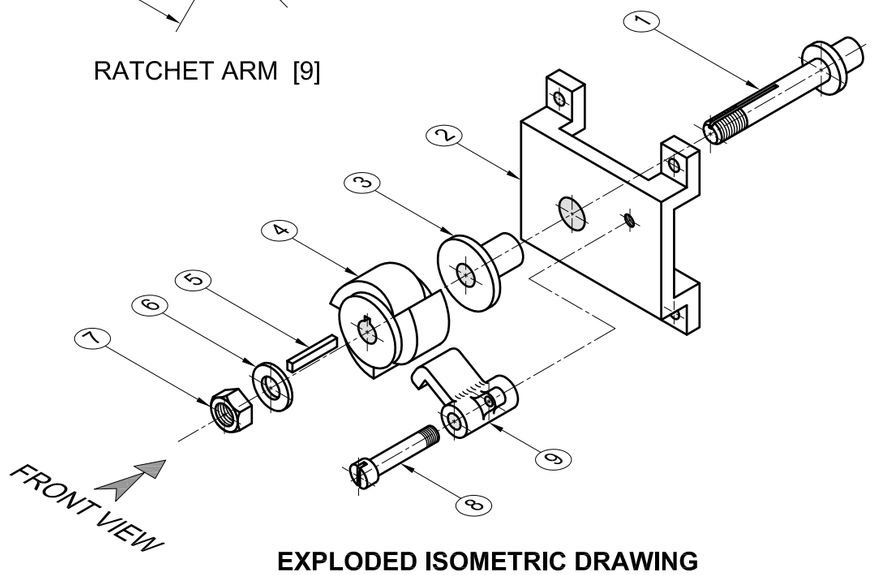
SCREW [8]



M14 NUT [7]



WASHER [6]



EXPLODED ISOMETRIC DRAWING

QUESTION 4: ASSEMBLY DRAWING

Given:
The exploded isometric drawing of the parts of a ratchet and base, showing the position of each part relative to all the others.

Orthographic views of each of the parts of the ratchet and base.

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 ratchet and base:

4.1 The front view as seen from the direction of the arrow indicated in the exploded isometric drawing. NO hidden detail is required.

4.2 A sectional right view on cutting plane A-A. The vertical cutting plane passes through the centre line of the assembly, as shown on the front view of the base.

- ALL drawings must comply with the guidelines contained in the *SABS 0111.*

Add the following feature to the drawing:
- The cutting plane A-A

Note:
- Show THREE faces of the M14 nut and ALL necessary construction. **[93]**

PARTS LIST		
PART	QUANTITY	MATERIAL
1. SHAFT	1	MILD STEEL
2. BASE	1	MILD STEEL
3. BUSH	1	BRASS
4. RATCHET	1	CAST IRON
5. KEY	1	MILD STEEL
6. WASHER	1	SPRING STEEL
7. M14 NUT	1	MILD STEEL
8. SCREW	1	MILD STEEL
9. RATCHET ARM	1	CAST IRON

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RATCHET AND BASE

ALL DIMENSIONS ARE IN MILLIMETRES

ALL UNSPECIFIED RADII ARE 5

Please turn over

STAPLE

ASSESSMENT CRITERIA				
SECTIONAL VIEW				
	POSSIBLE	OBTAINED	SIGN	MODERATE
1. BASE	10			
2. SHAFT	11			
3. BUSH	3			
4. RATCHET	6			
5. KEY	1½			
6. WASHER + M14 NUT	6½			
7. HATCHING	10½			
FRONT VIEW				
1. BASE	8			
2. SHAFT	2½			
3. WASHER + M14 NUT	3			
4. RATCHET	3½			
5. RATCHET ARM	7½			
6. PIN	1½			
7. CUTTING PLANE A-A	3			
CENTRE LINES	$15x\frac{1}{2}=7\frac{1}{2}$			
ASSEMBLY	6			
3rd ANGLE	2			
TOTAL	**93**			
EXAMINATION NUMBER				
EXAMINATION NUMBER				6