education

Department:
Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

ENGINEERING GRAPHICS AND DESIGN P2

FEBRUARY/MARCH 2009

MARKS: 100

TIME: 3 hours

This question paper consists of 6 pages.

INSTRUCTIONS AND INFORMATION

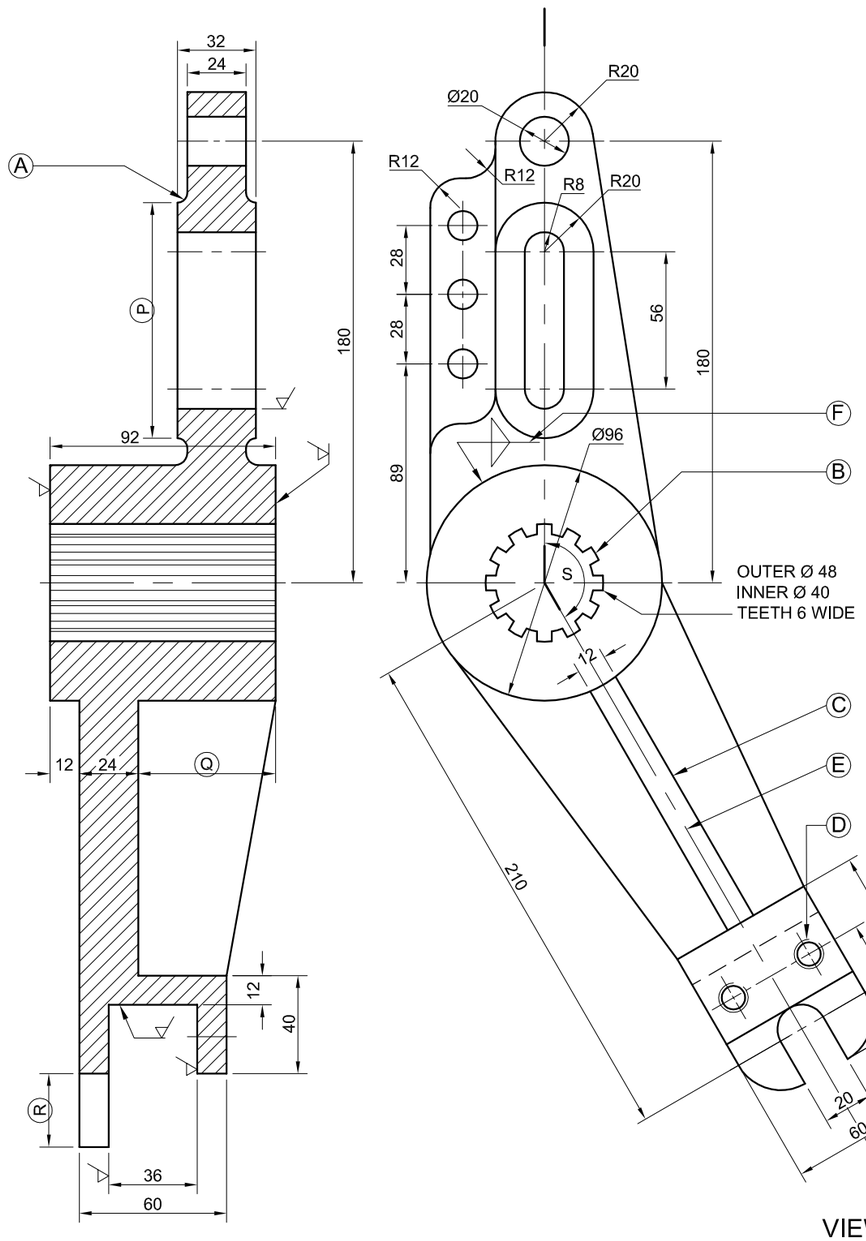
1. The question paper consists of FOUR questions.
2. Answer ALL the questions.
3. All drawings are in **third-angle** orthographic projection unless stated otherwise.
4. All drawings must be drawn to scale 1:1, unless stated otherwise.
5. All the questions must be answered on the ANSWER SHEETS provided.
6. All the answer sheets must be re-stapled in numerical sequence and handed in 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 answer sheet.
9. All answers must be drawn accurately and neatly.
10. Any details or dimensions not given must be assumed 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:
EXAMINATION NUMBER
EXAMINATION NUMBER
EXAMINATION CENTRE
EXAMINATION CENTRE

STAPLE



VIEW 1

VIEW 2

QUESTION 1: ANALYTICAL (MECHANICAL)

Given:
A table of questions and a working drawing.

Instructions:
Complete the table below by neatly printing the answers to the questions, which all refer to the accompanying drawings and the title block. **[29]**

	QUESTIONS	ANSWERS	
1	On what date was the drawing first completed?		1
2	What material is used to manufacture the bell crank?		1
3	What is the drawing number?		1
4	How many revisions have been made to the drawing?		1
5	Where is the manufacturing company situated?		1
6	What is the tolerance allowed on the dimensions?		1
7	How many surfaces must be machined?		1
8	What is feature **A** called?		1
9	What is feature **B** called?		1
10	What is feature **C** called?		1
11	What is feature **D** called?		1
12	Name the type of line shown at **E**.		1
13	Identify the type of symbol shown at **F**.		1
14	Name the type of section on VIEW 1.		2
15	Determine the dimensions at: **P** **Q** **R**		3
16	What is the size of angle **S**?		1
17	What orthographic projection system has been used?		1
18	Draw the arrows for the cutting plane located on view 2 and label it A-A.		2
19	In the box below and in freehand, neatly draw the symbol for the projection system used.		4
20	In the box below and in freehand, neatly draw the SABS 0111 convention used for the feature at **B**.		3
		TOTAL	**29**

ALL DIMENSIONS ARE IN MILLIMETRES

DATE	CHANGED BY	REVISION DESCRIPTION	№
15-10-08	KAREN	SPLINE ON MAIN HUB	A

UNLESS OTHERWISE SPECIFIED TOLERANCES ON DIMENSIONS ARE ± 0,25	DRAWN: COLEEN	DRAWING No. S8/ED/01	MATERIAL: CAST IRON
	DATE: 20/02/08	FILE NAME: S-P2-A2	HEAT TREATMENT: NORMALISE
ALL UNSPECIFIED RADII ARE R3	CHECKED: KARL	CAPE STEEL MANUFACTURING	FOREST DRIVE GOODWOOD 5240 www.capesteel.co.za
	DATE: 26/02/08		
	APPROVED: JESSIE		
DRAWING PROGRAMME: AUTOCAD 2008	DATE: 01/03/08	BELL CRANK	
	SCALE: 1:2		

19 SYMBOL

20 Convention for feature B

EXAMINATION NUMBER

EXAMINATION NUMBER 2

STAPLE

QUESTION 2: LOCI (MECHANISMS)

A manufacturing company designed a mechanism to open and close a mechanical gate on an assembly line in a bottling plant.

The mechanism consists of a crank, OA, attached to a shaft which rotates clockwise at a constant speed about a centre point O. Rod AB, attached to the crank at A, slides freely through a fixed point at C. AB rotates freely about point A.

During the design process the loci generated by points B and E on the moving parts of the mechanism had to be established.

Given:
FIGURE 1: A drawing showing the assembled parts of the mechanism.
FIGURE 2: A schematic drawing of the moving parts of the mechanism.

Instructions:
2.1 With point O as a reference, draw FIGURE 2 full size.
2.2 Trace the locus generated by point B located on the rod AB.
2.3 Trace the locus generated by point E located on the rod AB.

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

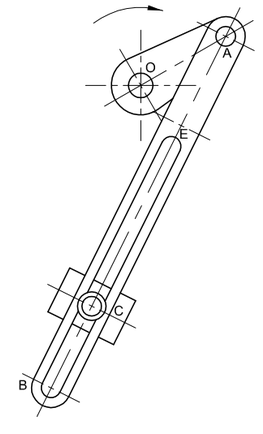


FIGURE 1

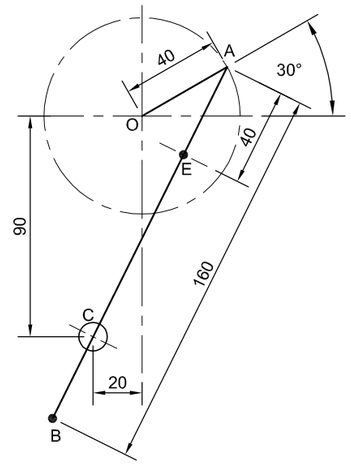


FIGURE 2

ASSESSMENT CRITERIA	
GIVEN FIGURE	4
CONSTRUCTION	3
LOCUS B	13
LOCUS E	13
TOTAL	**33**

EXAMINATION NUMBER	
EXAMINATION NUMBER	3

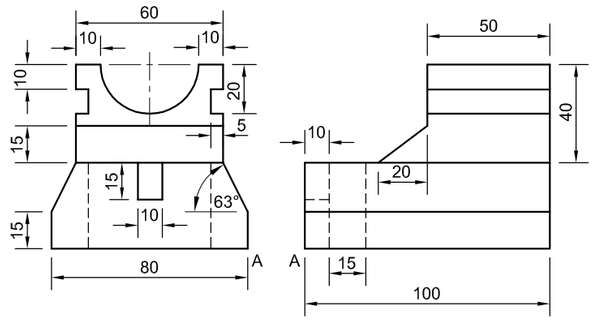
STAPLE

QUESTION 3: ISOMETRIC DRAWING

Given:
The front view and left view of a pipe support.
The position of point A on the drawing sheet.

Instructions:
3. Convert the orthographic views of the pipe support into an isometric drawing.

- Make corner A the lowest point of the drawing.
- Show ALL necessary construction.
- NO hidden detail is required. **[43]**



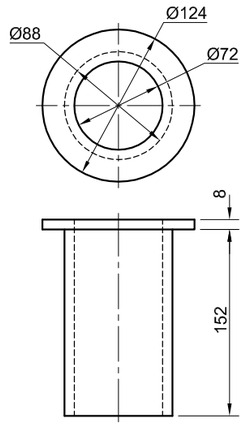
A

ASSESSMENT CRITERIA

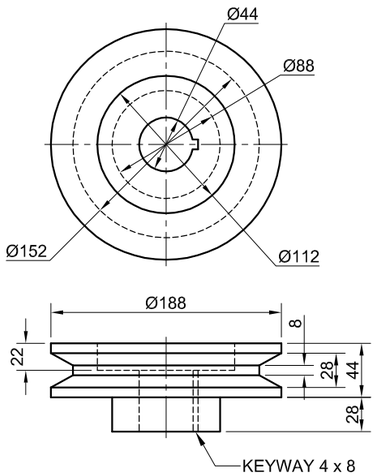
AUXILIARY VIEW	=	2
ISOMETRIC LINES	=	26
NON-ISOMETRIC LINES	=	5
ISOMETRIC CIRCLES	=	3
CIRCLE CONSTRUCTION	=	3
CENTRE LINES	=	3
PLACING ON A	=	1
TOTAL	**=**	**43**

EXAMINATION NUMBER

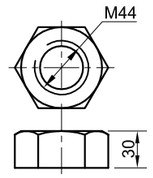
EXAMINATION NUMBER 4



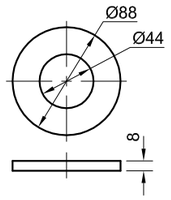
BUSH



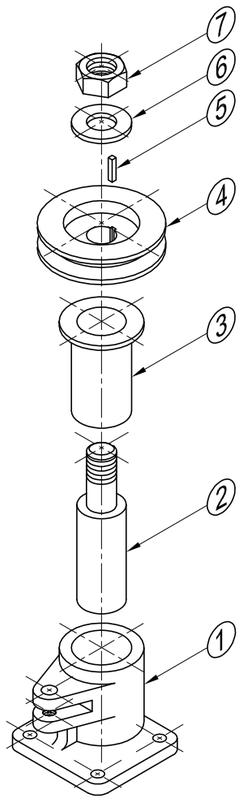
PULLEY



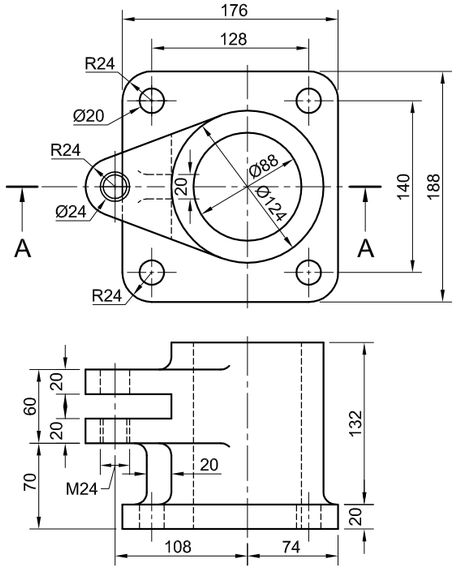
M44 NUT



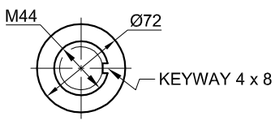
WASHER

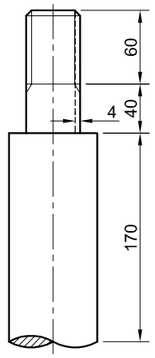


EXPLODED ISOMETRIC

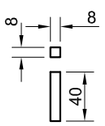


SUPPORT BRACKET

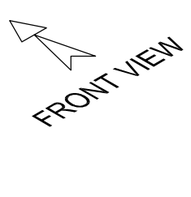




SHAFT



KEY



QUESTION 4: ASSEMBLY DRAWING

Given:
The exploded isometric drawing of the parts of a vertical support bracket, showing the position of each part relative to all the others.

Orthographic views of each of the parts of the vertical support bracket.

Instructions:
Answer this question on ANSWER SHEET 4 on page 6.
Draw to scale 1:2 the following views of the assembled parts of the vertical support bracket:

4.1 The full sectional front view on A-A as seen from the arrow indicated in the exploded isometric drawing. The vertical cutting plane passes through the centre line of the assembly as shown on the top view of the support bracket.

4.2 A top view of the the assembly. No hidden detail is required.

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

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

Note:
- Show THREE faces of the M44 nut and ALL necessary construction. **[95]**

PARTS LIST		
PART	QUANTITY	MATERIAL
1. SUPPORT BRACKET	1	CAST IRON
2. SHAFT	1	MILD STEEL
3. BUSH	1	BRASS
4. PULLEY	1	CAST IRON
5. KEY	1	MILD STEEL
6. WASHER	1	SPRING STEEL
7. M44 NUT	1	MILD STEEL

ALL DIMENSIONS ARE IN MILLIMETRES	DRAWN: S'BU	CAPE STEEL MANUFACTURING	FOREST DRIVE GOODWOOD 5240 www.capesteel.co.za
	DATE: 22/10/08		
	CHECKED: PENNY		
ALL UNSPECIFIED RADII ARE R10	DATE: 25/10/08	TITLE: VERTICAL SUPPORT BRACKET	
	APPROVED: SAREL		
DRAWING PROGRAM: AUTOCAD 2008	DATE: 26/10/08	NATIONAL SENIOR CERTIFICATE GRADE 12 NOVEMBER 2008	5
	SCALE: 1:1		

STAPLE

ANSWER SHEET 4

ASSESSMENT CRITERIA

FRONT VIEW	FACET		SECTIONING		TOTAL	
	POSSIBLE	OBTAINED	POSSIBLE	OBTAINED	POSSIBLE	OBTAINED
1. SUPPORT BRACKET	16		5		21	
2. SHAFT	$10\frac{1}{2}$		$1\frac{1}{2}$		12	
3. BUSH	3		1		4	
4. PULLEY	10		2		12	
5. KEY	1		$\frac{1}{2}$		$1\frac{1}{2}$	
6. WASHER	$1\frac{1}{2}$		$\frac{1}{2}$		2	
7. M44 NUT	5		$\frac{1}{2}$		$5\frac{1}{2}$	
TOP VIEW	**FACET**		**SECTIONING**		**TOTAL**	
	POSSIBLE	OBTAINED	POSSIBLE	OBTAINED	POSSIBLE	OBTAINED
1. SUPPORT BRACKET	$13\frac{1}{2}$				$13\frac{1}{2}$	
2. SHAFT	2				2	
3. PULLEY	2				2	
4. WASHER	1				1	
5. M44 NUT	4				4	
6. CUTTING PLANE A A	2				2	
CENTRE LINES					$6\frac{1}{2}$	
ASSEMBLY					6	
				TOTAL	95	

EXAMINATION NUMBER	
EXAMINATION NUMBER	6