basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

ENGINEERING GRAPHICS AND DESIGN P2

NOVEMBER 2013

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 otherwise stated.
4. ALL drawings must be completed using instruments, unless otherwise stated.
5. ALL answers must be drawn accurately and neatly.
6. ALL the questions must be answered on the QUESTION PAPER as instructed.
7. ALL the pages must be re-stapled in numerical sequence, irrespective of whether the question was attempted.
8. Time management is essential in order to complete all the questions.
9. Print your examination number in the block provided on every page.
10. Any details or dimensions not given must be assumed in good proportion.

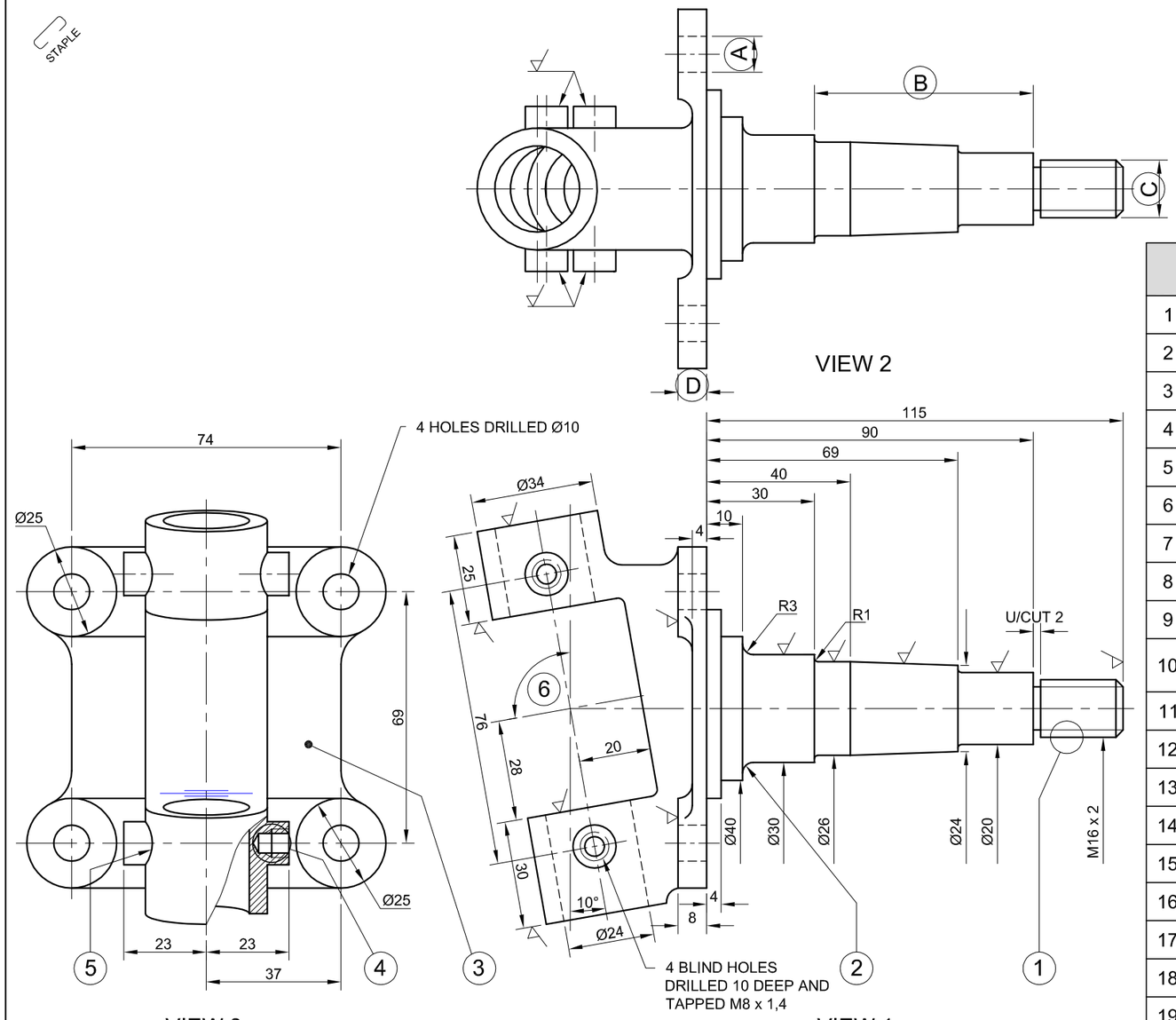
FOR OFFICIAL USE ONLY

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:
CENTRE NUMBER
CENTRE NUMBER
EXAMINATION NUMBER
EXAMINATION NUMBER

STAPLE



QUESTION 1: ANALYTICAL (MECHANICAL)

Given:
A detailed drawing of a front stub axle, a title block and a table of questions. The drawing has not been prepared to the indicated scale.

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

	QUESTIONS	ANSWERS		
1	On what date was the drawing checked?		1	
2	What is the name of the engineering firm?		1	
3	What scale is indicated for the drawing?		1	
4	What treatment must the stub axles undergo?		1	
5	On what date was the axle angle revised?		1	
6	What is the drawing number?		1	
7	What would VIEW 1 be called?		1	
8	How many surfaces need to be machined?		1	
9	How many threaded holes are there in the stub axle?		1	
10	What production method is required to achieve the finish on the stub axle?		1	
11	What type of section is shown in VIEW 3?		1	
12	Name the encircled feature at 1.		1	
13	Name the feature at 2.		1	
14	What is the thickness of the feature at 3?		1	
15	Name the encircled feature at 4.		2	
16	Name the type of curve at 5.		2	
17	Determine the angle between the centre lines at 6.		2	
18	What is the depth of the undercut?		2	
19	Determine the complete dimensions at: A B C D		4	
20	In the space provided in the title block (ANSWER 20), draw, in neat freehand, the symbol for the projection system used.		4	
		TOTAL	**30**	

ALL UNSPECIFIED RADII ARE 5 mm.	
ALL DIMENSIONS ARE IN MILLIMETRES.	SCALE: 1 : 2
DRAWING PROGRAM: AUTOCAD 2008	MATERIAL: CAST IRON
FILE NAME: T-SA FS AXLE.dwg	QUANTITY: 9 500 UNITS
DRAWING No. AWF 3628 W	TREATMENT: HARDENING
REMOVE ALL BURRS AND SHARP EDGES.	TURNING 0,25

PRECISION
ENGINEERING

54 SOMTSEU ROAD
KINGSMEAD
DURBAN
4000
☎ 031 335 1600

TITLE
FRONT STUB AXLE

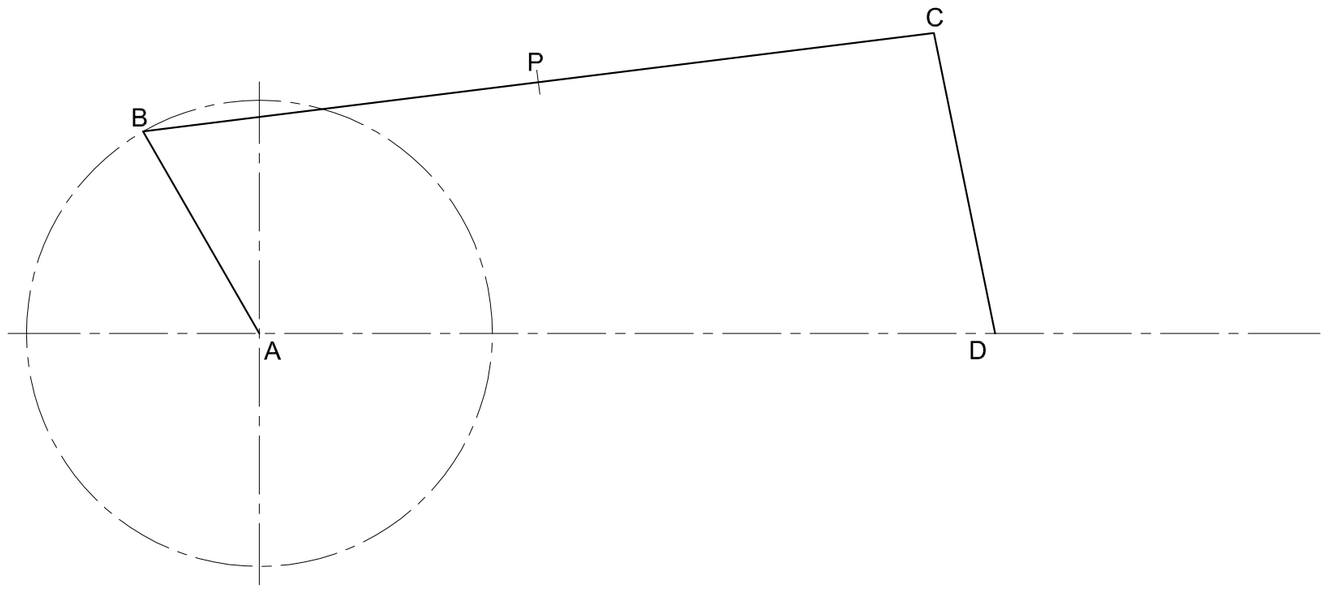
ANSWER 20

REVISIONS	DATE
2. AXLE HOLES	2013/05/16
1. AXLE ANGLE	2013/05/15
DRAWN: JVL	2013/04/10
CHECKED: KC	2013/05/12
APPROVED: SC	2013/05/22

SYMBOL

EXAMINATION NUMBER	
EXAMINATION NUMBER	2

STAPLE



QUESTION 2: LOCI
NOTE: Answer QUESTIONS 2.1 and 2.2.

2.1 MECHANISM
Given:
A schematic diagram of crank AB, connecting rod BC and rocker CD.
A and D are fixed points.

Motion:
As crank AB rotates in an anticlockwise direction, rocker CD oscillates back and forth.

Instructions:
Using the given diagram, trace the locus generated by point P for ONE revolution.

Show ALL necessary construction. **[14]**

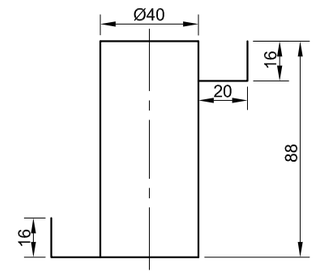
ASSESSMENT CRITERIA						
1	CONSTRUCTION	6				
2	LOCUS OF P	8				
	SUBTOTAL	14				

2.2 CHUTE
Given:
The front view of the shaft of a chute with the profile of the chute in the start and end positions.

Specification:
- Direction: left-hand
- Turns: ONE AND A HALF

Instructions:
Draw, to scale 1 : 1, the chute around the shaft.

Show ALL necessary construction. **[20]**



ASSESSMENT CRITERIA						
1	CL + CONSTRUCTION	8				
2	CHUTE	12				
	SUBTOTAL	20				
	TOTAL	34				

EXAMINATION NUMBER

EXAMINATION NUMBER

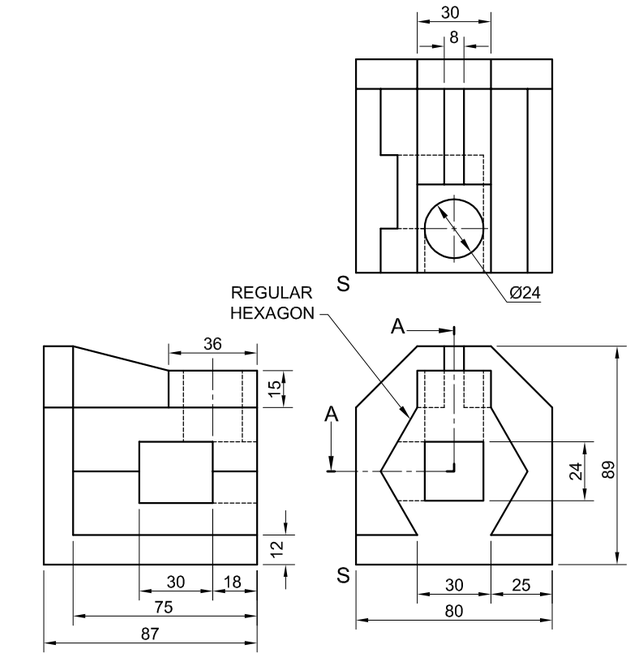
STAPLE

QUESTION 3: ISOMETRIC DRAWING

Given:
- The front view, top view and left view of a bracket
- The position of point S on the drawing sheet

Instructions:
Using scale 1 : 1, convert the orthographic views of the bracket to a sectional isometric drawing on cutting plane A-A.

- Make S the lowest point of the drawing.
- Show ALL necessary construction.
- NO stencils may be used.
- NO hidden detail is required. **[41]**

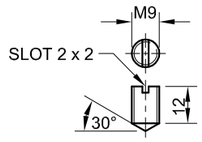


S

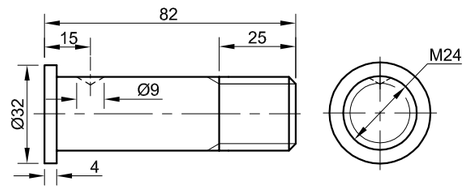
ASSESSMENT CRITERIA						
1	AUX' VIEW + PLACEMENT	2				
2	BASE	8				
3	HEXAGONAL PRISM	10				
4	CIRCLES	5				
5	SECTION	12				
6	HATCHING	4				
TOTAL		**41**				

EXAMINATION NUMBER

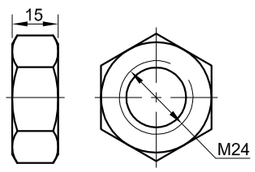
EXAMINATION NUMBER 4



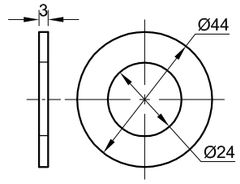
GRUB SCREW [6]



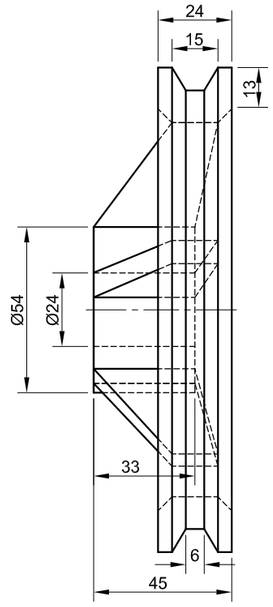
SHAFT [7]



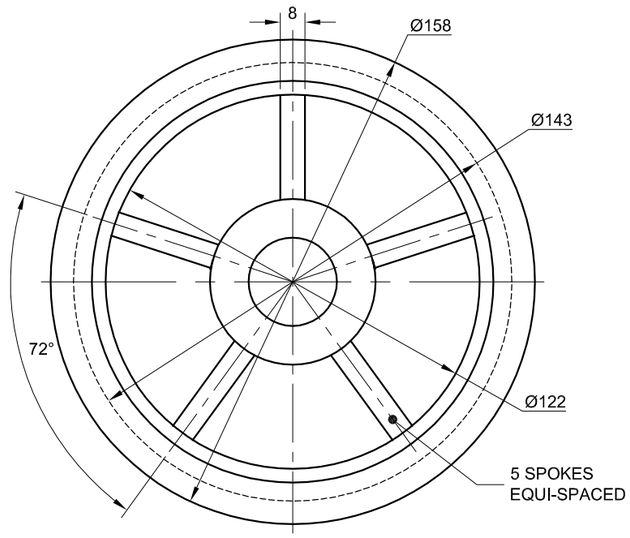
M24 NUT [1]

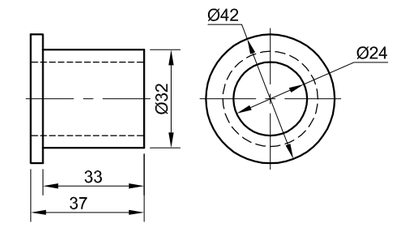


WASHER [2]

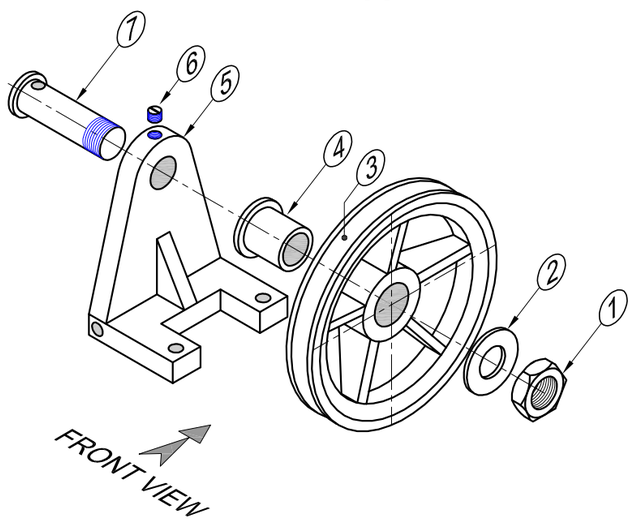


PULLEY [3]

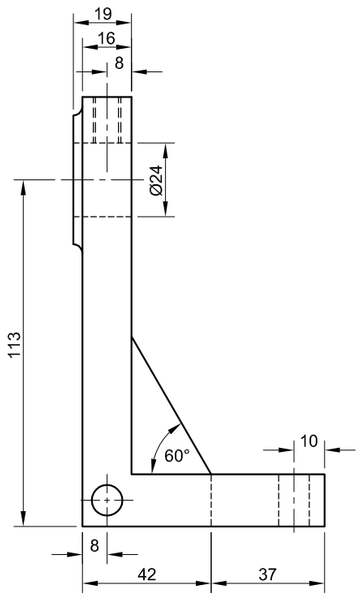


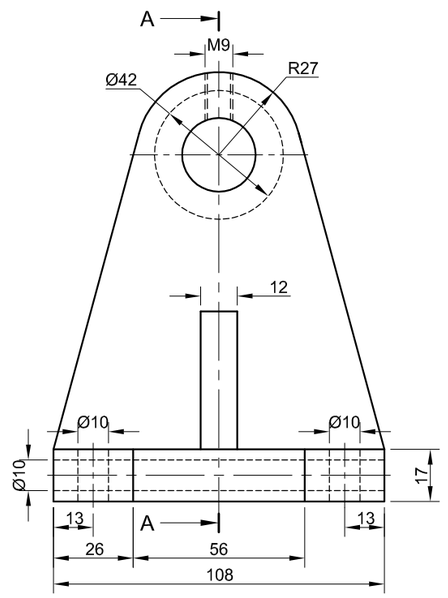


BUSH [4]



EXPLODED ISOMETRIC DRAWING





BRACKET [5]

QUESTION 4: MECHANICAL ASSEMBLY

Given:

- The exploded isometric drawing of the parts of a pulley assembly, showing the position of each part relative to all the others
- Orthographic views of each of the parts of the 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 pulley 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, which passes through the vertical centre line of the assembly, is shown on the right view of the bracket (part 5).
  - **4.2 The right view**
- ALL drawings must comply with the guidelines contained in the *SANS 10111.*

NOTE:

- Show THREE faces of the M24 nut and ALL necessary construction. You may not use a stencil.
- NO hidden detail is required.

Add the following features to the drawing:

- The cutting plane A-A
- Label the sectional view SECTION A-A. **[95]**

PARTS LIST

PART	QUANTITY	MATERIAL
1. M24 NUT	1	MILD STEEL
2. WASHER	1	MILD STEEL
3. PULLEY	1	CAST IRON
4. BUSH	1	BRONZE
5. BRACKET	1	CAST IRON
6. GRUB SCREW	1	MILD STEEL
7. SHAFT	1	MILD STEEL

TITLE

PULLEY ASSEMBLY

PRECISION
ENGINEERING

54 SOMTSEU ROAD
KINGSMEAD
DURBAN
4000
031 335 1600

ALL DIMENSIONS ARE IN MILLIMETRES.

ALL UNSPECIFIED RADII ARE R3.

Please turn over

STAPLE

ASSESSMENT CRITERIA					
SECTIONAL FRONT VIEW					
		POSSIBLE	OBTAINED	SIGN	MODERATED
1	M24 NUT + WASHER	8½			
2	PULLEY	16			
3	BRACKET	9½			
4	BUSH	3			
5	GRUB SCREW	3			
6	SHAFT	7			
7	HATCHING	10			
SUBTOTAL		**57**			
RIGHT VIEW					
1	M24 NUT + WASHER	6			
2	PULLEY	8			
3	BRACKET	7½			
SUBTOTAL		**21½**			
GENERAL					
1	CENTRE LINES	7			
2	CUTTING PLANE + LABEL	3½			
3	ASSEMBLY	6			
SUBTOTAL		**16½**			
TOTAL		**95**			

EXAMINATION NUMBER

EXAMINATION NUMBER 6