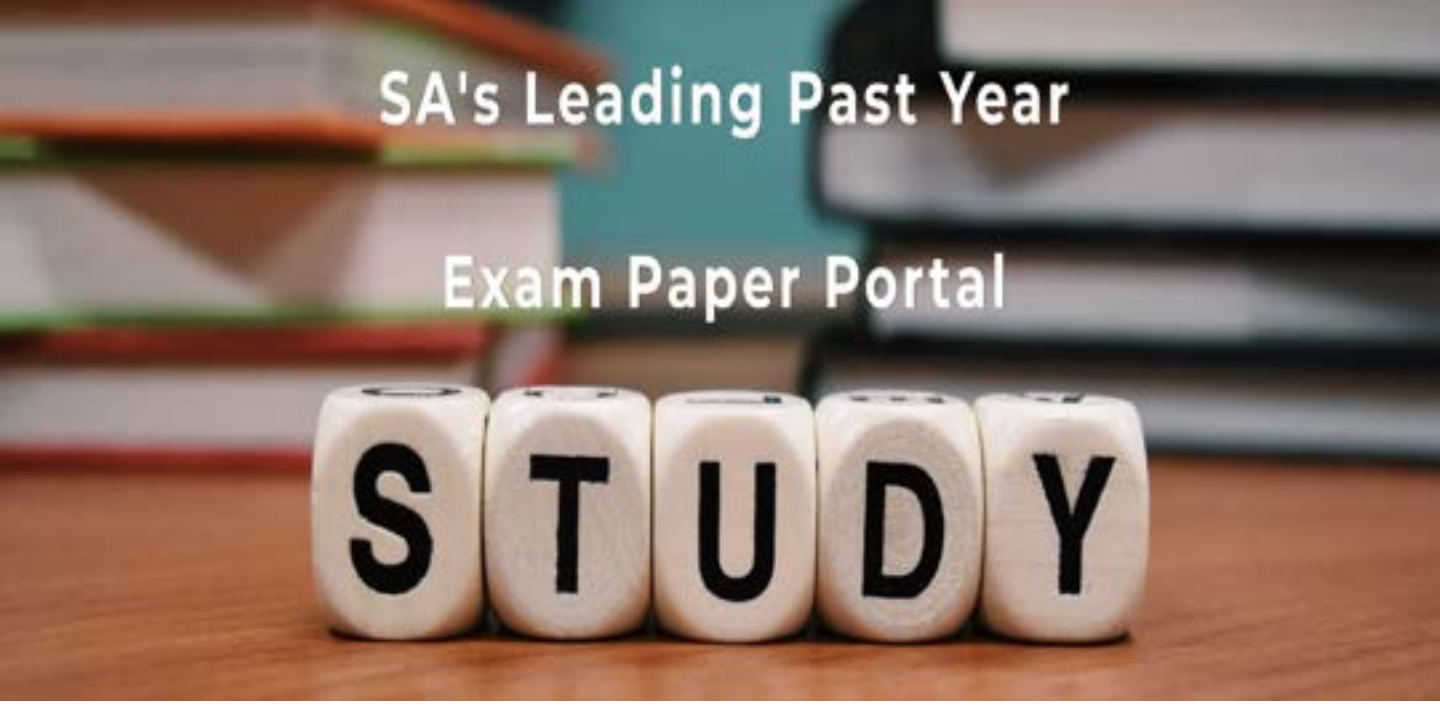

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GRADE 12

ENGINEERING GRAPHICS AND DESIGN P2

NOVEMBER 2014

MARKS: 100

TIME: 3 hours

This question paper consists of 6 pages.

INSTRUCTIONS AND INFORMATION

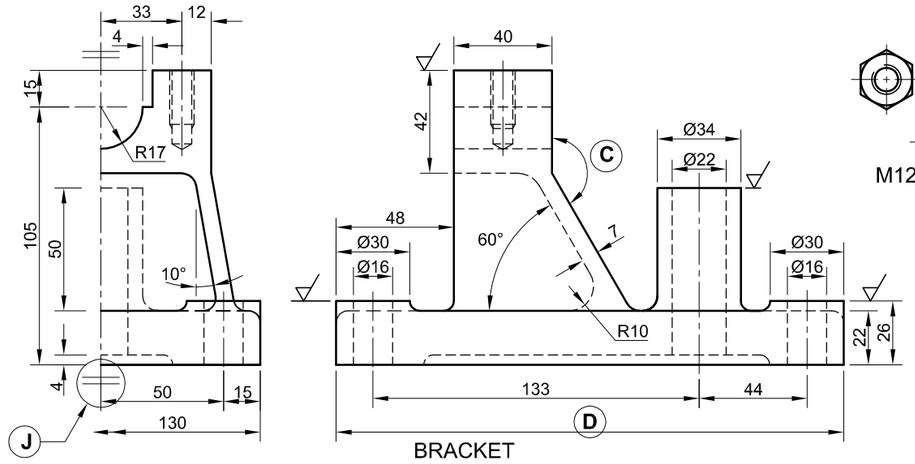
1. This question paper consists of FOUR questions.
2. Answer ALL the questions.
3. ALL drawings are in third-angle orthographic projection, unless otherwise stated.
4. ALL drawings must be completed using instruments, unless otherwise stated.
5. ALL answers must be drawn accurately and neatly.
6. ALL 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			

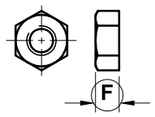
FINAL CONVERTED MARK	CHECKED BY
100	

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

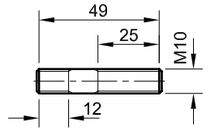
STAPLE



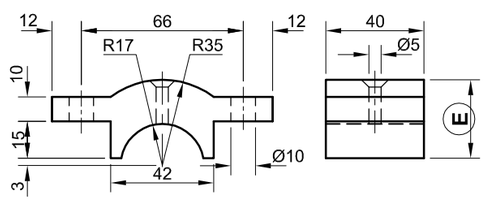
BRACKET



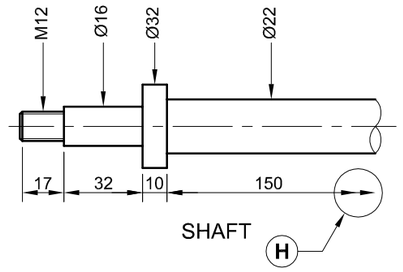
M12 NUT



PART G

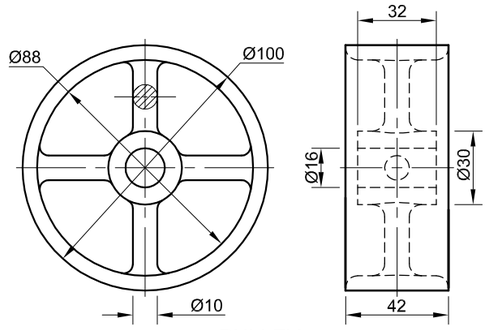


BEARING CAP

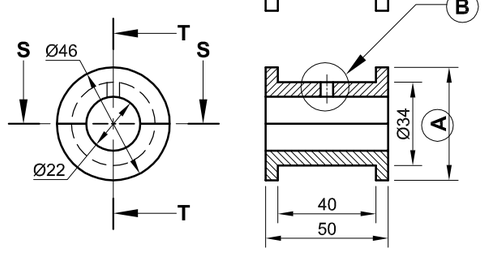


SHAFT

ANSWER 9



PULLEY



BEARING HALVES

QUESTION 1: ANALYTICAL (MECHANICAL)

Given:
A drawing showing orthographic views of the parts of a bearing bracket assembly, a title block and a table of questions. The drawings have 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 drawn?		1		
2	Who approved the drawing?		1		
3	What is the drawing number?		1		
4	Who was responsible for the revision?		1		
5	If the drawing was drawn to scale 1 : 1, what would the dimension at A read?		1		
6	What heat treatment is required?		1		
7	What type of machining is required?		1		
8	What is the tolerance allowed on dimensions?		1		
9	Complete, in neat freehand, the sectional top view of the BEARING HALVES on cutting plane S-S.		3		
10	Name the encircled feature at B.		1		
11	What type of section is shown on the PULLEY?		1		
12	Give the complete dimensions at: C D E		3		
13	Determine the dimension at F. Show ALL calculations.		2		
14	Give the correct name of PART G.		1		
15	What is indicated by the encircled convention at H?		1		
16	What is indicated by the encircled convention at J?		1		
17	How many surfaces on the BRACKET require machining?		1		
18	What is the purpose of the two shoulders on the BEARING HALVES?		2		
19	Name a part that can be added to the assembly to ensure that the momentum is effectively carried over from the PULLEY to the SHAFT?		2		
20	In the space below, draw, in neat freehand, the symbol for the projection system used.		4		
		TOTAL	**30**		

05/11	P MOOLMAN	INSERT OIL HOLE	1
DATE	REVISED BY	DESCRIPTION OF REVISION	№

UNLESS OTHERWISE SPECIFIED, TOLERANCES ON DIMENSIONS ARE ± 0,3.
ALL UNSPECIFIED RADII ARE 6 mm.

0.05 MILLING

MATERIAL: CAST IRON	FILE NAME: ANA0113.dwg
HEAT TREATMENT: NORMALISE	DRAWING No. 01-NOV-13
APPROVED BY: K CIZAKE	DATE: 2013-12-04
CHECKED BY: W GOEDE	DATE: 2013-11-15
DRAWN BY: J STANDER	DATE: 2013-11-04
SCALE 1 : 2	

DRAWING PROGRAMME: AUTOCAD

ANSWER 20

JPW DEVELOPMENTS
123 STRUBEN STR
Pretoria
www.jpwdevelopments.co.za
012 345 6789

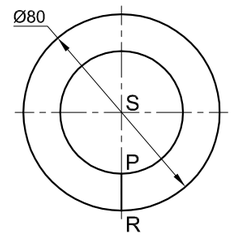
TITLE
BEARING BRACKET

EXAMINATION NUMBER

EXAMINATION NUMBER 2

BASIC-EDUCATION

STAPLE



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

2.1 COIL SPRING (HELIX)
Given:
- The right view of a coil spring with PR indicating the starting position
- The position of centre point S on the drawing sheet

Specifications:
- Pitch = 100
- Outer diameter = Ø80
- Inner diameter = Ø48
- Spring profile = Ø16
- Direction = Right-handed

Instructions:
- Draw, to scale 1 : 1, the given right view and the front view for ONE turn of the coil spring.
- Show ALL necessary construction.
- No hidden detail is required. **[21]**

ASSESSMENT CRITERIA						
1	GIVEN + CENTRE LINES	3				
2	CONSTRUCTION	6				
3	POINTS + CURVES	12				
PENALTIES (-)						
SUBTOTAL 2.1		**21**				

2.2 CAM
Motion:
- The follower rises with uniform motion for 20 mm over the first 60° of the rotation.
- There is a dwell period for 30°.
- The follower rises with simple harmonic motion for 50 mm over the next 90° of the rotation, to the maximum displacement of 70 mm.
- The follower descends with uniform acceleration and retardation to the original position over the rest of the rotation.

Instructions:
- Draw, to a horizontal scale of 130 mm = 360° and a displacement scale of 1 : 1, the complete displacement graph for the required motions.
- Label the graph and indicate the scale. **[17]**

ASSESSMENT CRITERIA						
1	CONSTRUCTION	$6\frac{1}{2}$				
2	POINTS + CURVES	$9\frac{1}{2}$				
3	LABELS	1				
PENALTIES (-)						
2.2 SUBTOTAL		**17**				
2.1 SUBTOTAL		**21**				
TOTAL		**38**				

EXAMINATION NUMBER	
EXAMINATION NUMBER	3

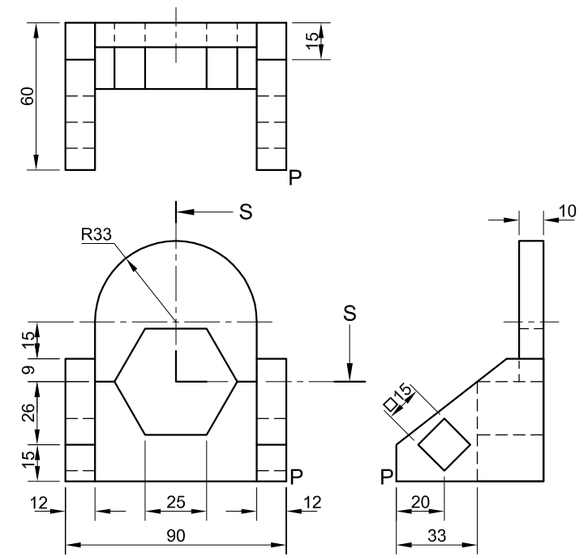
STAPLE

QUESTION 3: ISOMETRIC DRAWING

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

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

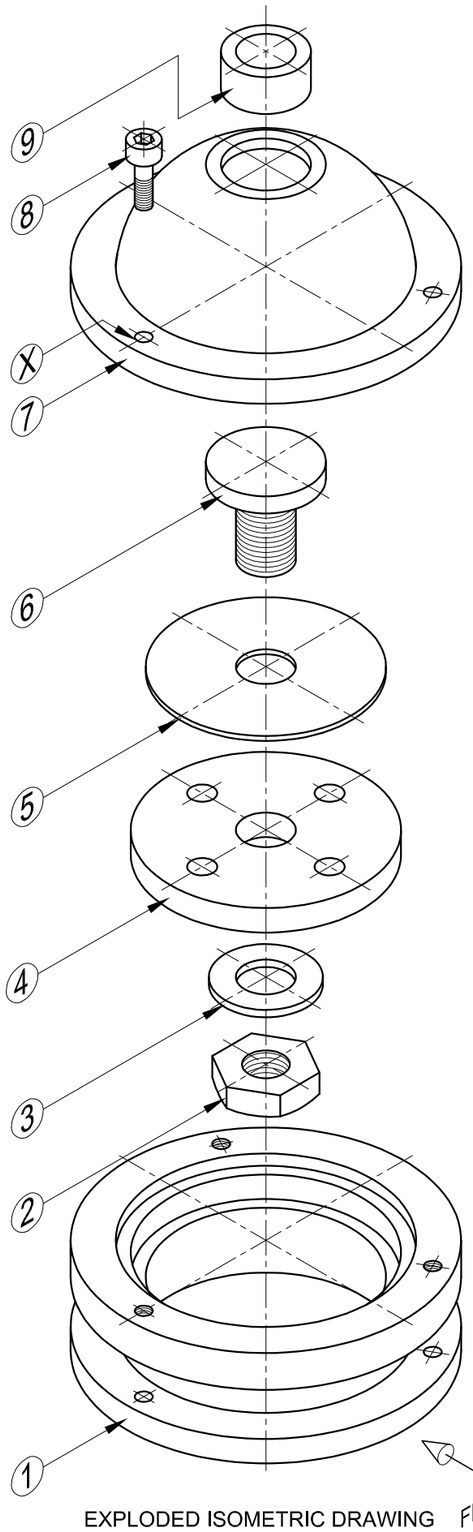
- Make P the lowest point of the drawing.
- Show ALL necessary construction.
- NO hidden detail is required. **[37]**



P

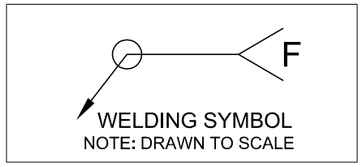
ASSESSMENT CRITERIA						
1	AUX. VIEW + PLACING	3				
2	ISOMETRIC + NON-ISO'	13				
3	HEXAGON + SQUARES	9½				
4	CIRCLES + CONST.	4				
5	SECTION	5				
6	HATCHING	2½				
PENALTIES (-)						
	TOTAL	**37**				
EXAMINATION NUMBER						
EXAMINATION NUMBER						4

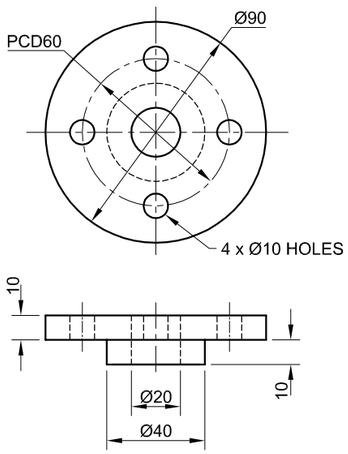
STAPLE



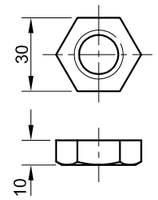
EXPLODED ISOMETRIC DRAWING

FRONT VIEW

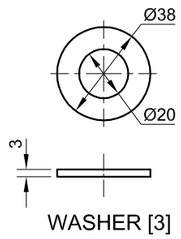




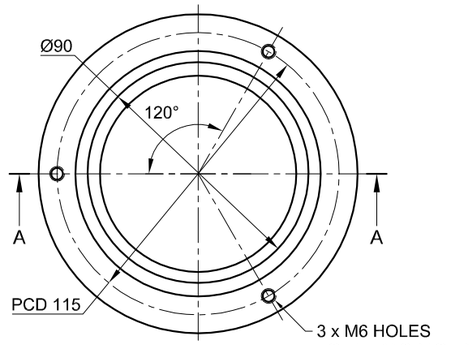
VALVE PLATE [4]

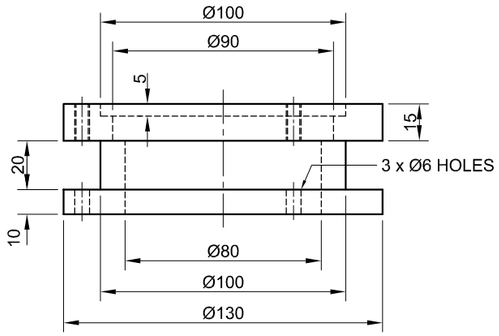


M20 NUT [2]

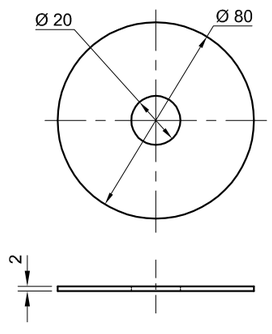


WASHER [3]

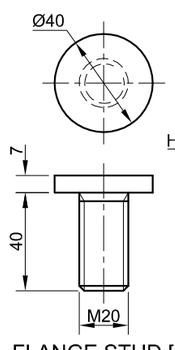




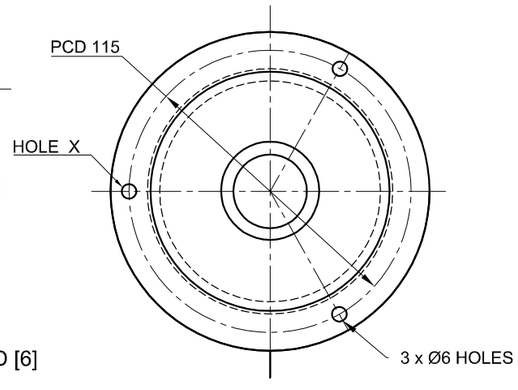
CYLINDER [1]

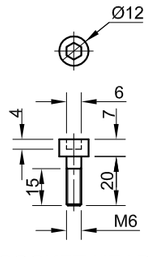


DIAPHRAGM [5]

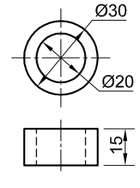


FLANGE STUD [6]

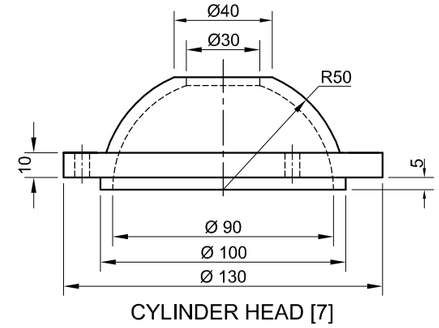




SOCKET HEAD BOLT [8]



OUTLET PIPE [9]



CYLINDER HEAD [7]

QUESTION 4: MECHANICAL ASSEMBLY

Given:

- The exploded isometric drawing of the parts of a one-way valve assembly, showing the position of each part relative to all the others
- Orthographic views of each of the parts of the one-way valve 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 one-way valve 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 vertically through the centre of the assembly, is shown on the top view of the cylinder (part 1).
  - **4.2 The top view**
  - **4.3 The left view**
- ALL drawings must comply with the guidelines contained in the *SANS 10111.*

NOTE:

- Proper planning is essential.
- Draw only ONE socket head bolt in the hole marked X.
- The outlet pipe (part 9) fits into the cylinder head (part 7) and must be welded in place. Show the given welding symbol on the left view.
- Show THREE faces and ALL the necessary construction for the M20 nut.
- Show TWO faces of the inside of the socket head bolt.
- Add cutting plane A-A to the drawing.
- NO hidden detail is required. **[95]**

PARTS LIST

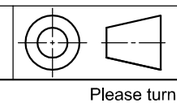
	PART	QUANTITY	MATERIAL
1	CYLINDER	1	CAST IRON
2	M20 NUT	1	STAINLESS STEEL
3	WASHER	1	STAINLESS STEEL
4	VALVE PLATE	1	CAST IRON
5	DIAPHRAGM	1	RUBBER
6	FLANGE STUD	1	STAINLESS STEEL
7	CYLINDER HEAD	1	CAST IRON
8	SOCKET HEAD BOLT	3	STAINLESS STEEL
9	OUTLET PIPE	1	STAINLESS STEEL

JPW ENGINEERING CC
123 STRUBEN STREET
PRETORIA
0001
www.jpwengineering.co.za
☎ 012 345 6789

ONE-WAY VALVE

ALL DIMENSIONS ARE IN MILLIMETRES.

ALL UNSPECIFIED RADII ARE R4.



Please turn over

STAPLE

PENALTIES		
THIRD-ANGLE (TA)		
INCORRECT SCALE (IS)		
NUT CONSTRUCTION (NC)		
HATCHING (H)		
TOTAL		

Carry the TOTAL over to the penalties row under GENERAL.

ASSESSMENT CRITERIA

SECTIONAL FRONT VIEW

		POSSIBLE	OBTAINED	SIGN	MODERATED
1	CYLINDER	12			
2	M20 NUT	6			
3	WASHER	2			
4	VALVE PLATE	9 $\frac{1}{2}$			
5	DIAPHRAGM	2 $\frac{1}{2}$			
6	FLANGE STUD	6 $\frac{1}{2}$			
7	CYLINDER HEAD	9 $\frac{1}{2}$			
8	SOCKET HEAD BOLT	8			
9	OUTLET PIPE	4			
SUBTOTAL		**60**			

TOP VIEW

1	CYLINDER HEAD	3 $\frac{1}{2}$			
2	SOCKET HEAD BOLT	1 $\frac{1}{2}$			
3	OUTLET PIPE	1			
SUBTOTAL		**6**			

LEFT VIEW

1	CYLINDER	4			
2	CYLINDER HEAD	3			
3	SOCKET HEAD BOLT	1 $\frac{1}{2}$			
4	OUTLET PIPE	1 $\frac{1}{2}$			
5	WELDING SYMBOL	2			
6	CUTTING PLANE	3			
SUBTOTAL		**15**			

GENERAL

1	CENTRE LINES	6			
2	ASSEMBLY	8			
SUBTOTAL		**14**			
PENALTIES (-)					
TOTAL		**95**			

EXAMINATION NUMBER

EXAMINATION NUMBER 6