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Department:
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**NASIONALE
SENIOR SERTIFIKAAT**

GRAAD 12

INGENIEURSGRAFIKA EN -ONTWERP V2
NOVEMBER 2011

PUNTE: 100

TYD: 3 uur

Hierdie vraestel bestaan uit 6 bladsye.

INSTRUKSIES EN INLIGTING

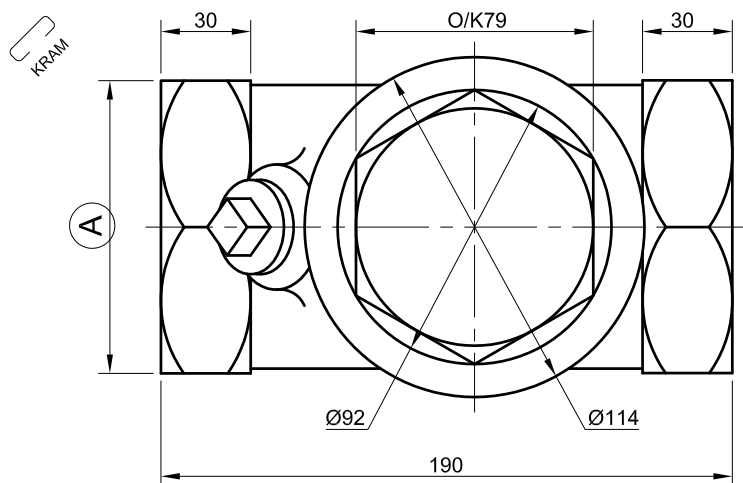
1. Hierdie vraestel bestaan uit VIER vrae.
2. Beantwoord AL die vrae.
3. ALLE tekene is in derdehoekse ortografiese projeksie, tensy anders aangedui.
4. ALLE tekene moet volgens skaal 1 : 1 geteken word, tensy anders aangedui.
5. AL die vrae moet, soos voorgeskryf, op die VRAESTEL beantwoord word.
6. AL die bladsye moet weer in nommervolgorde vasgekram word, ongeag of die vraag beantwoord is.
7. Tydsbeplanning is noodsaaklik om al die vrae te voltooi.
8. Drukskryf jou eksamennummer in die blokkie voorsien op elke bladsy.
9. Enige besonderhede of afmetings wat nie gegee is nie, moet in goeie verhouding veronderstel word.
10. ALLE antwoorde moet akkuraat en netjies geteken word.

SLEGS VIR AMPTELIKE GEBRUIK										
VRAAG	PUNTE BEHAAL			½	TEKEN	GEMODEREER			½	TEKEN
1										
2										
3										
4										
TOTAAL										
	2	0	0			2	0	0		

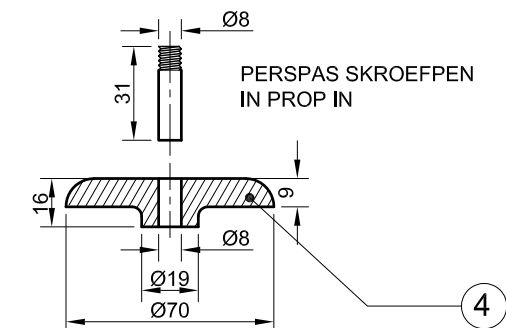
FINALE VERWERKTE PUNT	NAGESIEN DEUR
100	

VOLTOOI DIE VOLGENDE:
SENTRUMNOMMER
SENTRUMNOMMER
EKSAMENOMMER
EKSAMENOMMER

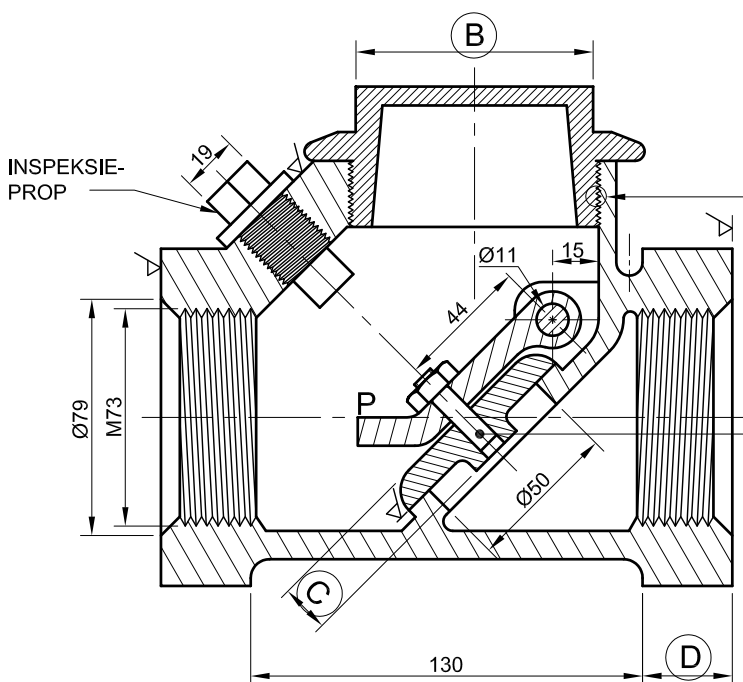




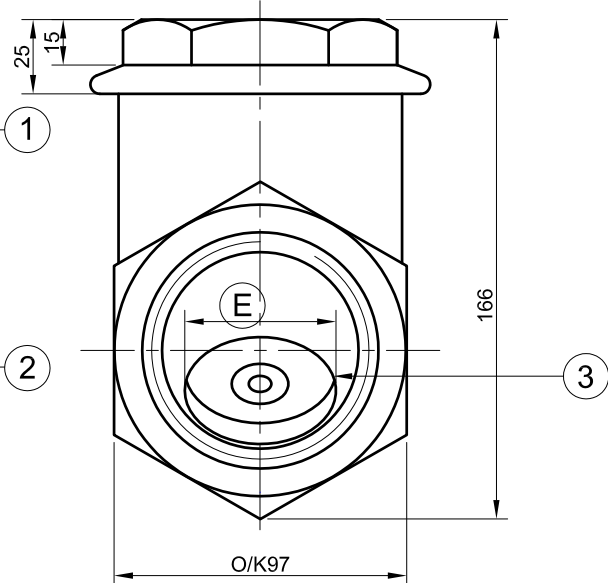
AANSIG 2



BESONDERHEDE VAN SKROEFPEN EN PROP



AANSIG 1



AANSIG 3

VRAAG 1: ANALITIES (MEGANIES)

Gegee:

DRIE gedetailleerde aansigte van 'n swaairolek, 'n gedetailleerde tekening van die skroefpen en prop, 'n titelblok en 'n tabel met vrae. Die tekene is nie volgens die aangetoonde skaal voorberei nie.

Instruksies:

Voltooi die tabel hieronder deur die vrae, wat almal na die bygaande tekene en titelblok verwys, netjies te beantwoord. [30]

VRAE		ANTWOORDE	
1	Wanneer is die tekening nagesien?		1/2
2	Wie het die tekening goedgekeur?		1/2
3	Watter skaal word vir die tekening aangedui?		1/2
4	Wie is verantwoordelik vir die hersienings?		1/2
5	Hoeveel hersienings is daar aan die tekening aangebring?		1/2
6	Wat was die aard van die eerste hersiening?		1/2
7	Hoeveel oppervlakke moet gemasjineer word?		1
8	Wat is die grofheidswaarde van die gemasjineerde oppervlakke?		1
9	Benoem die omsirkelde kenmerk by 1.		1
10	Benoem die onderdeel by 2.		1
11	Beskryf, in EEN woord, die ware vorm van die kenmerk by 3.		1
12	Watter tipe snit word by 4 getoon?		1
13	Wat moet die skroefdraadgrootte van 'n onderdeel wees sodat dit aan die swaairolek gekoppel kan word?		1
14	Uit hoeveel onderdele bestaan die swaairolek?		1
15	Wat sal aansig 3 genoem word?		1
16	Bepaal die afmetings by: A B C D E		5
17	Teken die snyvlak A-A op aansig 2.		3
18	In aansig 1, teken die lokus wat deur punt P gegeneer sal word soos wat die hek tot sy maksimum oopgemaak word.		2
19	In die blok hieronder (ANTWOORD 19), teken, in netjiese vryhand, die simbool vir die projeksiesisteen wat gebruik word.		4
20	In die blok hieronder (ANTWOORD 20), voltooi, in netjiese vryhand en volgens die SABS 0111-konvensies, die tekening van die inspeksieprop aan die regterkant.		4
TOTAAL			30

2011-08-12	N BOOTH	VERLENG INSPEKSIEPROP	3
2011-08-09	N BOOTH	TOON GEMASJINEERDE OPPERVLAKKE	2
2011-08-05	N BOOTH	VERWYDER WASTER	1
DATUM	HERSIEN DEUR	BESKRYWING VAN HERSIENING	Nr.

TEKENING NR. 60305 MATERIAAL: BRONS

LÊERNAAM: SCV 15-10 HITTEBEHANDELING: NORMALISEER

TENSY ANDERS VERMELD, IS ALLE TOLERANSIES OP AFMETINGS ± 0,25. TEKENPROGRAM: AUTOCAD 2011

MECHTECH LONGSTRAAT 17
INGENIEURSWERKE NEW PARK
KIMBERLEY 8300
www.mtech.co.za
053 645 7820

TITEL **SWAAIKONTROLEKLEP**

ALLE AFMETINGS IS IN MILLIMETER.

TEKENAAR: S SHABALALA 2011-07-22

NASIENER: S PIENAAR 2011-07-24

GOEDGEKEUR: A MOKOENA 2011-08-03

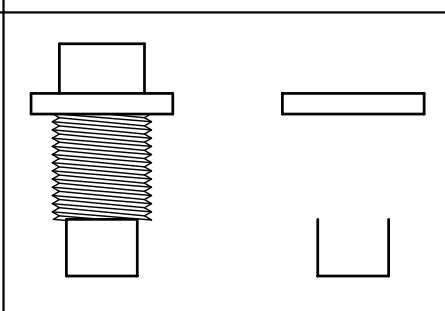
SKAAL: 1 : 2

0,8

ANTWOORD 19

SIMBOOL

ANTWOORD 20



TOTAAL **30**

EKSAMENNUMMER	
EKSAMENNUMMER	2





to

VRAAG 2: LOKUSSE

LET WEL: Beantwoord VRAAG 2.1 EN 2.2.

2.1 AWEGAAR

Gegee:

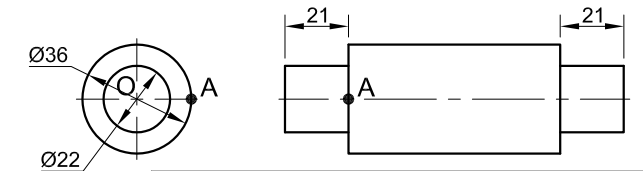
- Die vooraansig en linkeraansig van die as van 'n awegaar
- 'n Verwysingspunt, gemerk O, om te help met die plasing van die antwoord

Spesifikasies:

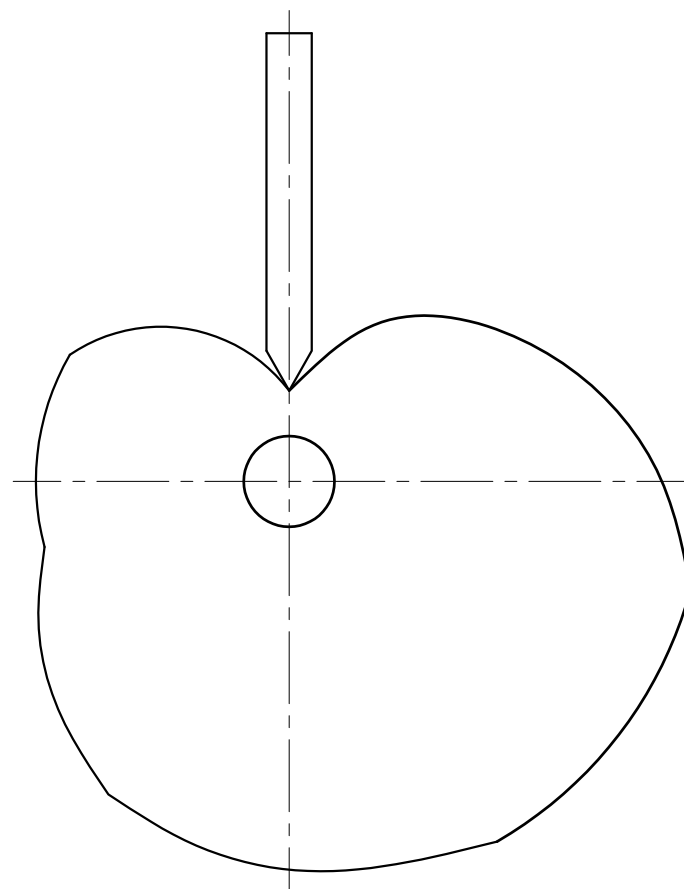
- Die steek (EEN volle draai) is 35 mm.
- Die buitediaameter van die awegaar is Ø80.

Instruksies:

- Deur te begin by punt A, teken, volgens skaal 1 : 1, TWEE draaie van 'n regterhandse awegaar op die gegewe aansigte van die as.
- Toon ALLE nodige konstruksies.
- GEEN verborge besonderhede word verlang nie. **[27]**



ASSESSERINGSKRITERIA			
GEGEE	5		
SENERLYNE + KONSTR	5		
HELIKS/AWEGAAR	17		
SUBTOTAAL	27		



2.2 NOK

Gegee:

'n Nokprofiel met 'n wigvormige volger

Spesifikasies:

Die nok roteer teen konstante snelheid in 'n kloksgewyse rigting en verleen eenvormige beweging aan die volger.

Instruksies:

- Teken die verplasinggrafiek vir die nok deur 'n horisontale skaal van 8 mm gelyk aan 30° te gebruik.
- Toon die rigting van rotasie op die nokprofiel aan.
- Benoem die verplasinggrafiek en toon die skaal wat gebruik word, aan.
- Toon AL die nodige konstruksies. **[12]**

ASSESSERINGSKRITERIA			
VERPLASINGSGRAFIEK	7		
KONSTRUKSIE	3		
BYSKRIFTE + PYL	2		
SUBTOTAAL	12		
TOTAAL	39		
EKSAMENNUMMER			
EKSAMENNUMMER			
EKSAMENNUMMER			3





VRAAG 3: ISOMETRIESE TEKENING

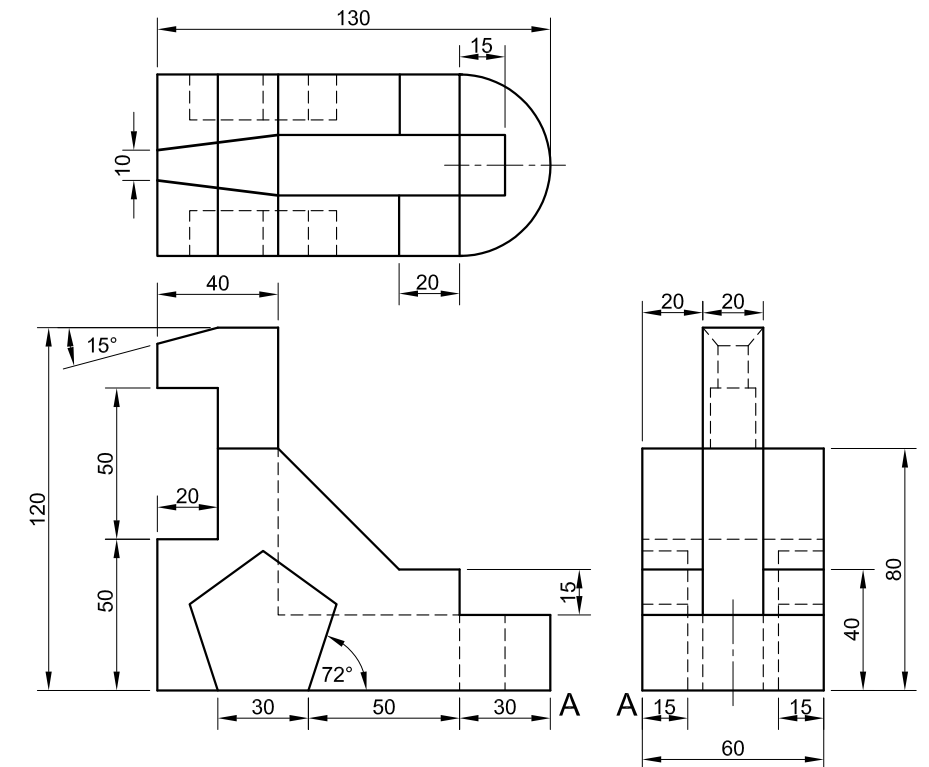
Gegee:

- Die vooraansig, boaansig en regteraansig van 'n veiligheidsknip met TWEE reëlmatige vyfkantige gleufgate
- Die posisie van punt A op die tekenvel

Instruksies:

Deur skaal 1 : 1 te gebruik, omskep die ortografiese aansigte van die veiligheidsknip in 'n isometriese tekening.

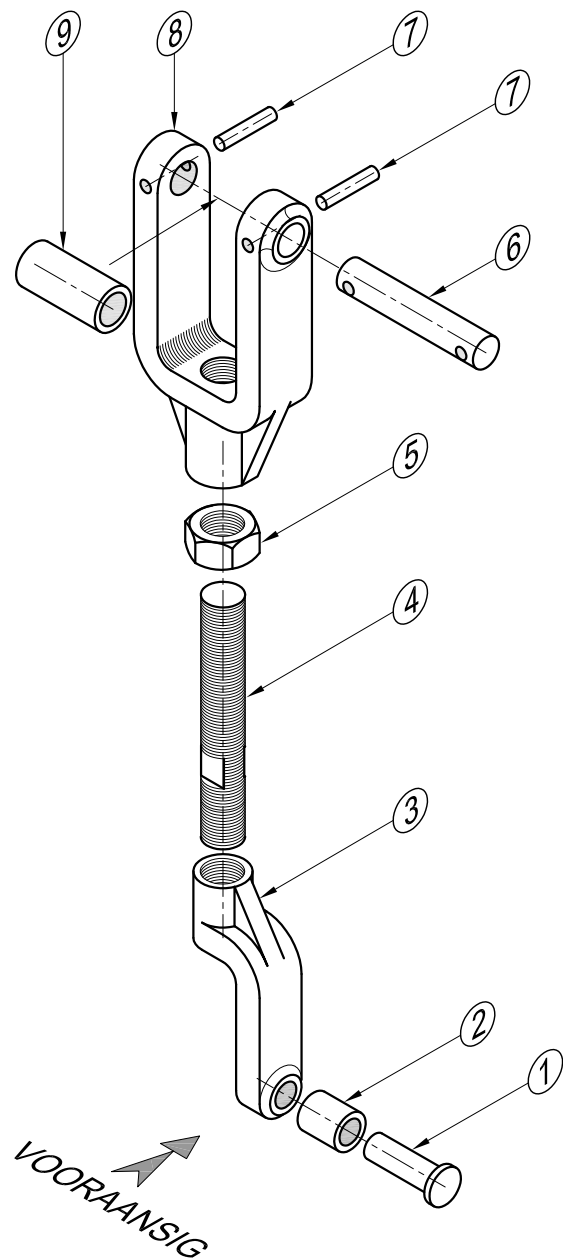
- Maak A die laagste punt van die tekening.
- Toon ALLE nodige konstruksies.
- GEEN stensils mag gebruik word nie.
- GEEN verborge besonderhede word verlang nie. **[40]**



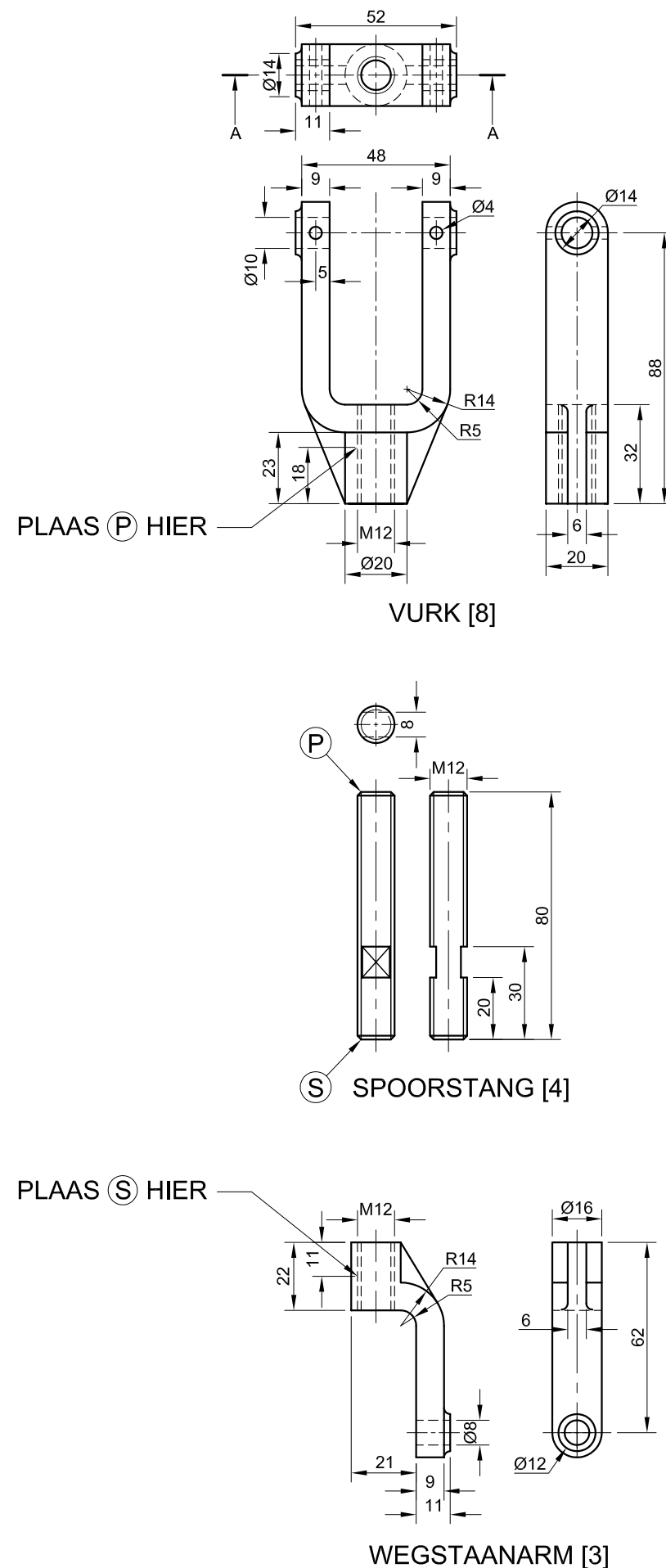
↓
A

ASSESSERINGSKRITERIA			
HULPAANSIGTE + SIRKEL-KONSTRUKSIES + PLASING	6		
ISO-KURWES + VYFKANTIGE GAT	11		
ISO- + NIE-ISO-LYNE	23		
TOTAAL	40		
EKSAMENNOMMER			
EKSAMENNOMMER			4





UITSKUIF- ISOMETRIESE TEKENING



VRAAG 4: MEGANIESE SAMESTELLING

Gegee:

- Die uitskuif- isometriese tekening van die onderdele van 'n wegstaanverbindingstaaf, wat die posisie van elke onderdeel relatief tot al die ander toon
- Ortografiese aansigte van elke onderdeel van die wegstaanverbindingstaaf-samestelling

Instruksies:

- Beantwoord hierdie vraag op bladsy 6.
- Teken, volgens skaal 1 : 1 en in derdehoekse ortografiese projeksie, die volgende aansigte van die saamgestelde onderdele van die wegstaanverbindingstaaf-samestelling:
 - 4.1 'n Deursnee-vooraansig** volgens snyvlak A-A, soos gesien vanuit die rigting van die pyl wat in die uitskuif-isometriese tekening getoon word. Die snyvlak, wat vertikaal deur die middel van die samestelling gaan, word op die boaansig van die vurk (onderdeel 8) getoon.
 - 4.2 Die regteraansig**
- ALLE tekene moet voldoen aan die riglyne vervat in die SABS 0111.

LET WEL:

- Soos aangedui, plaas punt P aan die bokant van die spoorstang met punt P op die vurk en punt S aan die onderkant van die spoorstang met punt S op die wegstaanarm.
- Toon DRIE vlakke van die moer in die vooraansig en ALLE nodige konstruksies.
- GEEN verborge besonderhede word verlang nie.

Voeg die volgende kenmerke by die tekening:

- Die snyvlak A-A
- Benoem die deursnee-aansig SNIT A-A. [91]

LYS VAN ONDERDELE		
ONDERDEEL	HOEVEELHEID	MATERIAAL
1. AS A	1	SAGTE STAAL
2. BUS A	1	BRONS
3. WEGSTAANARM	1	GIETYSER
4. SPOORSTANG	1	SAGTE STAAL
5. M12-SLUITMOER	1	SAGTE STAAL
6. AS B	1	SAGTE STAAL
7. TAPPEN	2	SAGTE STAAL
8. VURK	1	GIETYSER
9. BUS B	1	BRONS

MECHTECH
INGENIEURSWERKE

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WEGSTAANVERBINDINGSTAAF

ALLE AFMETINGS IS IN MILLIMETER.	ALLE ONGESPEFISEERDE RADIUSSE IS R2.		5
----------------------------------	--------------------------------------	--	---





ASSESSERINGSKRITERIA				
DEURSNEE-VOORAANSIG				
1	AS A	2		
2	BUS A	1		
3	WEGSTAAN-ARM	7½		
4	SPOORSTANG	9		
5	M12-MOER	8		
6	AS B	2		
7	TAPPEN	1		
8	VURK	10½		
9	BUS B	1		
H	ARSERING	12		
SUBTOTAAL		54		
REGTERAANSIG				
3	WEGSTAAN-ARM	5½		
4	SPOORSTANG	5		
5	M12-MOER	4½		
8	VURK	6		
SUBTOTAAL		21		
ALGEMEEN				
1	SENERLYNE	4		
2	SNYVLAK + TITEL	5		
3	SAMESTELLING	7		
SUBTOTAAL		16		
TOTAAL		91		
EKSAMENNOMMER				
EKSAMENNOMMER				
				6





basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

ENGINEERING GRAPHICS AND DESIGN P2
NOVEMBER 2011

MARKS: 100

TIME: 3 hours

This question paper consists of 6 pages.

INSTRUCTIONS AND INFORMATION

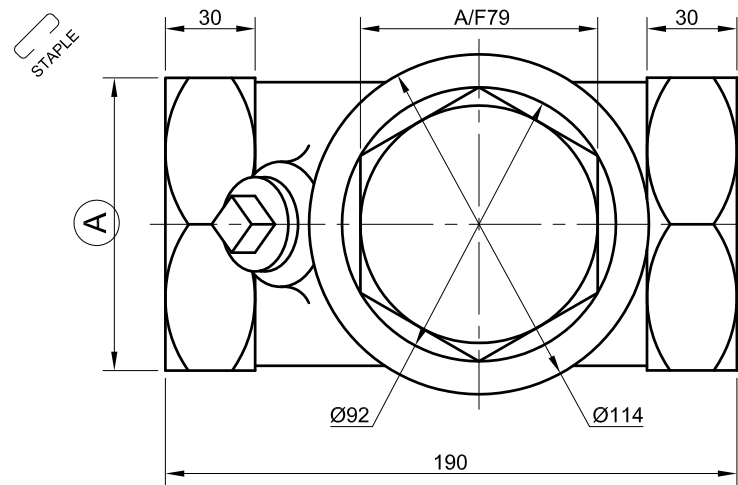
1. This question paper consists of FOUR questions.
2. Answer ALL the questions.
3. ALL drawings are in third-angle orthographic projection, unless stated otherwise.
4. ALL drawings must be drawn to scale 1 : 1, unless stated otherwise.
5. ALL the questions must be answered on the QUESTION PAPER as instructed.
6. ALL the pages must be restapled in numerical sequence, irrespective of whether the question was attempted.
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. Any details or dimensions not given, must be assumed in good proportion.
10. ALL answers must be drawn accurately and neatly.

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

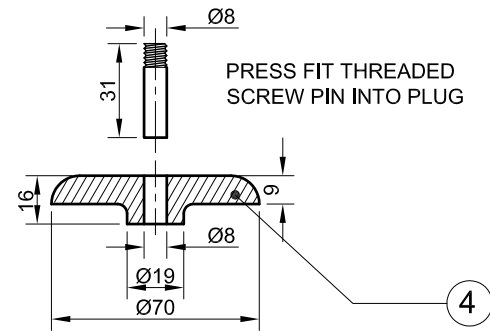
FINAL CONVERTED MARK	CHECKED BY
100	

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



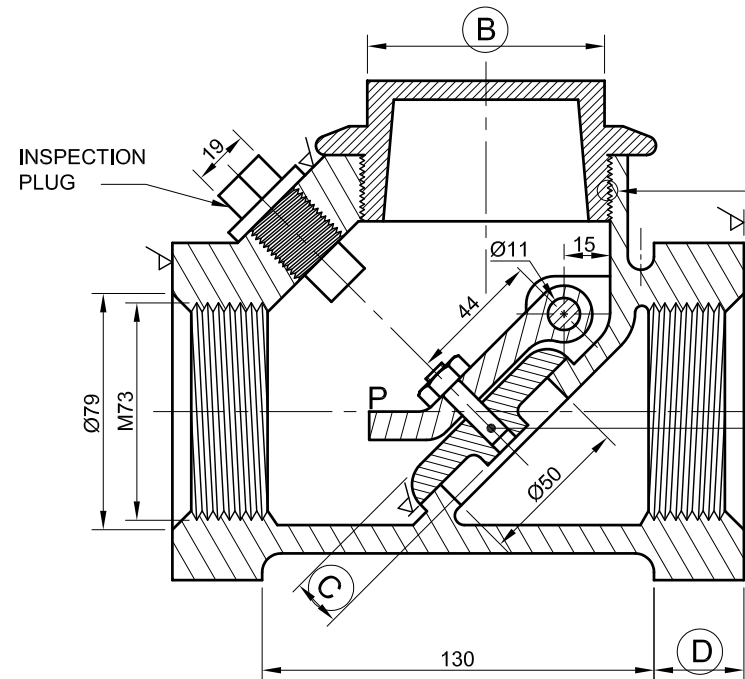


VIEW 2

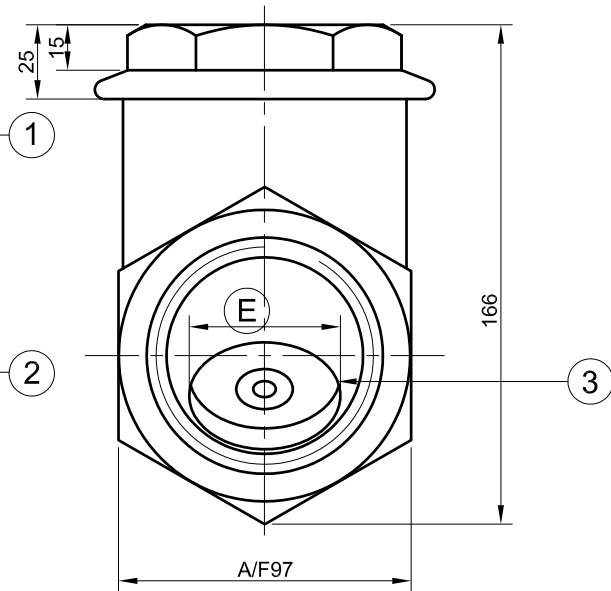


DETAIL OF THREADED SCREW PIN AND PLUG

4



VIEW 1



VIEW 3

1

2

3

QUESTION 1: ANALYTICAL (MECHANICAL)

Given:

THREE detailed views of a swing check valve, a detailed drawing of the screw pin and plug, 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 drawings and the title block. [30]

QUESTIONS		ANSWERS	
1	When was the drawing checked?		1/2
2	Who approved the drawing?		1/2
3	What scale is indicated for the drawing?		1/2
4	Who was responsible for the revisions?		1/2
5	How many revisions have there been to the drawing?		1/2
6	What was the nature of the first revision?		1/2
7	How many surfaces require machining?		1
8	What is the roughness value of the machined surfaces?		1
9	Name the circled feature at 1.		1
10	Name the component at 2.		1
11	In ONE word, describe the true shape of the feature at 3.		1
12	What type of section is shown at 4?		1
13	What thread size must a component have in order to be coupled to the swing check valve?		1
14	How many components make up the swing check valve?		1
15	What would view 3 be called?		1
16	Determine the dimensions at: A B C D E		5
17	Draw the cutting plane A-A on view 2.		3
18	In view 1, trace the locus that will be generated by point P as the gate opens to its maximum.		2
19	In the box below (ANSWER 19), draw, in neat freehand, the symbol for the projection system used.		4
20	In the box below (ANSWER 20), complete, in neat freehand and according to the SABS 0111 conventions, the drawing of the inspection plug on the right.		4
TOTAL			30

2011-08-12	N BOOTH	LENGTHEN INSPECTION PLUG	3
2011-08-09	N BOOTH	SHOW MACHINED SURFACES	2
2011-08-05	N BOOTH	REMOVE WASHER	1
DATE	REVISED BY	REVISION DESCRIPTION	No

DRAWING No. 60305		MATERIAL: BRONZE	
FILE NAME: SCV 15-10		HEAT TREATMENT: NORMALISE	
UNLESS OTHERWISE SPECIFIED, TOLERANCES ON DIMENSIONS ARE ± 0,25.		DRAWING PROGRAMME: AUTOCAD 2011	
		ALL UNSPECIFIED RADII ARE R2.	
<p>17 LONG STREET NEW PARK KIMBERLEY 8300 www.mtech.co.za 053 645 7820</p>		DRAWN BY: S SHABALALA 2011-07-22	
		CHECKED BY: S PIENAAR 2011-07-24	
		APPROVED BY: A MOKOENA 2011-08-03	
SCALE: 1 : 2			
TITLE			
SWING CHECK VALVE			

ALL DIMENSIONS ARE IN MILLIMETRES.	
DRAWN BY: S SHABALALA	2011-07-22
CHECKED BY: S PIENAAR	2011-07-24
APPROVED BY: A MOKOENA	2011-08-03
SCALE: 1 : 2	

ANSWER 19	ANSWER 20
SYMBOL	

EXAMINATION NUMBER	
EXAMINATION NUMBER	2





to

QUESTION 2: LOCI

NOTE: Answer QUESTIONS 2.1 AND 2.2.

2.1 AUGER

Given:

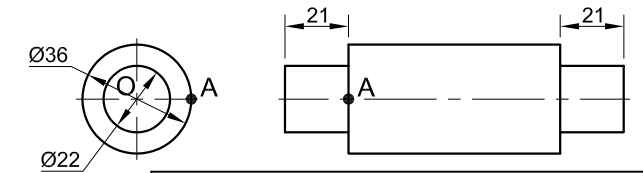
- The front view and left view of the shaft of an auger
- A reference point, labelled O, to help with the placement of the answer

Specifications:

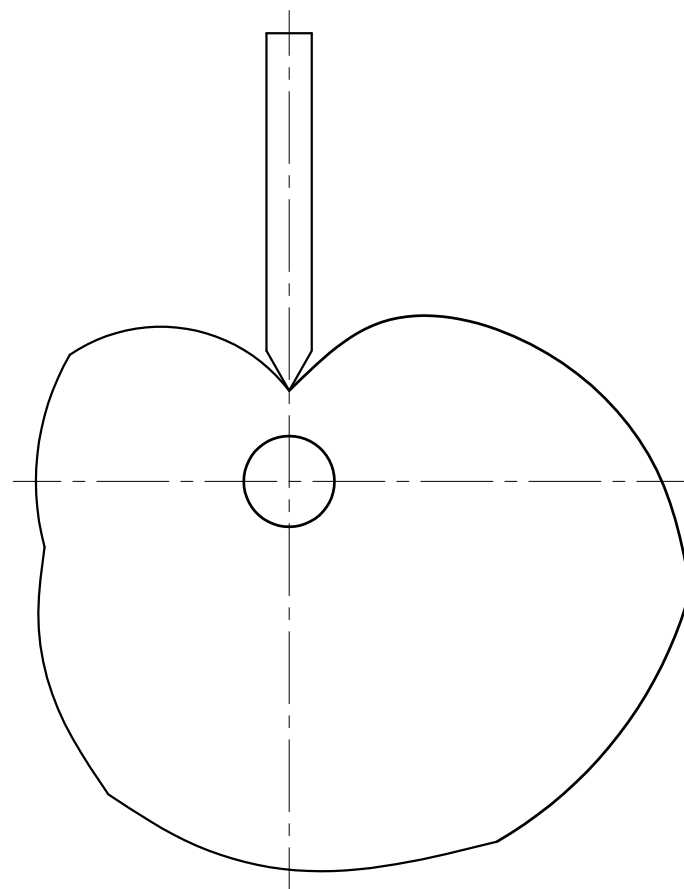
- The pitch (ONE full turn) is 35 mm.
- The outer diameter of the auger is $\text{Ø}80$.

Instructions:

- Starting at point A, draw, to scale 1 : 1, TWO turns of a right-hand auger on the given views of the shaft.
- Show ALL necessary construction.
- NO hidden detail is required. [27]



ASSESSMENT CRITERIA			
GIVEN	5		
CENTRE LINES + CONSTR'	5		
HELIX/AUGER	17		
SUBTOTAL	27		



2.2 CAM

Given:

A cam profile with a wedge-ended follower

Specifications:

The cam rotates with constant velocity in a clockwise direction, imparting uniform motion to the follower.

Instructions:

- Draw the displacement graph for the cam, using a horizontal scale of 8 mm equal to 30° .
- Indicate the direction of rotation on the cam profile.
- Label the displacement graph and indicate the scale used.
- Show ALL necessary construction. [12]

ASSESSMENT CRITERIA			
DISPLACEMENT GRAPH	7		
CONSTRUCTION	3		
LABELS + ARROW	2		
SUBTOTAL	12		
TOTAL	39		
EXAMINATION NUMBER			
EXAMINATION NUMBER			3





QUESTION 3: ISOMETRIC DRAWING

Given:

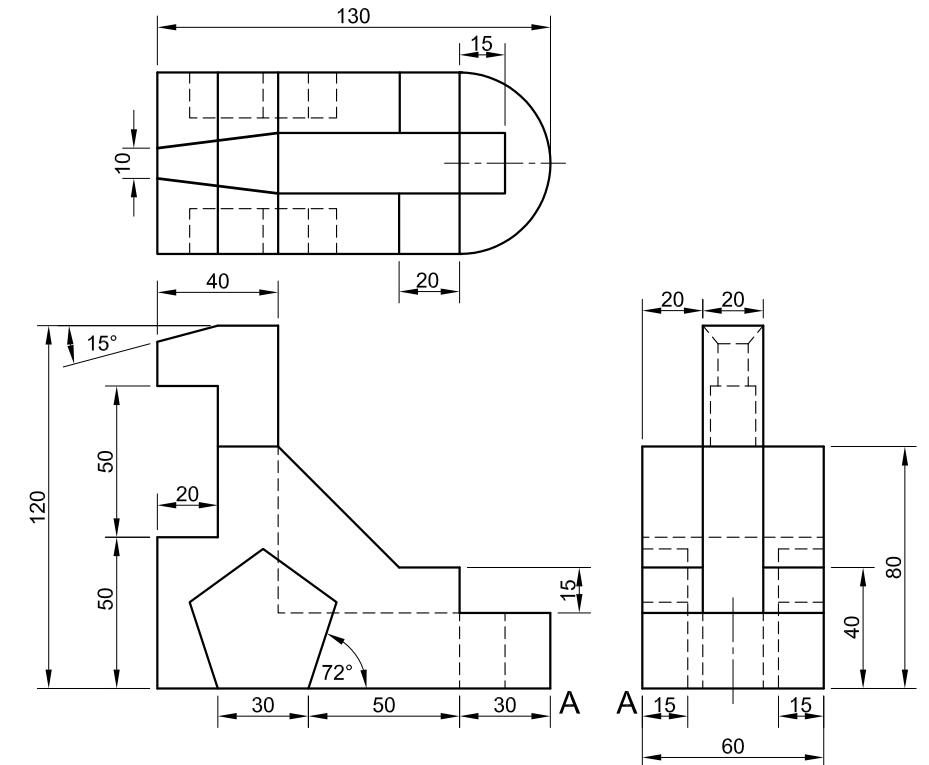
- The front view, top view and right view of a safety clip with TWO regular pentagonal slot holes
- The position of point A on the drawing sheet

Instructions:

Using scale 1 : 1, convert the orthographic views of the safety clip into an isometric drawing.

- Make A the lowest point of the drawing.
- Show ALL necessary construction.
- NO stencils may be used.
- NO hidden detail is required.

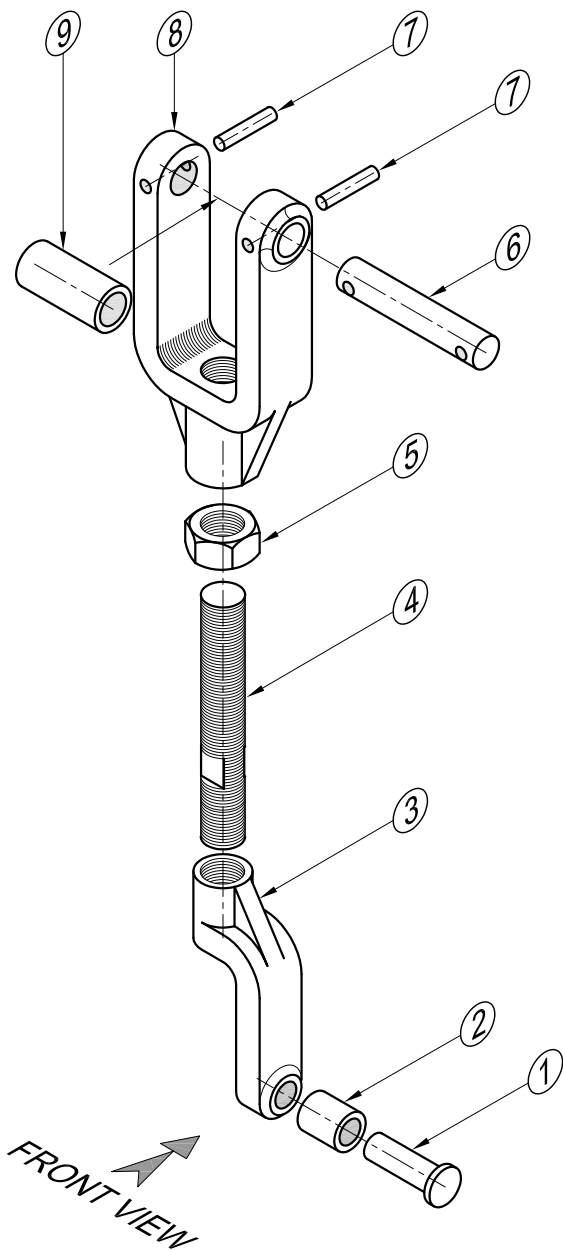
[40]



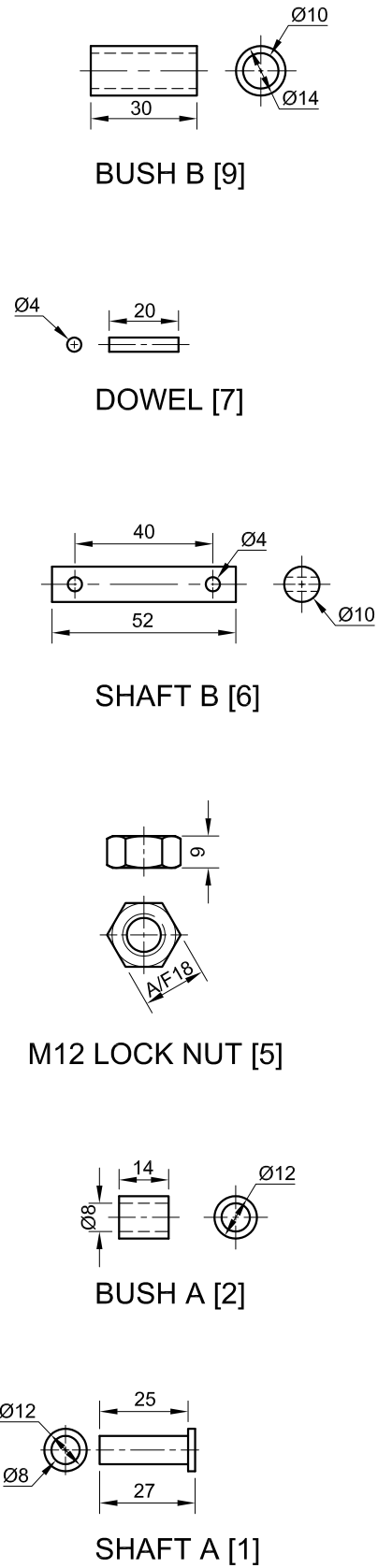
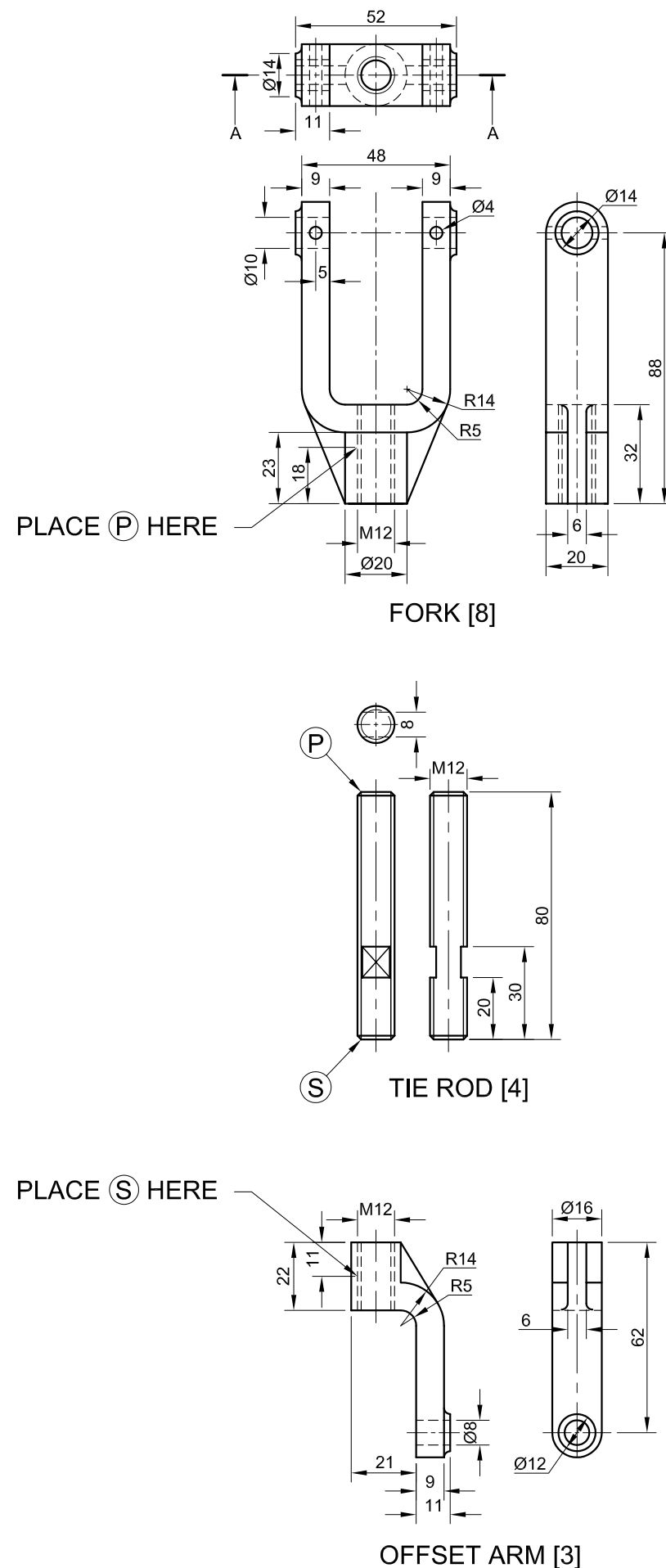
↓
A

ASSESSMENT CRITERIA			
AUXILIARY VIEWS + CIRCLE CONSTRUCTION + PLACE	6		
ISO' ARCS + PENTAGONAL HOLE	11		
ISO' + NON-ISO' LINES	23		
TOTAL	40		
EXAMINATION NUMBER			
EXAMINATION NUMBER			
EXAMINATION NUMBER			4





EXPLODED ISOMETRIC DRAWING



QUESTION 4: MECHANICAL ASSEMBLY

Given:

- The exploded isometric drawing of the parts of an offset connecting bar, showing the position of each part relative to all the others
- Orthographic views of each of the parts of the offset connecting bar 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 offset connecting bar 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 fork (part 8).
 - 4.2 The right view**
- ALL drawing must comply with the guidelines contained in the SABS 0111.

NOTE:

- As indicated, place point P on the upper end of the tie rod with point P on the fork and point S on the lower end of the tie rod, with point S on the offset arm.
- Show THREE faces of the nut in the front view and ALL necessary construction.
- NO hidden detail is required.

Add the following features to the drawing:

- The cutting plane A-A
- Label the sectional view SECTION A-A.

[91]

PARTS LIST		
PART	QUANTITY	MATERIAL
1. SHAFT A	1	MILD STEEL
2. BUSH A	1	BRONZE
3. OFFSET ARM	1	CAST IRON
4. TIE ROD	1	MILD STEEL
5. M12 LOCK NUT	1	MILD STEEL
6. SHAFT B	1	MILD STEEL
7. DOWEL	2	MILD STEEL
8. FORK	1	CAST IRON
9. BUSH B	1	BRONZE



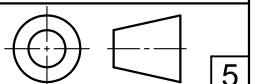
MECHTECH
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053 645 7820

OFFSET CONNECTING BAR

ALL DIMENSIONS ARE IN MILLIMETRES.

ALL UNSPECIFIED RADII ARE R2.





ASSESSMENT CRITERIA				
SECTIONAL FRONT VIEW				
1	SHAFT A	2		
2	BUSH A	1		
3	OFFSET ARM	7½		
4	TIE ROD	9		
5	M12 NUT	8		
6	SHAFT B	2		
7	DOWEL	1		
8	FORK	10½		
9	BUSH B	1		
H	HATCHING	12		
SUBTOTAL		54		
RIGHT VIEW				
3	OFFSET ARM	5½		
4	TIE ROD	5		
5	M12 NUT	4½		
8	FORK	6		
SUBTOTAL		21		
GENERAL				
1	CENTRE LINES	4		
2	CUTTING PLANE + TITLE	5		
3	ASSEMBLY	7		
SUBTOTAL		16		
TOTAL		91		
EXAMINATION NUMBER				
EXAMINATION NUMBER				6

