

STAPLE



# basic education

Department:  
Basic Education  
REPUBLIC OF SOUTH AFRICA

NATIONAL  
SENIOR CERTIFICATE

GRADE 12

ENGINEERING GRAPHICS AND DESIGN P2

FEBRUARY/MARCH 2016

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, irrespective of whether the question was attempted or not, must be re-stapled in numerical sequence in the TOP LEFT-HAND CORNER ONLY.
8. Proper planning 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			$\frac{1}{2}$	SIGN	MODERATED			$\frac{1}{2}$	SIGN	RE-MARKING
1											
2											
3											
4											
TOTAL											
	2	0	0			2	0	0			2 0 0

FINAL CONVERTED MARK

100

CHECKED BY

COMPLETE THE FOLLOWING:

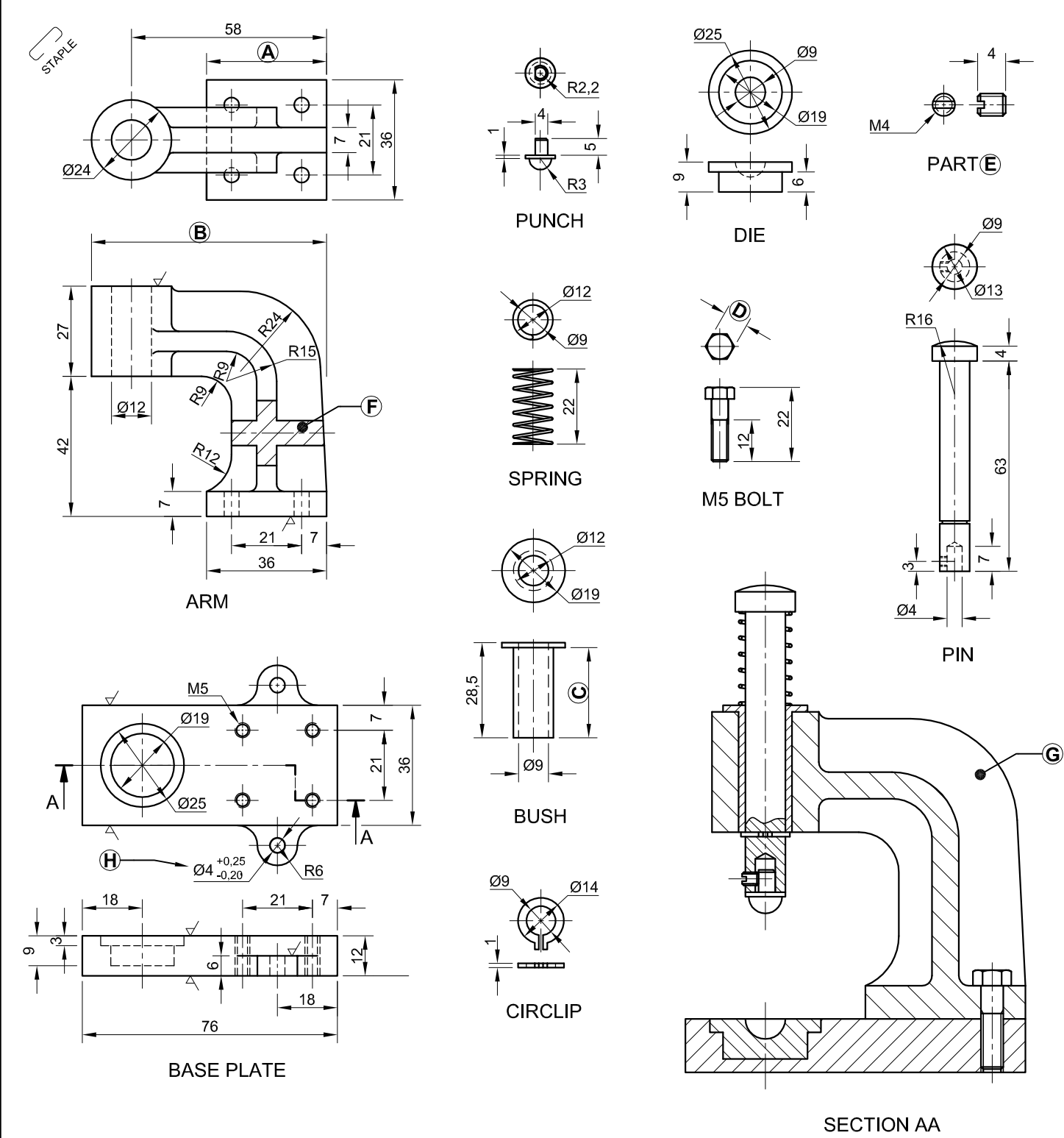
CENTRE NUMBER

CENTRE NUMBER

EXAMINATION NUMBER

EXAMINATION NUMBER






QUESTION 1: ANALYTICAL (MECHANICAL)

**Given:**  
Drawings of the parts of a punch, a sectional view of the punch assembly, a title block and a table of questions. The drawings have not been prepared according to the indicated scale.

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

QUESTIONS		ANSWERS		
1	On what date was the drawing checked?		1	
2	In which town is the engineering company situated?		1	
3	In which SI unit are the dimensions presented?		1	
4	What type of heat treatment is required?		1	
5	What is the file name?		1	
6	What material is used to manufacture the punch?		1	
7	On what date was the last revision made?		1	
8	How many surfaces require machining?		1	
9	What type of section is shown on the base plate?		1	
10	Determine the dimensions at: A: B: C: D:	4		
11	What is part E called?	1		
12	What type of section is shown at F on the arm?	1		
13	How many M5 bolts will be used to attach the arm to the base plate?	1		
14	What is the thickness of the feature at G?	1		
15	What is the purpose of the circlip in the assembly?	2		
16	With reference to the tolerance, determine the minimum size of the hole at H.	2		
17	With reference to the tolerance, determine the maximum size of the hole at H.	2		
18	In the box below (ANSWER 18), draw, in neat freehand, the symbol for the projection system used.	4		
19	In the box below (ANSWER 19), draw, in neat freehand, the convention of a spring.	3		
		TOTAL	30	

22/04/2015	ANDREW	INSERT CIRCLIP	3	DRAWING SET: 4 OF 5	DRAWN: PETER	07/03/2015
16/04/2015	ANDREW	INSERT GRUB SCREW	2	DRAWING PROGRAM: AutoCAD 2014	CHECKED: JOHN	13/03/2015
16/03/2015	ANDREW	CHANGE BUSH	1	DRAWING №. PUNCH/34/2015	APPROVED: ILSE	29/05/2015
DATE	CHANGED BY	REVISION DESCRIPTION	No.	FILE NAME: punch3.dwg	MATERIAL: CAST IRON	
PUNCH				UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETRES WITH A TOLERANCE OF 0,25.	HEAT TREATMENT: TEMPER	
					SCALE 2 : 1	
WEST COAST ENGINEERS (SA) (Pty) Ltd		15 MAIN ROAD VELDDRIFT 7365  www.wce.co.za ☎ 022 959 5432	QUANTITY: 200			
				✓ FOR SURFACE FINISHES		
						

ANSWER 18		ANSWER 19	
<div></div>		EXAMINATION NUMBER	
		EXAMINATION NUMBER	2



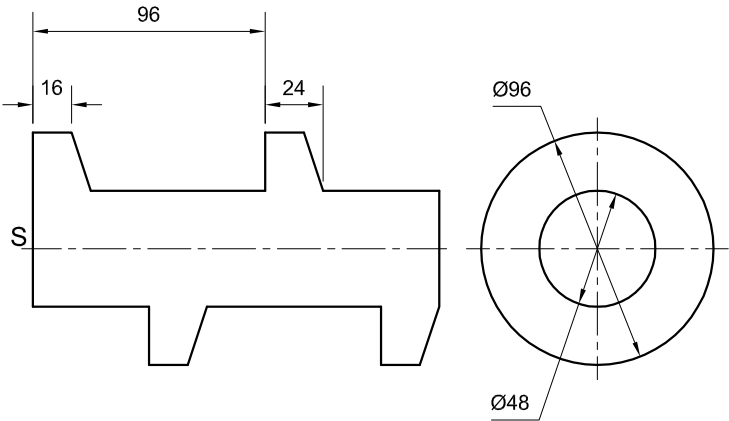
S

QUESTION 2: LOCI (HELIX)

- Given:**
- The core and the profile of the incomplete front view as well as the right view of a shaft with a unique single-start right-handed thread
  - The position of S on the drawing sheet

- Specifications:**
- Pitch = 96
  - Turns = ONE and a HALF
  - Direction = Right-handed

- Instructions:**  
Draw, to scale 1 : 1, the following views of the shaft with a unique single-start right-handed thread:
- 2.1 The given right view
  - 2.2 The complete front view
- Show ALL necessary construction.
  - NO hidden detail is required.
- [32]



ASSESSMENT CRITERIA					
1	RIGHT VIEW + CENTRE LINES	5			
2	CONSTRUCTION	5			
3	OUTER CURVE POINTS	10			
4	INNER CURVE POINTS	5			
5	CURVE QUALITY	4			
6	STRAIGHT LINES	3			
TOTAL		32			
EXAMINATION NUMBER					
EXAMINATION NUMBER					3



QUESTION 3: ISOMETRIC DRAWING

Given:

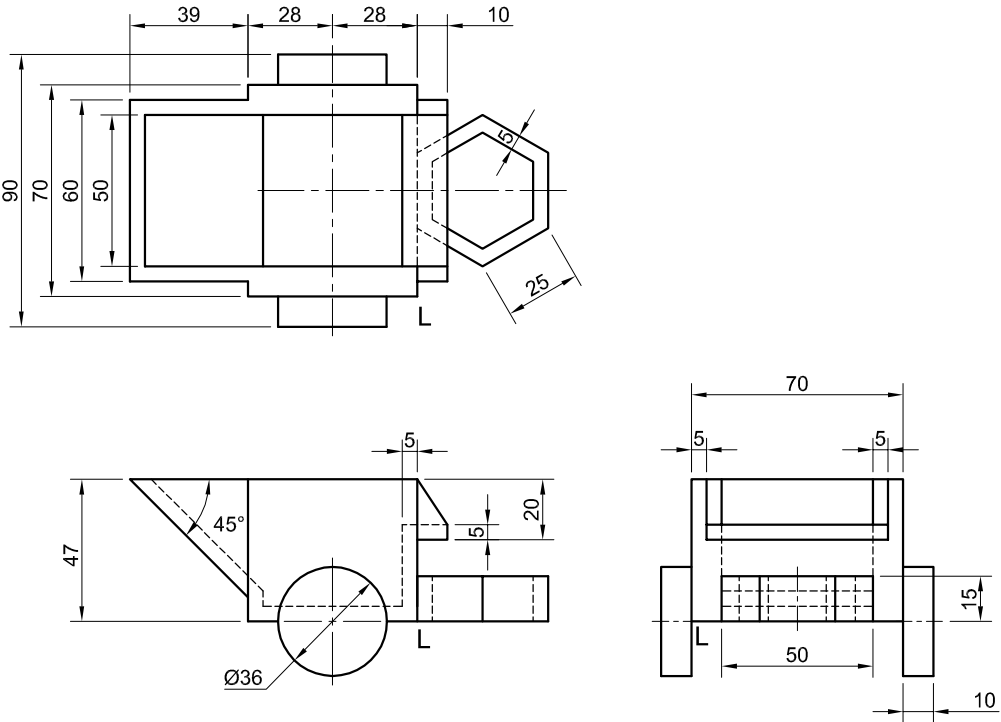
- The front view, top view and right view of a toy planter
- The position of corner L on the drawing sheet

Instructions:

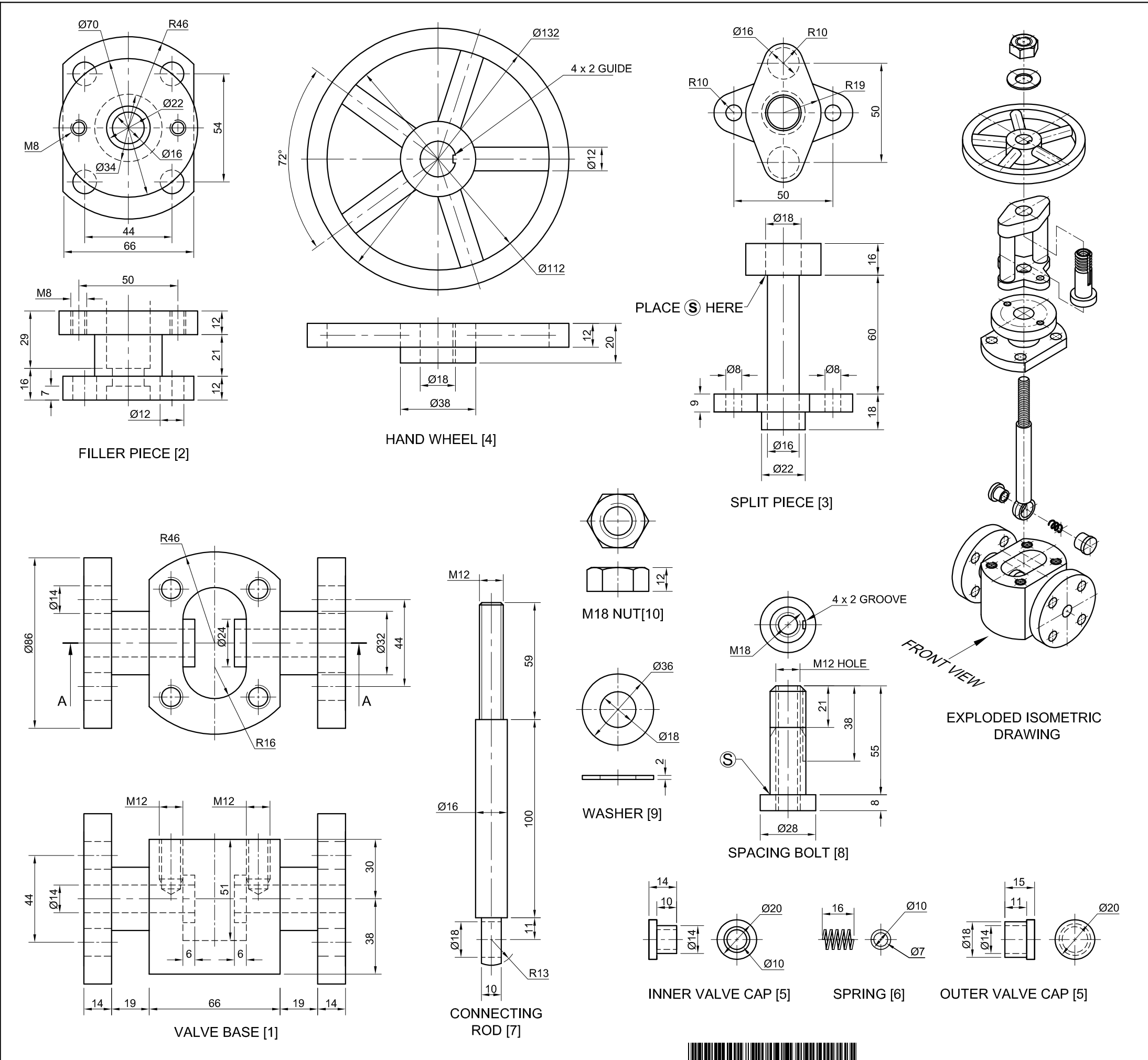
Using scale 1 : 1, convert the orthographic views of the toy planter into an isometric drawing.

- Use corner L as the starting point of the drawing.
- Show ALL necessary construction.
- NO hidden detail is required.

[40]



ASSESSMENT CRITERIA					
1	AUXILIARY VIEWS + PLACING	2			
2	ISOMETRIC + NON-ISOMETRIC LINES	18 ½			
3	HEXAGON	12			
4	CIRCLES + CONSTRUCTION + CENTRE LINES	7 ½			
PENALTIES (-)					
TOTAL		40			
EXAMINATION NUMBER					
EXAMINATION NUMBER					4



QUESTION 4: MECHANICAL ASSEMBLY

Given:

- The exploded isometric drawing of the parts of a steam valve assembly, showing the position of each part relative to all the others.
- Orthographic views of each of the parts of the steam valve assembly.

Instructions:

- Answer this question on page 6.
- Draw, to scale 1 : 1 and in third-angle orthographic projection, 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 valve base (part 1).
- ALL drawings must comply with the guidelines as contained in the SANS 10111.

NOTE:

- Planning is essential.
- The M12 bolts (part 12) which connect the filler piece (part 2) to the valve base (part 1) are not shown and not required to be drawn.
- The M8 bolts (part 11) which connect the filler piece (part 2) to the split piece (part 3) are not shown and not required to be drawn.
- The spacing bolt (part 8) must be placed through the split piece (part 3) so that point S will be at the indicated position.
- Show THREE faces of the M18 nut.
- NO hidden detail is required.

[98]

PARTS LIST			
PARTS		QUANTITY	MATERIAL
1	VALVE BASE	1	CAST IRON
2	FILLER PIECE	1	CAST IRON
3	SPLIT PIECE	1	CAST IRON
4	HAND WHEEL	1	MILD STEEL
5	VALVE CAPS	2	STAINLESS STEEL
6	SPRING	1	SPRING STEEL
7	CONNECTING ROD	1	STAINLESS STEEL
8	SPACING BOLT	1	TOOL STEEL
9	WASHER	1	MILD STEEL
10	M18 NUT	1	MILD STEEL
11	M8 BOLT	2	MILD STEEL
12	M12 BOLT	4	MILD STEEL

WEST COAST

MANUFACTURING

17 MAIN ROAD  
VELDDRIFT  
7365  
www.wce.co.za

TITLE		STEAM VALVE ASSEMBLY	
ALL DIMENSIONS ARE IN MILLIMETRES.	ALL UNSPECIFIED RADII ARE R3.		5



FOR OFFICIAL USE ONLY		
INCORRECT SCALE		
INCORRECT HATCHING		
PARTS NOT ASSEMBLED		
TOTAL PENALTIES (-)		

ASSESSMENT CRITERIA					
SECTIONAL FRONT VIEW					
		POSSIBLE	OBTAINED	SIGN	MODERATED
1	VALVE BASE	16 $\frac{1}{2}$			
2	VALVE CAPS	8 $\frac{1}{2}$			
3	SPRING	1 $\frac{1}{2}$			
4	CONNECTING ROD	8 $\frac{1}{2}$			
5	FILLER PIECE	15			
6	SPLIT PIECE	11			
7	SPACING BOLT	8			
8	HAND WHEEL	9			
9	WASHER	2			
10	M18 NUT	5			
SUBTOTAL		85			
GENERAL					
1	CENTRE LINES	3			
2	ASSEMBLY	10			
SUBTOTAL		13			
TOTAL		98			
TOTAL PENALTIES(-)					
GRAND TOTAL					
EXAMINATION NUMBER					
EXAMINATION NUMBER					6

