STAPLE

NATIONAL SENIOR CERTIFICATE

GRADE 12

DATE:	MAY/ JUNE 2024
SUBJECT:	ENGINEERING GRAPHICS AND DESIGN
PAPER:	2
MARKS:	100
TIME:	3 Hours
NUMBER OF PAGES:	6

MEMORANDUM

SOUTH AFRICAN COMPREHENSIVE ASSESSMENT INSTITUTE

SUID-AFRIKAANSE KOMPREHENSIEWE ASSESSERINGSINSTITUUT

INSTRUCTIONS AND INFORMATION

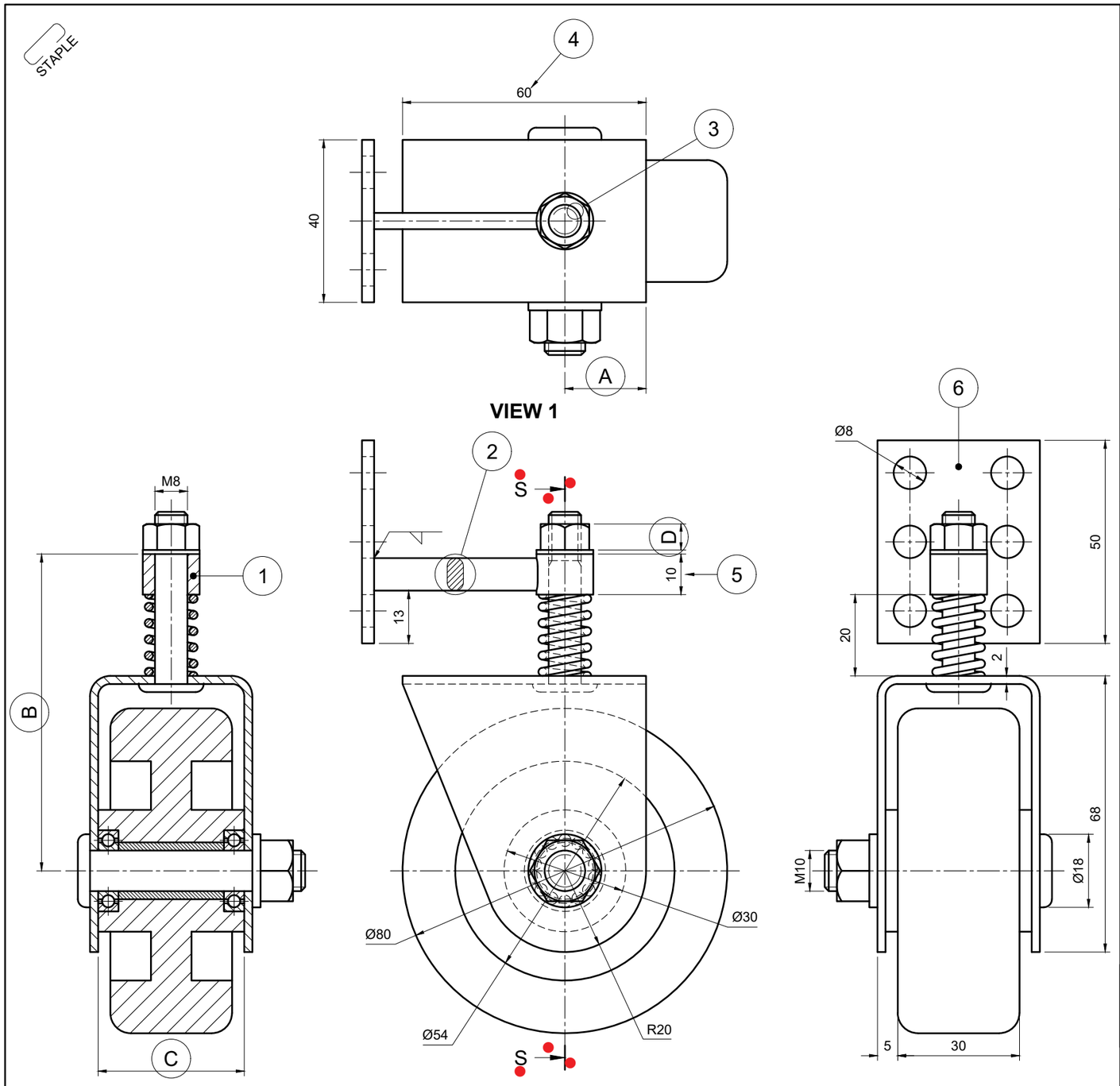
1. This paper consists of FOUR questions.
2. Answer ALL the questions.
3. ALL drawings are in third-angle orthographic projection, unless otherwise stated.
4. ALL drawings must be prepared using pencil and instruments, unless otherwise stated.
5. ALL answers must be drawn accurately and neatly.
6. ALL questions must be answered on the question paper, as instructed.
7. ALL pages must be placed in numerical order and stapled in ONLY the TOP LEFT CORNER, regardless whether the question was answered or not.
8. Time management is essential in order to complete all the questions.
9. Print your examination number in the provided block on each page.
10. Dimensions or detail not indicated must be estimated according to good proportions.

FOR OFFICIAL USE ONLY																
QUESTION	MARK OBTAINED			½	SIGN	MODERATED			½	SIGN	RE-MARKING			½	SIGN
1															
2															
3															
4															
TOTAL															
	2	**0**	**0**			**2**	**0**	**0**			**2**	**0**	**0**		

FINAL CALCULATED MARK	CHECKED
100	

CENTRE NUMBER
CENTRE NUMBER
IDENTIFICATION NUMBER
IDENTIFICATION NUMBER
EXAMINATION NUMBER
EXAMINATION NUMBER

STAPLE



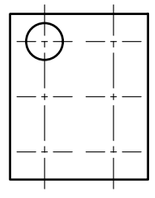
QUESTION 1 MECHANICAL ANALYTICAL

Given:
Four views of a spring loaded castor wheel assembly, a title block and a table of questions. The drawing is not presented to the indicated scale.

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

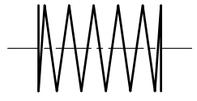
	QUESTIONS	ANSWERS			
1	Which company is responsible for the drawing?	NEW DAWN ENGINEERING✓	1		
2	On what date was the drawing approved?	2023/08/16✓	1		
3	What is the drawing number?	EGD-P2B✓	1		
4	What orthographic projection system has been used?	THIRD ANGLE PROJECTION / TAOP✓	1		
5	If VIEW 1 is the top view, what would VIEW 4 be called?	RIGHT VIEW✓	1		
6	How many different size nuts are used in the assembly?	TWO / 2✓	1		
7	What does the symbol Ø indicate?	DIAMETER✓	1		
8	What does the abbreviation *AF* stand for?	ACROSS FLATS✓	1		
9	Determine the complete dimensions at:	A: 20✓	1		
		B: 78✓	1		
		C: 36✓	1		
10	Name the feature at 1.	HATCHING✓	1		
11	Name the type of section at 2.	REVOLVED✓	1		
12	Name the encircled feature on the shaft at 3.	SCREW THREAD✓	1		
13	If the drawing was drawn to a scale 1 : 5, what would the dimension at 4 read?	60✓	1		
14	If a standard nut is used, determine the height of the M8 nut at D.	8 x 0,8✓ = 6,4✓	2		
15	With reference to the welding symbol on VIEW 2, what type of weld should be used?	FILLET WELD✓	1		
16	With reference to the given tolerance, determine the minimum dimension at 5.	10 - 0,102✓ = 9,898✓	2		
17	Complete the cutting plane on VIEW 2 for VIEW 3, and label it S-S.		3		
18	In the space below (ANSWER 18), and with reference to the MOUNTING PLATE at 6, draw, in neat freehand, the *SANS 10111* conventional representation for the given holes on a LINEAR PITCH.		4		
19	In the space below (ANSWER 19), draw, in neat freehand, the *SANS 10111* conventional representation of a COIL SPRING.		3		
		TOTAL:	**30**		

ANSWER 18: LINEAR PITCH



RECTANGLE	1
HORIZONTAL CLs	1
VERTICAL CLs	1
ONE CIRCLE	½
FREEHAND	½
	4

ANSWER 19: COIL SPRING



CENTRELINE	½
START	½
STOP	½
PROFILE	1
FREEHAND	½
	3

EXAMINATION NUMBER

EXAMINATION NUMBER 2

NEW DAWN ENGINEERING
105 DORP STREET, POTCHEFSTROOM, 1012
086 799 8569
www.ndawnengineering.co.za

TITLE:
SPRING LOADED CASTOR WHEEL ASSEMBLY

DRAWN:	PIETER	DATE:	2023/08/07
CHECKED:	MORNÊ	DATE:	2023/08/11
APPROVED:	TENDAI	DATE:	2023/08/16
UNLESS OTHERWISE SPECIFIED, ALL TOLERANCES ARE ±0,102		ALL DIMENSIONS ARE IN MILLIMETRES	
DRAWING PROGRAM: AUTOCAD 2022		QUANTITY: 150 CASTOR WHEELS	
DRAWING NUMBER: EGD-P2B		SCALE 1 : 2	

Please turn page

STAPLE

QUESTION 2 LOCI (CAM)

Given:

- The camshaft of a cam and the detail of a wedge shape follower at the maximum displacement.
- The position of centre point P on the drawing sheet.

Specifications:

- The minimum distance from the cam profile to the center of the cam shaft = 17 mm
- Rotation = anti-clockwise

Motion:

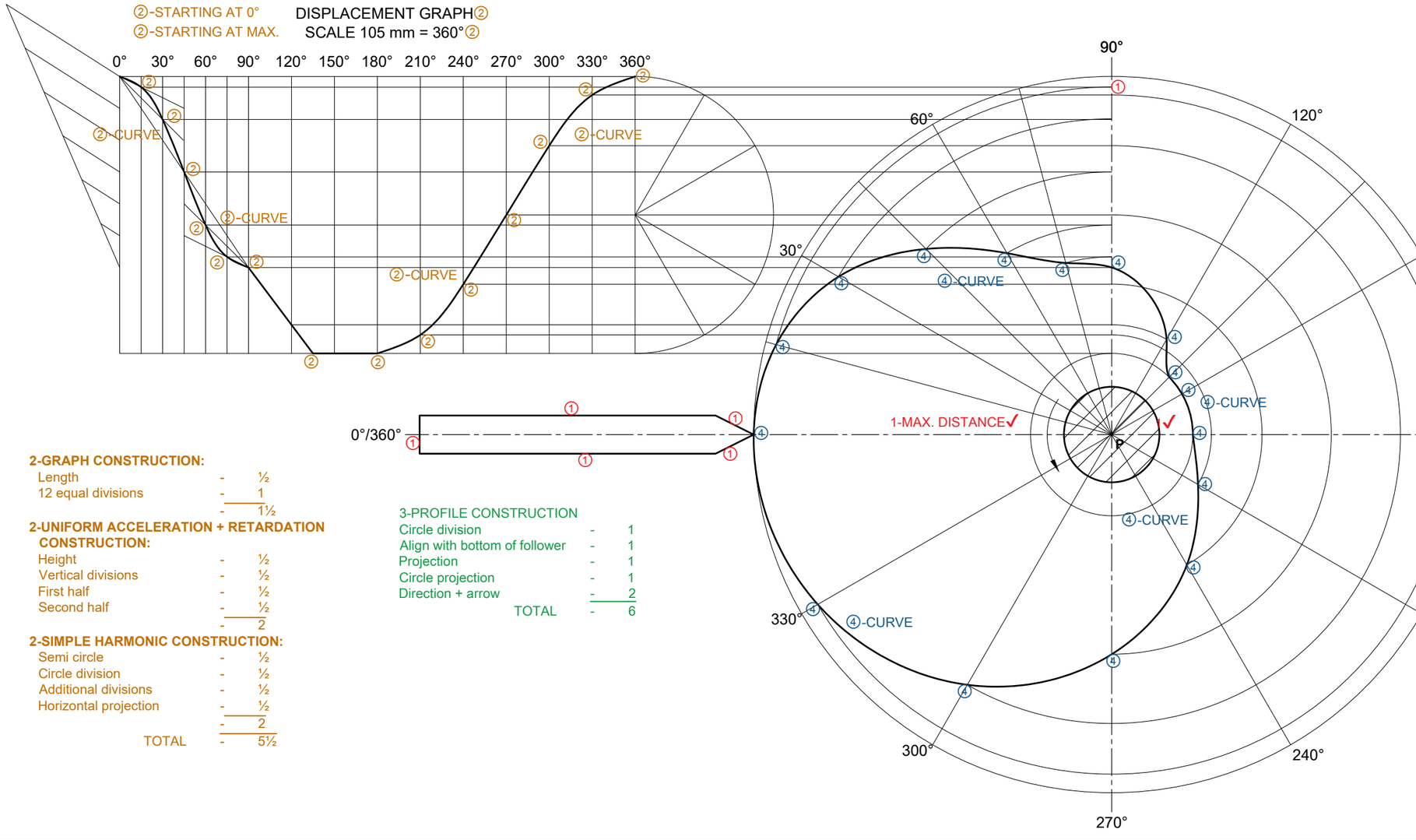
The cam rotates at constant velocity, imparting the following motion to the follower:

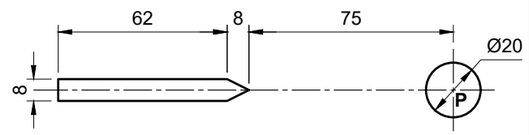
- Over the first 90° the follower moves to the right 40 mm with uniform acceleration and retardation
- It moves a further 18 mm to the right over the next 45° with uniform motion
- Over the next 45° the follower remains in rest
- It returns to the original position with simple harmonic motion over the remainder of the rotation.

Instructions:

- Use centre point P and draw, to a scale of 1 : 1, the given follower and cam shaft at the maximum displacement.
- Draw, to a rotational scale of 108 mm = 360° and a displacement scale of 1 : 1, the complete displacement graph for the given motion.
- Label the displacement graph and include the rotational scale.
- Using the given position of the follower as 0°, project and draw the cam profile from the displacement graph.
- Show the direction of rotation with an arrow on the cam profile.
- Show ALL construction.

[38]





2-GRAPH CONSTRUCTION:

Length	-	½
12 equal divisions	-	1
	-	1½

2-UNIFORM ACCELERATION + RETARDATION CONSTRUCTION:

Height	-	½
Vertical divisions	-	½
First half	-	½
Second half	-	½
	-	2

2-SIMPLE HARMONIC CONSTRUCTION:

Semi circle	-	½
Circle division	-	½
Additional divisions	-	½
Horizontal projection	-	½
	-	2
TOTAL	-	5½

3-PROFILE CONSTRUCTION

Circle division	-	1
Align with bottom of follower	-	1
Projection	-	1
Circle projection	-	1
Direction + arrow	-	2
TOTAL	-	6

ASSESSMENT CRITERIA						
1	FOLLOWER + MAX. DIST. + CAMSHAFT + CENT. LINE	5½				
2	DISPLACEMENT GRAPH + CONSTRUCTION	16½				
3	CONSTR + DIRECTION	6				
4	PLOTTING + CURVES	10				
	PENALTIES(-):					
	TOTAL:	**38**				

EXAMINATION NUMBER	
EXAMINATION NUMBER	3

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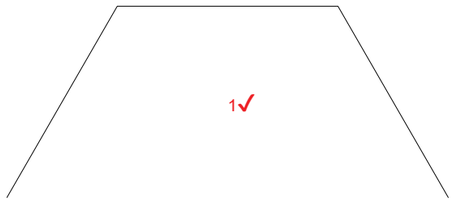


QUESTION 3 ISOMETRIC DRAWING

Given:

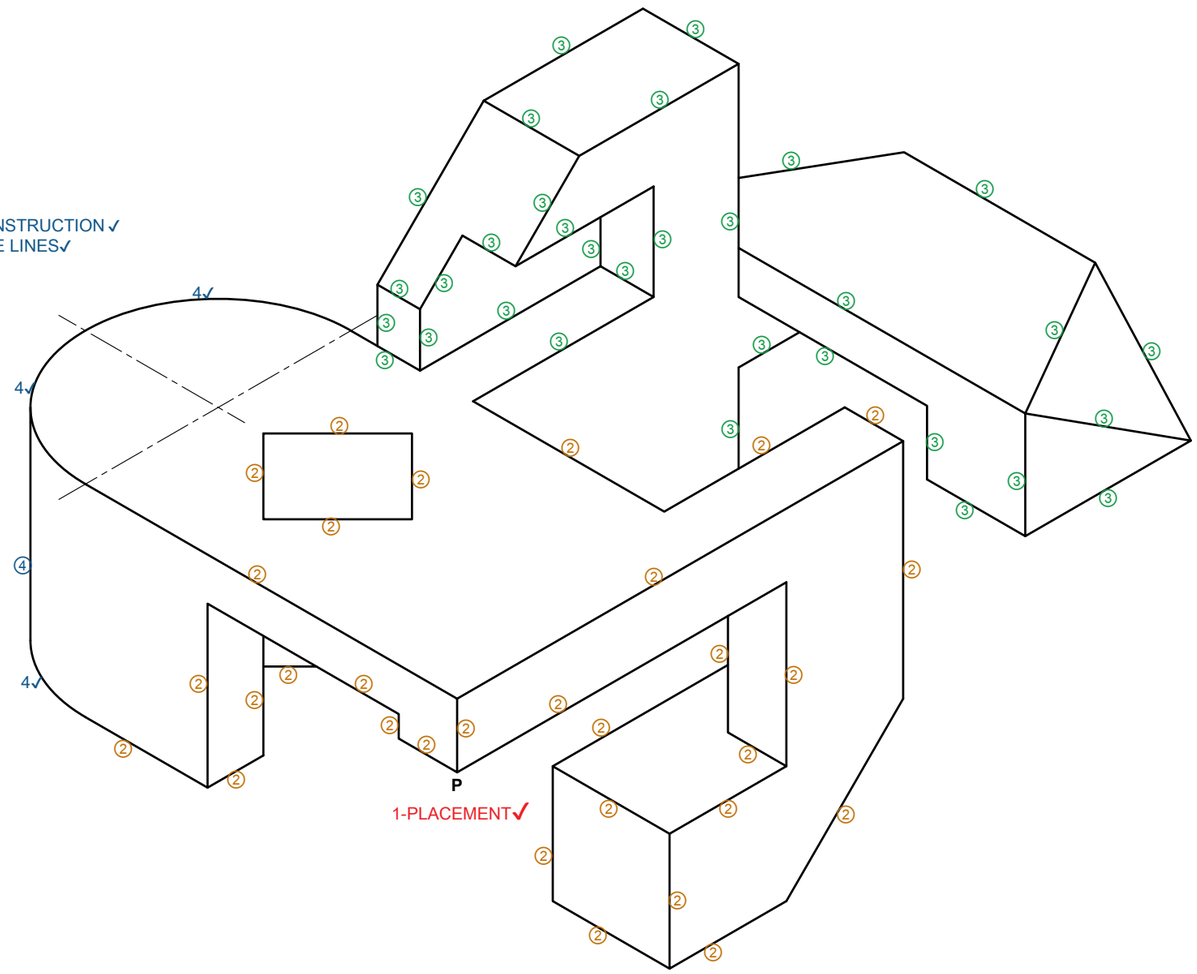
- The front view, top view and left view of a guide
- The position of point P on the drawing sheet

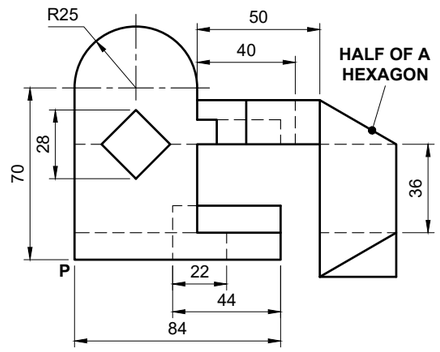
Instructions:

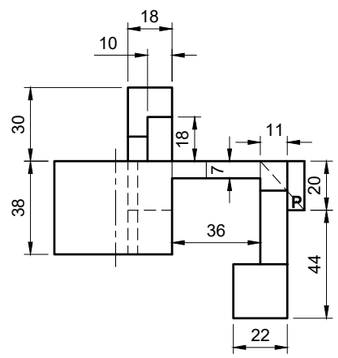
Using scale 1 : 1, convert the orthographic views of the guide into an isometric drawing.

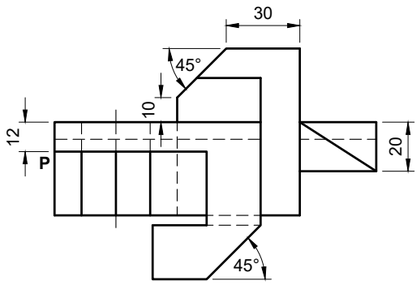
- Use P as the starting point of the drawing.
- Show ALL construction.
- No hidden detail is required.

[39]





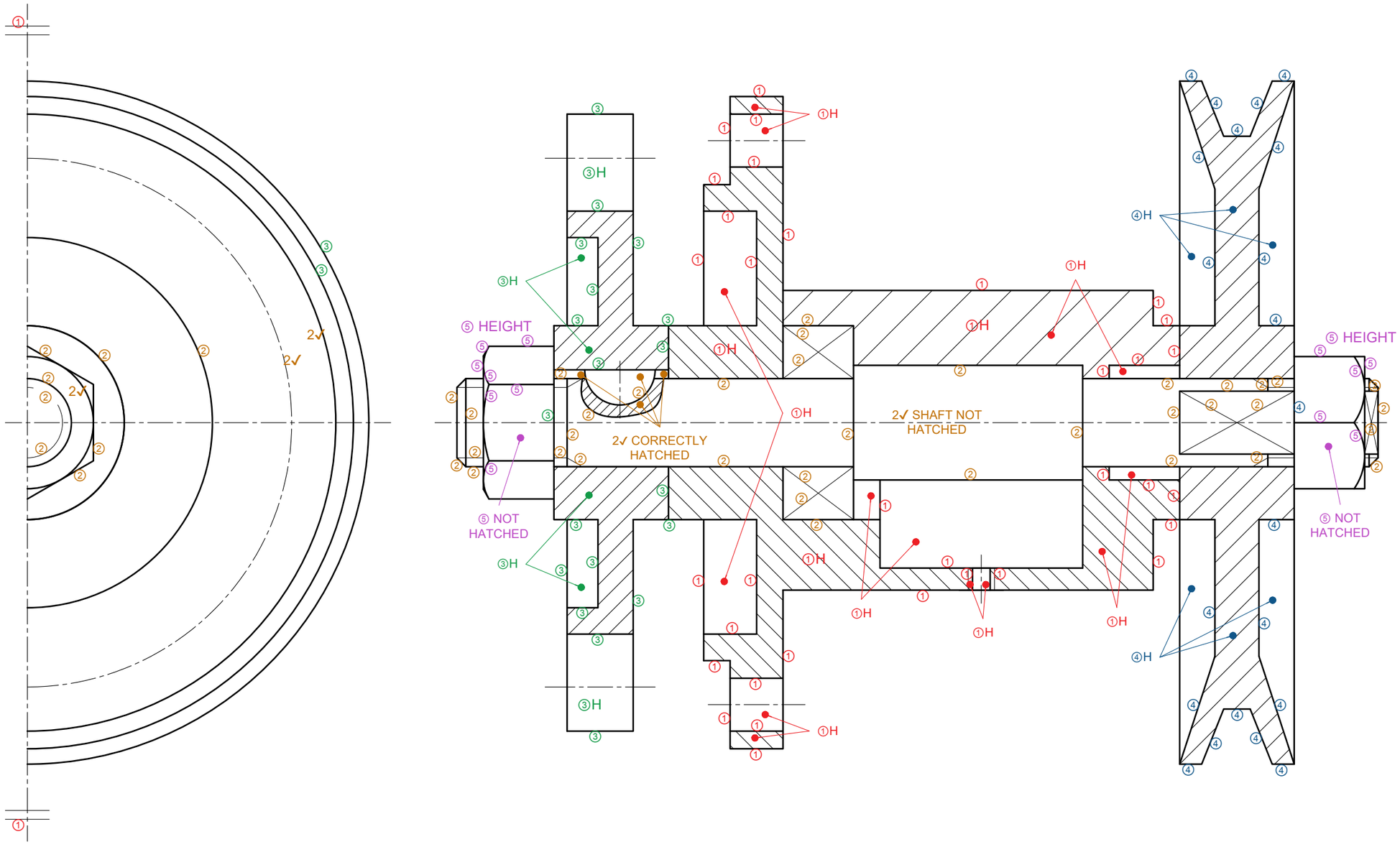




ASSESSMENT CRITERIA						
1	AUXILIARY VIEWS + PLACEMENT	2				
2	FRONT PART	15½				
3	BACK PART	16				
4	CIRCLE+ CENTRE LINES + CONSTRUCTION	5½				
	PENALTIES(-):					
	TOTAL:	**39**				

EXAMINATION NUMBER	
EXAMINATION NUMBER	4

STAPLE



FOR OFFICIAL USE ONLY	
INCORRECT ORTHOGRAPHIC PROJECTION	
INCORRECT OVERALL SCALE	
INCORRECT HATCHING	
PARTS NOT ASSEMBLED	
TOTAL:	

CENTRE LINE MARK ALLOCATION:

- SANS COMPLIANT (LINE TYPE) - 1
- 9 CENTRE LINES - 2

3

1 MARK FOR EVERY COMPONENT CORRECTLY ASSEMBLED
(9 parts - 1) = 8

ASSESSMENT CRITERIA						
LEFT VIEW						
1	SYMMETRY	1				
2	M20 NUT + GEAR	7				
3	BRACKET + PULLEY	1				
	SUBTOTAL:	9				
SECTIONAL FRONT VIEW						
1	BRACKET + COVER PLATE	22				
2	SHAFT + KEY + BEARING	20				
3	GEAR	11½				
4	PULLEY	11½				
5	M20 NUT	8				
	SUBTOTAL:	73				
GENERAL						
1	CENTER LINES	3				
2	ASSEMBLY	8				
	SUBTOTAL:	11				
	TOTAL:	**93**				
	PENALTIES(-):					
	GRAND TOTAL:					

EXAMINATION NUMBER

EXAMINATION NUMBER 5

End