STAPEL

education

Department of Education
FREE STATE PROVINCE

PROVINCIAL PAPER

GRADE 12

ENGINEERING GRAPHICS AND DESIGN P2

SEPTEMBER 2018

MARKS: 100
TIME: 3 HOURS

This 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 questions must be answered on the DIAGRAM SHEETS, as instructed.
6. ALL the pages must be restapled in numerical sequence, irrespective of whether the question was attempted or not.
7. Time management is essential in order to complete all the questions.
8. Print your name and surname as well as the grade in the space provided on each page.
9. ALL answers must be drawn accurately and neatly.
10. ALL necessary construction and projection lines must be shown.
11. Plan each drawing carefully from the given position, which is indicated on the diagram sheets.
12. Any details or dimensions not given must be assumed in good proportion.

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

FINAL CONVERTED MARK	CHECKED BY
$\frac{\quad}{100}$	

NAME & SURNAME	MEMORANDUM	GRADE		1

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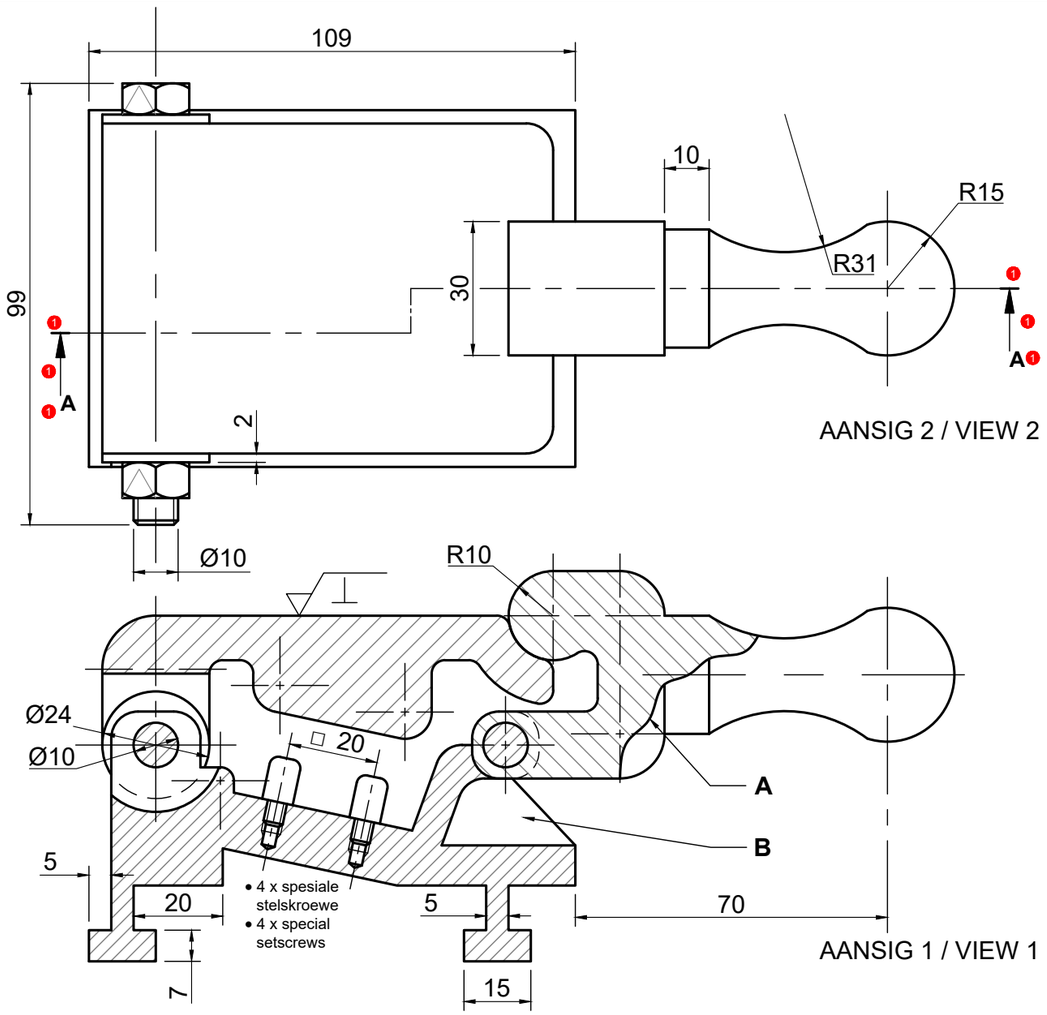


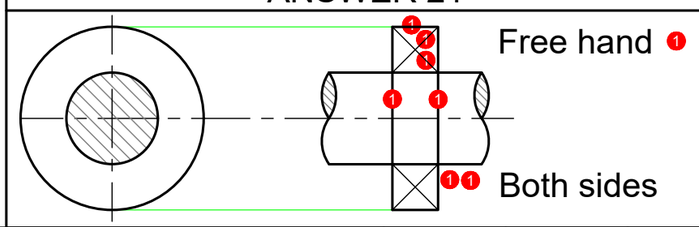
QUESTION 1: ANALYTICAL (MECHANICAL)

Given:
The working drawings of a clamp device in third-angle orthographic projection, a title block and a table of questions.

Instructions:
With a pencil, complete the table by neatly printing the correct answers in the corresponding answer column. All the questions refer to the accompanying drawings and the title block on diagram sheet 1. **[27]**

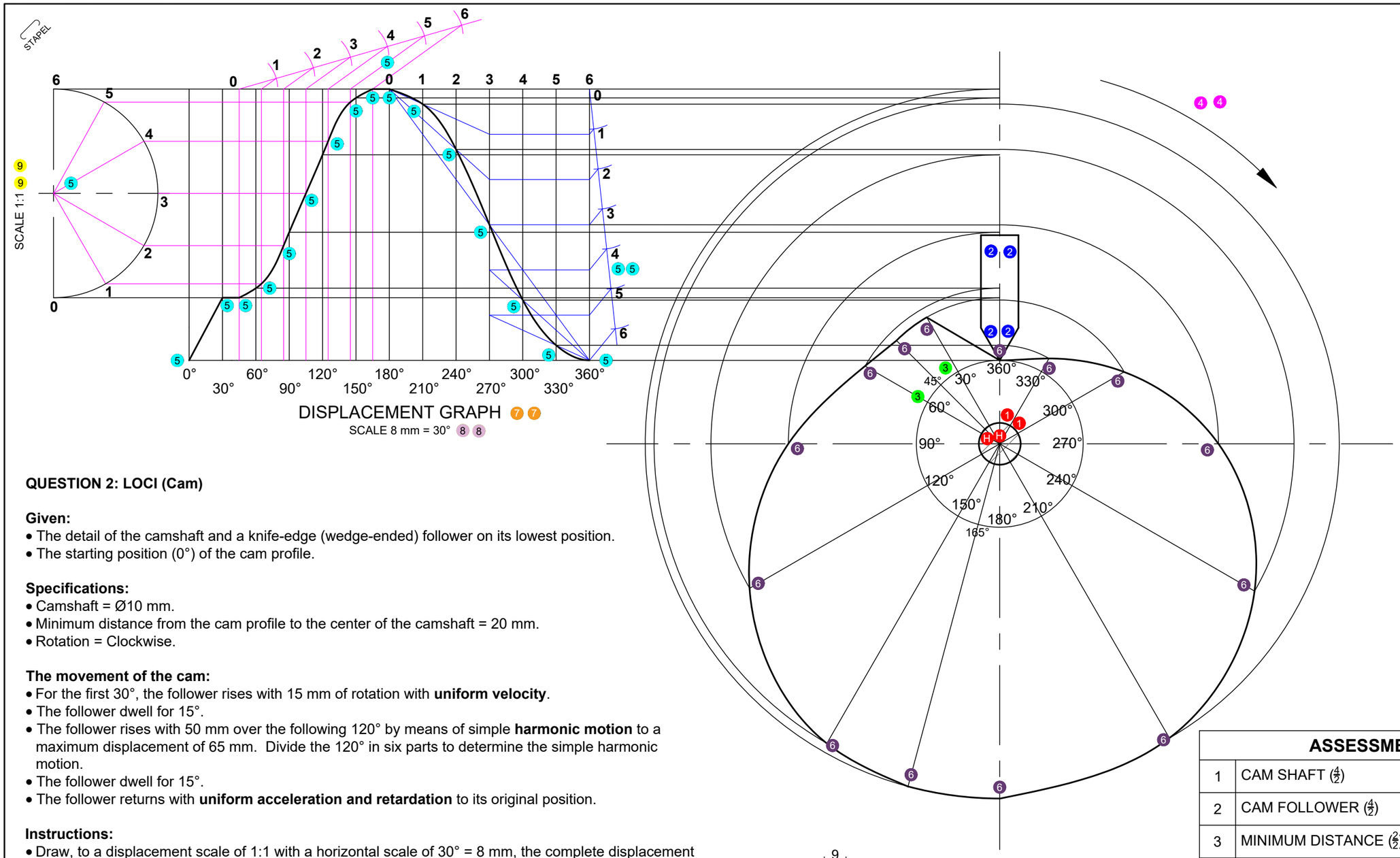
QUESTIONS		ANSWERS			
1	On which date was this drawing approved?	2011/06/01	1	✓1	
2	What is the manufacturing company`s name?	PC Engineering works	1	✓1	
3	What treatment process must be applied on the clamp device?	Perpendicular Lay	1	✓1	
4	What is the name of the drawing file?	AC 12-PQR-350	1	✓1	
5	How many clamp devices should be manufactured?	35	1	✓1	
6	What is VIEW 1 called?	Sectioned front view on AA	1	✓1	
7	What size bolt & nut should be used to bind the upper jaw with the lower jaw of the clamp?	M 10	1	✓1	
8	What is the thickness of the washers that was used?	2 mm	1	✓1	
9	Name the section line marked A.	Part sectioned line	1	✓1	
10	Why is the area at B not hatched?	No hatching on ribs	1	✓1	
11	How many special setscrews must be attached at each part?	4	1	✓1	
12	What distance should the setscrews be apart from each other?	20 mm	1	✓1	
13	What is the total length of the assembled clamp device?	194 mm	2	✓1 ✓1	
14	On what date was the drawing drawn?	2011/02/15	1	✓1	
15	Who checked the drawing?	PC Sams	1	✓1	
16	Indicate the cutting plane at VIEW 2.		3	✓1 ✓1 ✓1	
17	What drawing program was used?	AutoCAD 2018	1	✓1	
18	What is the title of the drawing?	Clamp device	1	✓1	
19	What material is used to manufacture the clamp?	Cast Iron	1	✓1	
20	What is the total length of the hinge bolt?	99 mm	1	✓1	
21	In the space provided (ANSWER 21), draw, in neat free hand, the convensional representation of a bearing.		4		
	TOTAL		27		

ANSWER 21



FILE NAME: AC 12-PQR-350	MATERIAL: CAST IRON		
DRAWING NUMBER: 7 CLAMP DEVICE WG CONTRACTORS 17 WESSEL STREET DURBAN	FINISH: CHROME PLATED DRAWING PROGRAM: AUTOCAD 2018 ALL UNSPECIFIED RADII ARE R3.	ALL DIMENSIONS ARE IN MILLIMETERS	
		DRAWN BY: DAVID MAHLANGA	2011/05/15
		CHECKED: PC SAMS	2011/05/25
		APPROVED BY: ANN NKHOSI	2011/06/01
PC ENGINEERING WORKS		55 Aaron Street Emalahleni 1039 www.ace.co.za. Tel No: 089 000 2598	Manufacture 35 Clamp Devices
TITEL: CLAMP DEVICE			

DIAGRAM SHEET 1 ENGINEERING GRAPHICS AND DESIGN JUNE 2018 - PAPER 2 NAME & SURNAME MEMORANDUM GRADE 2



QUESTION 2: LOCI (Cam)

Given:
- The detail of the camshaft and a knife-edge (wedge-ended) follower on its lowest position.
- The starting position (0°) of the cam profile.

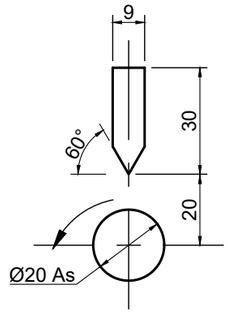
Specifications:
- Camshaft = Ø10 mm.
- Minimum distance from the cam profile to the center of the camshaft = 20 mm.
- Rotation = Clockwise.

The movement of the cam:
- For the first 30°, the follower rises with 15 mm of rotation with **uniform velocity**.
- The follower dwell for 15°.
- The follower rises with 50 mm over the following 120° by means of simple **harmonic motion** to a maximum displacement of 65 mm. Divide the 120° in six parts to determine the simple harmonic motion.
- The follower dwell for 15°.
- The follower returns with **uniform acceleration and retardation** to its original position.

Instructions:
- Draw, to a displacement scale of 1:1 with a horizontal scale of 30° = 8 mm, the complete displacement graph for the required motion.
- Draw the camshaft and follower detail.
- Project and draw the cam profile that would generate the given motion.

Note:
- Label the graph.
- Indicate the horizontal scale.
- Indicate the vertical scale.
- Show the direction of rotation.
- Show all construction lines.

[36]



ASSESSMENT CRITERIA					
1	CAM SHAFT ($\frac{4}{2}$)	1	2		
2	CAM FOLLOWER ($\frac{4}{2}$)	2	2		
3	MINIMUM DISTANCE ($\frac{2}{2}$)	3	1		
4	DIRECTION (Arrow / Degrees) ($\frac{2}{2}$)	4	1		
5	GRAPH (20)	5	20		
6	CAM PROFILE ($\frac{14}{2}$)	6	7		
7	NAMING OF GRAPH ($\frac{2}{2}$)	7	1		
8	SCALE (HORIZONTAL) ($\frac{2}{2}$)	8	1		
9	SCALE (VERTICAL) ($\frac{2}{2}$)	9	1		
TOTAL			36		

DIAGRAM SHEET 2	ENGINEERING GRAPHICS AND DESIGN	JUNE 2018 - PAPER 2	NAME & SURNAME	MEMORANDUM	GRADE		3

Please turn page over

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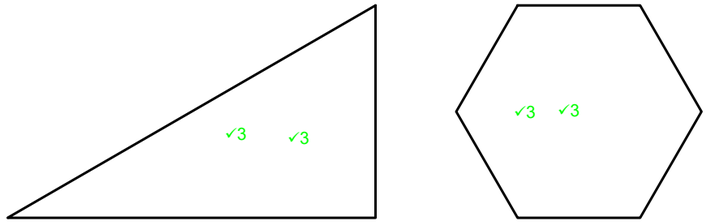
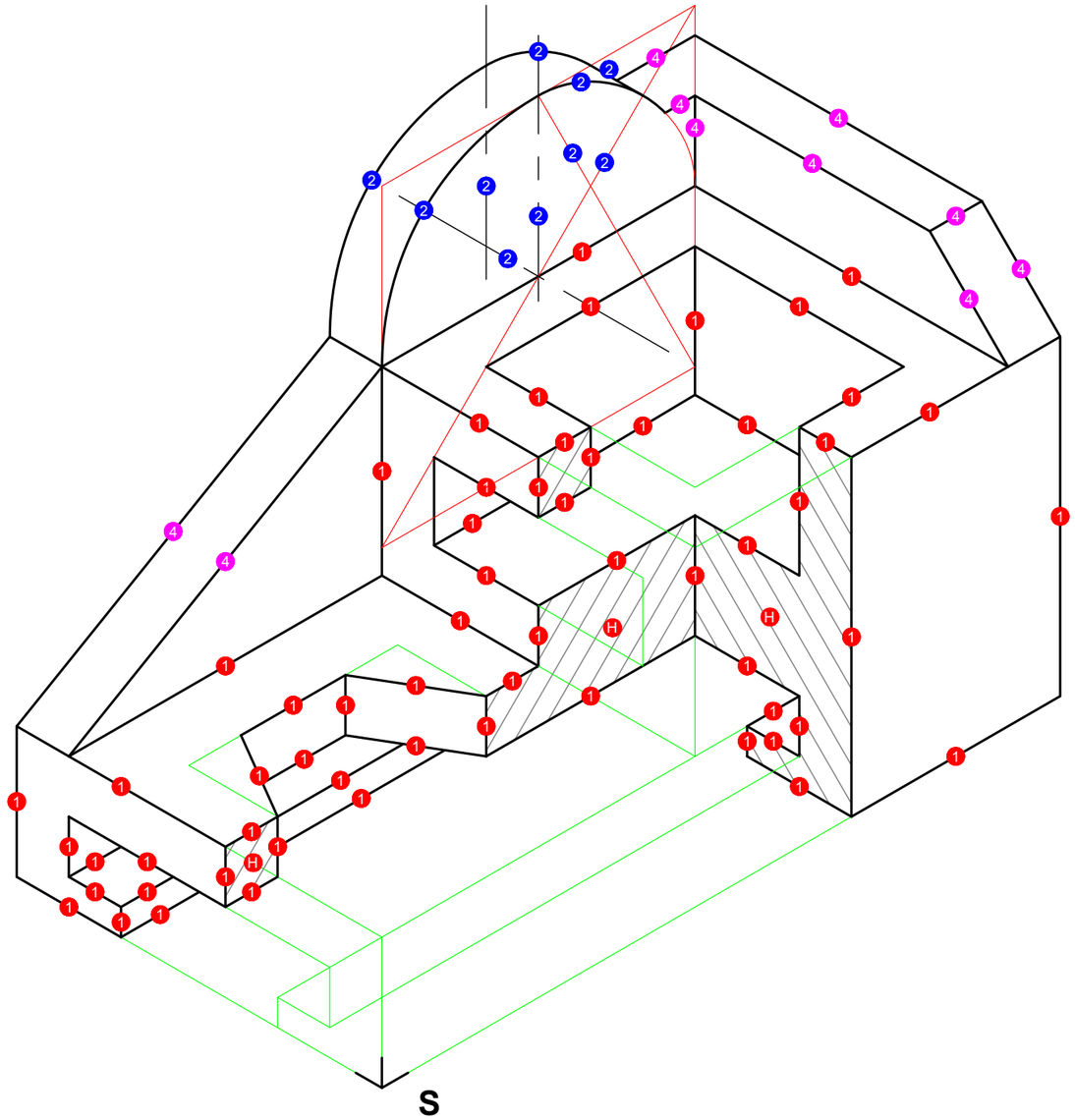




QUESTION 3: ISOMETRIC DRAWING

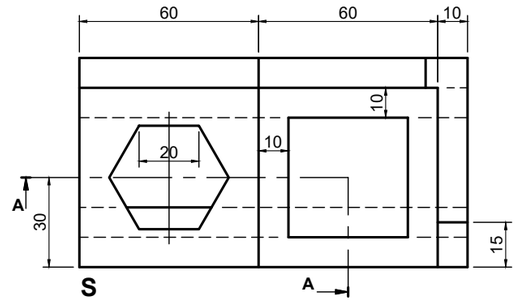
Given:

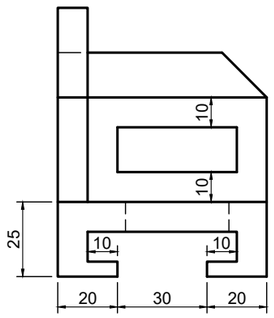
- The front view, top view and left view of a casting.
- The position of point S on the diagram sheet 3 (page 4).

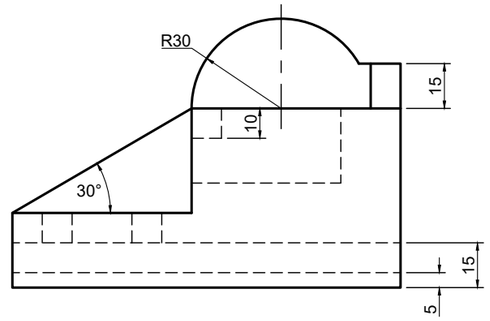
Instructions:

Use a scale of 1:1 to convert the orthographic view of the casting into a sectional isometric drawing on cutting plane A-A.

- Make S the lowest point of the drawing.
- Show ALL necessary constructions.
- NO hidden detail is required. **[39]**







ASSESSMENT CRITERIA				
1	BASE ($\frac{64}{2}$) ❶	32		
2	ISOMETRIC CIRCLE ($\frac{10}{2}$) ❷	5		
3	AUXILIARY VIEW ✓3	4		
4	BACK ($\frac{10}{2}$) ❹	5		
5	PLACEMENT WRONG (MAX -2)			
TOTAL		46		

DIAGRAM SHEET 3	ENGINEERING GRAPHICS AND DESIGN	JUNE 2018 - PAPER 2	NAME & SURNAME	MEMORANDUM	GRADE		4

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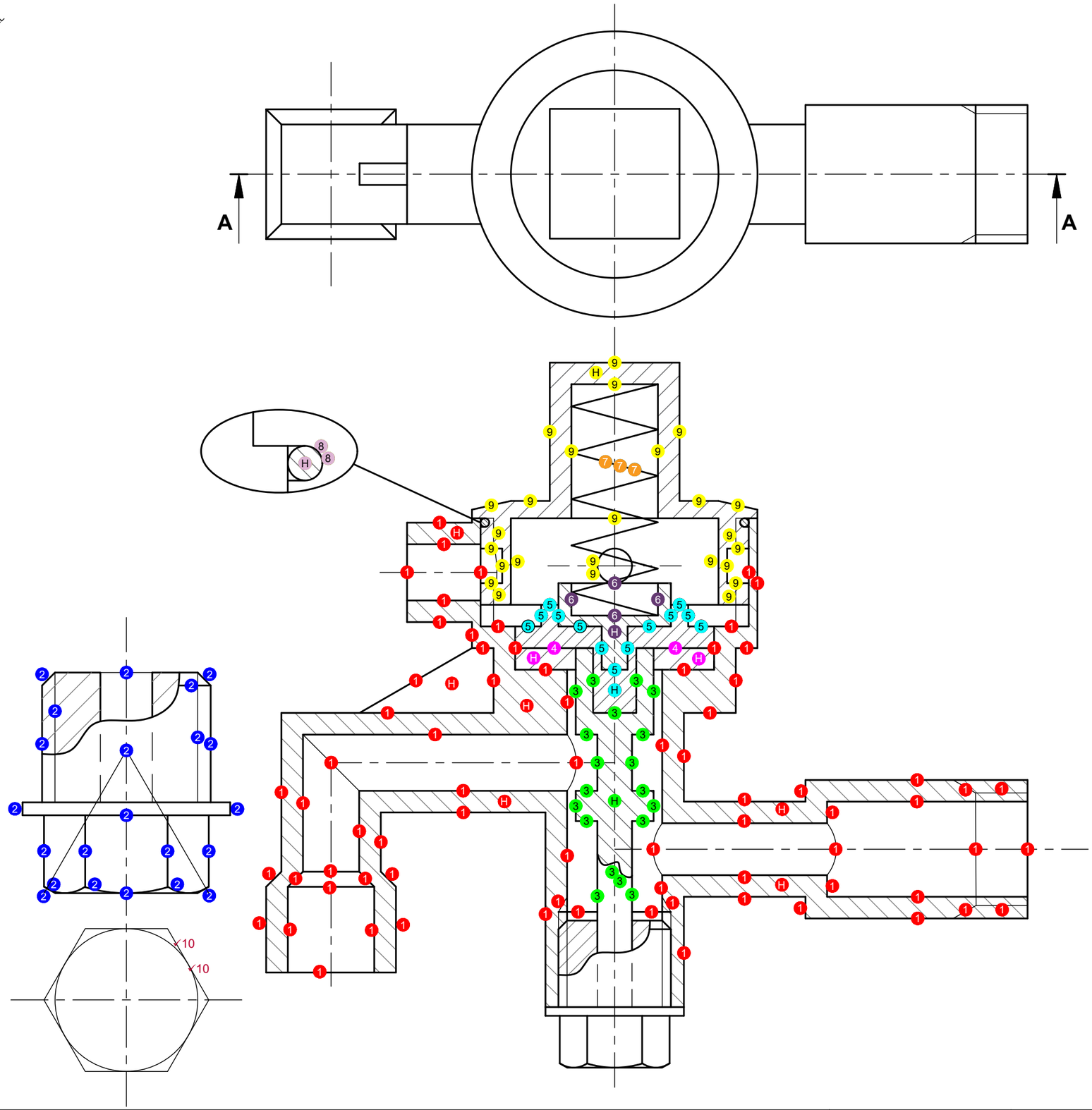
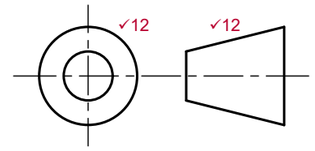


TITLE & SCALE
PRESSURE CONTROL VALVE ✓11
SCALE 1:1 ✓11

PROJECTION SYMBOL


ASSESSMENT CRITERIA					
SECTIONED FRONT VIEW					
1	REGULATOR UNIT ($\frac{70}{2}$)	1 H	35		
2	M15 SPECIAL NUT ($\frac{22}{2}$)	2	11		
3	REGULATOR ROD ($\frac{20}{2}$)	3	10		
4	DIAPHRAGM ($\frac{4}{2}$)	4 H	2		
5	PRESSURE PLATE ($\frac{14}{2}$)	5 H	7		
6	BALANCING PLATE ($\frac{6}{2}$)	6 H	2.5		
7	CYLINDRICAL SPRING ($\frac{3}{2}$)	7	1.5		
8	O-RING ($\frac{6}{2}$)	8 H	3		
9	THREADED CAP ($\frac{26}{2}$)	9 H	13		
	SUBTOTAL 1		85		
TECHNICAL CARE					
1	AUXILIARY VIEW (2)	✓10	2		
2	TITLE & SCALE (2)	✓11	2		
3	PROJECTION SYMBOL (2)	✓12	2		
4	DEDUCTIONS SPECIAL CASES				
	SUBTOTAL 2		6		
	TOTAL		91		

DIAGRAM SHEET 5	ENGINEERING GRAPHICS AND DESIGN	JUNE 2018 - PAPER 2	NAME & SURNAME	MEMORANDUM	GRADE		6