basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

ENGINEERING GRAPHICS AND DESIGN P2

FEBRUARY/MARCH 2013

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.

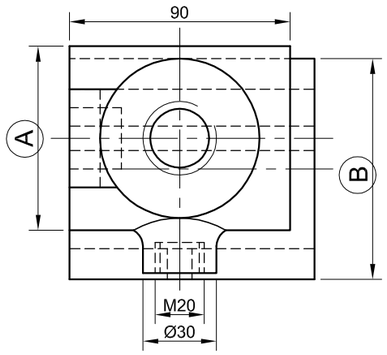
FOR OFFICIAL USE ONLY

QUESTION	MARKS OBTAINED	½	SIGN	MODERATED	½	SIGN	
1							
2							
3							
4							
TOTAL							
	2 0 0			2 0 0			

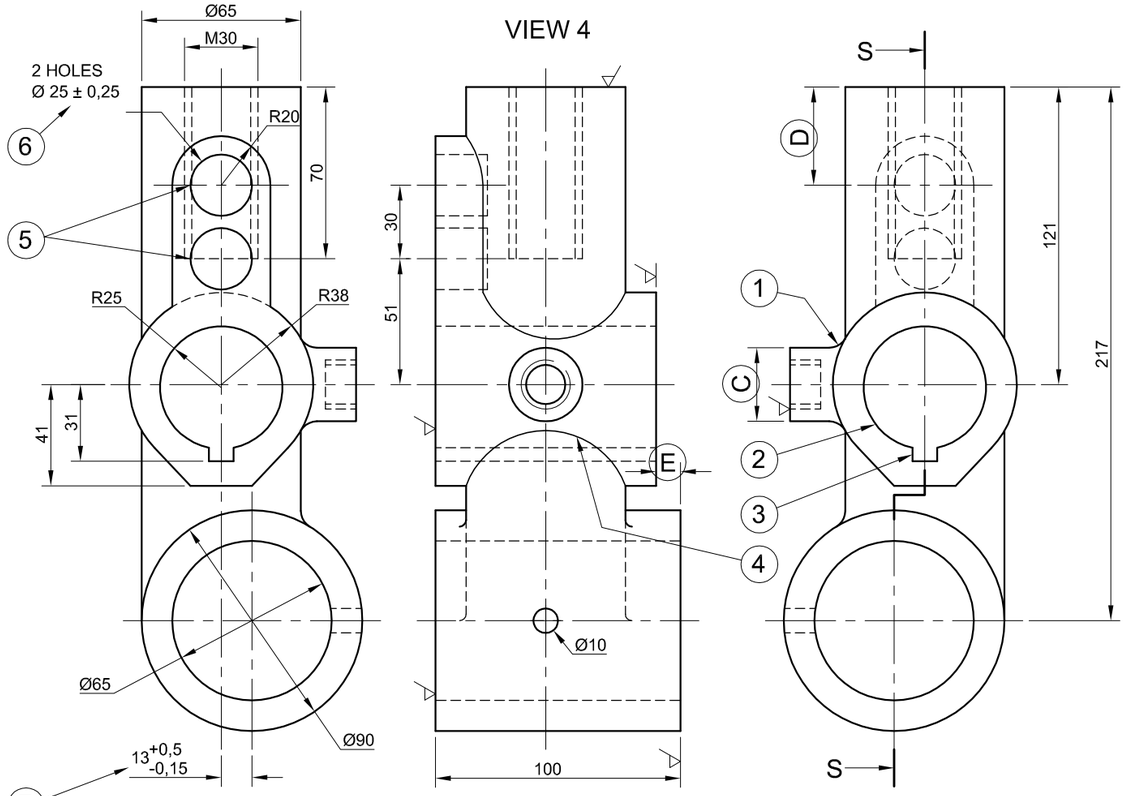
FINAL CONVERTED MARK	CHECKED BY
____ 100	

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

STAPLE



VIEW 4



VIEW 1 VIEW 2 VIEW 3

QUESTION 1: ANALYTICAL (MECHANICAL)

Given:
A detailed drawing showing FOUR views of a connector, 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 detailed drawing and the title block. **[30]**

	QUESTIONS	ANSWERS		
1	On what date was the drawing approved?		½	
2	What is the file name of the drawing?		½	
3	What was the nature of the first revision?		½	
4	What material is the connector made of?		½	
5	What is the radius of the unspecified curves?		½	
6	How many surfaces require machining?		½	
7	What method must be used to produce the machined surfaces?		1	
8	What does N4 on the machining symbol represent?		1	
9	Name the curve at 1.		1	
10	What is the diameter of the circle at 2?		1	
11	Name the slot at 3.		1	
12	Name the curve at 4.		1	
13	What is the tolerance on the unspecified dimensions?		1	
14	What is the distance between the centres of the two holes at 5?		1	
15	How many threaded holes are there on the connector?		1	
16	What is the total height of the connector?		1	
17	What would VIEW 4 be called?		1	
18	What type of sectional view would result from cutting plane SS?		1	
19	Determine the complete dimensions: A B C D E		5	
20	What is the upper tolerance of the dimension at 6?		2	
21	What is the upper and lower tolerance of the dimension at 7?		4	
22	In the box below (ANSWER 22), draw, in neat freehand, the symbol for the projection system used.		4	
	TOTAL		**30**	

DATE	REVISED BY	REVISION DESCRIPTION	№
2012-08-06	MARYNA	ADD MACHINING SYMBOLS	2
2012-08-04	MARYNA	INCREASE TOLERANCE	1

ALL DIMENSIONS ARE IN MILLIMETRES.
ALL UNSPECIFIED RADII ARE 2,5 mm.

UNLESS OTHERWISE SPECIFIED, TOLERANCES ON DIMENSIONS ARE ± 0,3.

N4 MILLING =

QUANTITY: 76

DRAWN BY: NOLWAZI DATE: 2012-07-15

CHECKED BY: AKHEEL DATE: 2012-07-18

APPROVED BY: DANIEL DATE: 2012-07-19

MATERIAL: CAST IRON FILE NAME: UFF 335.dwg

HEAT TREATMENT: NONE DRAWING No. 12-0967-msc

SCALE: 1 : 2

PRECISION
ENGINEERING WORKS
15 DYER STREET
EAST LONDON
www.precision.co.za
☏ 043 645 7820

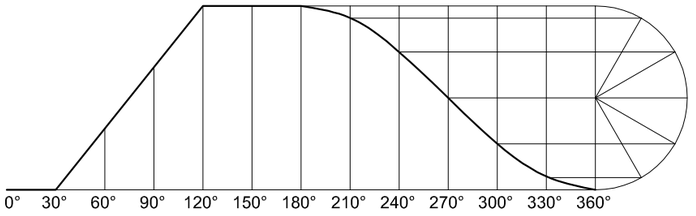
TITLE
CONNECTOR

ANSWER 22

EXAMINATION NUMBER

EXAMINATION NUMBER 2

STAPLE



DISPLACEMENT GRAPH
SCALE 8 mm = 30°

QUESTION 2: LOCI

NOTE: Answer QUESTIONS 2.1 AND 2.2.

2.1 CAM

Given:

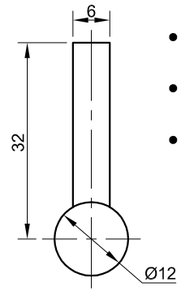
- The displacement graph showing uniform motion and simple harmonic motion
- The detail of a roller-ended follower

Specifications:

- The minimum distance from the cam profile to the centre of the camshaft = 19 mm
- Camshaft = Ø16 mm
- Rotation = clockwise

Instructions:

- Draw, to scale 1 : 1 and in the correct position, the given follower so that it will reciprocate along the vertical centre line of the camshaft.
- Project and draw the cam profile from the given displacement graph.
- Show the centre lines and the direction of rotation on the cam profile.
- Show ALL necessary construction. **[19]**



FOLLOWER DETAIL

ASSESSMENT CRITERIA					
1	FOLLOWER + MIN. DIST' C'LINES + CAMSHAFT	5			
2	CONSTRUCTION	3			
3	PLOTTING + DIRECTION	7			
4	CURVE	4			
	SUBTOTAL	**19**			

2.2 HELICAL SQUARE SPRING

Given:

- The right view of a left-hand square spring, showing the starting position
- The position of centre point O on the answer sheet

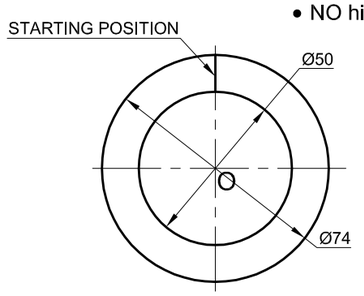
Specifications:

- Pitch = 48 mm
- Spring profile = 12 x 12 mm

Instructions:

- Draw, to scale 1 : 1, the front view and right view of the left-hand square spring.
- Show ONE AND A HALF turns ONLY.
- Show ALL necessary construction.
- NO hidden detail is required. **[21]**

O



ASSESSMENT CRITERIA					
1	CONSTRUCTION	5			
2	POINTS + CURVE	16			
	SUBTOTAL	**21**			
	TOTAL	**40**			

EXAMINATION NUMBER

EXAMINATION NUMBER 3

STAPLE

QUESTION 3: ISOMETRIC DRAWING

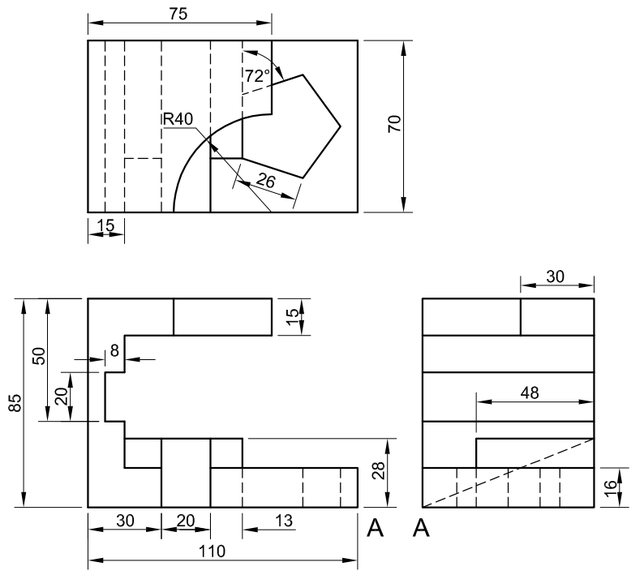
Given:

- The front view, top view and right view of a bracket with a regular pentagonal hole
- The position of point A on the drawing sheet

Instructions:

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

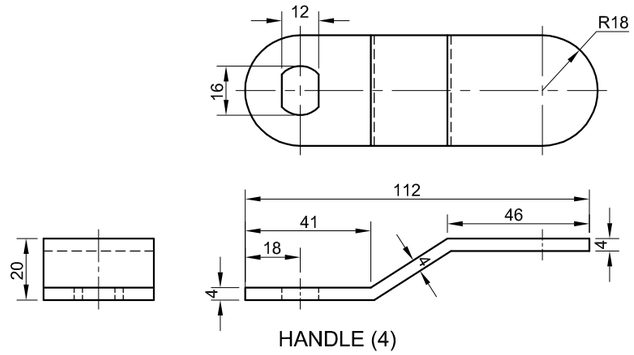
- Make A the lowest point of the drawing.
- Show ALL necessary construction.
- NO stencils may be used.
- NO hidden detail is required. **[37]**



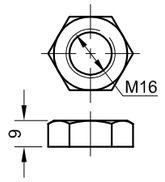
A

ASSESSMENT CRITERIA						
1	AUX' VIEW + CIRCLE PENTAGON + PLACING	12				
2	LOWER PORTION	15½				
3	UPPER PORTION	9½				
TOTAL		**37**				

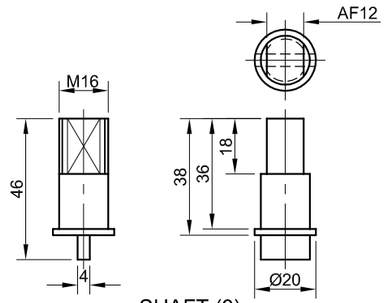
EXAMINATION NUMBER	
EXAMINATION NUMBER	4



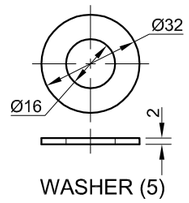
HANDLE (4)



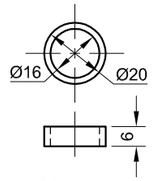
M16 NUT (6)



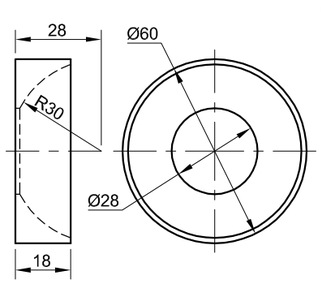
SHAFT (3)



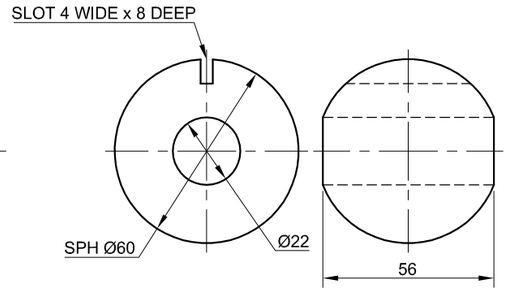
WASHER (5)



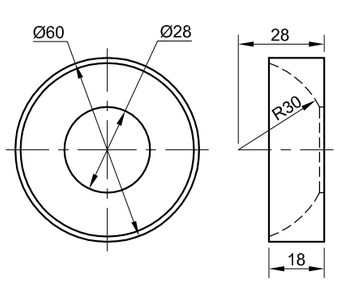
SEAL (2)



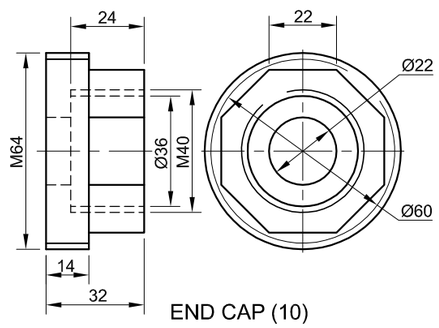
LEFT CUP SEAL (7)



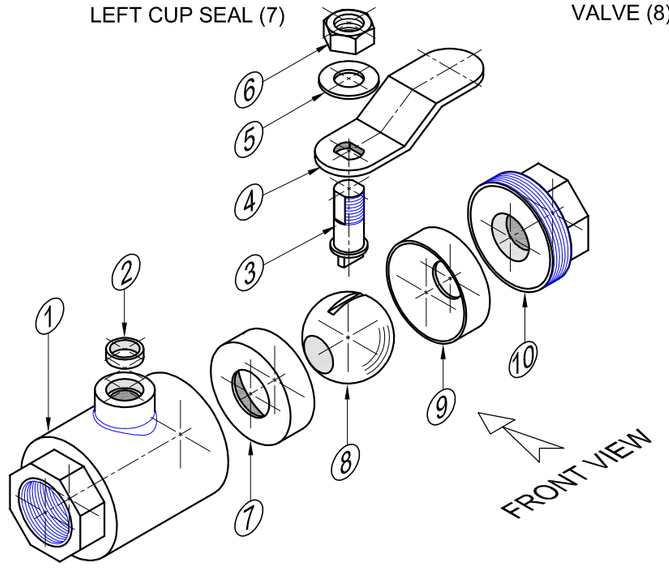
VALVE (8)



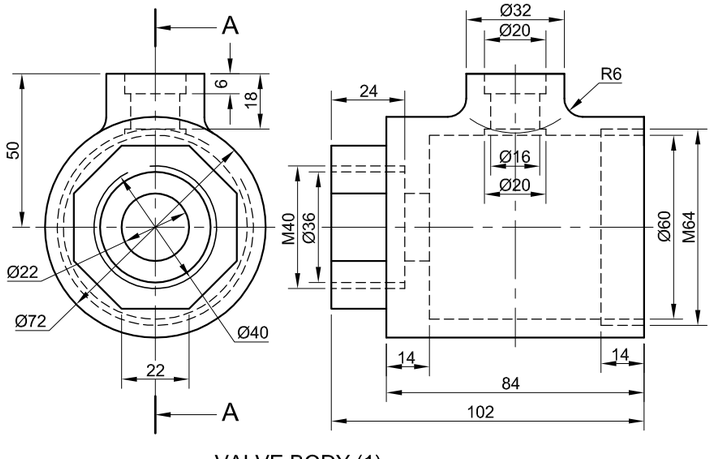
RIGHT CUP SEAL (9)



END CAP (10)



EXPLODED ISOMETRIC DRAWING



VALVE BODY (1)

QUESTION 4: MECHANICAL ASSEMBLY

Given:

- The exploded isometric drawing of the parts of a stop valve assembly, showing the position of each part relative to all the others
- Orthographic views of each of the parts of the stop 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 stop 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 left view of the valve body (part 1).
  - **4.2 The left view**
- ALL drawing must comply with the guidelines contained in the *SABS 0111.*

NOTE:

- Show THREE faces of the nut in the front view and ALL necessary construction.
- NO hidden detail is required. **[93]**

PARTS LIST

PART	QUANTITY	MATERIAL
1. VALVE BODY	1	CAST IRON
2. SEAL	1	FIBRE
3. SHAFT	1	MILD STEEL
4. HANDLE	1	STEEL
5. WASHER	1	MILD STEEL
6. M16 NUT	1	MILD STEEL
7. LEFT CUP SEAL	1	TEFLON
8. VALVE	1	STEEL
9. RIGHT CUP SEAL	1	TEFLON
10. END CAP	1	MILD STEEL

PRECISION
ENGINEERING WORKS

15 DYER STREET
EAST LONDON
www.precision.co.za
☏ 043 645 7820

STOP VALVE

ALL DIMENSIONS ARE IN MILLIMETRES.

ALL UNSPECIFIED RADII ARE R2.

Please turn over

STAPLE

ASSESSMENT CRITERIA					
SECTIONAL FRONT VIEW					
1	VALVE BODY	10			
2	SEAL	2			
3	SHAFT	6			
4	HANDLE	5			
5	WASHER	2			
6	M16 NUT	5			
7	LEFT CUP SEAL	5			
8	VALVE	3			
9	RIGHT CUP SEAL	4			
10	END CAP	7			
H	HATCHING	13			
SUBTOTAL		**62**			
LEFT VIEW					
1	HANDLE	2½			
2	M16 NUT	4			
3	SHAFT	3			
4	WASHER	1½			
5	VALVE BODY	9			
SUBTOTAL		**20**			
GENERAL					
1	CENTRE LINES	2			
2	ASSEMBLY	9			
SUBTOTAL		**11**			
TOTAL		**93**			

EXAMINATION NUMBER

EXAMINATION NUMBER 6