basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

ENGINEERING GRAPHICS AND DESIGN P2

FEBRUARY/MARCH 2014

MARKS: 100

TIME: 3 hours

This question paper consists of 6 pages.

GRDDM2

INSTRUCTIONS AND INFORMATION

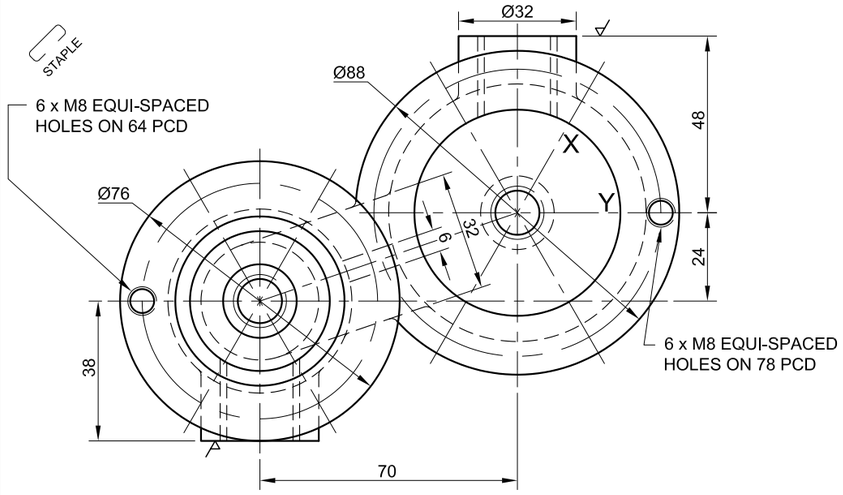
1. This question paper consists of FOUR questions.
2. Answer ALL the questions.
3. ALL drawings are in third-angle orthographic projection, unless otherwise stated.
4. ALL drawings must be completed using instruments, unless otherwise stated.
5. ALL answers must be drawn accurately and neatly.
6. ALL 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			

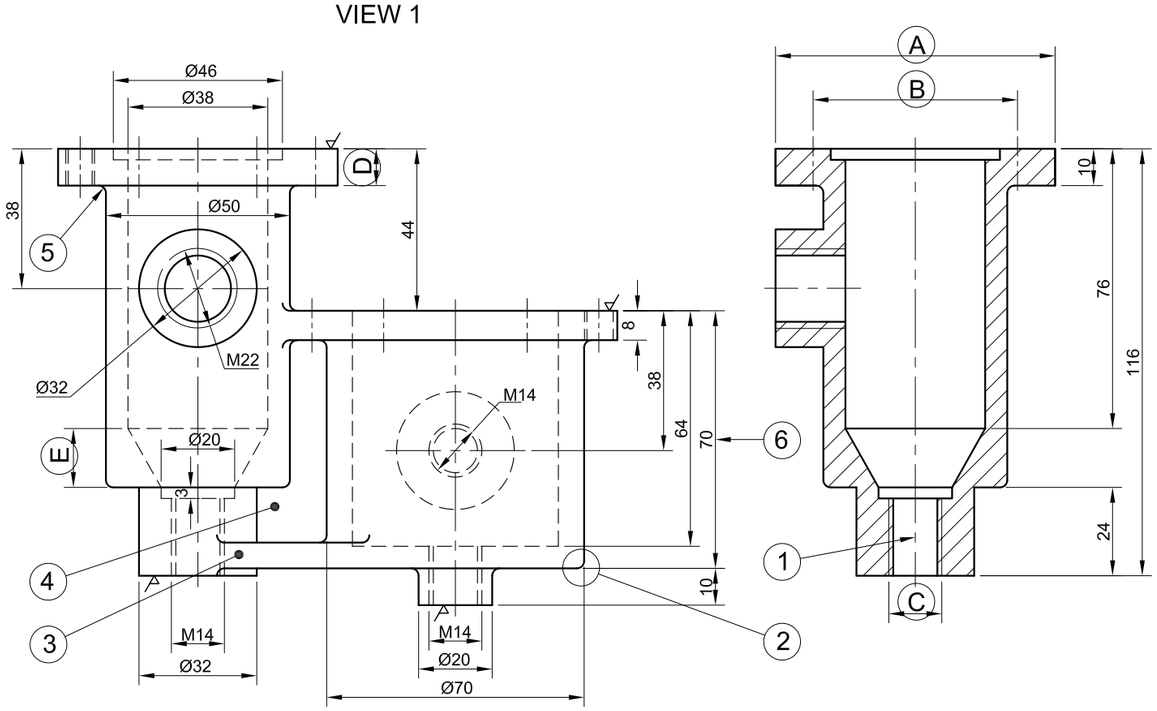
FINAL CONVERTED MARK	CHECKED BY
100	

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

EASTERN-CAPE



VIEW 1



VIEW 2

VIEW 3

QUESTION 1: ANALYTICAL (MECHANICAL)

Given:
A detailed drawing showing THREE views of a carburettor body, a title block and a table of questions. The drawing has not been prepared to the indicated scale.

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

QUESTIONS		ANSWERS		
1	How many carburettor bodies must be produced?		1	
2	From what material is the carburettor body manufactured?		1	
3	What is the file name of the drawing?		1	
4	On what date was the drawing checked?		1	
5	In which province is the engineering company situated?		1	
6	Name the line at 1.		1	
7	Name the encircled feature at 2.		1	
8	What is the width of the feature at 3?		1	
9	Name the feature at 4.		1	
10	What is the radius of the feature at 5?		1	
11	What would the dimension at 6 be if a drawing scale of 1 : 1 was used?		1	
12	What is the angle between the centre lines marked X and Y in VIEW 1?		1	
13	What type of section is shown in VIEW 3?		1	
14	How many threaded holes are there on the carburettor body?		1	
15	What does the abbreviation PCD stand for?		1	
16	How many surfaces need to be machined?		1	
17	What direction of lay is indicated by the machining symbol?		2	
18	Insert the cutting plane for VIEW 3. Label the cutting plane A-A.		3	
19	Determine the complete dimensions at: A B C D E		5	
20	In the space provided in the title block (ANSWER 20), draw, in neat freehand, the symbol for the projection system used.		4	
		TOTAL	**30**	

PROGRAMME: AUTOCAD	MATERIAL: ALUMINIUM	SCALE: 1 : 5
FILE NAME: 562 CB - SS.dwg	QUANTITY: 18000 UNITS	ALL UNSPECIFIED RADII ARE 2,5 mm.
DRAWING No. YAP 356	TREATMENT: NORMALISE	ALL DIMENSIONS ARE IN MILLIMETRES.
REMOVE ALL BURRS AND SHARP EDGES.	MACHINED 0,05 C	ANSWER 20
DYNAMIC ENGINEERING 1051 BRAKEN ROAD LITTLE FALLS GAUTENG 1735 ☎ 011 355 1550		
TITLE CARBURETTOR BODY		SYMBOL

REVISIONS	DATE
DRAWN: MARYNA	2013/09/10
CHECKED: ANDY	2013/10/12
APPROVED: MVE	2013/10/22

EASTERN - CAPE

EXAMINATION NUMBER	
EXAMINATION NUMBER	2

STAPLE

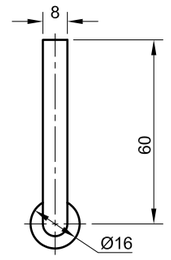
QUESTION 2: LOCI

Given:
The detail of the roller-ended follower for a disc cam.

Specifications:
- The minimum distance from the centre of the cam shaft to the cam profile = 20 mm
- Camshaft = Ø 20 mm
- Rotation = clockwise

Motion:
The disc cam rotates at constant velocity imparting the following uniform motion to the roller-ended follower:
- Over the first 60° the follower is at rest.
- Over the next 60° the follower rises to a height of 57 mm.
- There is a dwell period for the next 45°.
- Over the next 45° the follower falls 20 mm.
- There is a dwell period for the next 60°.
- Over the final 90° the follower returns to its original position.

Instructions:
- Using a horizontal scale of 30° equal to 8 mm and a displacement scale of 1 : 1, draw the displacement graph for the given motion.
- Label the displacement graph and include the scale.
- Draw, to scale 1 : 1, the given roller-ended follower in the correct position.
- Project and draw the cam profile from the displacement graph.
- Show the direction of rotation on the cam profile.
- Show ALL necessary construction. **[36]**



ASSESSMENT CRITERIA					
1	DISPLACEMENT GRAPH	10			
2	FOLLOWER, ARROW, SHAFT + CENTRE LINES + MIN DIST. + ROTATION	9			
3	CONSTRUCTION	4			
4	ROLLER + PROFILE	13			
	TOTAL	**36**			

EXAMINATION NUMBER

EXAMINATION NUMBER 3

EASTERN-CAPE

STAPLE

QUESTION 3: ISOMETRIC DRAWING

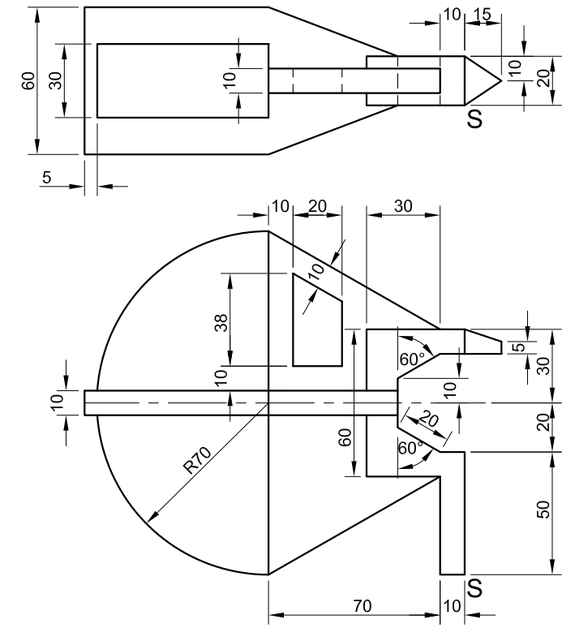
Given:

- The front view and top view of a jig
- The position of point S on the drawing sheet

Instructions:

Using scale 1 : 1, convert the orthographic views of the jig to an isometric drawing.

- Make S the lowest point of the drawing.
- Show ALL necessary construction.
- NO stencils may be used.
- NO hidden detail is required. **[41]**



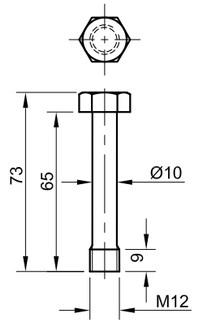
S

ASSESSMENT CRITERIA						
1	AUX. + PLACEMENT	2				
2	FRONT	19				
3	MIDDLE	14				
4	CONSTR. + CIRCLE	6				
TOTAL		**41**				

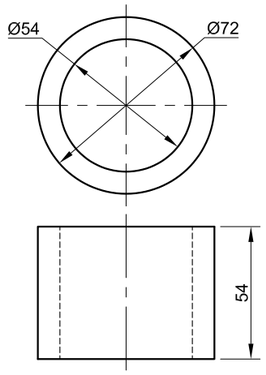
EXAMINATION NUMBER

EXAMINATION NUMBER 4

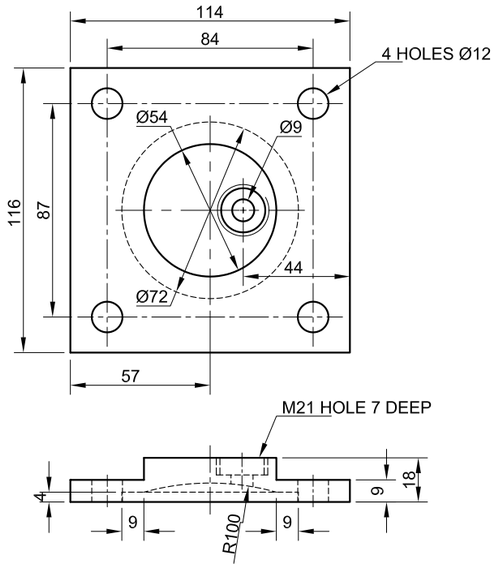
EASTERN-CAPE



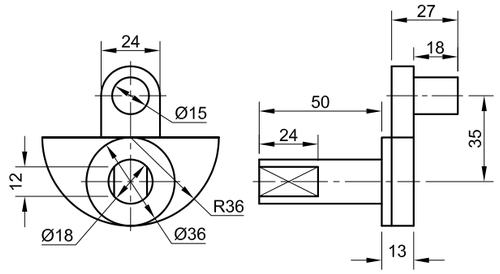
M12 BOLT [1]



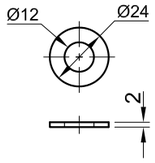
CYLINDER [4]



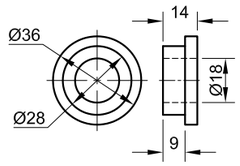
CYLINDER HEAD [3]



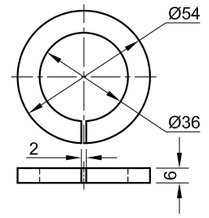
CRANK SHAFT [7]



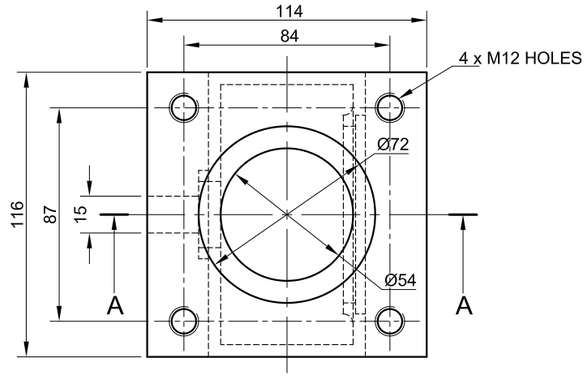
WASHER [2]

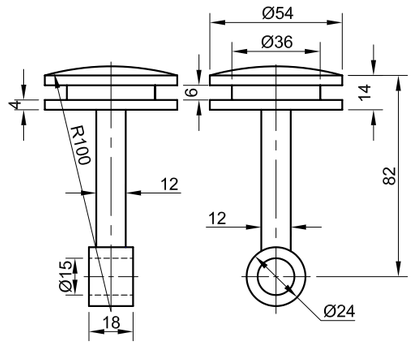


BUSH [6]

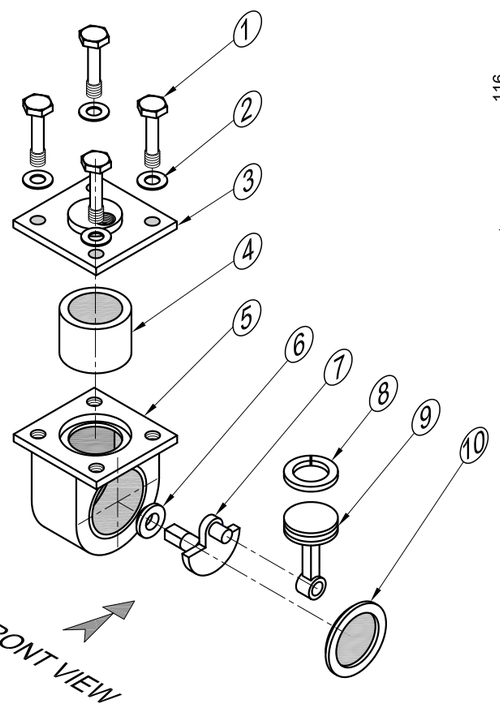


PISTON RING [8]

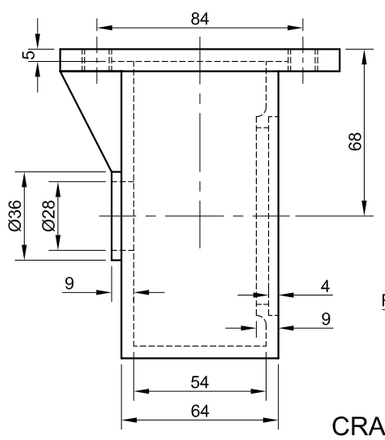




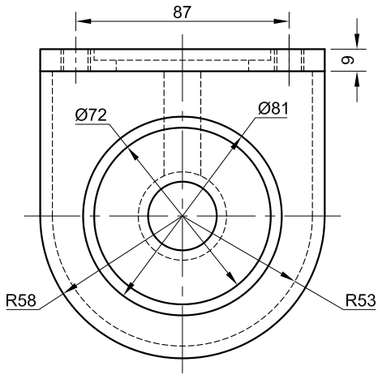
PISTON [9]

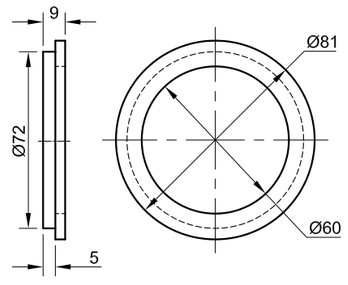


EXPLODED ISOMETRIC DRAWING



CRANK CASE [5]





CRANK CASE COVER [10]

QUESTION 4: MECHANICAL ASSEMBLY

Given:

- The exploded isometric drawing of the parts of an air pump assembly, showing the position of each part relative to all the others
- Orthographic views of each of the parts of the air pump assembly

Instructions:

- Answer this question on page 6.
- Draw, to scale 1 : 1 and in third-angle orthographic projection, the following view of the assembled parts of the air pump assembly:
  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 through the vertical centre of the assembly, is shown on the top view of the crank case (part 5).
- ALL drawings must comply with the guidelines contained in the *SANS 10111.*

NOTE:

- Show THREE faces of the M12 bolt on the left of the assembly.
- Show TWO faces of the M12 bolt on the right of the assembly.
- Show ALL necessary construction for the bolts. NO stencils may be used.
- NO hidden detail is required. **[93]**

PARTS LIST		
PART	QUANTITY	MATERIAL
1. BOLT	4	HARDENED STEEL
2. WASHER	4	MILD STEEL
3. CYLINDER HEAD	1	CAST IRON
4. CYLINDER	1	HARDENED STEEL
5. CRANK CASE	1	CAST IRON
6. BUSH	1	BRONZE
7. CRANK SHAFT	1	HARDENED STEEL
8. PISTON RING	1	HARDENED STEEL
9. PISTON	1	ALUMINIUM
10. CRANK CASE COVER	1	MILD STEEL

TITLE

AIR PUMP

DYNAMIC
ENGINEERING

1051 BRAKEN ROAD
LITTLE FALLS
GAUTENG
1735
011 355 1550

ALL DIMENSIONS ARE IN MILLIMETRES.

ALL UNSPECIFIED RADII ARE R4.

Please turn over

STAPLE

ASSESSMENT CRITERIA					
SECTIONAL FRONT VIEW					
		POSSIBLE	OBTAINED	SIGN	MODERATED
1	M12 BOLT + WASHER	15			
2	CYLINDER HEAD	9			
3	CYLINDER	5			
4	CRANK CASE	13			
5	BUSH	3			
6	CRANK SHAFT	9			
7	PISTON RING	1			
8	PISTON	6			
9	CRANK CASE COVER	5			
H	HATCHING	15			
SUBTOTAL		**81**			
GENERAL					
1	CENTRE LINES	3			
2	ASSEMBLY	9			
SUBTOTAL		**12**			
TOTAL		**93**			
EXAMINATION NUMBER					
EXAMINATION NUMBER					6

EASTERN-CAPE