HILLCREST HIGH SCHOOL

TRIALS EXAMINATION

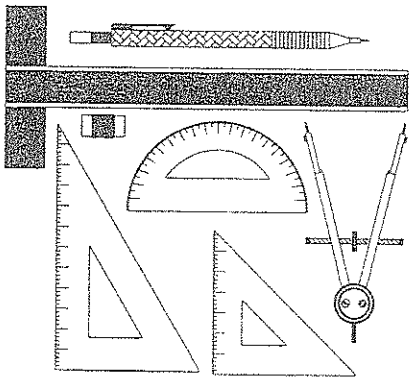
ENGINEERING, GRAPHICS & DESIGN

GRADE 12

2013

PAPER 2

MARKS: 200 **TIME**: 3 HOURS



INSTRUCTIONS TO CANDIDATES

1. This question paper consists of **7 pages** including the cover page and **4 questions**.
2. **All** questions must be answered.
3. Unless specified otherwise, all questions are in **Third Angle Orthographic Projection**.
4. Unless specified otherwise, all questions are to be completed to a **scale of 1:1**.
5. **All** answer sheets must be re-stapled in numerical order, even questions that are not attempted/blank.
6. **All construction work** must be shown, even if a stencil was used.
7. Print your **NAME** neatly on each page.
8. Use only the **drawing sheets** provided.
9. Your drawings should reflect **neatness and accuracy**.
10. All dimensions or detail not given may be **assumed in good proportion**.

QUESTION	SECTION	MARK	MAXIMUM
1	MECHANICAL ANALYTICAL		15
2a	LOCI: CAM PROFILE		40
2b	LOCI: MECHANISM		15
3	ISOMETRIC PROJECTION		35
4	MECHANICAL ASSEMBLY		95
TOTAL			200
SYMBOL			100

NAME

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MACHINING: MILLED 0,01 / 0,2

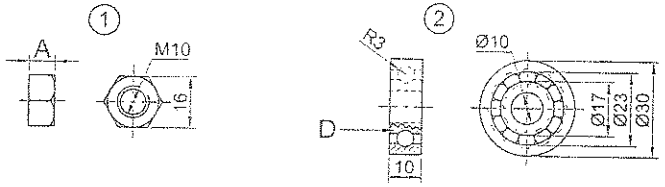
WELDING: X, Z

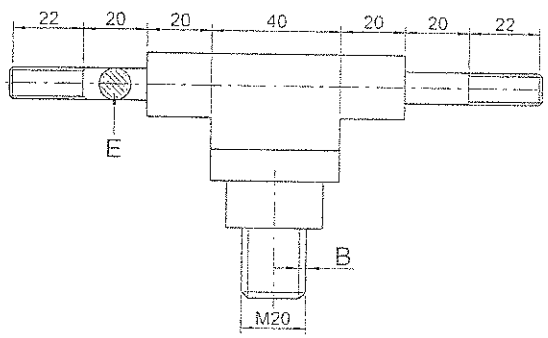
MACHINING COMPANY: P.D.N PTY

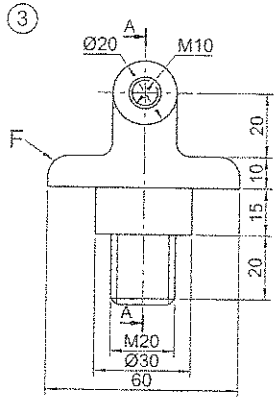
TRIALS 2013
GRADE 12 P2

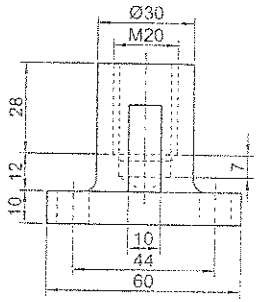
QUESTION 1
15 MARKS

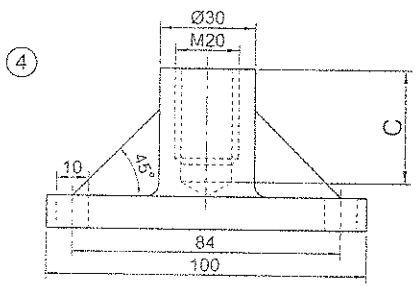
MECHANICAL ANALYTICAL











REFER TO THE INFORMATION GIVEN AND ANSWER THE FOLLOWING QUESTIONS	
1.1 Describe the machining lay on the machining symbol?	
1.2 What is the roughness value on the machining symbol?	
1.3 What is the machining allowance on the machining symbol?	
1.4 What is the production method on the machining symbol?	
1.5 What is the welding symbol X?	
1.6 What is the welding symbol Z?	
1.7 What is the dimension A on Part 1?	
1.8 What is the dimension B on Part 3?	
1.9 What is the dimension C on Part 4?	
1.10 How many ball bearings are there on Part 2?	
1.11 What is the type of sectioning shown at D on Part 2?	
1.12 What is the type of sectioning shown at E on Part 3?	
1.13 What is the thickness of the rib on Part 4?	
1.14 What feature is shown at F on Part 3?	
1.15 How many parts have internal threaded holes?	

ANSWER SHEET 1

NAME

TRIALS 2012
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QUESTION 2a
40 MARKS

LOCI:
SQUARE SPRING

A disc cam rotates with uniform velocity in an anti-clockwise direction, and transmits the following motion to a wedge - ended follower which reciprocates along the vertical centre line of the cam shaft. The position of the follower is shown below.
During the first 45° rotation the follower ***falls 15mm***.
During the next 45° rotation the follower is at ***rest***.
During the next 45° rotation the follower ***falls 15mm***.
During the next 45° rotation the follower ***rises 30mm***.
During the next 30° rotation the follower is at ***rest***.
During the next 45° rotation the follower ***rises 15mm***.
During the next 45° rotation the follower is at ***rest***.
During the final 60° rotation the follower returns to the ***original position***.

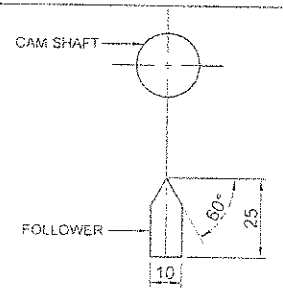
Cam Shaft Diameter = 20mm
Minimum distance from cam shaft centre to the profile = 20mm

Draw the following:
2a.1.1. the graph of displacement, using a scale 7mm = 30°.
2a.1.2. the profile of the cam that generates the above motion.
Calculate the following:
2a.2.1. The maximum displacement.
2a.2.2. The total travel.
2a.2.3. The displacement at 240°.
2a.2.4. The travel at 240°.
2a.2.5. The angular movement when the follower has travelled 10mm.

ASSESSMENT CRITERIA

You will be assessed on your ability to do the following:

• draw a graph of displacement	(9)
• label the graph of displacement	(2)
• accurately plot the minimum cam profile	(5)
• draw and hatch the cam shaft	(2)
• draw and label the divisions	(2)
• draw the direction	(1)
• project points from the graph to the divisions	(1)
• accurately plot the locus of the cam profile	(14)
• draw the centre lines	(2)
• draw a neat locus	(2)



DIVISION	SHAFT	MIN CAM	LABELS	GRAPH	LOCUS	CLINES	PROFILE	PROJECTION	DIRECTION
2	2	5	2	9	2	2	14	1	1

NAME

ANSWER SHEET 2a

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QUESTION 2b
15 MARKS

LOCI:
MECHANISM

The figure shows a mechanism that is used in a hydraulic pump.

The mechanism consists of a wheel, which rotates in a clock-wise direction around O, and a rod AD. The rod is attached to the wheel at point A and slides about point B.

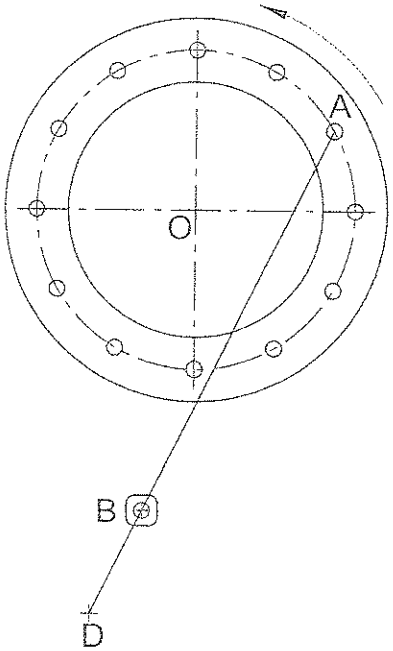
Instructions:

- Trace the locus generated by point D of the rod AB.
- Show ALL necessary construction.

ASSESSMENT CRITERIA

You will be assessed on your ability to draw the following:

• show all construction	3
• draw the locus of D	11
• draw a neat locus	1



PTS 11

CON 3

LOC 1

ANSWER SHEET 2b

NAME

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QUESTION 3
35 MARKS

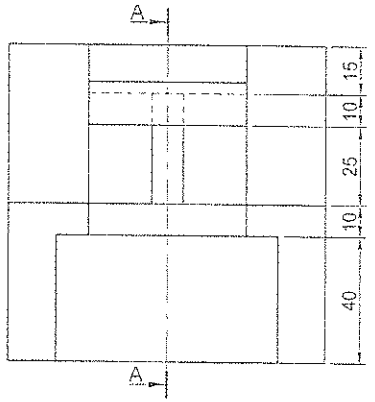
ISOMETRIC PROJECTION

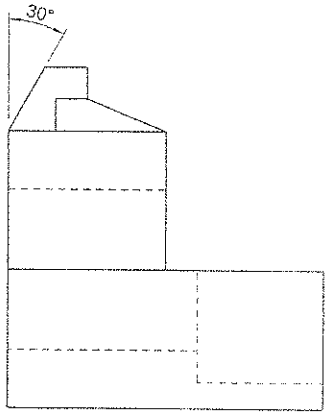
The figure shows the front view, top view and left view of a CASTING drawn in Third Angle Orthographic projection. The casting is cut by a cutting plane A-A.
Use your instruments to draw a **Sectional Isometric** view of the casting, on the cutting plane A-A.
Do **NOT** show hidden details. Show all construction.
X-Hatch all the sectioned areas. Use scale 1:1.

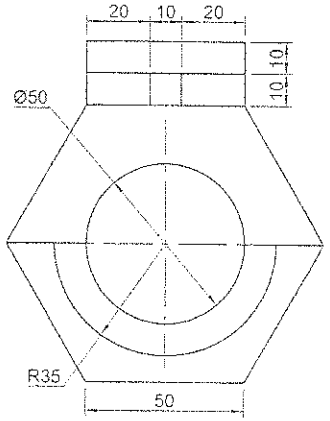
ASSESSMENT CRITERIA

You will be assessed on your ability to do the following:

• draw the isometric view in the correct position	18½
• draw the isometric circle arcs using construction	5
• draw the construction for the angles & hexagon	2
• draw all centre lines	5
• X-Hatch all sectioned areas	4½







PTS	37
ARC	7
CCo	6
CLS	4
CON	4
RIB	4
HAT	6
POS	2
ANG	-2
TOT	70

NAME

ANSWER SHEET 3

TRIALS 2013
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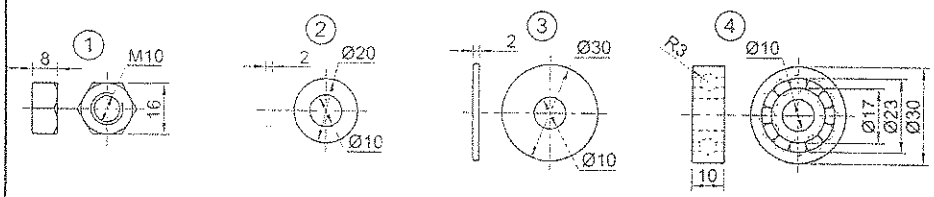
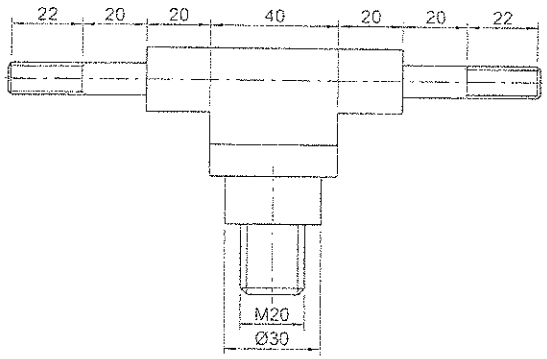
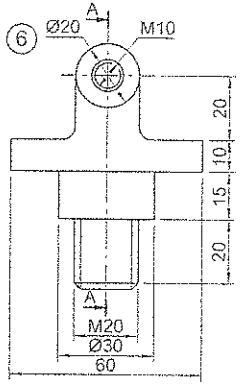
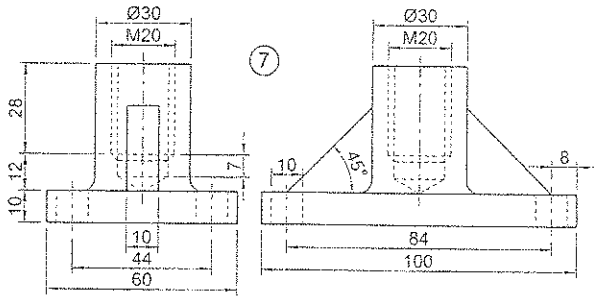
QUESTION 4
95 MARKS

MECHANICAL ASSEMBLY









Answer this question on **ANSWER SHEET 4**

The figure shows the multi-views of components of a **SKATEBOARD TRUCK ASSEMBLY**, drawn in third angle orthographic projection.

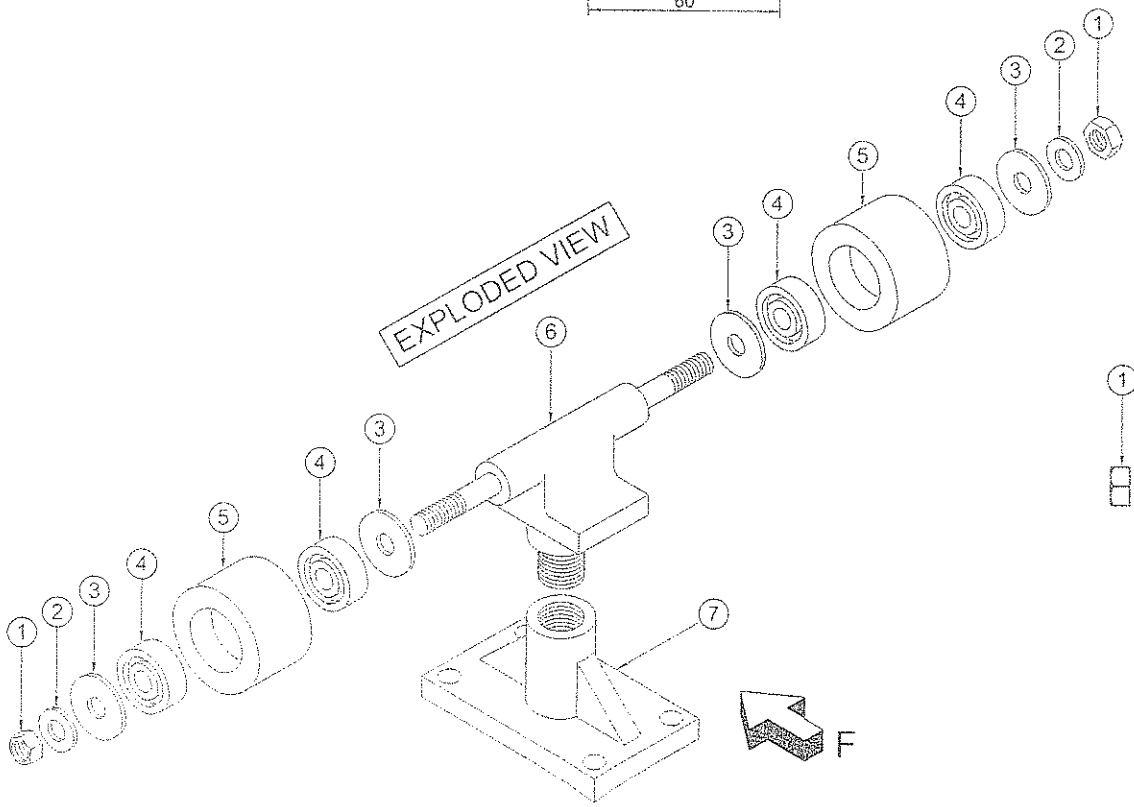
Draw to a scale 1:1 the following:

1.1 A **Sectional Front View**, on the cutting plane A-A, of the assembled components, as seen in the direction of F;
1.2 An **Outside Right View** of the assembled components.
Show hidden detail for the HANGER only, in this view.

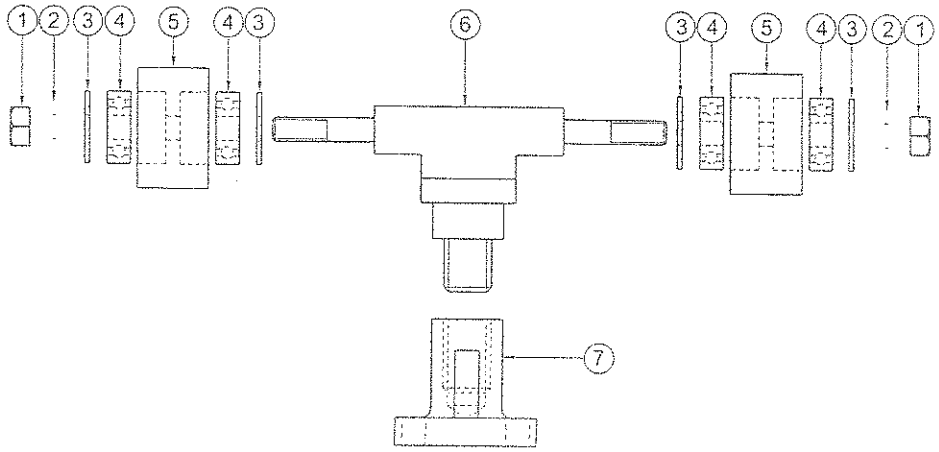
- Show the stud & nut construction.
- All fillets not given R4.
- Print the title, scale and heading in the space provided.
- Draw the projection symbol in the space provided.
- Show 2 faces for the M10 hexagonal nut.
- Draw the BEARING using the *Conventional Representation* as stipulated in the *SANS 0111-1*. Do not draw the *Detailed Representation* as shown.

COMPONENT LIST		
No	PART	Quantity
1	M10 HEXAGONAL NUT	2
2	WASHER	2
3	BEARING PLATE	4
4	BEARING	4
5	WHEEL	2
6	HANGER	1
7	BASE	1

EXPLODED VIEW



GRAPHICAL REPRESENTATION



TRIALS 2013
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QUESTION 4
95 MARKS

MECHANICAL ASSEMBLY

ASSESSMENT CRITERIA			
SECTIONAL FRONT VIEW			
Titl,Sca,Sym,Head	A		8
CENTRE LINES	B		2
SECTIONING	C		30
NO SECTIONING	D		12
M10 NUT	E		10
M10 NUT Const	F		2
BEARINGS	G		16
BEARING Conve	H		2
FILLETS	J		2
HATCHING	K		30
THREAD	L		20
INT.THREAD.HAT	M		4
ASSEMBLY	N		8
OUTSIDE LEFT VIEW			
CENTRELINES	O		2
BASE	P		8
HANGER	Q		4
WHEEL	R		2
M10 NUT	S		4
WASHER	T		2
HIDDEN DETAIL	U		12
DIMENSIONS	V		10
TOTAL	190		
TOTAL	95		

TITLE:

SCALE:

HEADING:

PROJECTION
SYMBOL

NAME

ANSWER SHEET 4