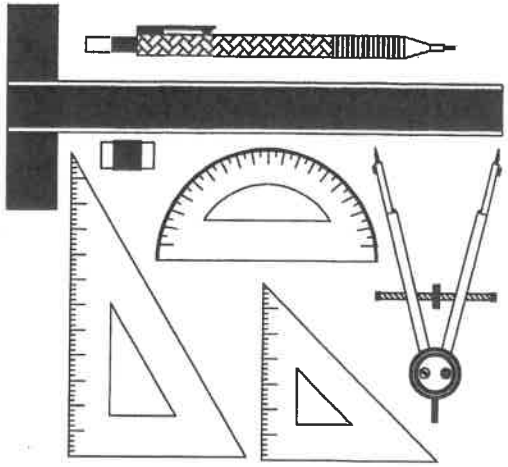


NATIONAL SENIOR CERTIFICATE EXAMINATION

MAY 2022

ENGINEERING GRAPHICS AND DESIGN

PAPER 1

MARKS: 200
TIME: 3 HOURS

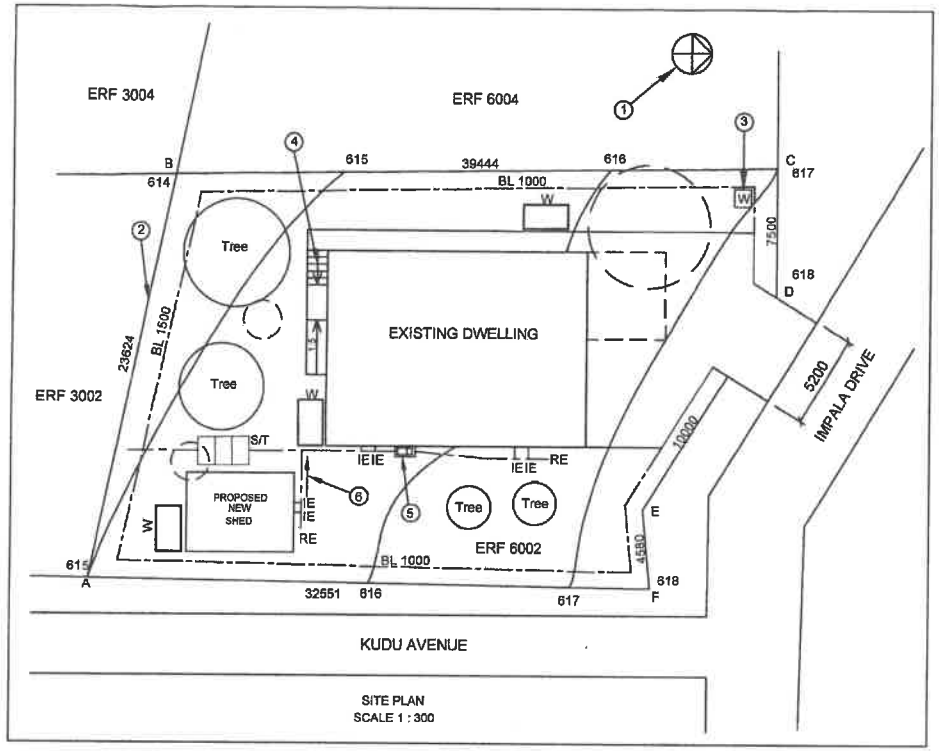
PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of **6 pages** including the cover page and **4 questions**.
2. **All** questions must be answered.
3. Unless specified otherwise, all questions are in **First-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 restapled in numerical order, even questions that have not been answered.
6. All **construction work** must be shown.
7. Print your **examination number** neatly on each page.
8. Use only the **answer sheets** provided.
9. Your drawings should reflect **neatness** and **accuracy**.
10. All dimensions or detail not given may be **assumed** in **good proportion**.
11. Your drawings should comply with SANS 10143.
12. All measurements are in millimetres (mm) unless otherwise indicated.

FOR OFFICIAL USE ONLY					
QUESTION	SECTION	MARK	MODERATED	MAXIMUM	CODE
1	CIVIL ANALYTICAL			20	
2	INTERPENETRATION & DEVELOPMENT			40	
3	TWO-POINT PERSPECTIVE			40	
4	CIVIL DRAWING			100	
	TOTAL			200	

CHECKED BY

EXAMINATION NUMBER



PLEASE NOTE: THIS SITE PLAN IS NOT DRAWN TO THE INDICATED SCALE

STUDY THE ABOVE DRAWING AND ANSWER THE QUESTIONS THAT FOLLOW.
CIRCLE THE LETTER CORRESPONDING TO YOUR CHOICE OF ANSWER.

1.1 In what units are the dimensions on this site plan?	A	CENTIMETRES	B	MILLIMETRES	C	METRES	D	UNKNOWN	1
1.2 What is the indicated scale of this drawing?	A	1 : 100	B	1 : 50	C	1 : 300	D	1 : 30	1
1.3 How many trees on ERF 6002 need to be removed?	A	4	B	6	C	2	D	3	1
1.4 In which direction would you be walking, if you walked up the ramp?	A	NORTH	B	SOUTH	C	EAST	D	WEST	1
1.5 Which is the lowest corner on ERF 6002?	A	A	B	B	C	C	D	F	1
1.6 What is the feature at 1 called?	A	NORTH POINT	B	WIND DIRECTION	C	SLOPE	D	COMPASS	1
1.7 What is the feature at 2 called?	A	BOUNDARY LABEL	B	BOUNDARY LINE	C	BUILDING LINE	D	BUILDING LABEL	1

QUESTION 1

CIVIL ANALYTICAL

1.8 What is the feature at 3 called?	A	WASTE TANK	B	WATER TANK	C	WATER METER	D	ELECTRICITY METER	1
1.9 What does the arrow at feature 4 indicate?	A	DIRECTION	B	WEST	C	UP	D	DOWN	1
1.10 What is the feature at 5 called?	A	SEPTIC TANK	B	GULLY	C	GREASE TRAP	D	STEP	1
1.11 How many water tanks are there on ERF 6002?	A	NONE	B	1	C	2	D	3	1
1.12 How close to ERF 6004 could a new building be built?	A	1500 mm	B	1000 mm	C	1500 m	D	1000 m	1
1.13 How many rodding eyes are there in the drawing?	A	6	B	4	C	2	D	1	1
1.14 What does the arrow indicate at feature 6?	A	DIRECTION OF FLOW	B	DIRECTION OF RAMP	C	DIRECTION OF WIND	D	WALKWAY DIRECTION	1

1.15 In the space below, determine the perimeter of ERF 6002 in metres (m). Round your answer to 2 decimal places. 2

Answer:

1.16 Which of the following symbols correctly indicate a fire hydrant according to SANS 10143? 1

A	B	C	D
			

1.17 By how many metres is the highest point on ERF 6002 above the lowest point?

	A	2	B	3	C	4	D	7	1

1.18 In the space below, draw, in NEAT freehand, the PLAN VIEW and ELEVATION VIEW of the SANS 10143 convention for a water closet (toilet). 2

PLAN VIEW	ELEVATION VIEW

20 MARKS

ANSWER SHEET 1

EXAMINATION NUMBER

QUESTION 2

INTERPENETRATION & DEVELOPMENT

The figures below show the INCOMPLETE Front View as well as a COMPLETE Top View and LEFT View of a **HEXAGONAL PIPE** penetrated by an **EQUILATERAL TRIANGULAR DUCT.** The views are drawn in First Angle Orthographic Projection. Auxiliary views of the triangular duct are also shown.

Draw the following:

2.1 the complete FRONT view clearly showing the curve of interpenetration. Show all hidden detail.

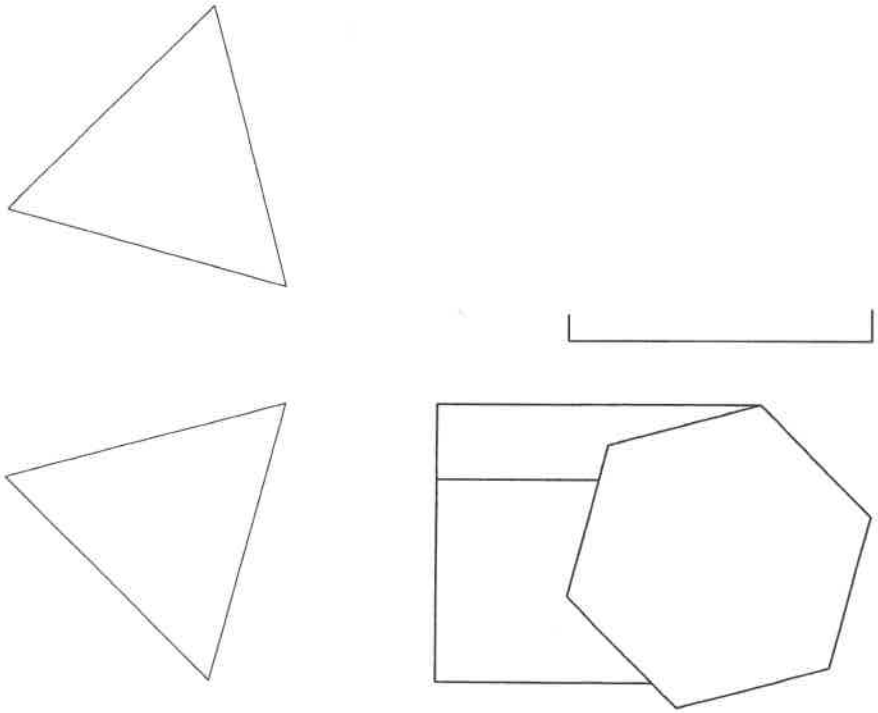
2.2 the development of the 3 panels of the hexagonal pipe that are being penetrated.

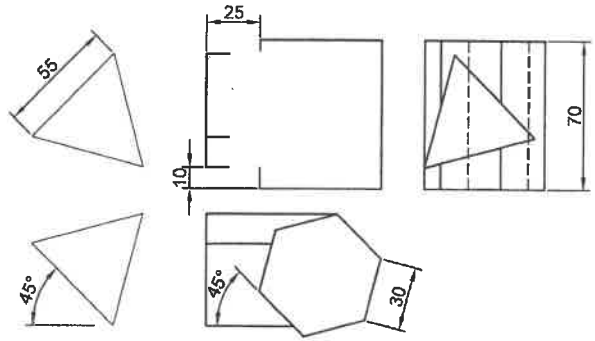
Show all construction.
It is not necessary to draw the left view.

ASSESSMENT CRITERIA

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

• draw the given incomplete Front View	4
• complete the Front View	22
• show necessary construction	2
• develop 3 panels of the hexagonal pipe	12





FV	26
CON	2
DEV	12
40 MARKS	

ANSWER SHEET 2

EXAMINATION NUMBER

QUESTION 3

TWO-POINT PERSPECTIVE

The figures show the three views of a house with a garage. Draw a neat two-point perspective view of this building.

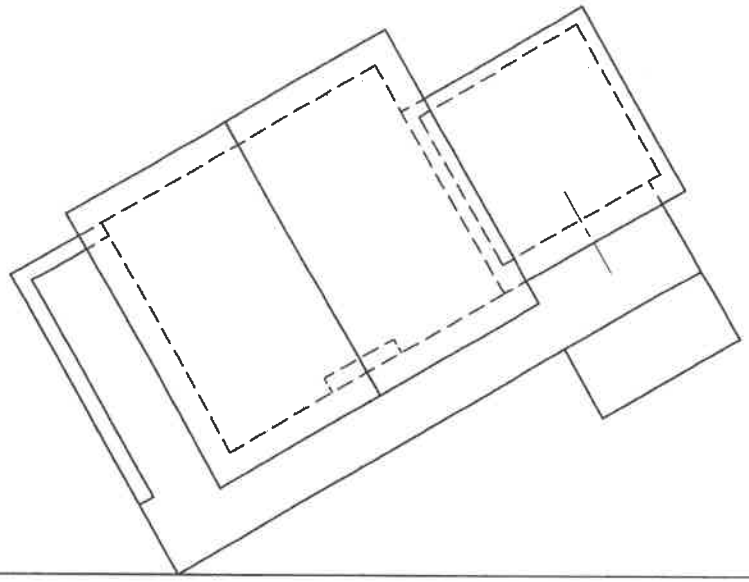
PP - Picture Plane
HL - Horizon Line
GL - Ground Line
SP - Station Point

Show the wall thickness where applicable.
Determine and label the vanishing points RVP and LVP
NO HIDDEN DETAIL IS REQUIRED.

ASSESSMENT CRITERIA

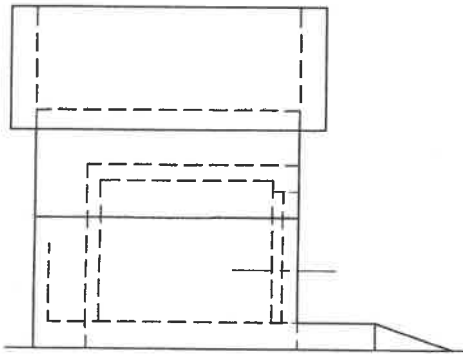
You will be assessed on your ability to do the following:

- determine and label the vanishing points 2
- draw the two-point perspective view 38

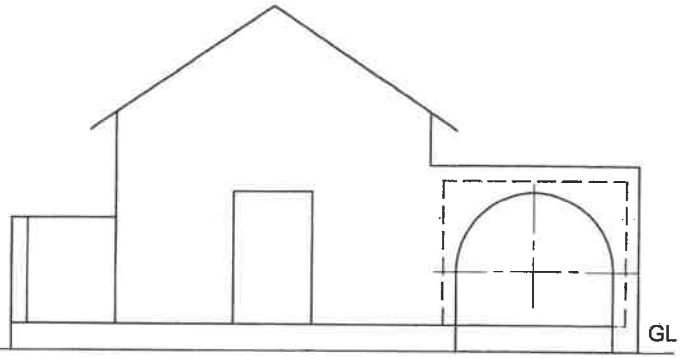


PP PP

HL HL



GL SP



GL

PTS	Con	Arc	VPS
28	3	7	2

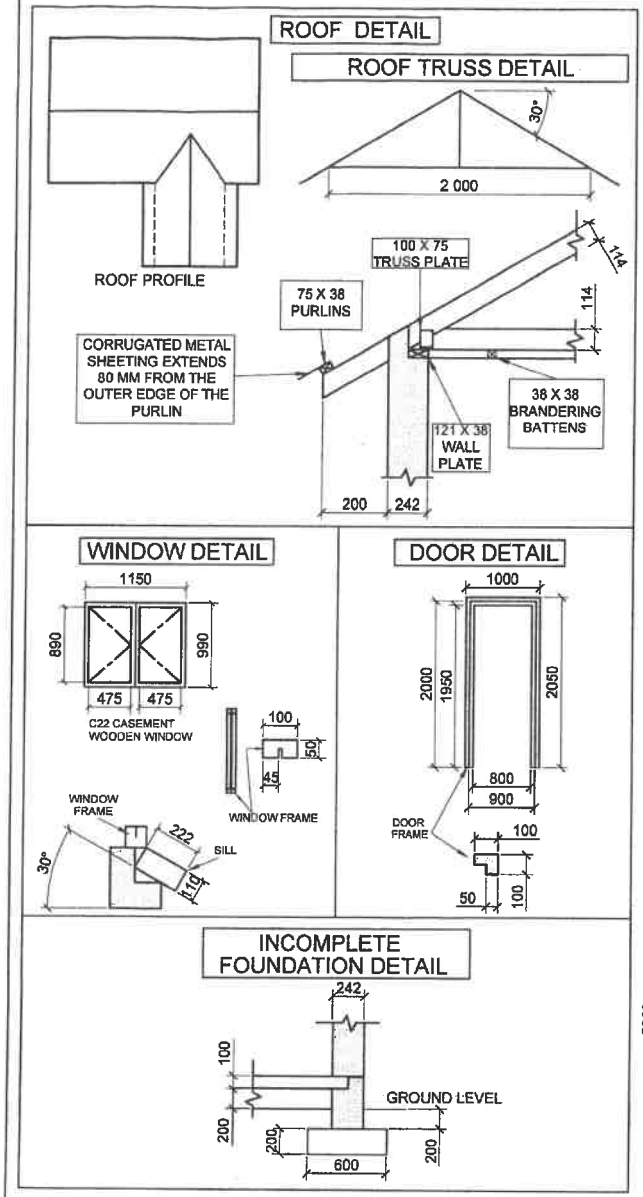
40 MARKS

EXAMINATION NUMBER

ANSWER SHEET 3

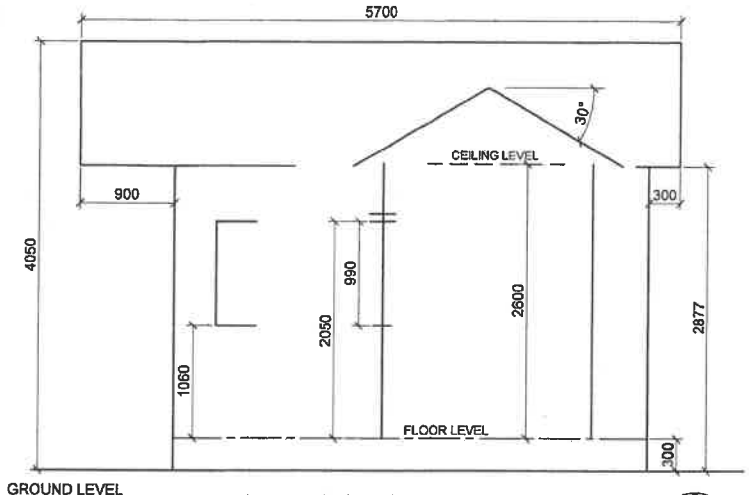
QUESTION 4

CIVIL DRAWING

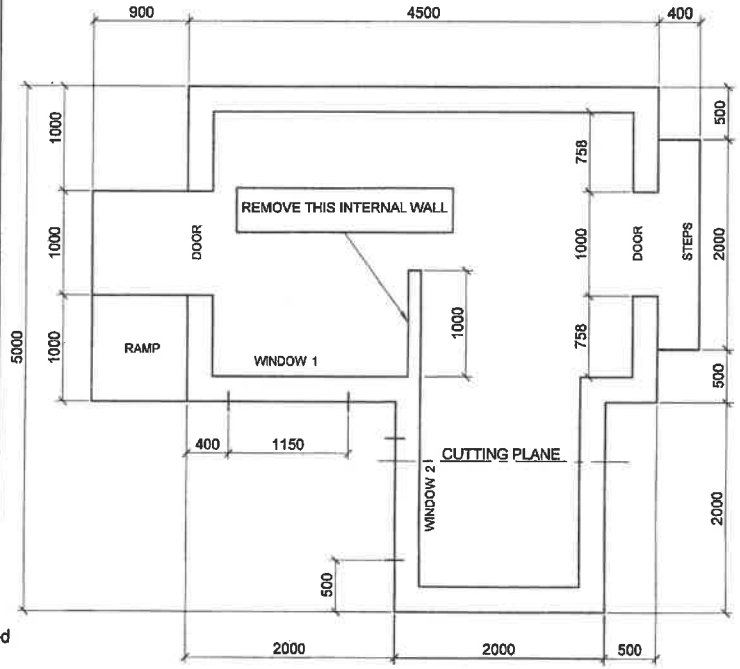


NOTES:

- Floor tiles should be used for the entire floor area.
- Brickwork must be carried out as indicated on the schematic drawing: The internal wall must be removed.
- The ramp leads onto a landing which is the same height as the finished floor level.
- Each step has a 150 mm rise and a 200 mm step. The top of the second step is the same height as the finished floor level.



SCHEMATIC SOUTH ELEVATION



SCHEMATIC FLOOR PLAN

Answer this question on ANSWER SHEET 4 (page 6).
All drawings must comply with SANS 10143.

The following are given:

- Roof detail
- Window detail
- Door frame detail
- Incomplete foundation detail
- An incomplete schematic elevation with
  - ► door and window positions, ground and floor levels
- An incomplete schematic floor plan of a tiled ***STOREROOM*** with
  - ► window and door positions
  - ► perimeter dimensions

Draw the following on Answer Sheet 4 using a scale of 1:50:

1) The **complete FLOOR PLAN**
2) The **SECTIONAL SOUTH ELEVATION** on the indicated cutting plane

FLOOR PLAN INSTRUCTIONS

- Draw the complete floor plan of the storeroom.
- The following alterations must be made to the storeroom:
  - ► Remove the internal wall as indicated.
- Draw and hatch all walls.
- Insert all window details.
- Insert all door details.
- Draw the ramp and landing.
- Draw the steps.
- Label the floor plan and indicate the scale.
- Draw and label the cutting plane A-A.

SECTIONAL SOUTH ELEVATION INSTRUCTIONS

- Draw the complete SOUTH ELEVATION showing the section as per the indicated cutting plane and the rest of the exterior of the building.
- Draw the window detail of window 1.
- Show some roof detail for the corrugated metal sheeting.
- Draw the steps and ramp.
- Complete the foundation details.
  - ► insert all floor slab details
  - ► use 200 mm compacted hardcore filling
- Label the ground level.
- Label the damp-proof course at the floor slab and window.
- Draw in the sectional window 2, using the C22 frame detail.
  - ► use ONE 242 x 75 mm concrete lintel above the window
  - ► use a 222 x 110 mm quarry tile windowsill
  - ► show the window frame detail
- Roof details:
  - ► draw the roof truss using 114 x 38 mm rafters and FOUR 100 x 75 mm truss plates
  - ► use FOUR 75 x 38 mm purlins spaced appropriately
  - ► use TWO 121 x 38 mm wall plates
  - ► use TWO 38 x 38 mm ceiling battens spaced appropriately
  - ► use corrugated metal sheeting for the roof and a 30° pitch
  - ► use 9 mm gypsum ceiling boards
- Show all hatching detail.
- Label the sectional SOUTH ELEVATION.

QUESTION 4

CIVIL DRAWING

Assessment Criteria

Sectional South Elevation

1	Ceiling Battens	2	
2	Wall Plates	2	
3	Ceiling Board	1	
4	Truss Plates	4	
5	Roof Truss	5	
6	Purlins	4	
7	Roof	1	
8	Walls	4	
9	Sectioned Window	5	
10	Floor & Foundation	6	
11	DPC	2	
12	Hatching	10	
13	Walls - elevation	3	
14	Roof Detail/Height	5	
15	Labels	2	
16	Outside window	6	
17	Steps	2	
18	Ramp	2	
Subtotal		66	

Floor Plan

19	Walls	8	
20	Hatching	4	
21	Windows	4	
22	Doors	6	
23	Steps	4	
24	Ramp	4	
25	Labels	2	
26	Cutting Plane	2	
Subtotal		34	
TOTAL		100	

EXAMINATION NUMBER

ANSWER SHEET 4