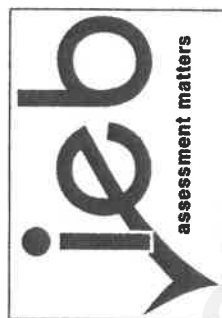




eduresourceza.com



NATIONAL SENIOR CERTIFICATE EXAMINATION

2021

ENGINEERING GRAPHICS AND DESIGN

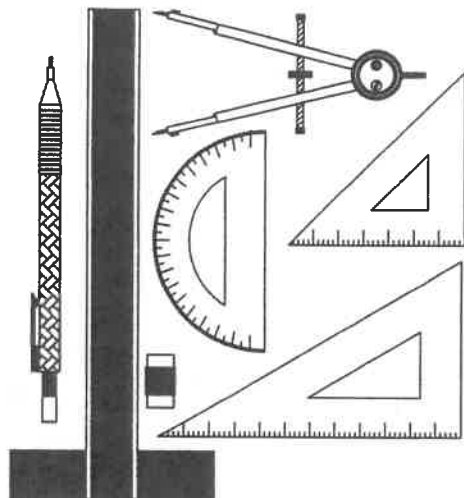
PAPER 1

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 re-stapled in numerical order, including 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 must be **assumed** in **good proportion**.
11. Your drawings should comply with SANS 10143.

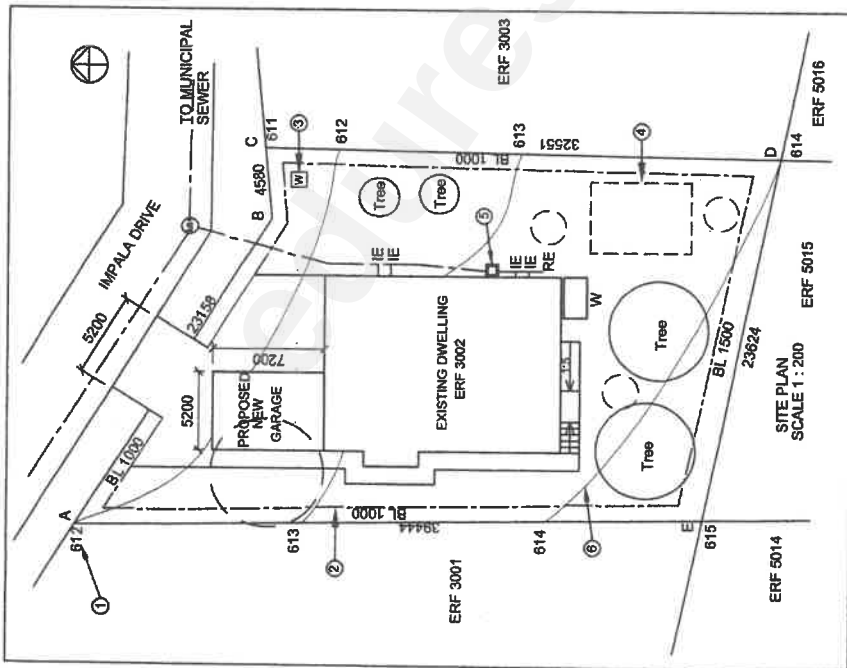


FOR OFFICIAL USE ONLY

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



STUDY THE DRAWING ABOVE AND ANSWER THE QUESTIONS THAT FOLLOW.

CIRCLE THE LETTER CORRESPONDING TO YOUR ANSWER

1.1 Which ERF is to the SOUTHWEST of ERF 3002?	A	ERF 5016	B	ERF 5015	C	ERF 5014	D	ERF 3001	1
1.2 What does the abbreviation 'IE' stand for?	A	INDUCTION EYE	B	INSPECTION EYE	C	INDUCTION EVE	D	INSPECTION EVE	1
1.3 How many trees need to be removed from ERF 3002?	A	4	B	6	C	2	D	1	1
1.4 In which direction would you be walking, if you walked up the stairs?	A	NORTH	B	SOUTH	C	EAST	D	WEST	1
1.5 Which corner has the highest elevation?	A	A	B	C	C	D	D	E	1
1.6 What is the feature at 1 called?	A	BEACON HEIGHT	B	ERF NUMBER	C	DIMENSION	D	CORNER NUMBER	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 is indicated by the dashed line at feature 4?	A	SEPTIC TANK	B	HIDDEN DETAIL	C	WORK TO BE REMOVED	D	WATER TANK	1
1.10 What is the feature at 5 called?	A	DOG KENNEL	B	GULLY	C	SEPTIC TANK	D	STEP	1
1.11 What is the feature at 6 called?	A	DRAIN LINE	B	SEWER LINE	C	WATER PIPE	D	CONTOUR	1
1.12 How close to ERF 5015 could a new building be built?	A	1500 mm	B	1000 mm	C	1500 m	D	1000 m	1
1.13 How many inspection eyes are there in the drawing?	A	1	B	2	C	4	D	6	1
1.14 How wide is the driveway?	A	5000	B	5200	C	1000	D	23158	1
1.15 In the space below, determine the area of the proposed new garage in metres squared. (m ²) Round your answer off to 2 decimal places.	Answer:								
1.16 Which of the following symbols correctly indicate a fire extinguisher according to SANS 10143?	A		B		C		D		1
1.17 Which of the following options indicate the largest slope of ERF 3002?	A	NORTH TO SOUTH	B	SOUTHWEST TO NORTHEAST	C	EAST TO WEST	D	NORTHWEST TO SOUTHEAST	1
1.18 In the space below, draw, in NEAT freehand, the PLAN VIEW and ELEVATION VIEW of the SANS 10143 graphical symbol for a wash basin.	PLAN VIEW ELEVATION VIEW								

20 MARKS

ANSWER SHEET 1

EXAMINATION NUMBER

INTERPENETRATION
& DEVELOPMENT

The drawings below show the **INCOMPLETE** Front View, **COMPLETE** Top View and Right View of a right **SQUARE PRISM** made to fit around a right regular **HEXAGONAL PRISM**.

Draw the following:

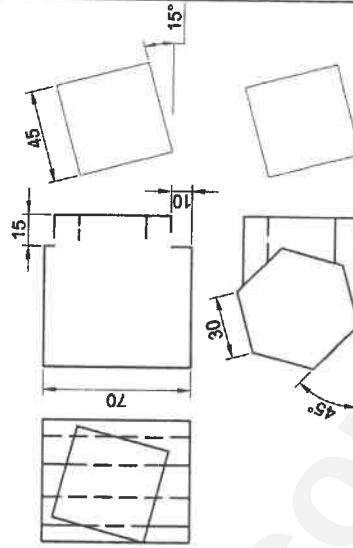
- 2.1 the complete Front View clearly showing the line of interpenetration formed between the two solids.
- 2.2 the surface development of the square branch piece.

Show all hidden detail.
Show all construction.

ASSESSMENT CRITERIA

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

- draw the given incomplete Front View 4
- complete the Front View 23
- show necessary construction 2
- draw the development of the square branch piece 11



FV	CON	DEV
27	2	11

40 MARKS

[illegible]

ANSWER SHEET 2

PLEASE TURN OVER

QUESTION 3
TWO-POINT
PERSPECTIVE

The figures show the three views of a house with an open garage and verandah.
Draw a neat two-point perspective view of the house and garage showing the inside of the garage.

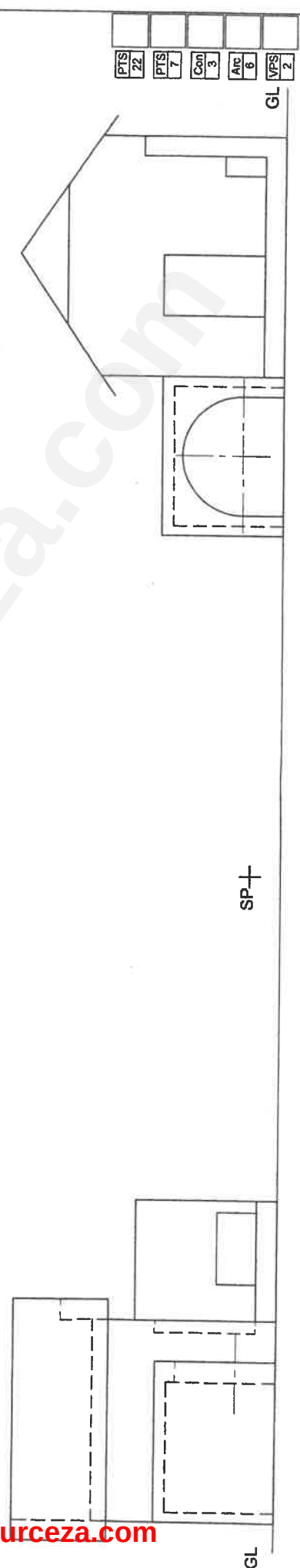
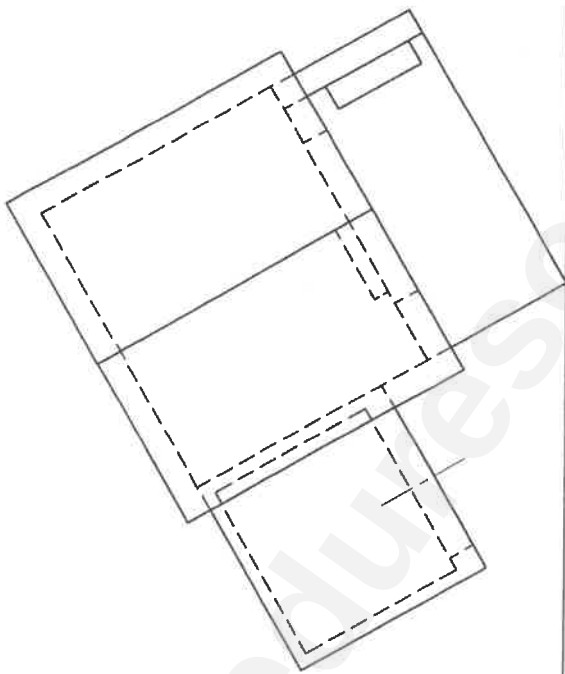
PP - Picture Plane
HL - Horizon Line
GL - Ground Line
SP - Station Point

Neatly 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	38
• draw the two-point perspective view		

PP

HL



PTS	22
PTS	7
Con	3
Arc	6
VPS	2

ANSWER SHEET 3

40 MARKS

EXAMINATION NUMBER

PLEASE TURN OVER

QUESTION 4

CIVIL
DRAWING

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 south elevation with
 - ▶ 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
- 3) The **OUTSIDE WEST ELEVATION**

FLOOR PLAN INSTRUCTIONS

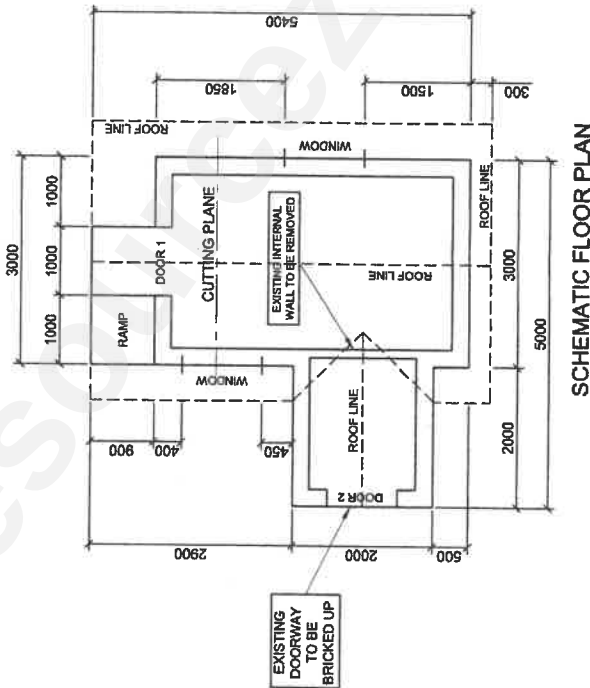
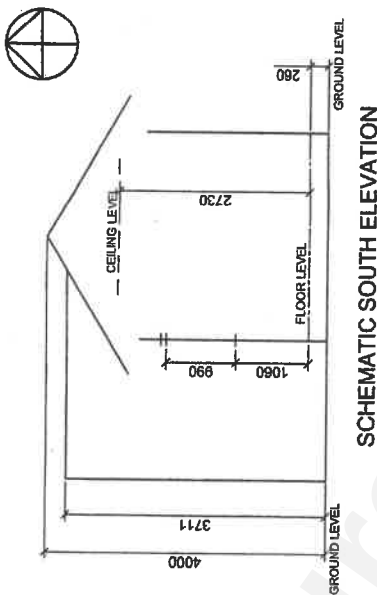
- Draw the complete floor plan of the store room.
- It is NOT necessary to draw the roof line.
- The following alterations must be made to the store room:
 - ▶ Remove and brick up **DOOR 2**.
 - ▶ Remove the internal wall as indicated.
- Draw and hatch all walls
- Insert all window details
- Insert the door detail of the external door (**DOOR 1**)
- Draw the ramp and landing. Indicate the inclination of the ramp.
- 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
- Complete the foundation details
 - ▶ insert all floor slab details
 - ▶ use 150 mm compacted hardcore filling and 10 mm screed
- Label the ground level and damp-proof course
- Draw in the sectional window 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 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 228 x 38 mm fascia boards
 - ▶ use 9 mm gypsum ceiling boards
- Draw the doorway only. (Do not draw the door frame)
- Show all hatching detail
- Label the sectional **SOUTH ELEVATION**

WEST ELEVATION INSTRUCTIONS

- Draw the complete outside **WEST ELEVATION**
- Show the window details. Do not draw the windowsills.
- Show some detail for the metal roof sheeting
- Label the **WEST ELEVATION**

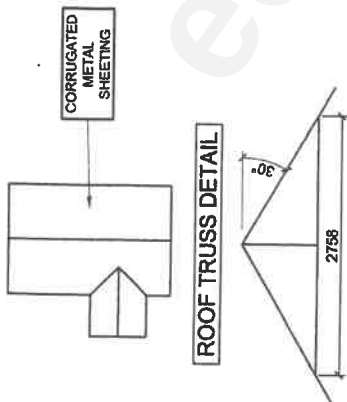


NOTES:

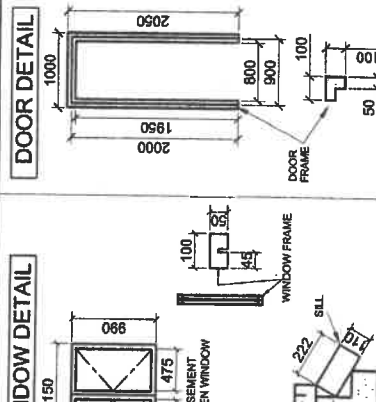
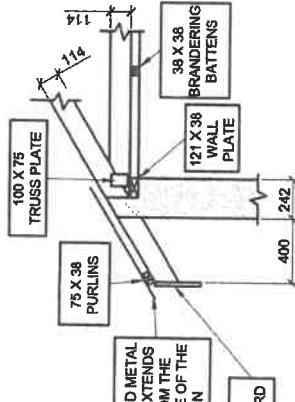
- Floor tiles should be used for the entire floor area.
- Brickwork must be carried out as indicated on the schematic drawing:
 - DOOR 2 must be bricked up.
- The internal wall must be removed.
- The ramp leads onto a landing which is the same height as the finished floor level. The ramp has a gradient of 1:4.
- The finished floor level is in line with the top of the screed.

ROOF DETAIL

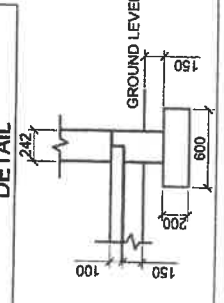
ROOF PROFILE



ROOF TRUSS DETAIL



INCOMPLETE FOUNDATION DETAIL



QUESTION 4

CIVIL
DRAWING

Assessment Criteria

Sectional 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 Fascia Boards	2
9 Sectioned Walls	4
10 Sectioned Window	5
11 Floor & Foundation	6
12 DPC	2
13 Hatching	9
14 Doorway	3
15 Labels	2
Subtotal	52

Floor Plan

16 Walls	7
17 Hatching	4
18 Windows	4
19 Door	3
20 Ramp	5
21 Cutting Plane	2
22 Labels	2
Subtotal	27

West Elevation

23 Ramp	2
24 Walls	5
25 Window	4
26 Fascia Board	2
27 Roof	7
28 Label	1
Subtotal	21

TOTAL	100
--------------	------------

EXAMINATION NUMBER

ANSWER SHEET 4