



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

ENGINEERING GRAPHICS AND DESIGN P1

NOVEMBER 2023

MARKS: 100

TIME: 3 hours

This question paper consists of 6 pages.

Barcode label

INSTRUCTIONS AND INFORMATION

1. This question paper consists of FOUR questions.
2. Answer ALL the questions.
3. ALL drawings are in first-angle orthographic projection, unless otherwise stated.
4. ALL drawings must be prepared using pencil and 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, irrespective of whether the question was attempted or not, must be re-stapled in numerical sequence in the TOP LEFT-HAND CORNER ONLY.
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			$\frac{1}{2}$	SIGN	MODERATED			$\frac{1}{2}$	SIGN	RE-MARKING
1											
2											
3											
4											
TOTAL											
	2	0	0			2	0	0			2 0 0

FINAL CONVERTED MARK

100

CHECKED BY

COMPLETE THE FOLLOWING:

CENTRE NUMBER

CENTRE NUMBER

EXAMINATION NUMBER

EXAMINATION NUMBER

STAPLE

LAND SURVEYOR'S CERTIFICATE OF THE CORNER HEIGHTS AND BOUNDARY LENGTHS OF LOT 22

CORNER HEIGHTS IN METRES		BOUNDARY LENGTHS IN MILLIMETRES	
A	350	AB	40000
B	351	BC	48000
C	349	CD	23340
D	349	DE	7500
E	349	EA	44560

SYMBOL LEGEND:

1. PALM TREE

2. EVERGREEN TREE

3. PARKING FOR PEOPLE WITH DISABILITIES

SITE PLAN

SCALE 1 : 450

NOTE:
Contractors must verify all dimensions and levels on site before commencing work. Architects to be notified immediately of any discrepancies.

ARCHITECT'S SIGNATURE

CLIENT'S SIGNATURE

ANSWER 21

In the space below, draw, in neat freehand, the SANS 10143 graphical symbol for:
(a) SHOWER (elevation and plan)
(b) SOCKET OUTLET

(a) SHOWER (elevation and plan)

(b) SOCKET OUTLET

2	04/02/2023	REPLACE 150 CONCRETE APRON	
1	30/01/2023	NEW ENTRANCE ADDED	
REVISION	DATE	DESCRIPTION	
ACE ARCHITECTS 17 ALPINE ROAD SPRINGFIELD 4091 ACEARC@AFRICA.COM 031 208 2456			
PRINTED BY: PRINTFRIEND PRINTERS		DATE OF PRINT: 05/02/2023	
DRAWING TITLE: SITE PLAN			
PROJECT: PROPOSED NEW FAST-FOOD OUTLET AND COVERED WALKWAY FOR LAHRIE AND ASSOCIATES, LOT 22, 7th AVENUE, KLOOF			
PROJECT NUMBER: 72846-23		DRAWING NUMBER: LA - 787976	
DATE: 28/01/2023	DRAWN: S MOTALA	CHECKED: A BUX	SCALE: 1 : 450
REFERENCE CODE: 12183124			

QUESTION 1: ANALYTICAL (CIVIL)

Given:
The site plan of an existing service station with a proposed new fast-food outlet and a covered walkway, a title panel and a table of questions. The drawing is not presented to the indicated scale.

Instructions:
Complete the table below by neatly answering the questions, which refer to the accompanying drawing, title panel and civil content.

QUESTIONS

ANSWERS

1	What is the e-mail address of the architectural firm?		1		
2	What scale is indicated for the site plan?		1		
3	When was the first revision made to the drawing?		1		
4	Into which street does the service station exit?		1		
5	What is the height of the highest corner of LOT 22 in metres?		1		
6	What is the finish on all the existing driveways?		1		
7	How many existing underground fuel tanks are shown?		1		
8	On what feature in the road is the zebra crossing?		1		
9	What is the fall of the existing sewer line?		1		
10	What is the height of the electronic display board in millimetres?		1		
11	What does the abbreviation G at 1 stand for?		1		
12	Name the feature at 2.		1		
13	What does the feature at 3 indicate?		1		
14	To what must the new sewerage line be connected?		1		
15	What is the thickness of the concrete apron in metres?		1		
16	In what colour must new walkways be indicated on site plans?		1		
17	Which elevation of the new fast-food outlet faces 7th Avenue?		2		
18	If wall S-S on the new fast-food outlet is 4,8 m from boundary line AB, how far is it from building line T-T in millimetres?		2		
19	In the space below (ANSWER 19), determine the perimeter of LOT 22 in metres.		3		
20	In the space below (ANSWER 20), determine the total area of the existing building in square metres.		3		
21	In the space in the title panel (ANSWER 21), draw, in neat freehand, the SANS 10143 graphical symbol for: (a) SHOWER (elevation and plan) and (b) SOCKET OUTLET.		4		
TOTAL			30		

ANSWER 19

Show ALL calculations.
(Do NOT round off the answer.)

ANSWER 20

Show ALL calculations.
(Do NOT round off the answer.)

EXAMINATION NUMBER

EXAMINATION NUMBER

2

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Please turn over

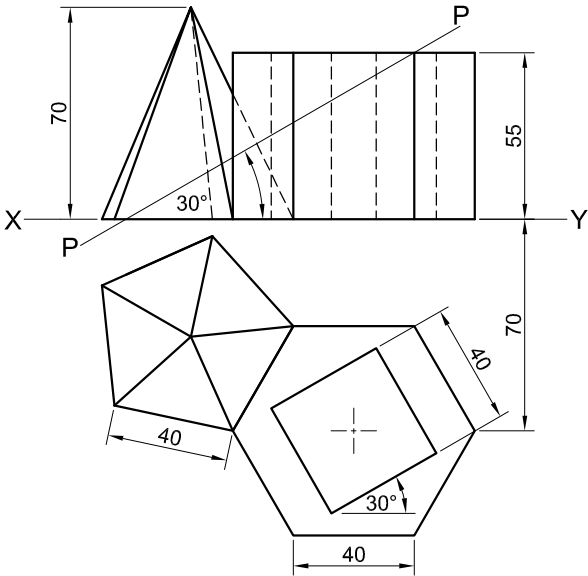


QUESTION 2: SOLID GEOMETRY

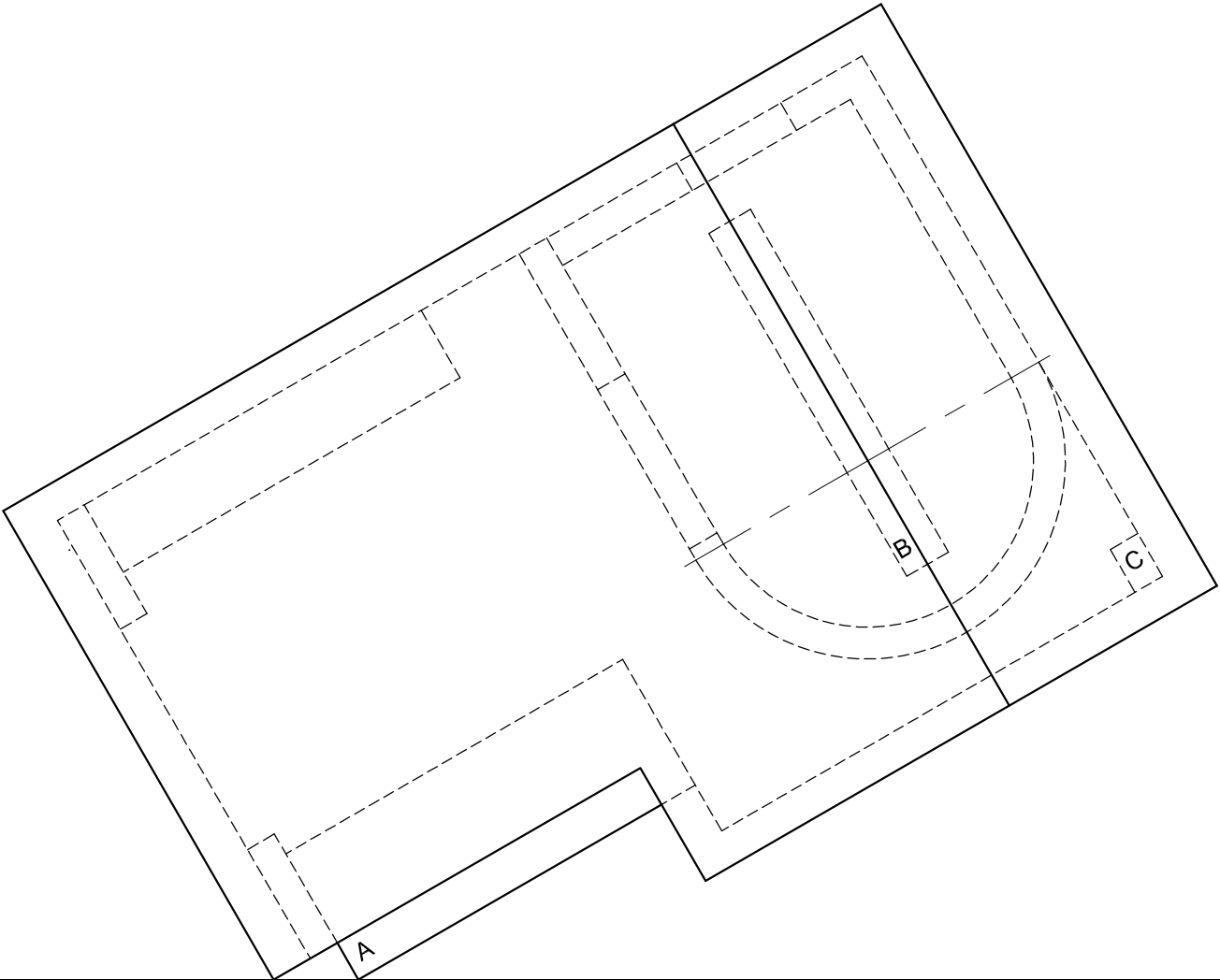
- Given:**
- The front view and top view of a right regular pentagonal pyramid with one base edge in contact with a base edge of a right regular hexagonal prism. The prism is centrally pierced by a right square prismatic hole.
 - Cutting plane P-P, that cuts both solids

- Instructions:**
- Draw, to scale 1 : 1, the following views of both solids:
- 2.1 The given front view
 - 2.2 A sectional top view
 - 2.3 A sectional left view

- Planning is essential.
 - Show ALL hidden detail.
 - Show ALL construction.
- [38]



ASSESSMENT CRITERIA				
1	SECTIONAL TOP VIEW	15 ¹ / ₂		
2	FRONT VIEW	8 ¹ / ₂		
3	SECTIONAL LEFT VIEW	14		
PENALTIES (-)				
TOTAL		38		
EXAMINATION NUMBER				
EXAMINATION NUMBER				3



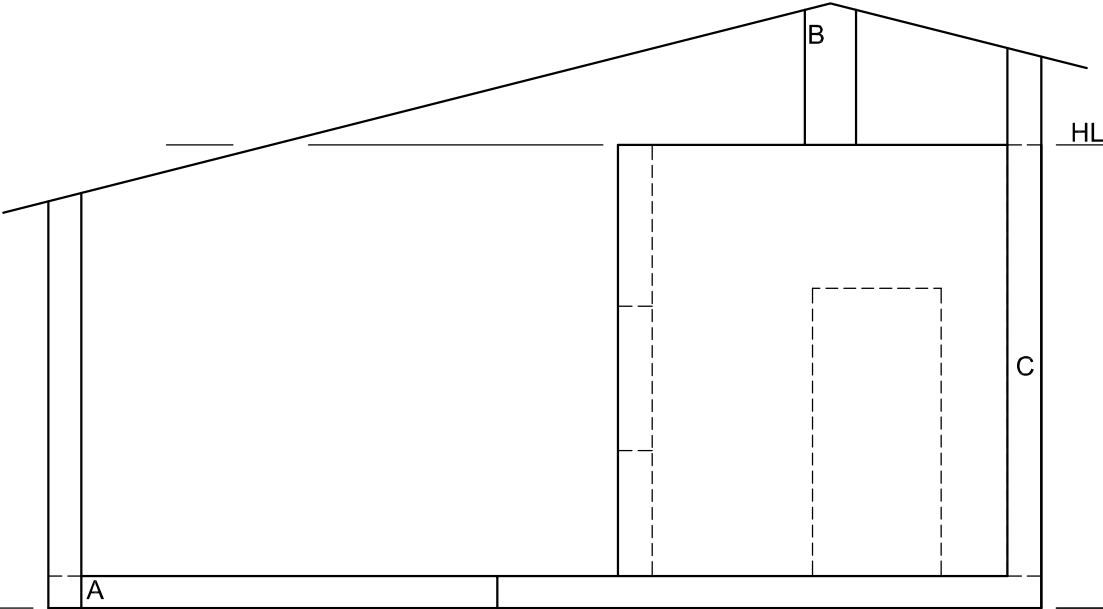
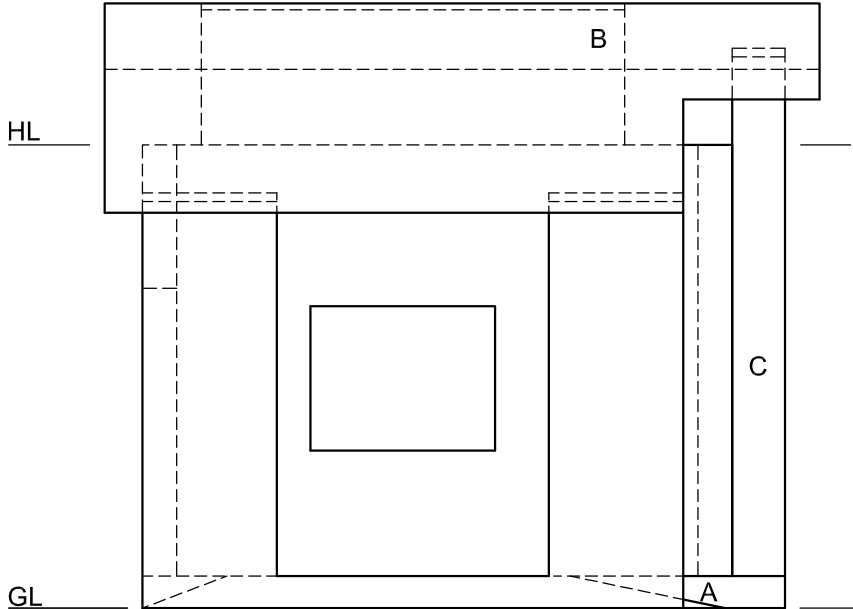
QUESTION 3: PERSPECTIVE

Given:
Three views of a covered drive-through ticket booth and the information needed to draw a two-point perspective drawing
PP – Picture plane
HL – Horizon line
GL – Ground line
SP – Station point

- Instructions:**
Complete the perspective drawing.
- Align the drawing sheet with the ground line (GL).
 - Determine and label the vanishing points.
 - Show ALL construction.
 - Show depth at the window.
 - Show ALL interior detail as seen through the window.
 - NO hidden detail is required.
- [40]

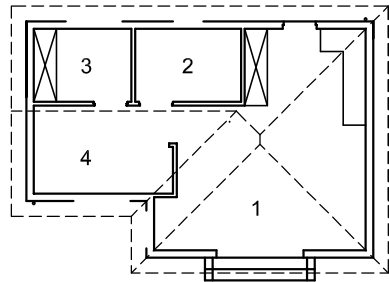
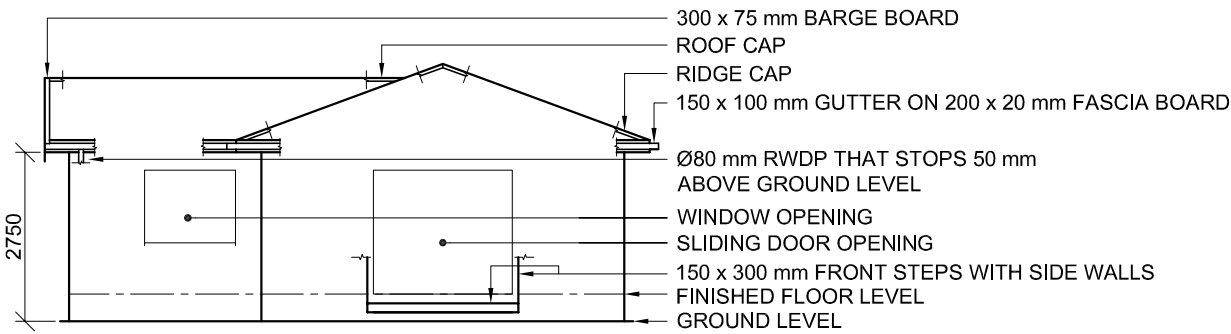
ASSESSMENT CRITERIA					
1	CONSTRUCTION	6			
2	FLOOR	11			
3	WALLS	8 1/2			
4	ROOF	4 1/2			
5	WINDOWS + ARC	10			
PENALTIES (-)					
TOTAL		40			

PP

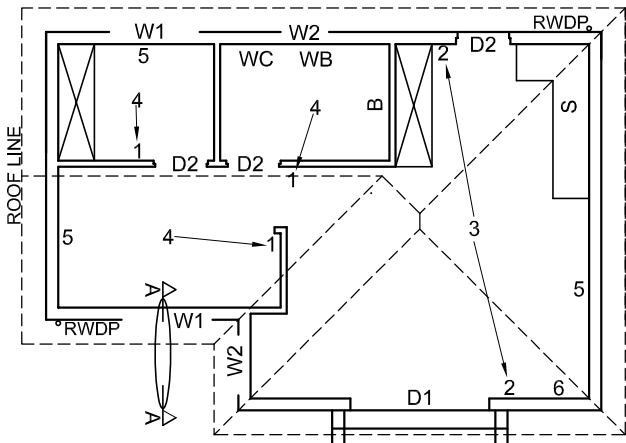


SP

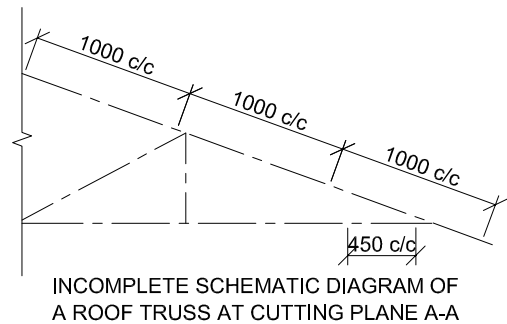
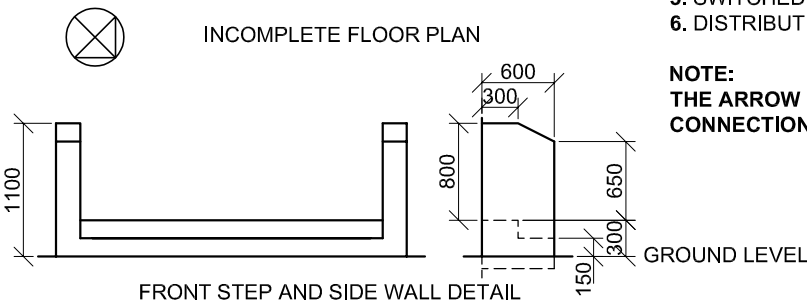
EXAMINATION NUMBER	
EXAMINATION NUMBER	
4	



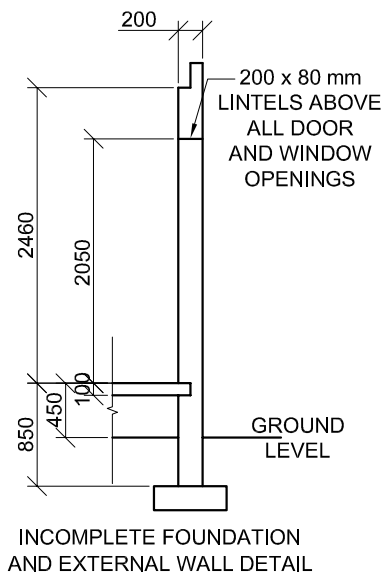
FLOOR FINISHES	
1. OPEN AREA:	TILE
2. BATHROOM:	TILE
3. BEDROOM:	CARPET
4. OFFICE:	LAMINATE



- FEATURES**
D1 SLIDING DOOR
D2 DOOR
W1 WINDOW
W2 WINDOW
- FIXTURES**
B BATH
S SINK
WC TOILET
WB WASH BASIN
- ELECTRICAL FITTINGS**
1. ONE-WAY SWITCH - SINGLE-POLE
2. TWO-WAY SWITCH
3. FLUORESCENT LIGHT 4 x 40 W
4. CEILING LIGHT
5. SWITCHED SOCKET OUTLET
6. DISTRIBUTION BOARD



- ROOF NOTES:**
20° ROOF PITCH
114 x 40 mm ROOF TRUSSES ON
114 x 40 mm WALL PLATES
400 mm ROOF OVERHANG TO END OF
ROOF TRUSS
40 mm CORRUGATED ROOF SHEET ON
75 x 50 mm PURLINS @ 1000 mm c/c
300 x 75 mm BARGE BOARD ON GABLE ENDS AND
200 x 20 mm FASCIA BOARD WITH
150 x 100 mm GUTTERS ON ALL SIDES
10 mm CEILING BOARD ON 40 x 40 mm
BRANDERING STRIPS @ 450 mm c/c



DOOR AND WINDOW SCHEDULE	
WINDOW (W1) 	
WINDOW (W2) 	
SLIDING DOOR (D1) TO FIT 600 2050 100	
DOOR (D2) TO FIT 50 2050	
WINDOW NOTES: - A = OPENING SIDE - B = FIXED PANEL - ALL FRAMES = 50 mm THICK 200 x 20 mm FIBRE CEMENT SILL UNDER ALL WINDOWS	

ROOF COMPONENTS		ELECTRICAL SYMBOLS	
	200 x 20 mm FASCIA BOARD		
	150 x 100 mm GUTTER		
	75 x 50 mm PURLINS		
	300 x 75 mm BARGE BOARD		
	ROOF CAP AND RIDGE CAP		

FIXTURES			
BATH (B)	SINK (S)	TOILET (WC)	WASH BASIN (WB)

QUESTION 4: CIVIL DRAWING

- Given:**
- The incomplete north-east elevation of a **new house**, showing the walls, the window and sliding door openings, the front steps, roof and labels
 - The incomplete floor plan showing the walls, front steps, positions of the doors, windows, fixtures and electrical layout
 - The front step and side wall detail
 - An incomplete schematic diagram of a roof truss at cutting plane A-A and roof notes
 - The incomplete foundation and external wall detail
 - Room designations and floor finishes
 - A door and window schedule
 - A table of roof components
 - A table of electrical symbols
 - A table of fixtures
 - The incomplete floor plan and ground level of the **new house**, drawn to scale 1 : 50, and the incomplete foundation and break lines for the detailed section, drawn to scale 1 : 20, on page 6

- Instructions:**
Answer this question on page 6.
- 4.1 Using the given incomplete floor plan and ground level, draw, to scale 1 : 50, the following views of the **new house**:
- 4.1.1 **THE COMPLETE FLOOR PLAN**
Add the following features to the drawing:
- ALL doors and windows
 - ALL fixtures as indicated by abbreviations
 - ALL electrical fittings as indicated by the numbers
 - ALL hatching detail
- 4.1.2 **THE COMPLETE NORTH-EAST ELEVATION**
Show the following features on the drawing:
- The outside walls, window, sliding door and step detail
 - The roof detail including the fascia boards, barge board, gutters and rainwater down-pipe
 - The finished floor level
- 4.2 Using the incomplete foundation and break lines on page 6, draw, to scale 1 : 20, a **DETAILED SECTION** on cutting plane A-A of the area in the ellipse shown on the incomplete floor plan.
- Show the following features on the drawing:**
- The complete foundation, external wall, slab and window detail
 - The roof detail including ALL rainwater items
 - The W2 window, roof and rainwater item detail, to the right (north-west) of cutting plane A-A
 - ALL hatching detail. ONLY the substructure hatching may be drawn in neat freehand.

- Label the following:**
- The floor finishes
 - Ground level, finished floor level and damp-proof course (use the correct abbreviations and show them on ALL relevant views)

NOTE:
ALL drawings must comply with the **guidelines** and **graphical symbols** as contained in the **SANS 10143**.

GL

NORTH-EAST ELEVATION

ROOF LINE

BEDROOM

BATHROOM

OFFICE

OPEN AREA

RWDP

RWDP

FLOOR PLAN
SCALE 1 : 50

SECTION A-A
SCALE 1 : 20

MARK ALLOCATION FOR SECTION OF ROOF			FOR OFFICIAL USE ONLY		
A			INCORRECT SCALE(S) USED		
B			NON-ALIGNMENT OF VIEWS		
C			VIEW(S) ROTATED		
D			SECTION VIEWED INCORRECTLY		
E			INCORRECT LETTERING		
F					
G					
H					
J					
TOTAL			TOTAL		

ASSESSMENT CRITERIA				
FLOOR PLAN				
		POSSIBLE	OBTAINED	SIGN
1	DOORS + WINDOWS	13 1/2		
2	FIXTURES	8		
3	ELECTRICAL	9 1/2		
4	HATCHING	3		
5	LABELS	2		
SUBTOTAL		36		
NORTH-EAST ELEVATION				
1	ROOF + RWDP	8 1/2		
2	WALLS + STEPS	7		
3	DOOR + WINDOW	8		
4	LABELS	1 1/2		
SUBTOTAL		24		
DETAILED SECTION				
1	ROOF DETAIL	13 1/2		
2	SLAB + WALL	4 1/2		
3	HATCHING	5 1/2		
4	WINDOWS	7		
5	LABELS	1 1/2		
SUBTOTAL		32		
TOTAL		92		
PENALTIES (-)				
GRAND TOTAL				
EXAMINATION NUMBER				
EXAMINATION NUMBER				6



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NATIONAL SENIOR CERTIFICATE

GRADE 12

ENGINEERING GRAPHICS AND DESIGN P1

NOVEMBER 2023

MARKING GUIDELINES

MARKS: 100

These marking guidelines consist of 8 pages.

ANSWERS

1	acearc@africa.com / ACEARC@AFRICA.COM	1
2	1 : 450	1
3	30/01/2023	1
4	QUALITY STREET	1
5	351	1
6	<u>BRICK</u> PAVING	1
7	3	1
8	SPEED <u>HUMP</u>	1
9	1 : 40	1
10	2500	1
11	GULLY	1
12	EVERGREEN <u>TREE</u> (TREE = $\frac{1}{2}$)	1
13	ADJACENT BUILDING / <u>CIVIL</u> STRUCTURE	1
14	<u>EXISTING</u> SEWER LINE	1
15	0,15	1
16	RED	1
17	SOUTH EAST / EAST-SOUTH-EAST / SE	2
18	1800	2
19	See below	3
20		3
21		4
TOTAL		30

ANSWER 19

Show ALL calculations.

APPLYING CORRECT FORMULA ✓

$$P = AB + BC + CD + DE + EA$$

$$= 40 + 48 + 23,34 + 7,5 + 44,56$$

$$= 163,4 \quad \text{ANSWER IN METRES} \quad \checkmark$$

ANSWER 20

Show ALL calculations.

APPLYING CORRECT FORMULA ✓

$$A = (10 \times 9,2) + (7,4 \times 4) + (6,2 \times 3,2)$$

$$= 92 + 29,6 + 19,84$$

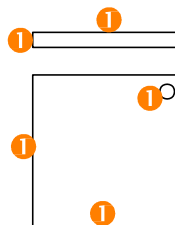
$$= 141,44 \quad \text{ANSWER IN SQUARE METRES} \quad \checkmark$$

ANSWER 21

NOT FAOP

(a)

$$= -\frac{1}{2}$$

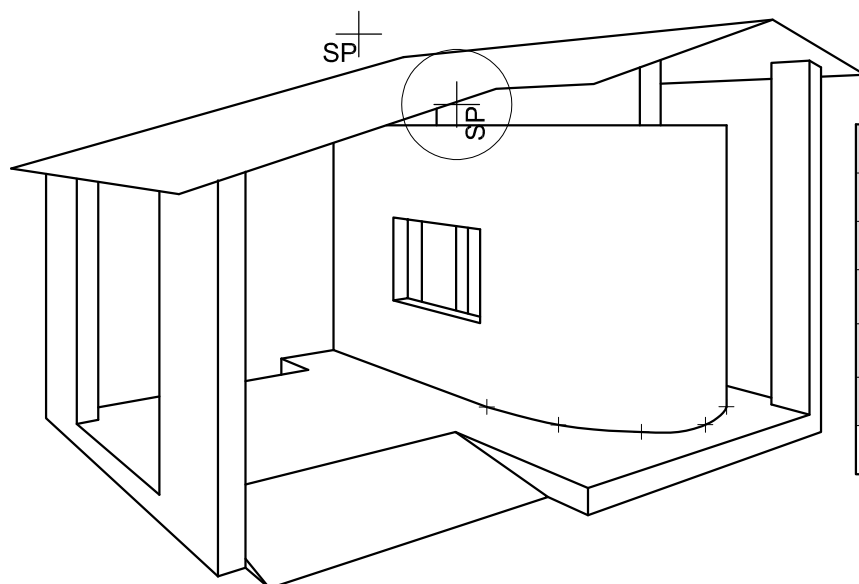
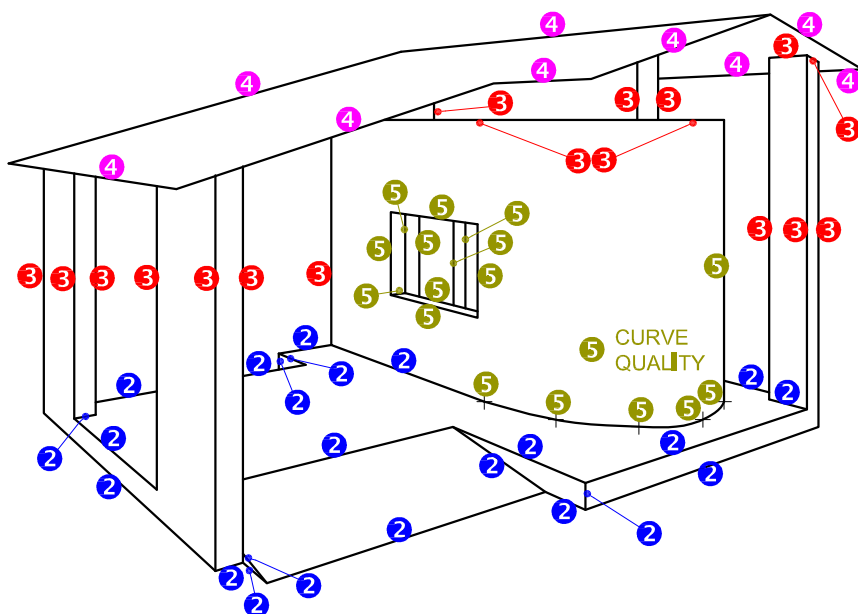
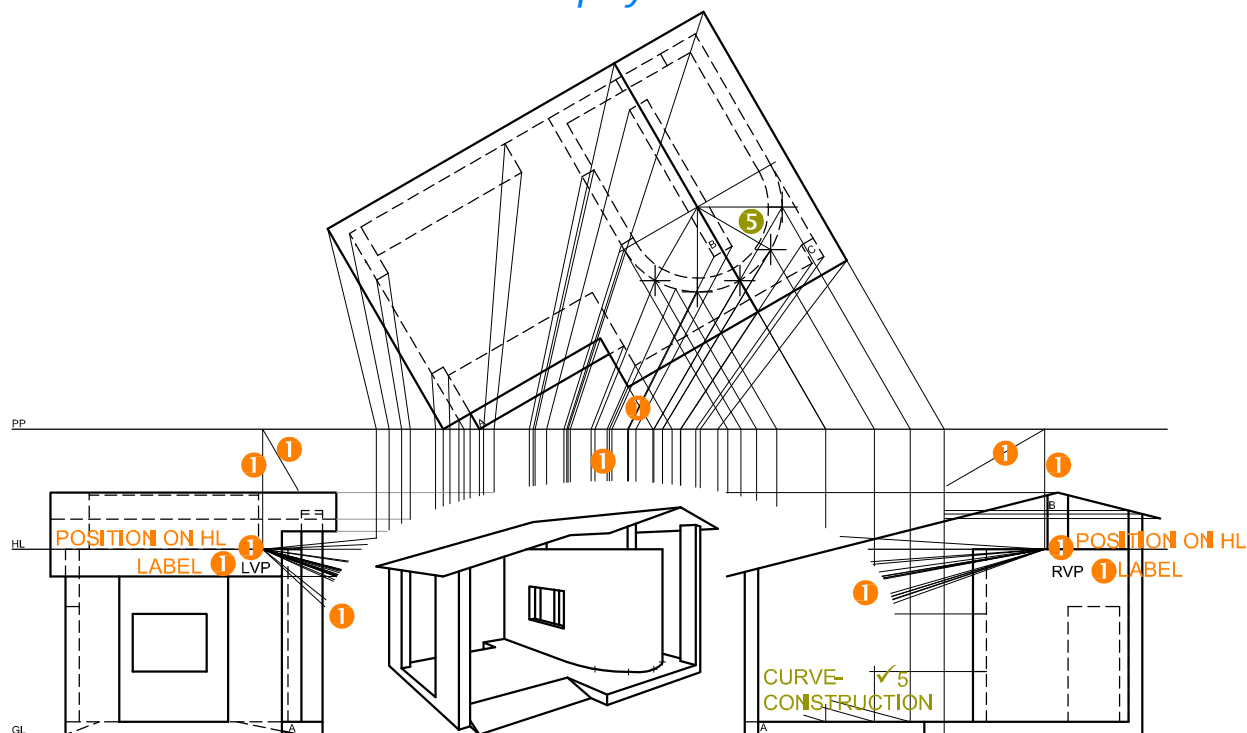


(b)



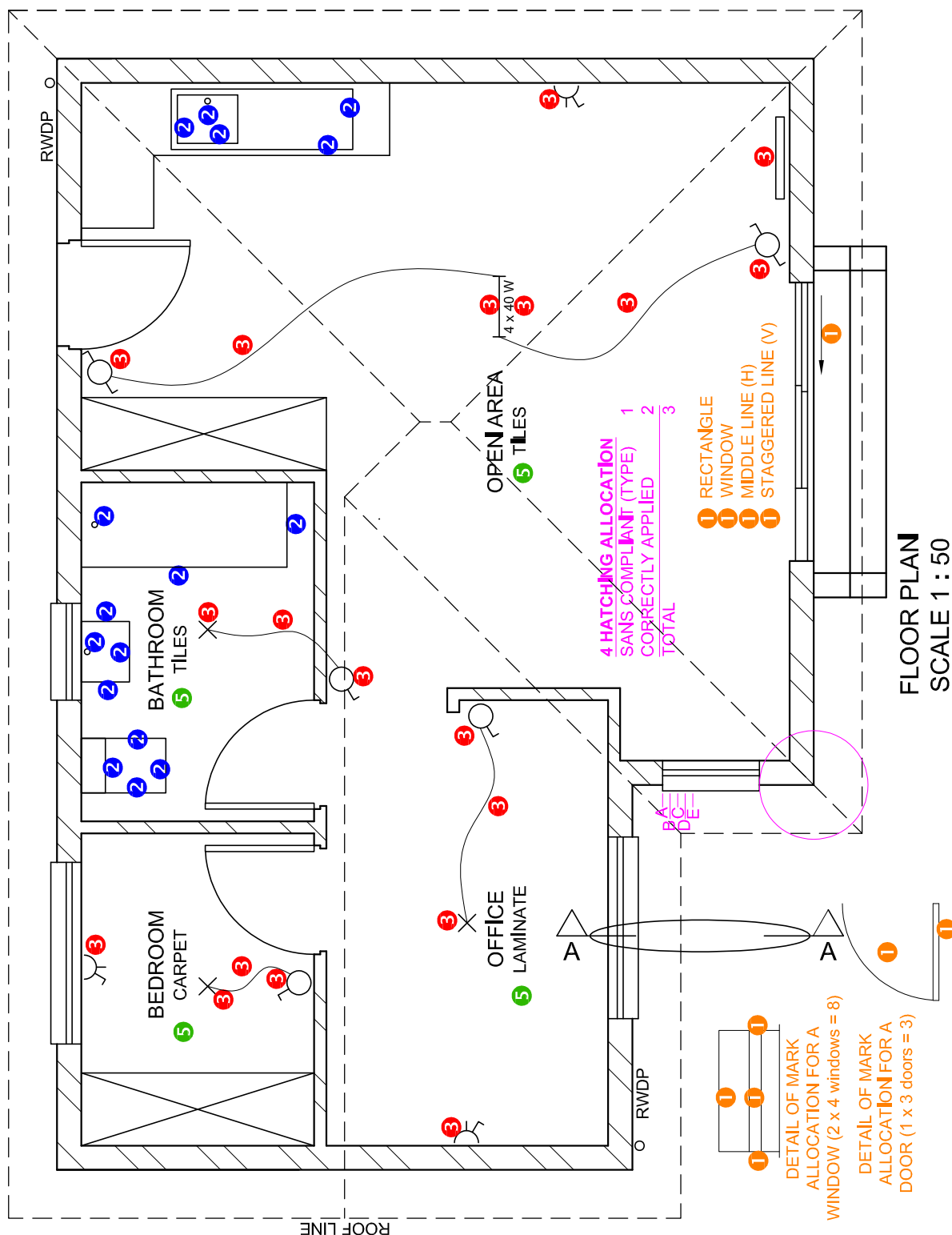
1 FREEHAND

PAPER 1 QUESTION 1
GRADE 12
NOVEMBER 2023
MARKING GUIDELINES



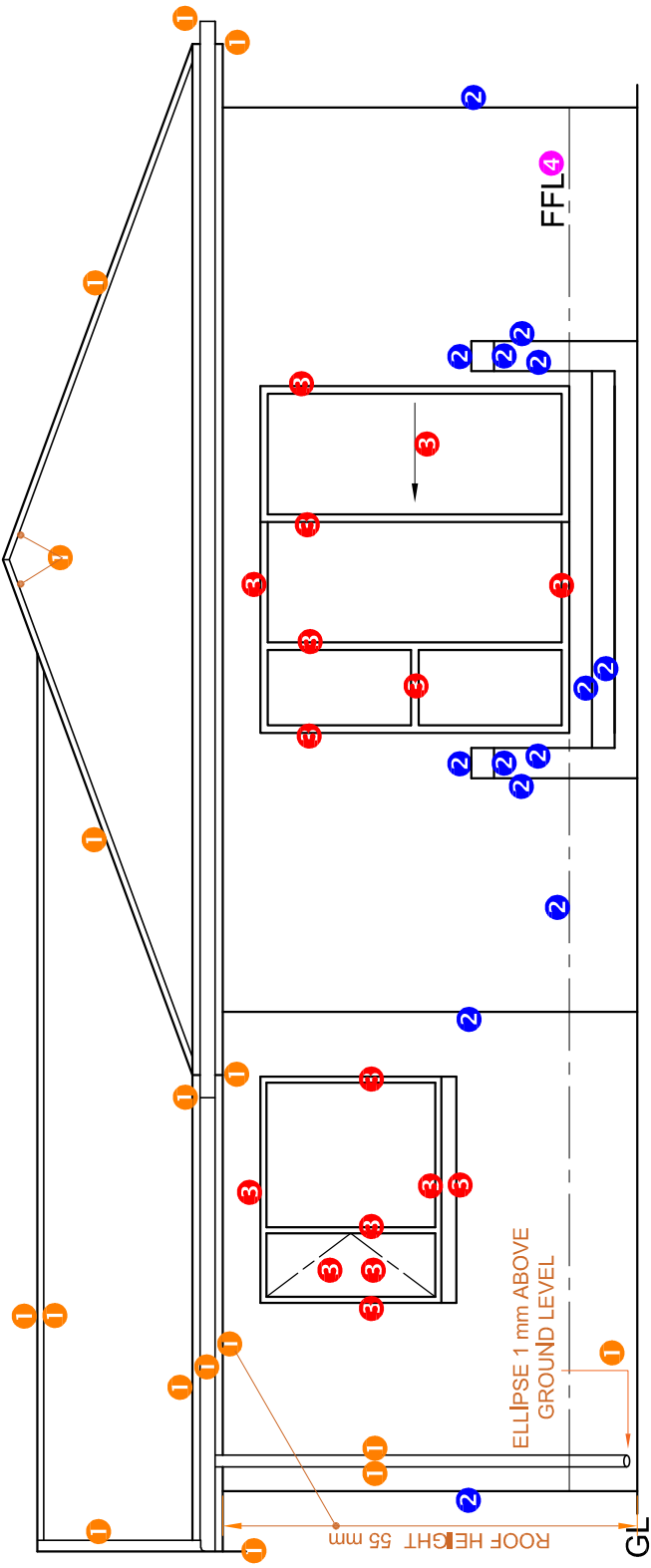
ASSESSMENT CRITERIA		
1	CONSTRUCTION	6
2	FLOOR	11
3	WALLS	8 $\frac{1}{2}$
4	ROOF	4 $\frac{1}{2}$
5	WINDOWS + ARC	10
TOTAL		40

PAPER 1 QUESTION 3
GRADE 12
NOVEMBER 2023
MARKING GUIDELINES



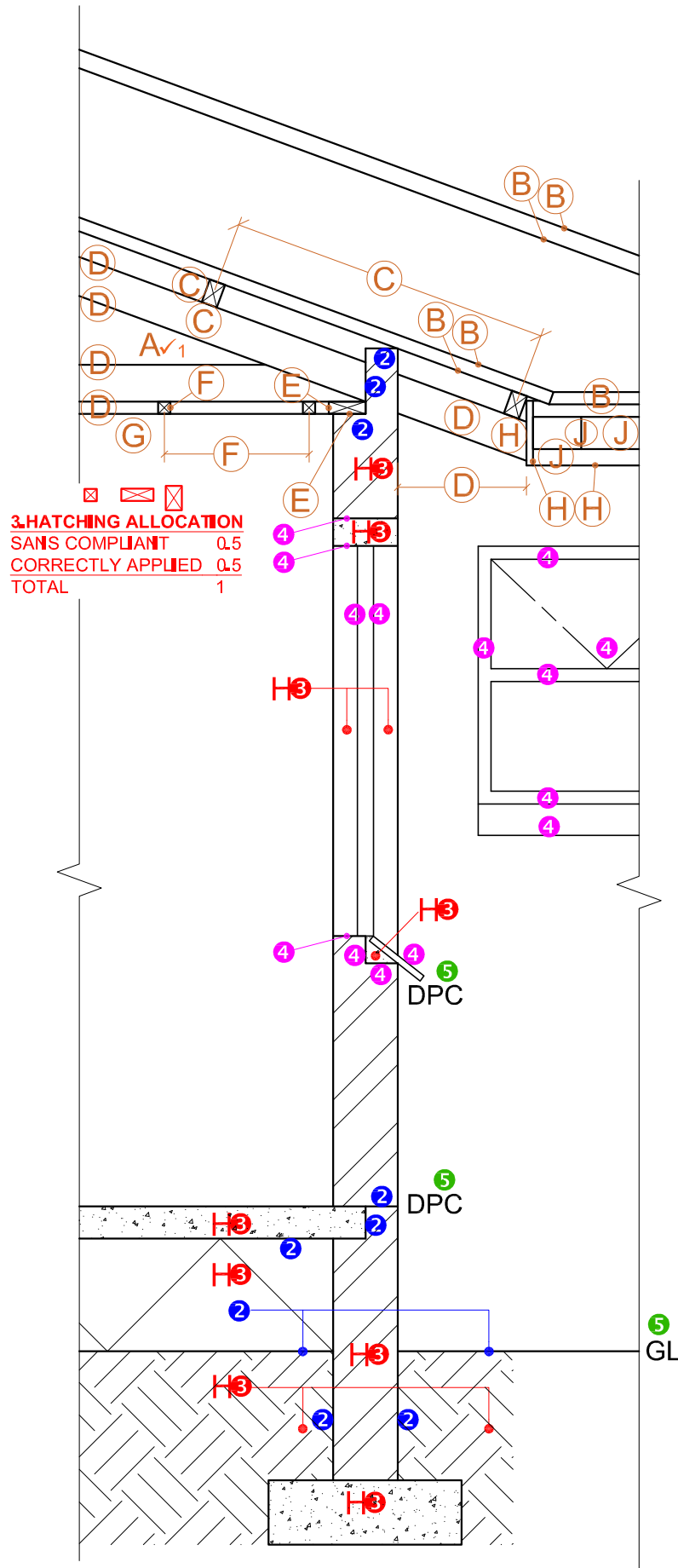
ASSESSMENT CRITERIA		FLOOR PLAN	
1	DOORS + WINDOWS	13	$1\frac{1}{2}$
2	FIXTURES	8	
3	ELECTRICAL	9	$1\frac{1}{2}$
4	HATCHING	3	
5	LABELS	2	
SUBTOTAL		36	

PAPER 1 QUESTION 4
GRADE 12
NOVEMBER 2023
MARKING GUIDELINES



ASSESSMENT CRITERIA	
NORTH EAST ELEVATION	
1	ROOF + RWDP 8 ¹ / ₂
2	WALLS + STEPS 7
3	DOOR + WINDOW 8
4	LABELS 1 ¹ / ₂
SUBTOTAL 24	

PAPER 1 QUESTION 4
GRADE 12
NOVEMBER 2023
MARKING GUIDELINES



3. HATCHING ALLOCATION
 SANS COMPLIANT 0.5
 CORRECTLY APPLIED 0.5
 TOTAL 1

1. MARK ALLOCATION FOR ROOF

A: ROOF ANGLE	1
B: ROOF SHEET + R. CAP	2.5
C: PURLIN + SPACING	1.5
D: TRUSS + OVERHANG	3
E: WALL PLATE	1
F: BRANDING + SPACING	1
G: CEILING BOARD	0.5
H: FACIA	1.5
J: GUTTER	1.5
TOTAL	13.5

ASSESSMENT CRITERIA

DETAILED SECTION

1	ROOF DETAIL	13 $\frac{1}{2}$
2	SLAB + WALL	4 $\frac{1}{2}$
3	HATCHING	5 $\frac{1}{2}$
4	WINDOWS	7
5	LABELS	1 $\frac{1}{2}$
SUBTOTAL		32

SECTION A-A
SCALE 1 : 20

PAPER 1 QUESTION 4
 GRADE 12
 NOVEMBER 2023
 MARKING GUIDELINES