



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL
SENIOR CERTIFICATE

GRADE 12

ENGINEERING GRAPHICS AND DESIGN P1

NOVEMBER 2021

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			$\frac{1}{2}$	SIGN
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 SUB-A AND SUB-B OF STAND 32.

CORNER HEIGHTS IN METRES		BOUNDARY LENGTHS IN METRES	
A	351,5	AB	38,16
B	349,2	BC	60
C	351,5	CD	38,16
D	352,2	DA	60
E	351,5	FD	33,8
F	351,7	EG	33,8
G	350,4	FG	34,56

SYMBOL LEGEND:

1. SHRUBBERY

2. PALM TREES

3. DECIDUOUS TREES

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 20

In the space below, draw, in neat freehand, the front view and top view of the SANS 10143 graphical symbol for a BIDET.

2

2021-02-14

ADD NEW STORM WATER DRAIN AT LOWEST CORNER

1

2021-01-23

INCREASE WIDTH OF DRIVEWAY

REVISION

DATE

DESCRIPTION

CLASSIC DESIGN ARCHITECTS

459 CONCORD RD
CAPE TOWN

www.clasdes.co.za

PRINTED BY:
DUPLEX PRINTING

DATE OF PRINT:
2021-02-21

DRAWING TITLE:

SITE PLAN

PROJECT:

PROPOSED NEW HOUSE AND GARAGE ON SUBDIVISION B OF STAND 32 FOR ROSS WATSON, 25 AUSTEN STREET, PIKETBERG, 1965

PROJECT NUMBER:
JBV-500W

DRAWING NUMBER:
AAG-2121

DATE:
2021-01-10

DRAWN:
JOHN

CHECKED:
WAYNE

SCALE:
1 : 350

REFERENCE CODE:
Q1R-2021

QUESTION 1: ANALYTICAL (CIVIL)

Given:

The site plan of newly subdivided STAND 32 with new boundary and building lines as well as a proposed new house and garage, 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.

[30]

QUESTIONS

ANSWERS

1

What is the project number?

1

2

Who prepared the drawing?

1

3

What is the date of the first revision?

1

4

Name the company that printed the drawing.

1

5

What size pipe is used for the new sewer line?

1

6

What does the abbreviation /C at 1 stand for?

1

7

What type of tree is indicated at 2?

1

8

Name the constructed feature at 3.

1

9

What is indicated by the arrow at 4?

1

10

Name the feature at 5.

1

11

How many inspection eyes are there on the proposed new house?

1

12

In what colour should drain and soil pipes be indicated on drainage installation drawings?

1

13

With reference to the building regulations, why should the existing outbuilding be demolished now?

2

14

What is the fall of the existing sewer line?

1

15

What is the shortest distance from the existing house to Austen Street in metres?

2

16

With reference to the second revision, closest to which corner of SUB-B of STAND 32 should a new stormwater drain be placed?

1

17

With reference to the north point, what is the direction of flow of the municipal sewer line?

2

18

In the space below (ANSWER 18), determine the perimeter of SUB-B of STAND 32, including the new driveway, in metres.

3

19

In the space below (ANSWER 19), determine the total area of the proposed new house in square metres.

3

20

In the space in the title panel (ANSWER 20), draw, in neat freehand, the front view and top view of the SANS 10143 graphical symbol for a BIDET.

4

TOTAL

30

ANSWER 18. Show ALL calculations.

15900

12400

2600

3300

8000

4100

5000

ANSWER 19. Show ALL calculations.

EXAMINATION NUMBER

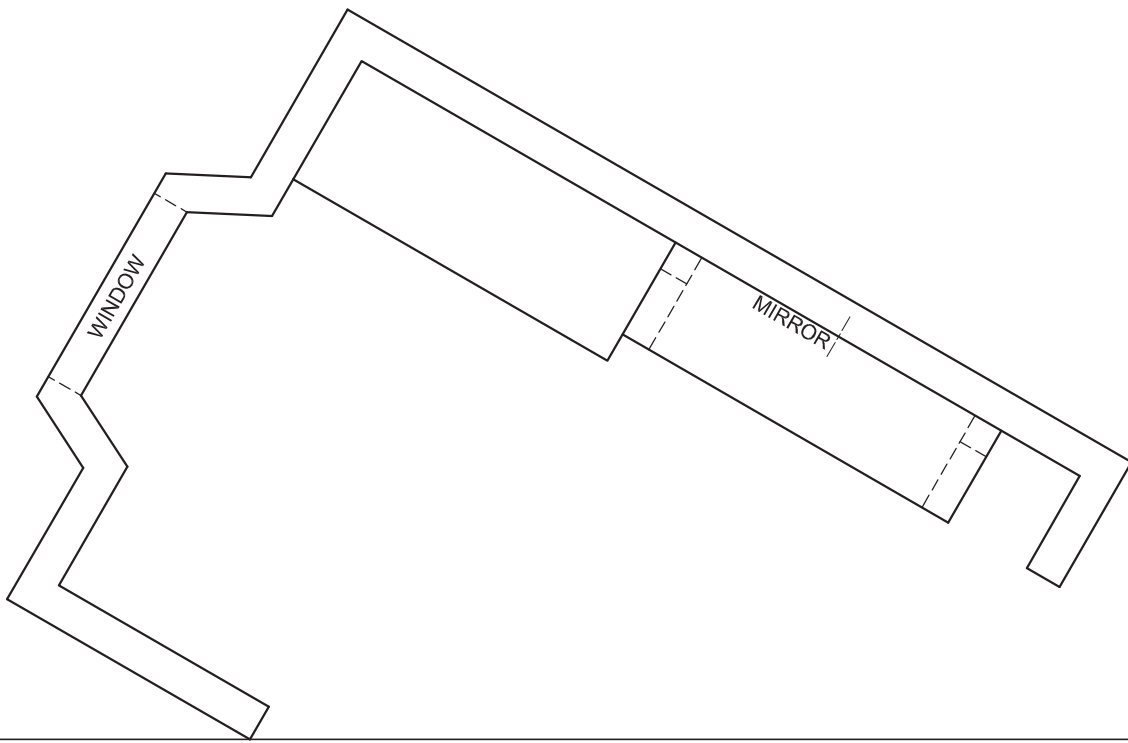
EXAMINATION NUMBER

2

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Basic Education

Please turn over



QUESTION 3: PERSPECTIVE

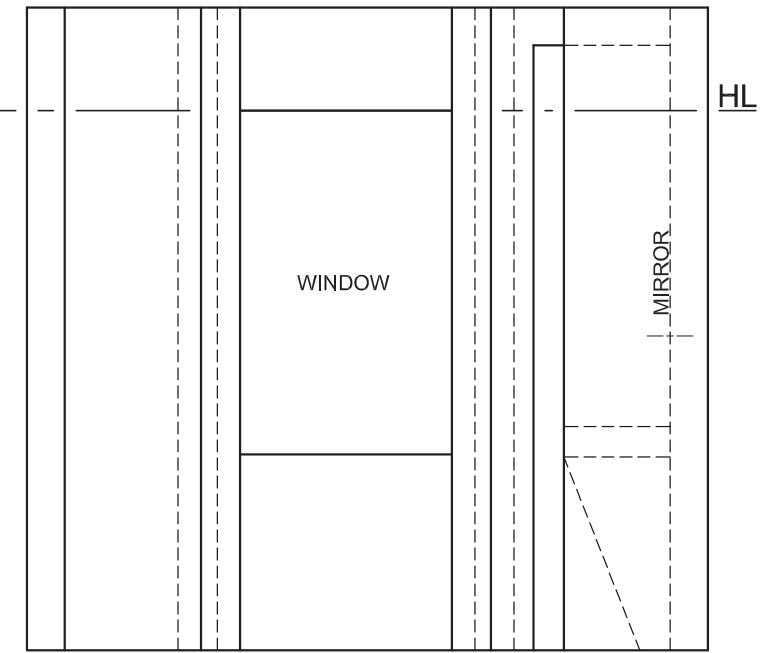
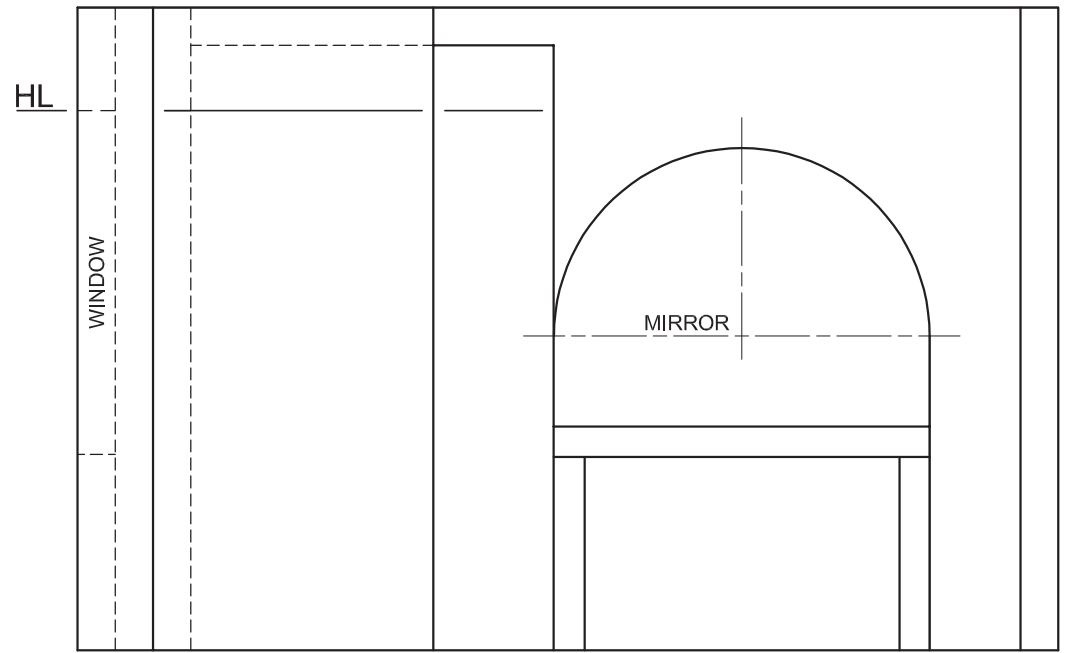
Given:
Three views of the inside of a dressing room
and the information needed to draw a two-point
perspective drawing
PP – Picture plane
HL – Horizon line
GL – Ground line
SP – Station point

Instructions:
Complete the perspective drawing.

- Align the drawing sheet with the ground line (GL).
- Determine and label the vanishing points.
- Show ALL construction.
- NO hidden detail is required.

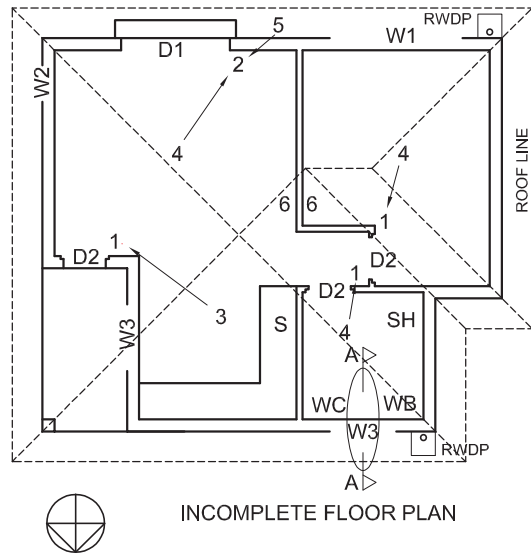
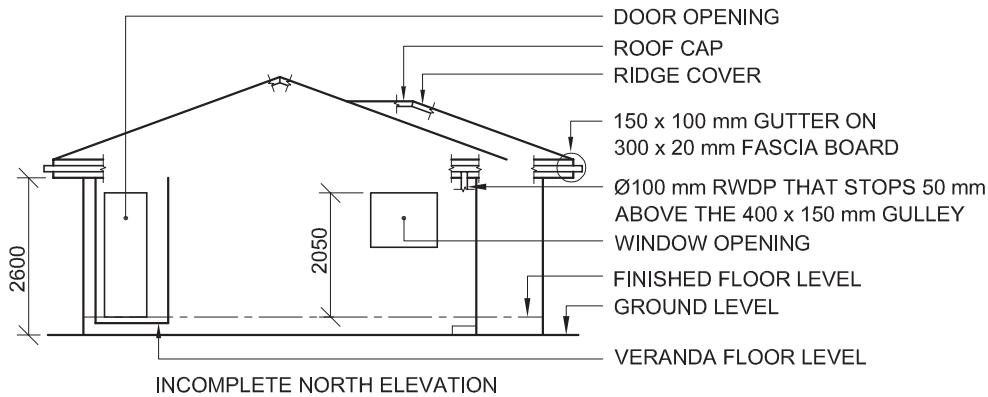
[40]

PP

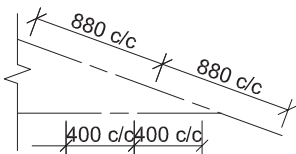


SP

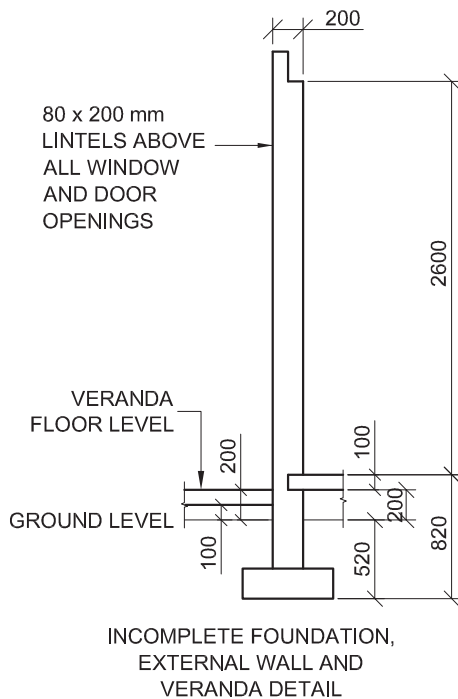
ASSESSMENT CRITERIA				
1	CONSTRUCTION	6		
2	WALLS + CUPBOARD + WINDOW	20		
3	TABLE + MIRROR	14		
PENALTIES (-)				
TOTAL		40		
EXAMINATION NUMBER				
EXAMINATION NUMBER				4



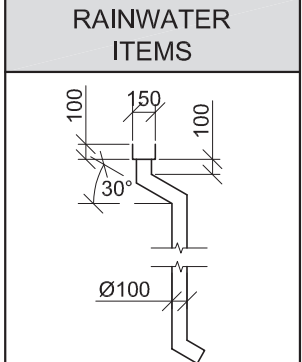
- FEATURES**
D1 SLIDING DOOR
D2 DOOR
W1 WINDOW
W2 WINDOW
W3 WINDOW
- FIXTURES**
WC TOILET
WB WASH BASIN
SH SHOWER
S SINK
- ELECTRICAL FITTINGS**
1. ONE-WAY SWITCH - SINGLE-POLE
2. ONE-WAY SWITCH - DOUBLE-POLE
3. FLUORESCENT LIGHT 3 x 45 W
4. CEILING LIGHT
5. WALL-MOUNTED LIGHT
6. SWITCHED SOCKET OUTLET
- NOTE:**
THE ARROW SHOWS THE LIGHT CONNECTION TO THE SWITCH.



- ROOF NOTES:**
20° ROOF PITCH
- 114 x 40 mm ROOF TRUSSES ON
114 x 40 mm WALL PLATES
- 500 mm ROOF OVERHANG TO END OF
ROOF TRUSS
- 20 mm FIBRE CEMENT ROOF SHEET
ON 75 x 50 mm PURLINS @ 880 mm c/c
- 300 x 20 mm FASCIA BOARD WITH
150 x 100 mm GUTTER ON ALL SIDES
- 10 mm CEILING BOARD ON 40 x 40 mm
BRANDING STRIPS @ 400 mm c/c



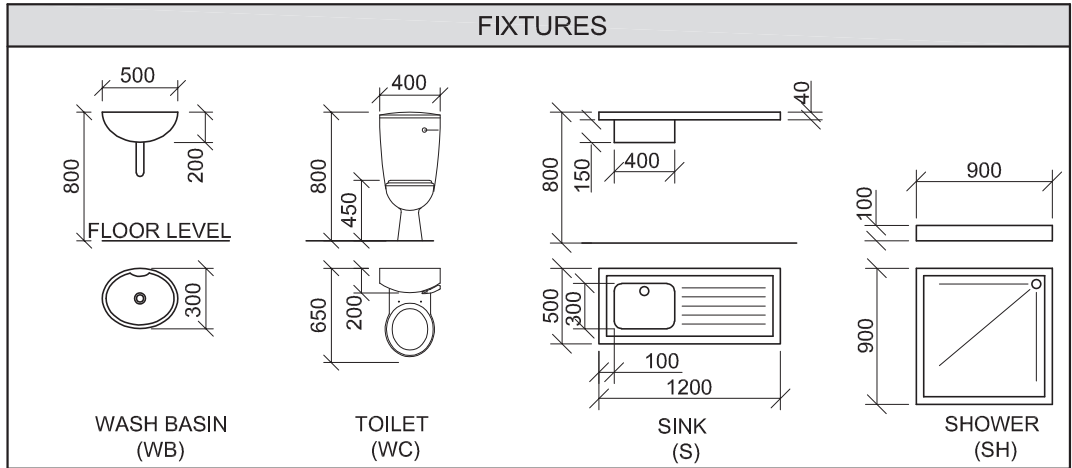
- FLOOR FINISHES**
BEDROOM: CARPET
BATHROOM: TILES
LIVING ROOM: WOOD
KITCHEN: TILES
VERANDA: TILES



DOOR AND WINDOW SCHEDULE			
TO FIT	TO FIT	50	2200
SLIDING DOOR (D1)	DOOR FRAME AND DOOR (D2)		WINDOW (W1)
WINDOW NOTES: • A = OPENING SIDE • B = FIXED PANEL • ALL FRAMES = 50 mm • 150 x 20 mm FIBRE CEMENT SILL UNDER ALL WINDOWS			
		WINDOW (W2)	WINDOW (W3)

ELECTRICAL SYMBOLS	

ROOF COMPONENTS	
	300 x 20 mm FASCIA BOARD
	150 x 100 mm GUTTER
	ROOF CAP AND RIDGE COVER



QUESTION 4: CIVIL DRAWING

- Given:**
- The incomplete north elevation of a **new house**, showing the walls, the window and door openings, the veranda, the roof and labels
 - The incomplete floor plan showing the walls, positions of the doors, windows, fixtures and electrical layout
 - A schematic diagram of a roof truss at A-A and roof notes
 - The incomplete foundation, external wall and veranda detail
 - Room and area designations as well as floor finishes
 - A table of rainwater items
 - A door and window schedule
 - A table of electrical symbols
 - A table of roof components
 - A table of fixtures
 - The incomplete floor plan and the ground line of the **new house**, drawn to scale 1 : 50, and the incomplete foundation and a break line for the detailed section, drawn to scale 1 : 20, on page 6.

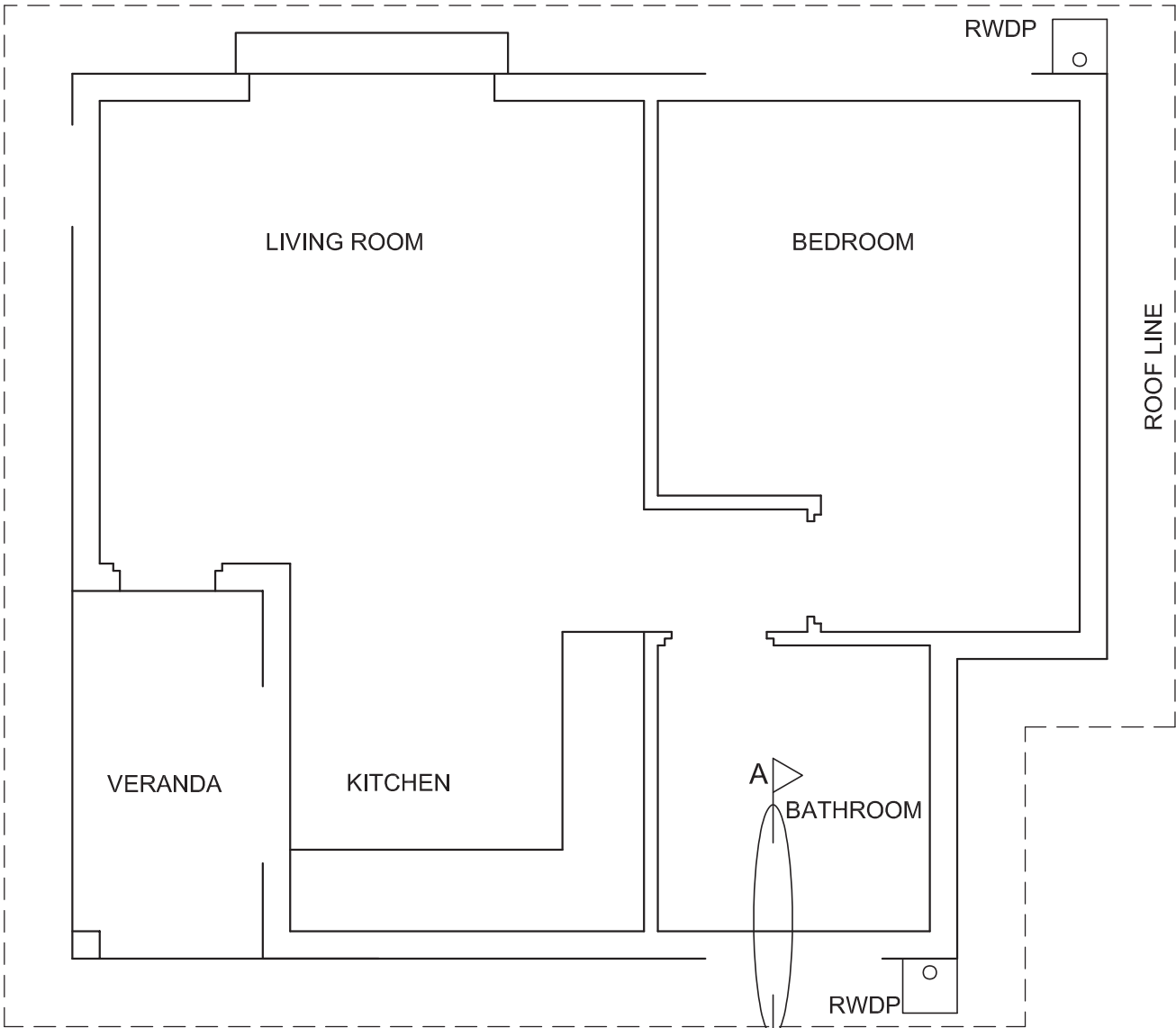
- Instructions:**
Answer this question on page 6.
- 4.1 Using the given incomplete floor plan, draw, to scale 1 : 50, the following views of the **new house**:
- 4.1.1 **THE COMPLETE FLOOR PLAN**
Add the following features to the drawing:
- ALL doors and windows
 - ALL fixtures as indicated by the abbreviations
 - ALL electrical fittings as indicated by the numbers
 - The complete roof lines
 - ALL hatching detail
- 4.1.2 **THE COMPLETE NORTH ELEVATION**
Show the following features on the drawing:
- The outside walls, veranda, window and door detail
 - The roof detail, including the fascia boards, gutters, rainwater down-pipe and gulley
 - The finished floor level
- 4.2 Using the given foundation and break line 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 and window detail
 - The roof detail, including the fascia board, gutter, rainwater down-pipe and gulley
 - The wash basin to the west of cutting plane A-A
 - ALL hatching detail. ONLY the substructure hatching may be drawn in neat freehand.

- Label the following:**
- The north elevation
 - The floor finishes
 - Ground level, finished floor level and damp-proof course (use the correct abbreviations and show it on ALL the relevant views)
- NOTE:**
ALL drawings must comply with the **guidelines** and **graphical symbols** as contained in the **SANS 10143**. [92]





GL



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			
TOTAL		TOTAL	

ASSESSMENT CRITERIA				
FLOOR PLAN				
		POSSIBLE	OBTAINED	SIGN
1	DOORS + WINDOWS	13		
2	FIXTURES + ROOF LINES	11		
3	ELECTRICAL	8 1/2		
4	HATCHING	3		
5	LABELS	2 1/2		
SUBTOTAL		38		
NORTH ELEVATION				
1	ROOF + RWDP + GULLEY	10 1/2		
2	WALLS + STEP + FFL	4		
3	DOOR + WINDOW	6		
4	LABELS	1		
SUBTOTAL		21 1/2		
DETAILED SECTION				
1	ROOF DETAIL	13 1/2		
2	SLAB, WALL, WINDOW + BASIN	12		
3	HATCHING	5 1/2		
4	LABELS	1 1/2		
SUBTOTAL		32 1/2		
TOTAL		92		
PENALTIES (-)				
GRAND TOTAL				
EXAMINATION NUMBER				
EXAMINATION NUMBER				6





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GRADE 12

ENGINEERING GRAPHICS AND DESIGN P1

NOVEMBER 2021

MARKING GUIDELINES

MARKS: 100

These marking guidelines consist of 8 pages.

ANSWERS		
1	JBV-500W	1
2	JOHN	1
3	2021-01-23	1
4	DUPLEX PRINTING	1
5	Ø 100	1
6	INSPECTION CHAMBER	1
7	DECIDUOUS	1
8	CONCRETE WALL	1
9	GATE OPENING	1
10	ADJACENT BUILDING/STRUCTURE/HOUSE	1
11	6	1
12	BROWN	1
13	CROSSES BUILDING LINE	2
14	1 : 40	1
15	13,2	2
16	B/TOP RIGHT/349,2	1
17	SOUTH EAST/SE	2
18	See the title panel	3
19		3
20		4
TOTAL		30

ANSWER 18

APPLYING CORRECT FORMULA ✓

$$\text{Perimeter} = AB + BC + CE + EG + FG + FA$$

$$= 38,16 + 60 + 3,6 + 33,8 + 34,56 + 26,2$$

$$= 196,32 \quad \text{CONVERTED TO METER} \quad \checkmark$$

ANSWER 19

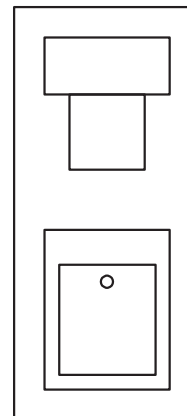
APPLYING CORRECT FORMULA ✓

$$\text{Area} = L \times B$$

$$= (15,9 \times 5,0) + (3,3 \times 5,4) + (8 \times 4,1)$$

$$= 130,12 \text{ m}^2 \quad \checkmark \quad \checkmark$$

ANSWER 20

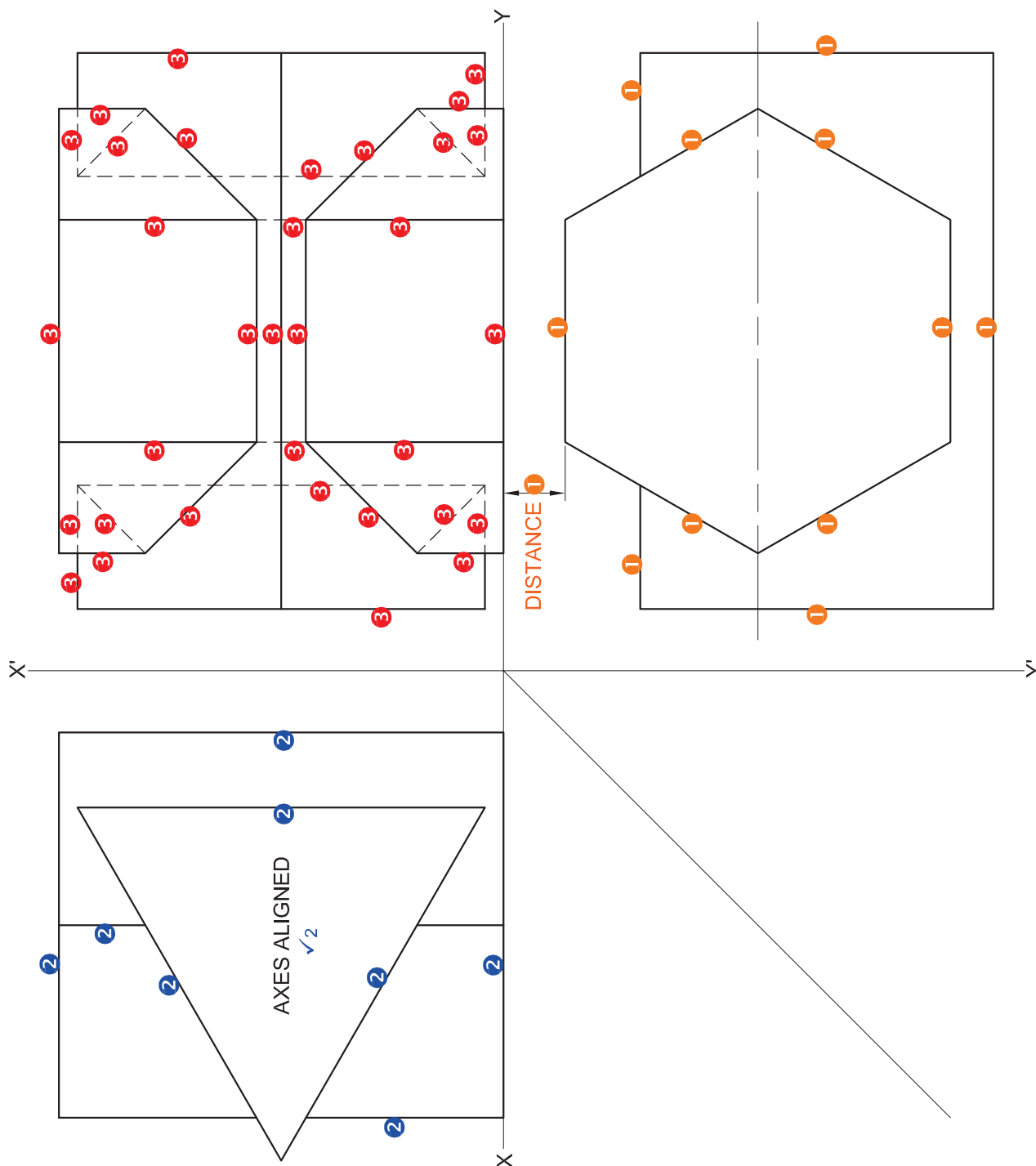


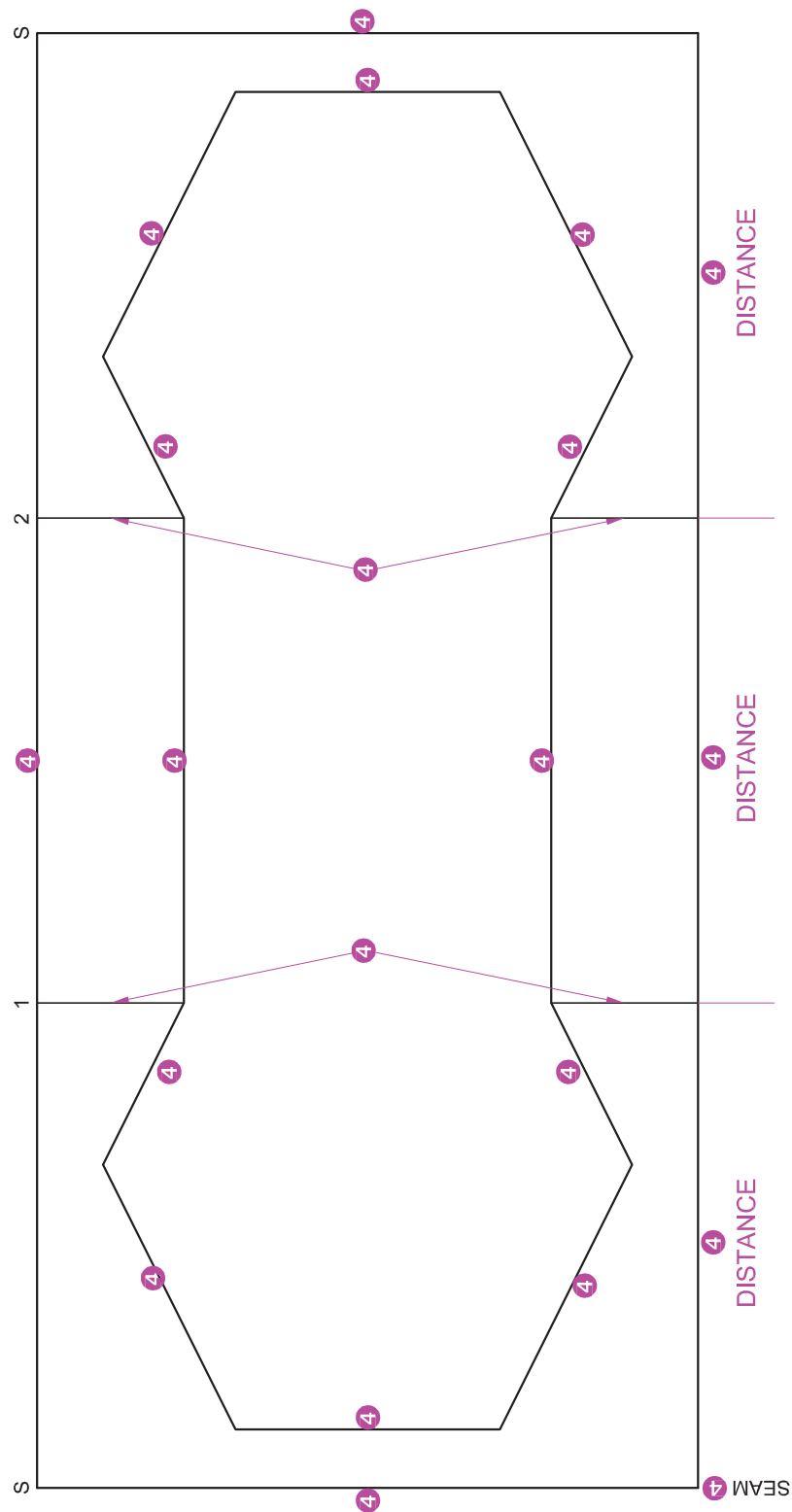
FREEHAND 0.5

 RECTANGLE (T) 1
 SQUARE/
 RECTANGLE (B) 1

 RECTANGLE (B) 0.5
 RECTANGLE (S) 0.5
 HOLE 0.5

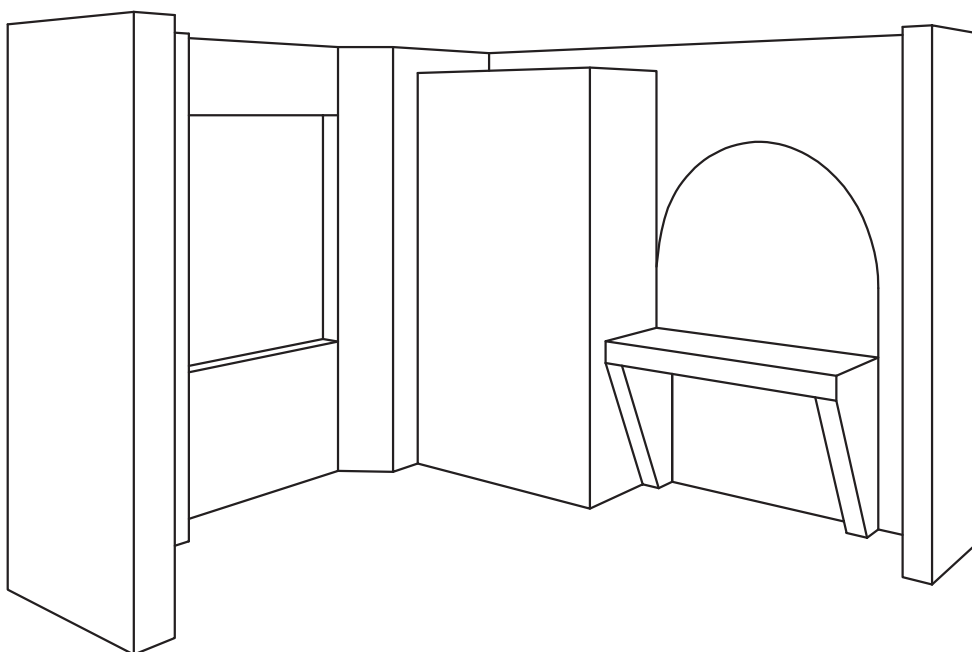
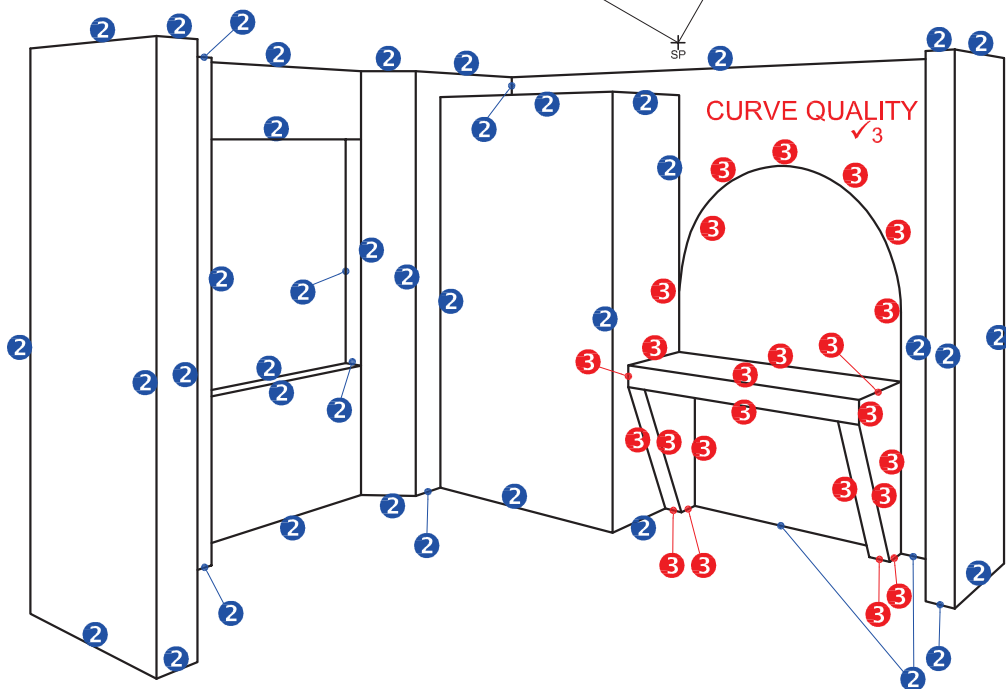
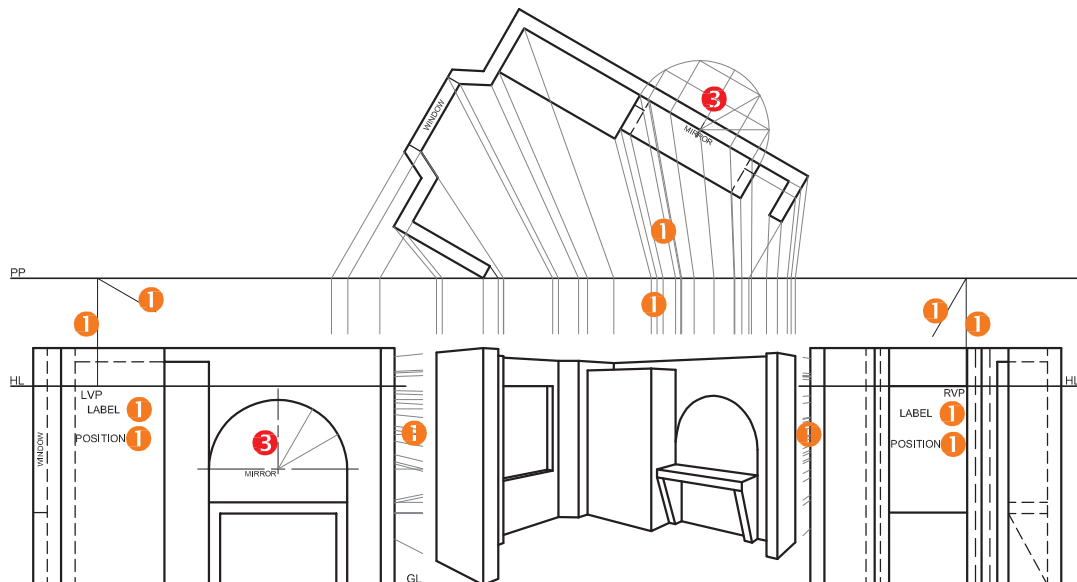
ASSESSMENT CRITERIA		
1	TOP VIEW	6
2	RIGHT VIEW	5
3	FRONT VIEW	16 $\frac{1}{2}$





ASSESSMENT CRITERIA		
4	DEVELOPMENT	10 $\frac{1}{2}$
TOTAL		38

PAPER 1 QUESTION 2
 GRADE 12
 NOVEMBER 2021
 MARKING GUIDELINE

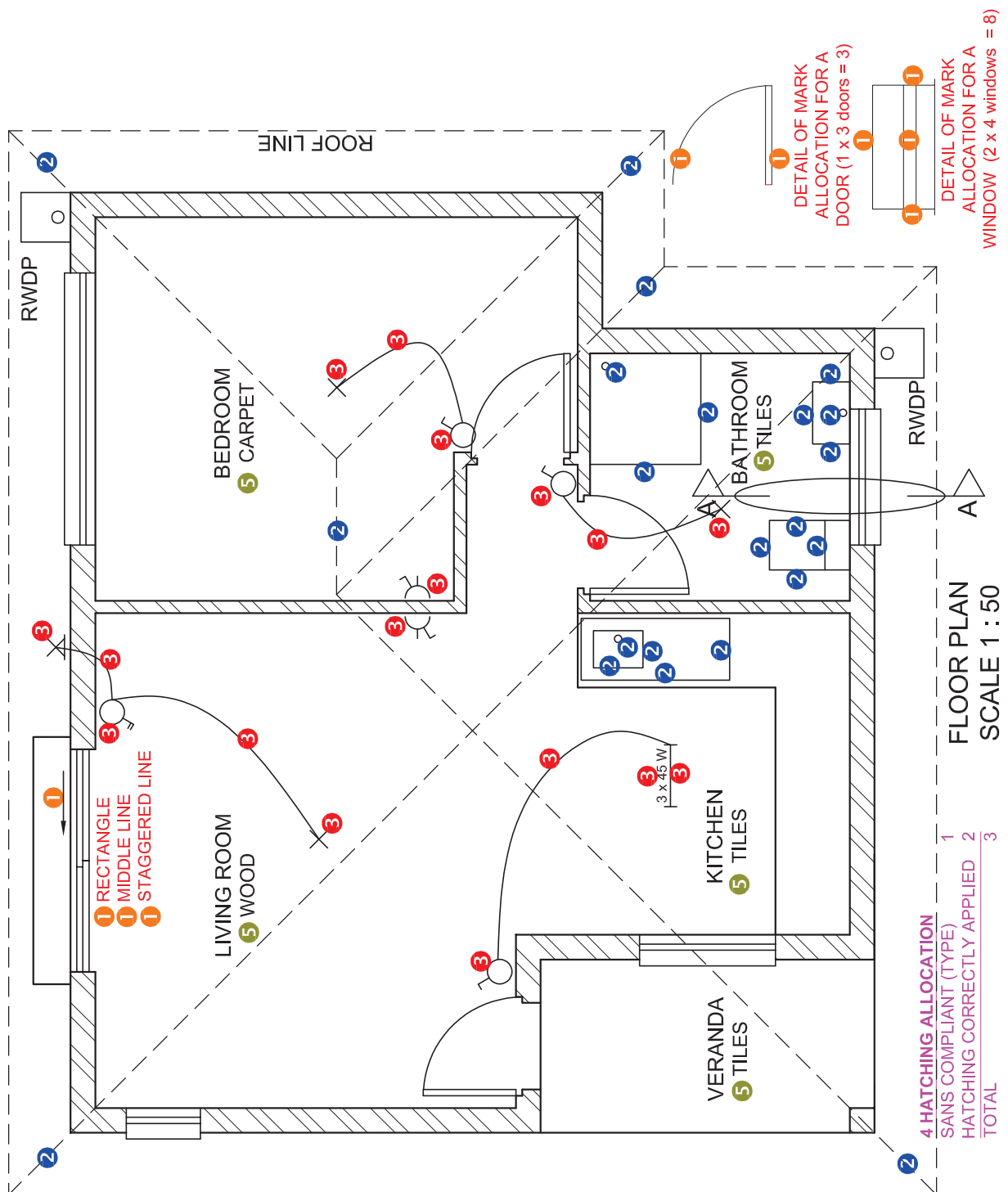


PAPER 1 QUESTION 3
GRADE 12
NOVEMBER 2021
MARKING GUIDELINE

ASSESSMENT CRITERIA		
1	CONSTRUCTION	6
2	WALLS + CUPBOARD + WINDOW	20
3	TABLE + MIRROR	14
TOTAL		40

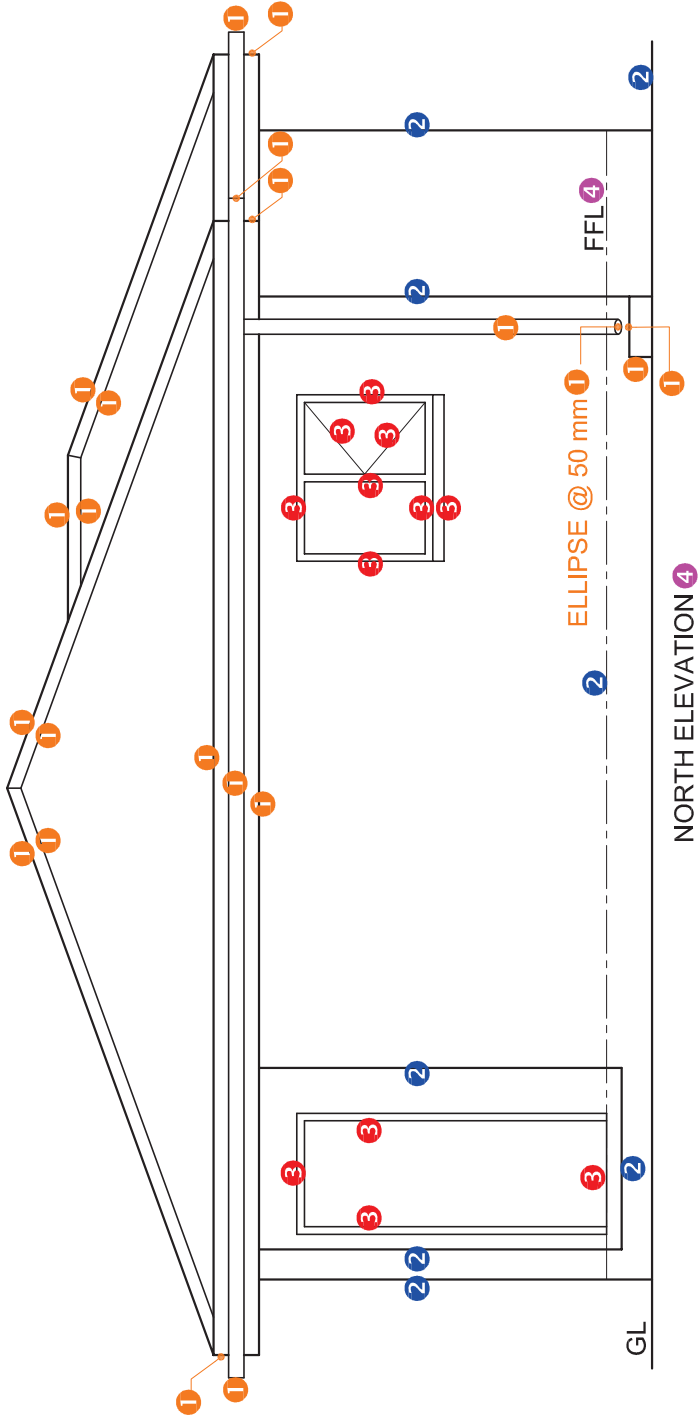
PAPER 1 QUESTION 4
GRADE 12
NOVEMBER 2021
MARKING GUIDELINE

ASSESSMENT CRITERIA	
FLOOR PLAN	
1	DOORS + WINDOWS 13
2	FIXTURES + ROOF LINES 11
3	ELECTRICAL $8\frac{1}{2}$
4	HATCHING 3
5	LABELS $2\frac{1}{2}$
SUBTOTAL 38	



PAPER 1 QUESTION 4
GRADE 12
NOVEMBER 2021
MARKING GUIDELINE

ASSESSMENT CRITERIA	
NORTH ELEVATION	
1	ROOF + RWDP + GULLEY 10 ¹ ₂
2	WALLS + STEP + FFL 4
3	DOOR + WINDOW 6
4	LABELS 1
SUBTOTAL	
21 ¹ ₂	

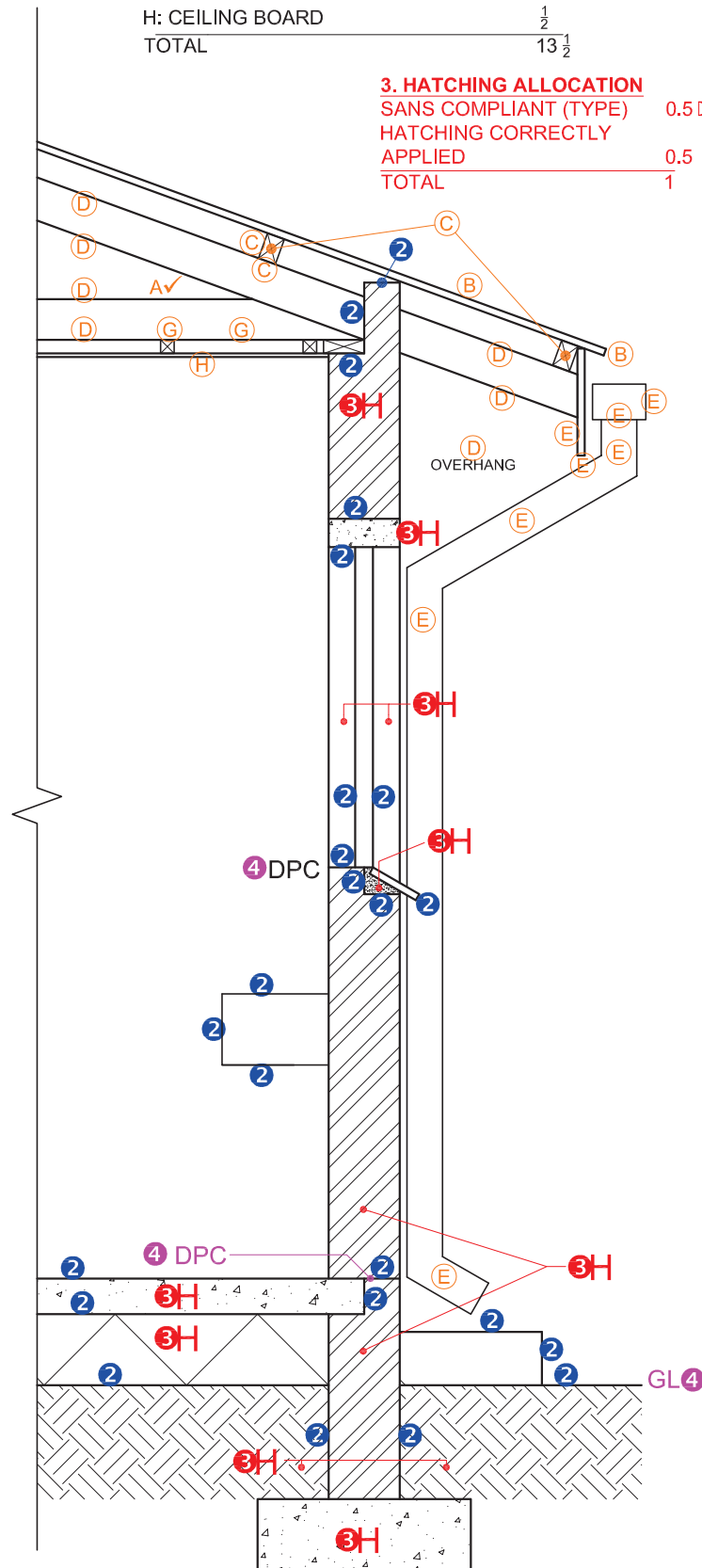


1. MARK ALLOCATION FOR ROOF

A: ROOF ANGLE	1
B: ROOF SHEET	1
C: PURLIN + SPACING	1 $\frac{1}{2}$
D: TRUSS + OVERHANG	3 $\frac{1}{2}$
E: FASCIA BOARDS, GUTTER + RWDP	4
F: WALL PLATE	1
G: BRANDING + SPACING	1
H: CEILING BOARD	$\frac{1}{2}$
TOTAL	13 $\frac{1}{2}$

3. HATCHING ALLOCATION

SANS COMPLIANT (TYPE)	0.5 
HATCHING CORRECTLY APPLIED	0.5
TOTAL	1



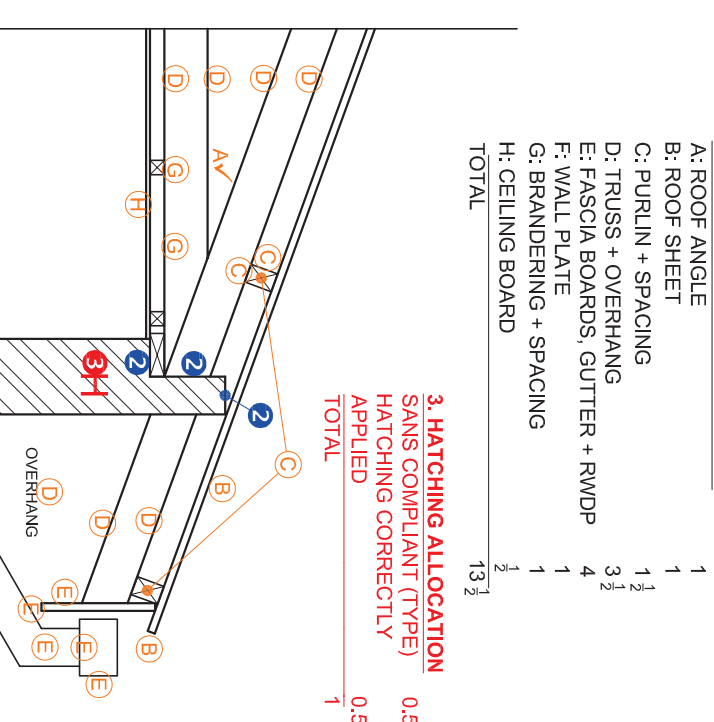
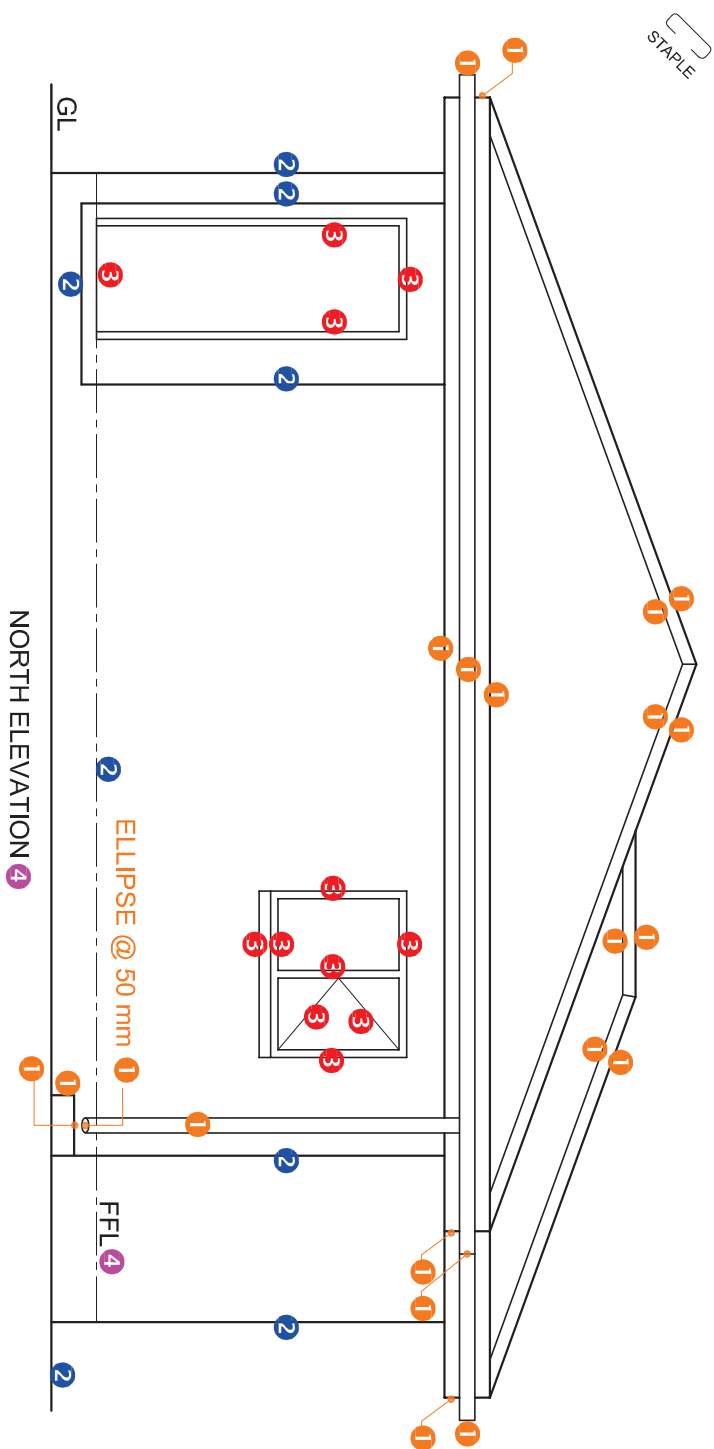
SECTION A-A
SCALE 1 : 20

PAPER 1 QUESTION 4
GRADE 12
NOVEMBER 2021
MARKING GUIDELINE

**ASSESSMENT
CRITERIA**

DETAILED SECTION

1	ROOF DETAIL	13 $\frac{1}{2}$
2	SLAB, WALL, WINDOW + BASIN	12
3	HATCHING	5 $\frac{1}{2}$
4	LABELS	1 $\frac{1}{2}$
SUBTOTAL		32 $\frac{1}{2}$



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			
TOTAL		TOTAL	

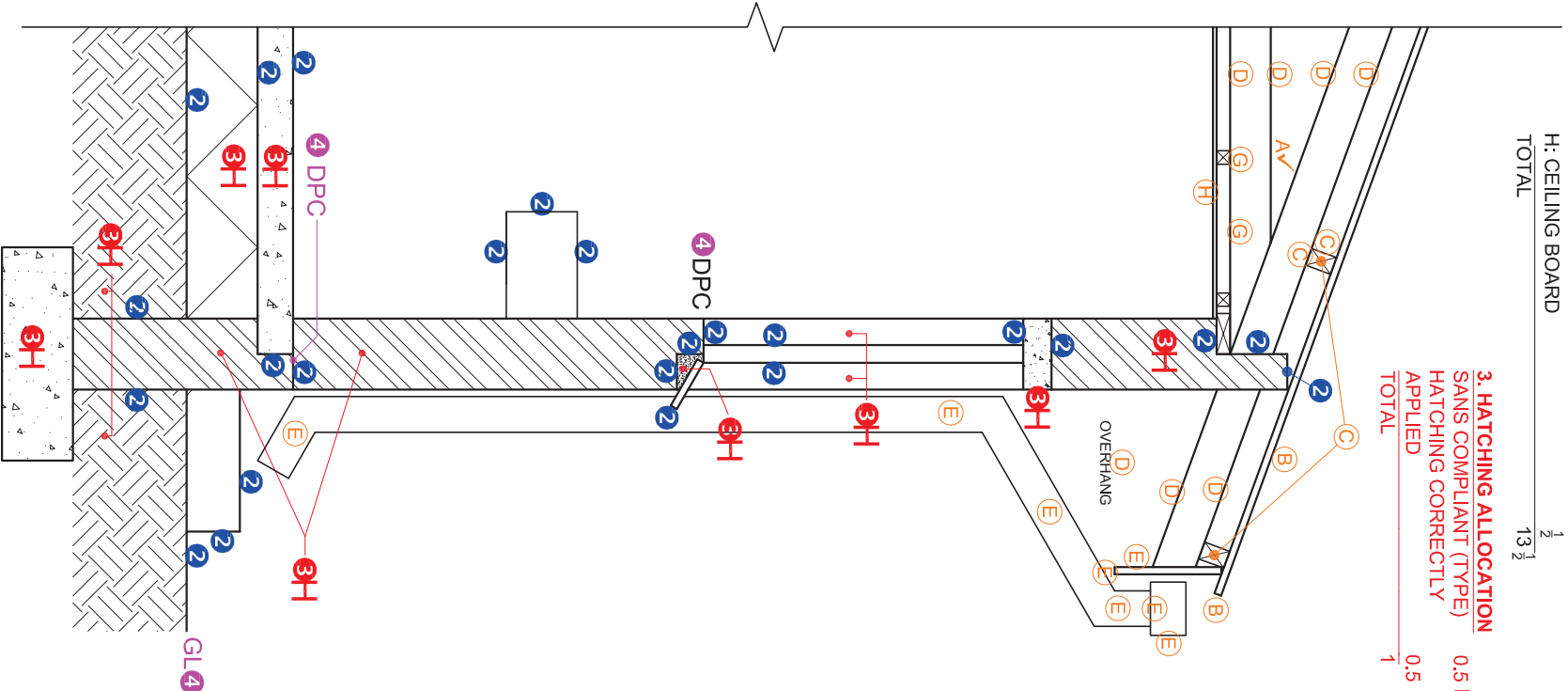
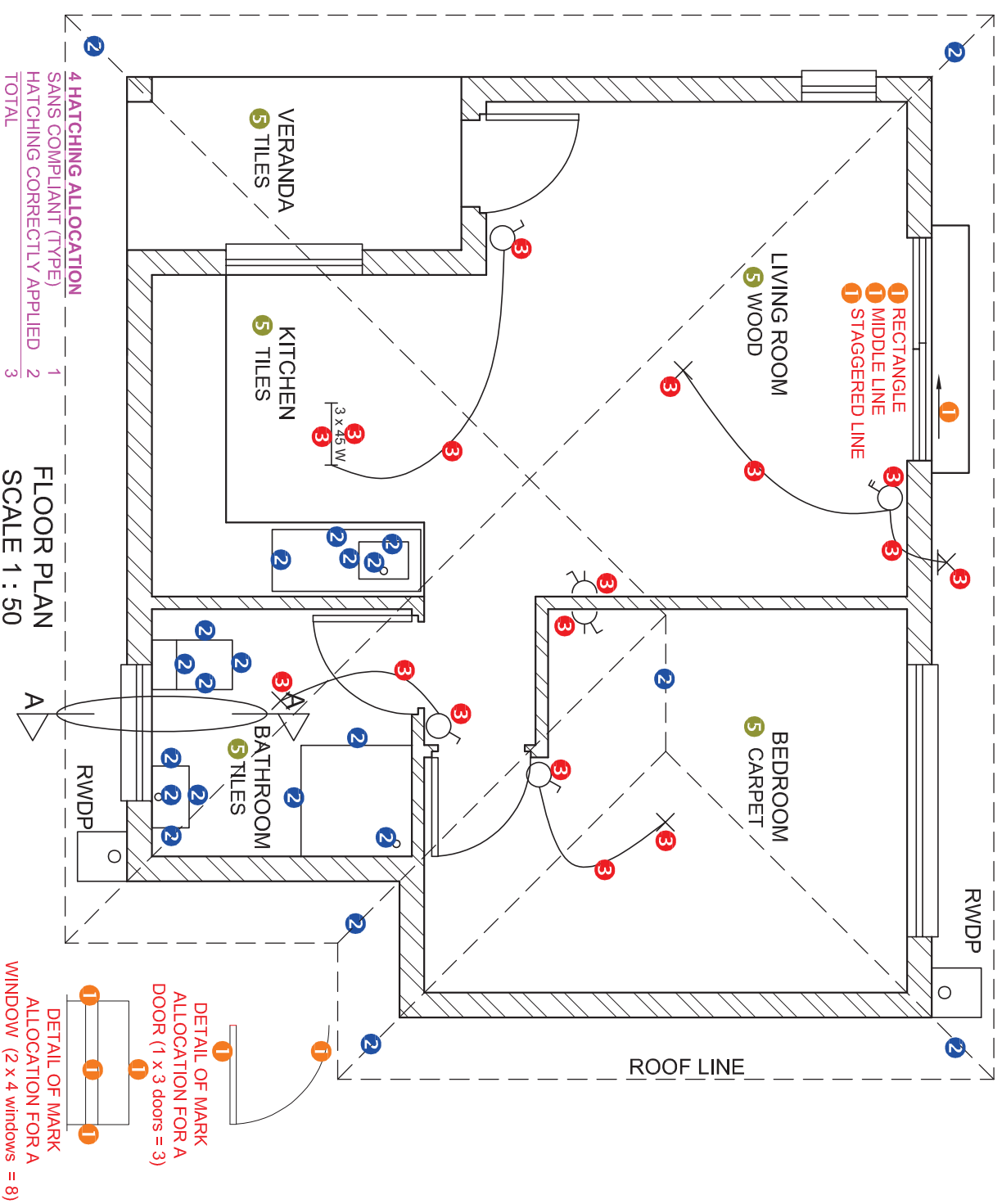
ASSESSMENT CRITERIA

FLOOR PLAN				
	POSSIBLE	OBTAINED	SIGN	MODERATED
1	DOORS + WINDOWS	13		
2	FIXTURES + ROOF LINES	11		
3	ELECTRICAL	8 $\frac{1}{2}$		
4	HATCHING	3		
5	LABELS	2 $\frac{1}{2}$		
SUBTOTAL		38		

NORTH ELEVATION				
1	ROOF + RWDP + GULLEY	10 $\frac{1}{2}$		
2	WALLS + STEP + FFL	4		
3	DOOR + WINDOW	6		
4	LABELS	1		
SUBTOTAL		21 $\frac{1}{2}$		

DETAILED SECTION				
1	ROOF DETAIL	13 1/2		
2	SLAB WALL, WINDOW + BASIN	12		
3	HATCHING	5 1/2		
4	LABELS	1 1/2		
SUBTOTAL		32 1/2		
TOTAL		92		
PENALTIES (-)				

GRAND TOTAL			
EXAMINATION NUMBER			
EXAMINATION NUMBER			
EXAMINATION NUMBER			
6			



MARK ALLOCATION FOR SECTION OF ROOF		FOR OFFICIAL USE ONLY		
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B		VIEW(S) ROTATED		
C		SECTION VIEWED INCORRECTLY		
D		INCORRECT LETTERING		
E				
F				
G				
H				
TOTAL		TOTAL		

ASSESSMENT CRITERIA

FLOOR PLAN

	POSSIBLE	OBTAINED	SIGN	MODERATED
1	DOORS + WINDOWS	13		
2	FIXTURES + ROOF LINES	11		
3	ELECTRICAL	8 $\frac{1}{2}$		
4	HATCHING	3		
5	LABELS	2 $\frac{1}{2}$		
SUBTOTAL		38		

NORTH ELEVATION

1	ROOF + RWDP + GULLEY	10 $\frac{1}{2}$		
2	WALLS + STEP + FFL	4		
3	DOOR + WINDOW	6		
4	LABELS	1		
SUBTOTAL		21 $\frac{1}{2}$		

DETAILED SECTION

1	ROOF DETAIL	13 $\frac{1}{2}$		
2	SLAB WALL, WINDOW + BASIN	12		
3	HATCHING	5 $\frac{1}{2}$		
4	LABELS	1 $\frac{1}{2}$		
SUBTOTAL		32 $\frac{1}{2}$		
TOTAL		92		
PENALTIES (-)				
GRAND TOTAL				
EXAMINATION NUMBER				
EXAMINATION NUMBER				6