



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATIONS/ NATIONAL SENIOR CERTIFICATE EXAMINATIONS

ENGINEERING GRAPHICS AND DESIGN P1

2022

MARKS: 100

TIME: 3 hours

This question paper consists of 6 pages.

Barcode label

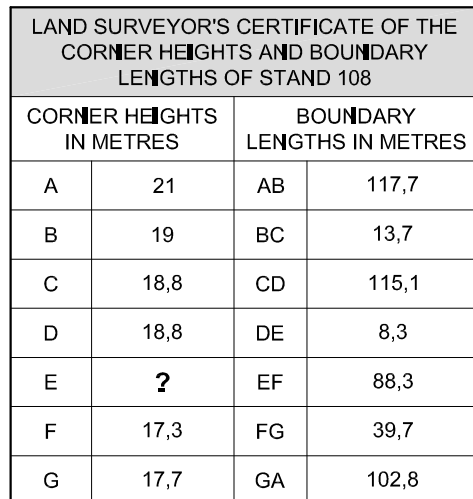
INSTRUCTIONS AND INFORMATION

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			1/2	SIGN	MODERATED			1/2	SIGN	RE-MARKING			1/2	SIGN
1															
2															
3															
4															
TOTAL															
	2	0	0			2	0	0			2	0	0		

FINAL CONVERTED MARK	CHECKED BY
100	

COMPLETE THE FOLLOWING:
CENTRE NUMBER
CENTRE NUMBER
EXAMINATION NUMBER
EXAMINATION NUMBER



1. PALM TREE
2. EVERGREEN TREE
3. BRICK PAVING
4. INTERNAL FENCE
5. 2 m HIGH BOUNDARY FENCE
6. PARKING FOR DISABLED PEOPLE

CLIENT'S SIGNATURE

In the space below, draw, in neat freehand, the *SANS 10143* graphical symbol for a:

20.1 NORTH POINT

20.2 TWO-WAY SWITCH

20.2 TWO-WAY SWITCH

1	2021-09-20	ADD PARKING FOR DISABLED PEOPLE	
REVISION	DATE	DESCRIPTION	
MULLER ARCHITECTS 63 ALLIANZ ROAD NEW GERMANY 4001 www.carl.arch.co.za 098 765 4321			
PRINTED BY: CREATE PRINTERS (PTY) LTD		DATE OF PRINT: 2021-09-30	
DRAWING TITLE: SITE PLAN			
PROJECT: PROPOSED NEW HOSPITAL FOR DR W ZULU & PARTNERS ON STAND 108, 7 MUNCHEN STREET, SYRINGER, 4002			
PROJECT NUMBER: CR 20200401 - 7		DRAWING NUMBER: 001 - TU	
DATE: 2021-09-13	DRAWN: EINSTEIN	CHECKED: PLATO	SCALE: 1 : 1300
REFERENCE CODE: 884939			

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 reference code of the drawing?		1	
2	What scale is indicated for the site plan?		1	
3	With reference to the title panel, what does CR 20200401 – 7 refer to?		1	
4	What architectural firm was responsible for the design of the new hospital?		1	
5	What does the arrow on the sliding gate into Munchen Street indicate?		1	
6	What does the abbreviation <i>RE</i> at 1 stand for?		1	
7	What is the height of the boundary fence in millimetres?		1	
8	Name the feature at 2.		1	
9	Name the feature at 3.		1	
10	What must happen to the existing building at 4?		1	
11	What finish is required at 5?		1	
12	Name the feature at 6.		1	
13	What does the symbol at 7 indicate?		1	
14	What is the shortest distance from the proposed new hospital building to boundary line AB in metres?		2	
15	What colour is used to represent new wood on sectional elevations and floor plans?		1	
16	What is the height of corner E in metres?		2	
17	Which elevation of the proposed new hospital entrance faces Dortmund Avenue?		2	
18	In the space below (ANSWER 18), determine the perimeter of STAND 108 in metres.		3	
19	In the space below (ANSWER 19), determine the total area of the proposed new hospital building in square metres.		3	
20	In the space provided in the title panel (ANSWER 20), draw, in neat freehand, the SANS 10143 graphical symbol for a: (20.1) NORTH POINT and (20.2) TWO-WAY SWITCH.		4	
TOTAL		30		

EXAMINATION NUMBER

[illegible]



QUESTION 2: SOLID GEOMETRY

Given:

- The front view and the top view of a right regular hexagonal pyramid resting with its base on an edge of a truncated right square prism. The prism is centrally pierced by a right equilateral triangular prismatic hole.
- An auxiliary view of the base of the hexagonal pyramid
- Both solids are cut by cutting plane D-D

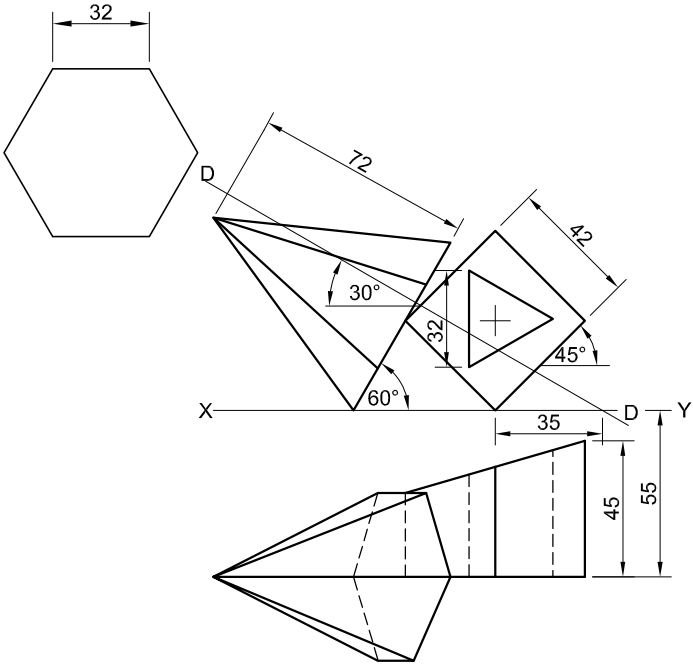
Instructions:

Draw, to scale 1 : 1, the following views of both solids:

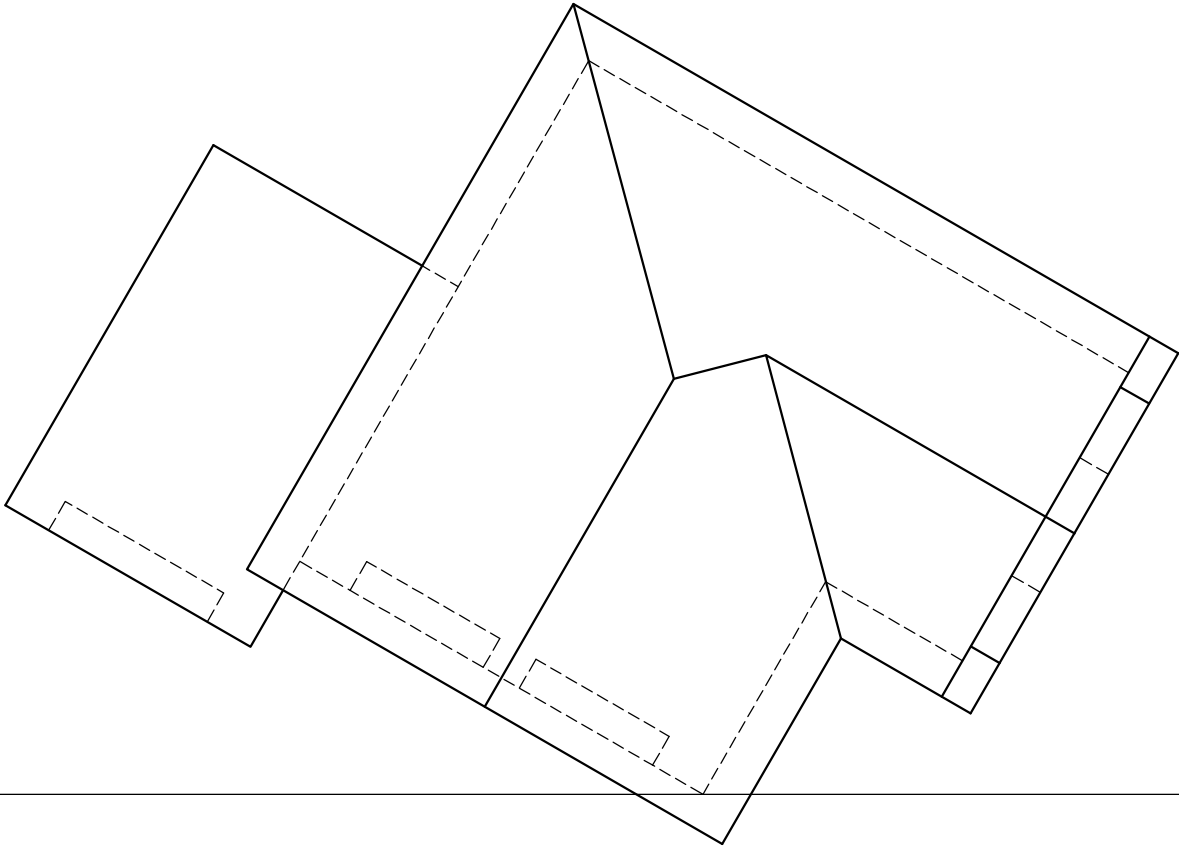
- 2.1 The given front view
- 2.2 A sectional top view on cutting plane D-D
- 2.3 The left view
- 2.4 The true shape of the cut surface of the truncated prism

- Planning is essential.
- Show ALL hidden detail.
- Show ALL construction.

[40]



ASSESSMENT CRITERIA					
1	FRONT VIEW	7 1/2			
2	SECTIONAL TOP VIEW	14			
3	LEFT VIEW	12 1/2			
4	TRUE SHAPE	6			
PENALTIES (-)					
TOTAL		40			
EXAMINATION NUMBER					
EXAMINATION NUMBER					3



QUESTION 3: PERSPECTIVE

Given:
Three views of a dwelling 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 doors and windows.
 - NO hidden detail or interior detail is required.
- [38]

ASSESSMENT CRITERIA					
1	CONSTRUCTION	6			
2	WALLS	11 ½			
3	ROOF	5			
4	WINDOWS	10			
5	GARAGE	5 ½			
PENALTIES (-)					
TOTAL		38			

PP

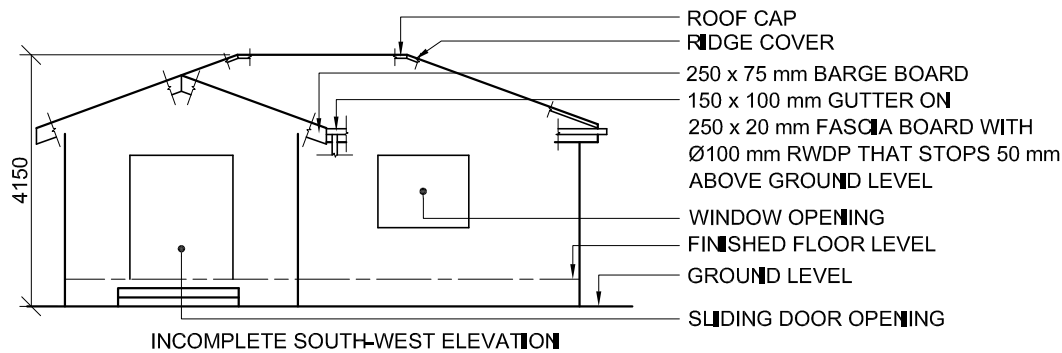
HL

GL

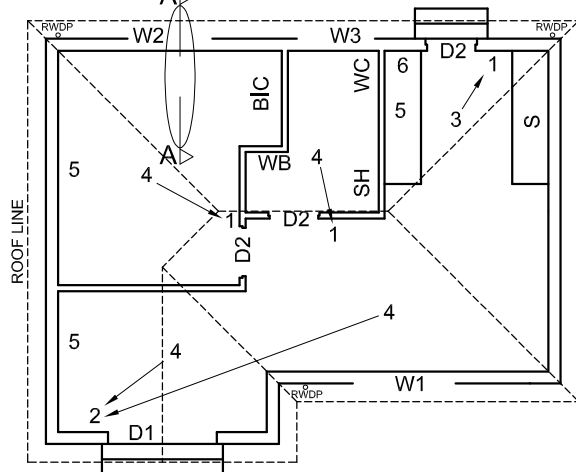
SP

HL

EXAMINATION NUMBER	
EXAMINATION NUMBER	4



INCOMPLETE SOUTH-WEST ELEVATION



INCOMPLETE FLOOR PLAN

FEATURES

- D1 SLIDING DOOR
- D2 DOOR
- W1 WINDOW
- W2 WINDOW
- W3 WINDOW

FIXTURES

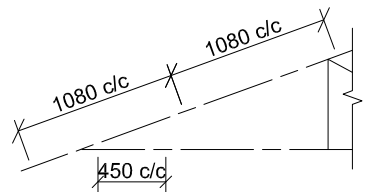
- WC TOILET
- WB WASH BASIN
- SH SHOWER
- S SINK
- BIC BUILT-IN CUPBOARD

ELECTRICAL FITTINGS

- 1. ONE-WAY SWITCH - SINGLE-POLE
- 2. ONE-WAY SWITCH - DOUBLE-POLE
- 3. FLUORESCENT LIGHT 1 x 40 W
- 4. CEILING LIGHT
- 5. SWITCHED SOCKET OUTLET
- 6. DISTRIBUTION BOARD

NOTE:

THE ARROW SHOWS THE LIGHT CONNECTION TO THE SWITCH.



SCHEMATIC DIAGRAM OF A SECTION OF THE ROOF TRUSS AT CUTTING PLANE A-A

ROOF NOTES:

20° ROOF PITCH
114 x 40 mm ROOF TRUSSES ON 114 x 40 mm WALL PLATES

300 mm ROOF OVERHANG TO END OF ROOF TRUSS

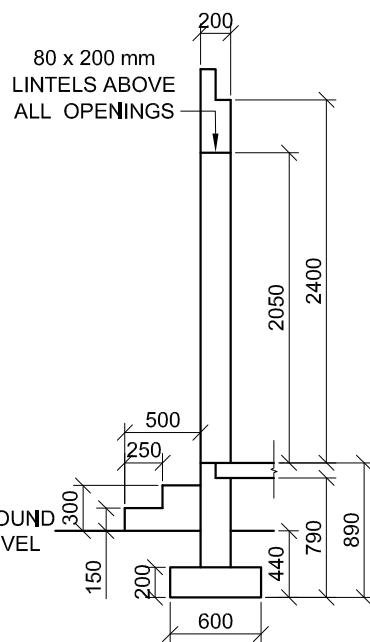
30 mm CORRUGATED ROOF SHEET ON 75 x 50 mm PURLINS @ 1080 mm c/c

250 x 75 mm FIBRE CEMENT BARGE BOARDS ON GABLE ENDS

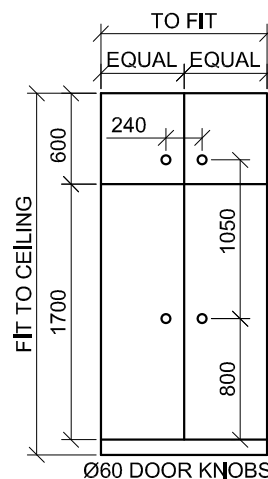
BARGE BOARDS END FLUSH WITH OUTSIDE EDGE OF GUTTERS

250 x 20 mm FASCIA BOARDS WITH 150 x 100 mm GUTTERS ON ALL SIDES

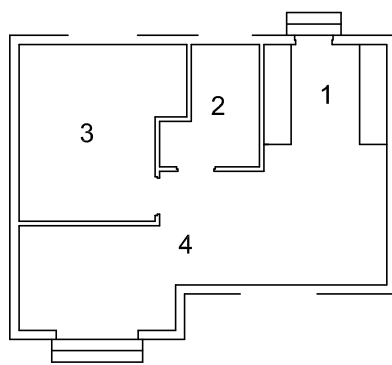
10 mm CEILING BOARD ON 40 x 40 mm BRANDING STRIPS @ 450 mm c/c



INCOMPLETE FOUNDATION AND EXTERNAL WALL DETAIL



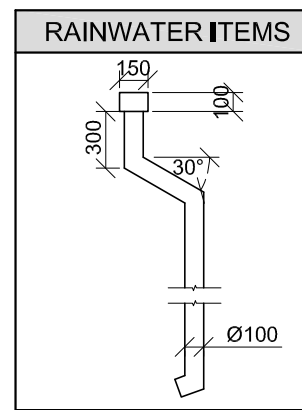
BUILT-IN CUPBOARD DETAIL



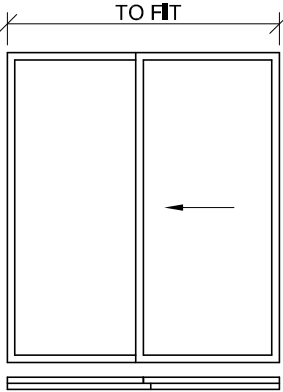
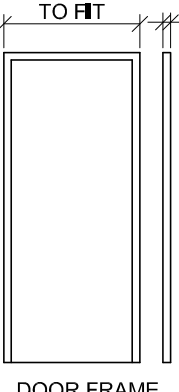
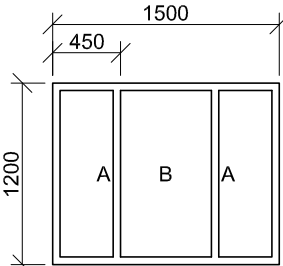
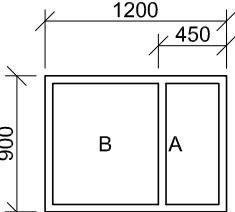
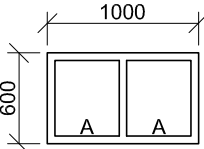
ROOM DESIGNATIONS

FLOOR FINISHES

- 1. KITCHEN: TILES
- 2. BATHROOM: TILES
- 3. BEDROOM: CARPET
- 4. LIVING AREA: VINYL



RAINWATER ITEMS

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

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

FIXTURES			
WASH BASIN (WB)	TOILET (WC)	SHOWER (SH)	SINK (S)

QUESTION 4: CIVIL DRAWING

Given:

- The incomplete south-west elevation of a **new house**, showing the walls, the window opening, the sliding door opening, the roof and labels
- The incomplete floor plan showing the walls, roof line, positions of the doors, windows and fixtures, as well as the electrical layout
- A schematic diagram of a section of a roof truss at cutting plane A-A and roof notes
- The incomplete foundation and external wall detail
- The built-in cupboard detail
- Room designations and floor finishes
- A table of rainwater items
- A door and window schedule
- A table of roof components
- A table of electrical symbols
- A table of fixtures
- The incomplete floor plan and position of the ground level 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 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 the abbreviations
- ALL electrical fittings as indicated by numbers
- ALL hatching detail

4.1.2 THE COMPLETE SOUTH-WEST ELEVATION

Show the following features on the drawing:

- The outside walls, steps, window and sliding door detail
- ALL the roof detail, including the fascia board, barge boards, gutters and rainwater downpipe
- 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 and rainwater items
- The steps, roof, wall and built-in cupboard detail to the right of cutting plane A-A
- ALL hatching detail. **ONLY** the substructure may be hatched in neat freehand.

Label the following:

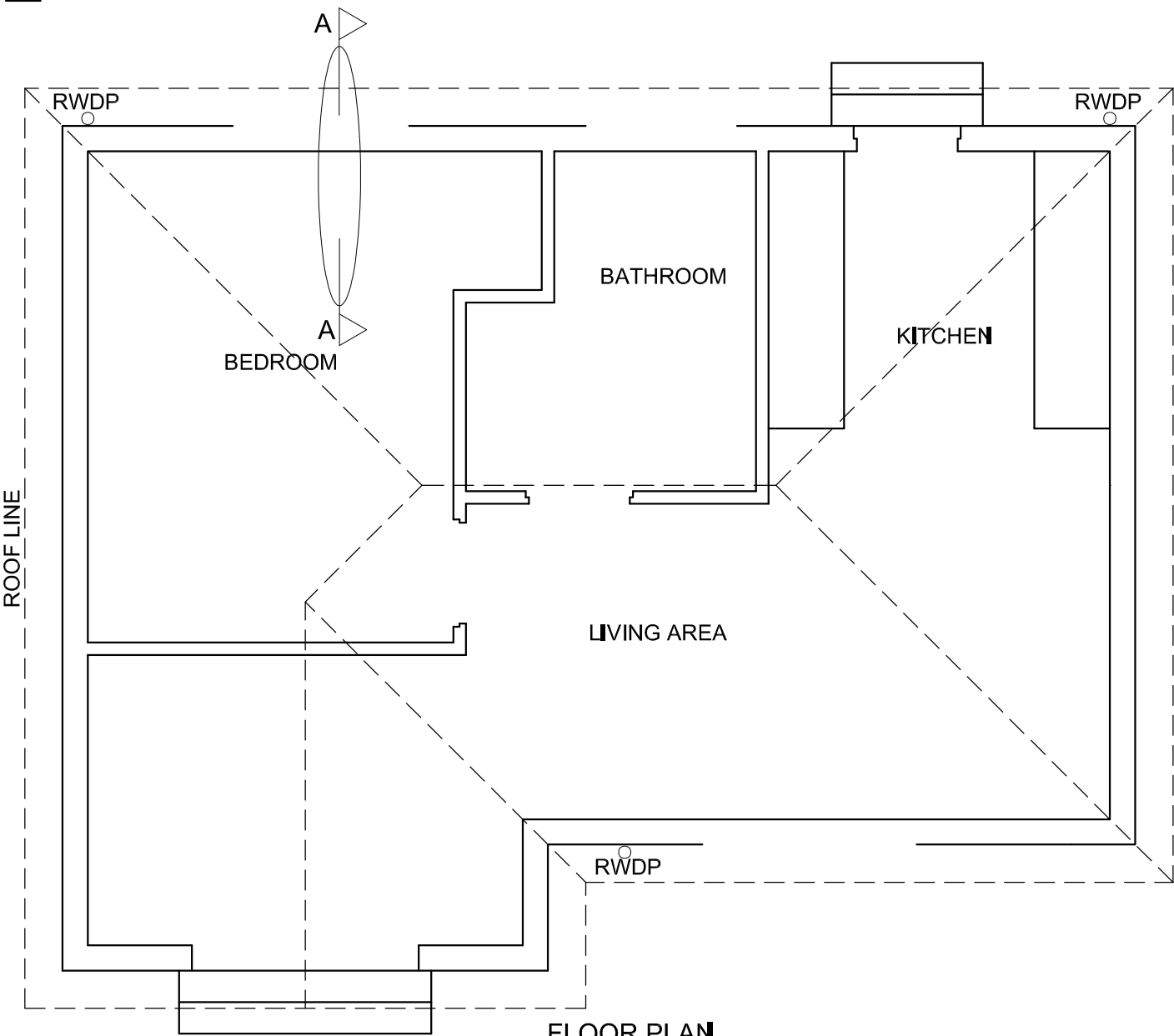
- The south-west elevation
- The floor finishes
- Ground level, finished floor level and damp-proof course (use the correct abbreviations and show them on ALL the relevant views)

NOTE:

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



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			
J			
TOTAL		TOTAL	

ASSESSMENT CRITERIA					
FLOOR PLAN					
		POSSIBLE	OBTAINED	SIGN	MODERATED
1	DOORS + WINDOWS	11			
2	FIXTURES	9			
3	ELECTRICAL	9 1/2			
4	HATCHING	3			
5	LABELS	2			
SUBTOTAL		34 1/2			
SOUTH-WEST ELEVATION					
1	ROOF + RWDP	9 1/2			
2	WALLS + STEP + FFL	4 1/2			
3	DOOR + WINDOW	8 1/2			
4	LABELS	1			
SUBTOTAL		23 1/2			
DETAILED SECTION					
1	ROOF DETAIL	13			
2	SLAB + WALL + WINDOW + STEP	11 1/2			
3	HATCHING	5 1/2			
4	BIC	2 1/2			
5	LABELS	1 1/2			
SUBTOTAL		34			
TOTAL		92			
PENALTIES (-)					
GRAND TOTAL					
EXAMINATION NUMBER					
EXAMINATION NUMBER					
					6



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ENGINEERING GRAPHICS AND DESIGN P1

2022

MARKS: 100

These marking guidelines consist of 7 pages.

ANSWERS		
1	884939	1
2	1 : 1300	1
3	PROJECT NUMBER	1
4	MULLER ARCHITECTS	1
5	DIRECTION OF OPENING	1
6	RODDING EYE	1
7	2000	1
8	BUILDING LINE	1
9	SEWERAGE LINE	1
10	MUST BE DEMOLISHED/REMOVED	1
11	BRICK PAVING	1
12	ELECTRICITY METER / WATT METER	1
13	PARKING FOR DISABLED PEOPLE	1
14	18,28	2
15	YELLOW	1
16	18	2
17	SOUTH EAST	2
18	See below	3
19		3
20		4
TOTAL		30

ANSWER 18

Show ALL calculations.

APPLYING CORRECT FORMULA ✓

$$\begin{aligned}
 P &= AB + BC + CD + DE + EF + FG + GA \\
 &= 117.7 + 13.7 + 115.1 + 8.3 + 88.3 + 39.7 + 102.8 \\
 &= 485.6 \text{ m}
 \end{aligned}$$

ANSWER IN METRES ✓

ANSWER 19

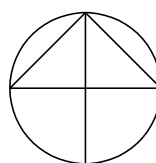
Show ALL calculations.

APPLYING CORRECT FORMULA ✓

$$\begin{aligned}
 A &= (15,4 \times 24,5) + (39,1 \times 48,0) \\
 &\quad + (6,0 \times 27,9) \\
 &= 377,3 + 1876,8 + 167,4 \\
 &= 2421,5 \text{ m}^2
 \end{aligned}$$

ANSWER 20

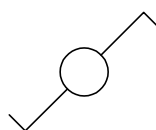
20.1



20.1 NORTH POINT

CIRCLE 0.5
 VERTICAL LINE 0.5
 HORIZONTAL LINE 0.5
 ANGLED LINES 0.5

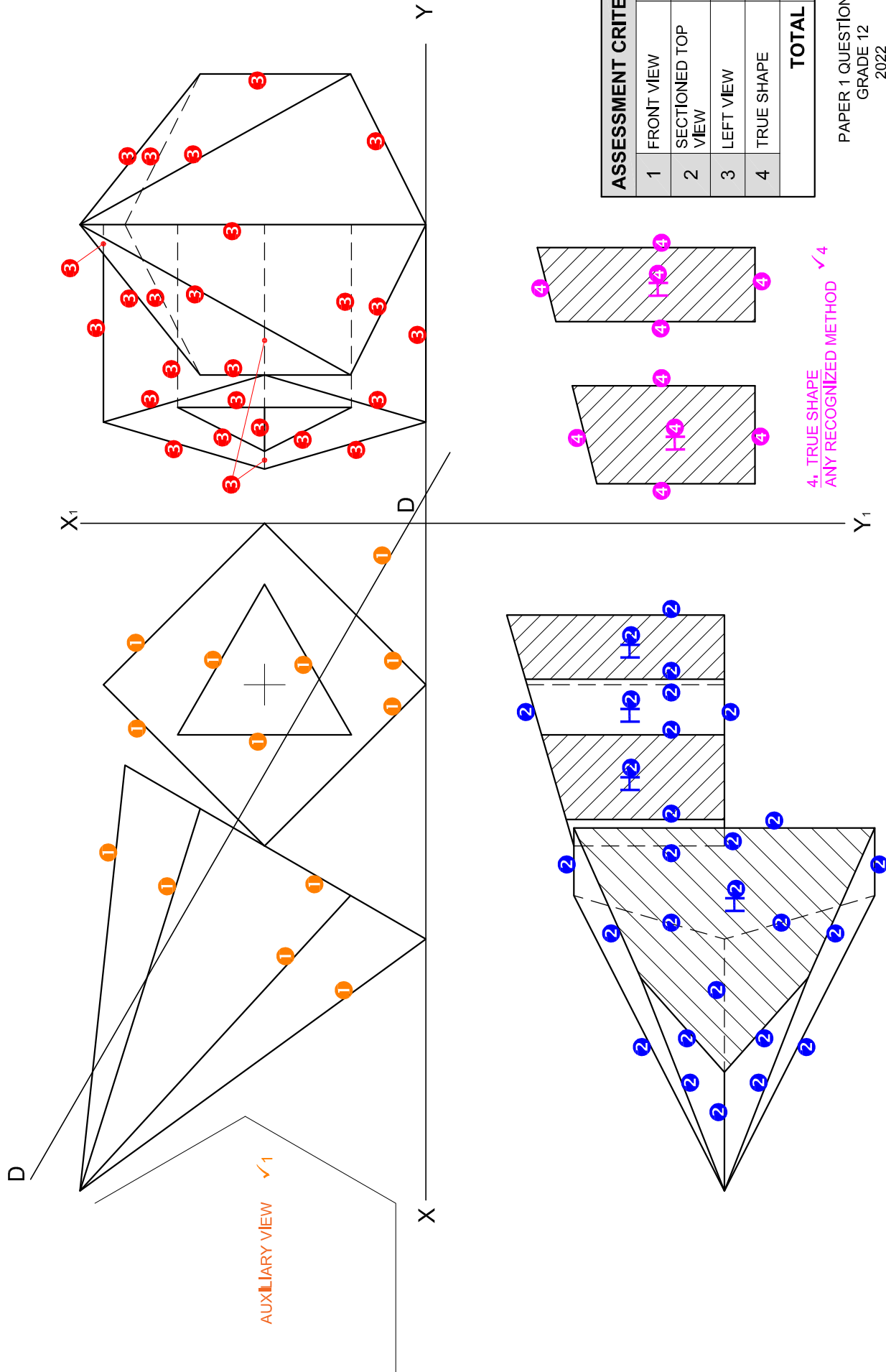
20.2

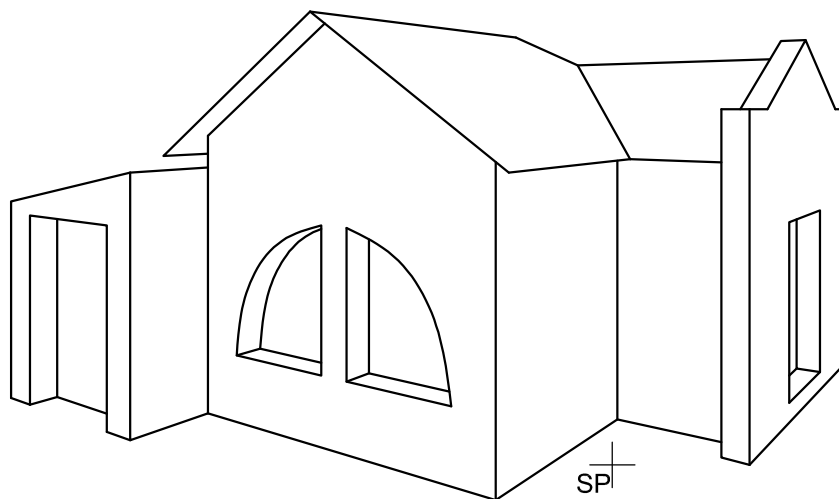
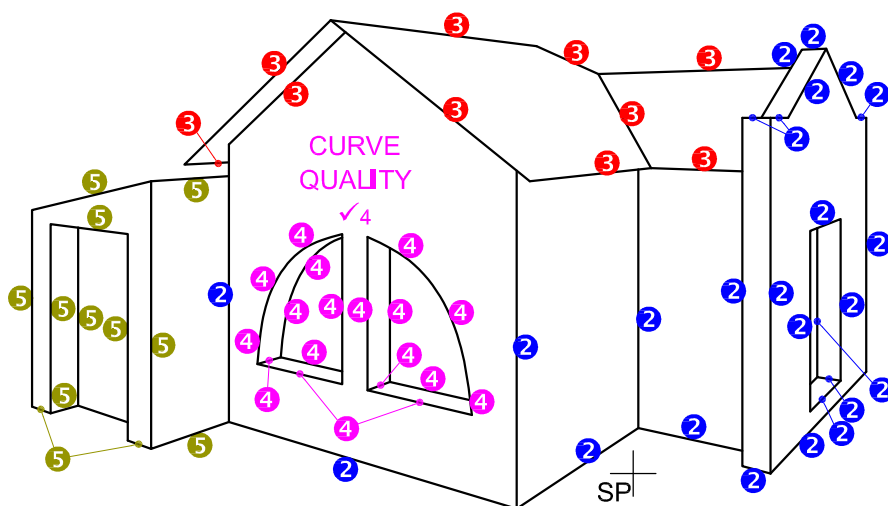
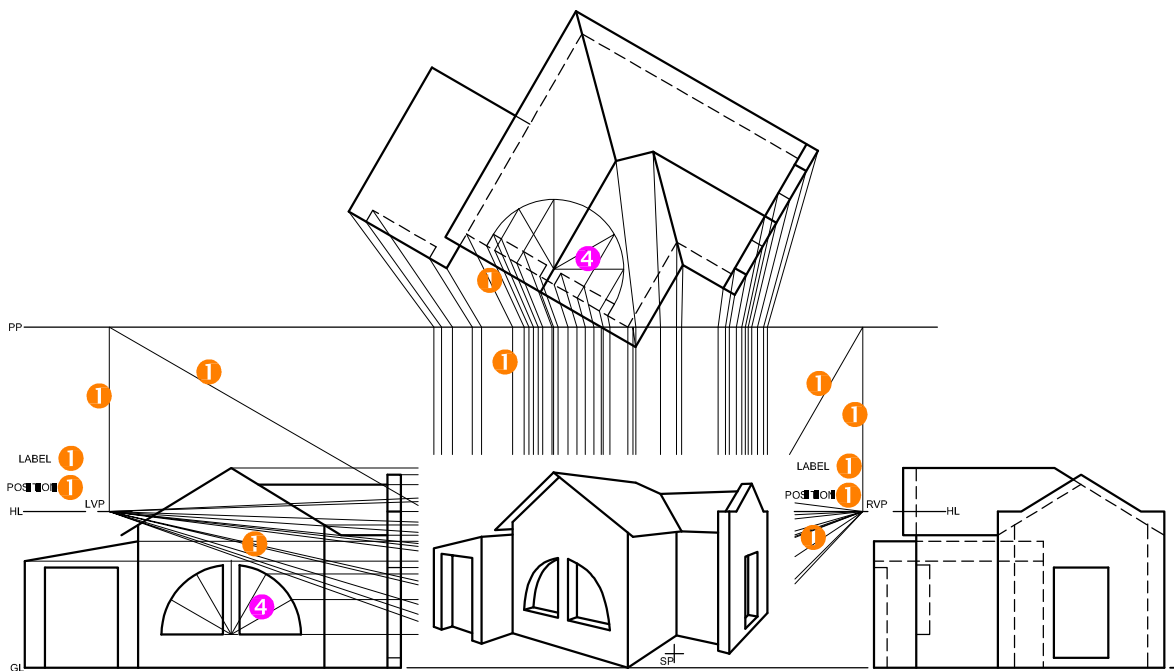


20.2 TWO-WAY SWITCH

CIRCLE 0.5
 SWITCH ON ONE SIDE 0.5
 SWITCH ON OTHER SIDE 0.5

20.1 + 20.2 IN FREEHAND 0.5





ASSESSMENT CRITERIA		
1	CONSTRUCTION	6
2	WALLS	11 $\frac{1}{2}$
3	ROOF	5
4	WINDOWS	10
5	GARAGE	5 $\frac{1}{2}$
TOTAL		38

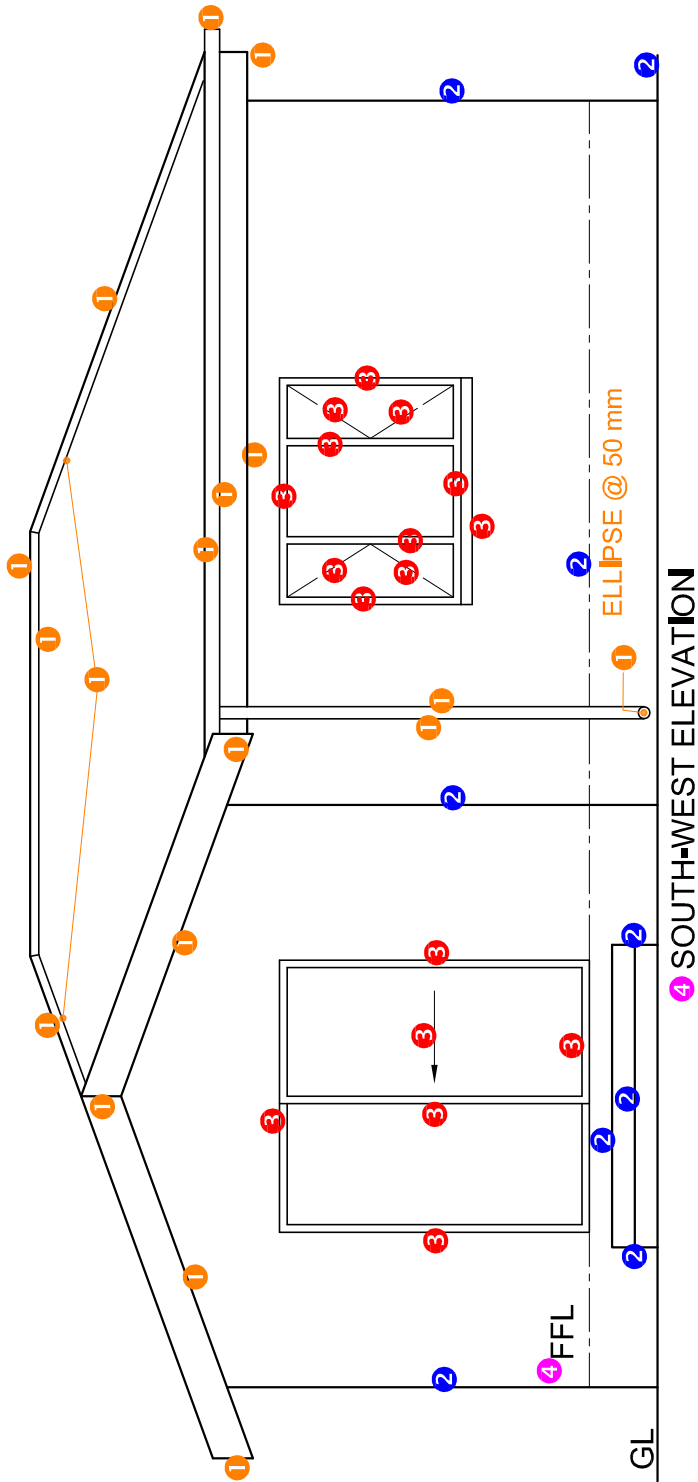
PAPER 1 QUESTION 3
 GRADE 12
 2022
 MARKING GUIDELINES



ASSESSMENT CRITERIA		FLOOR PLAN	POSSIBLE
1	DOORS + WINDOWS		11
2	FIXTURES		9
3	ELECTRICAL		$9\frac{1}{2}$
4	HATCHING		3
5	LABELS		2
SUBTOTAL			$34\frac{1}{2}$

PAPER 1 QUESTION 4
GRADE 12
2022

MARKING GUIDELINES

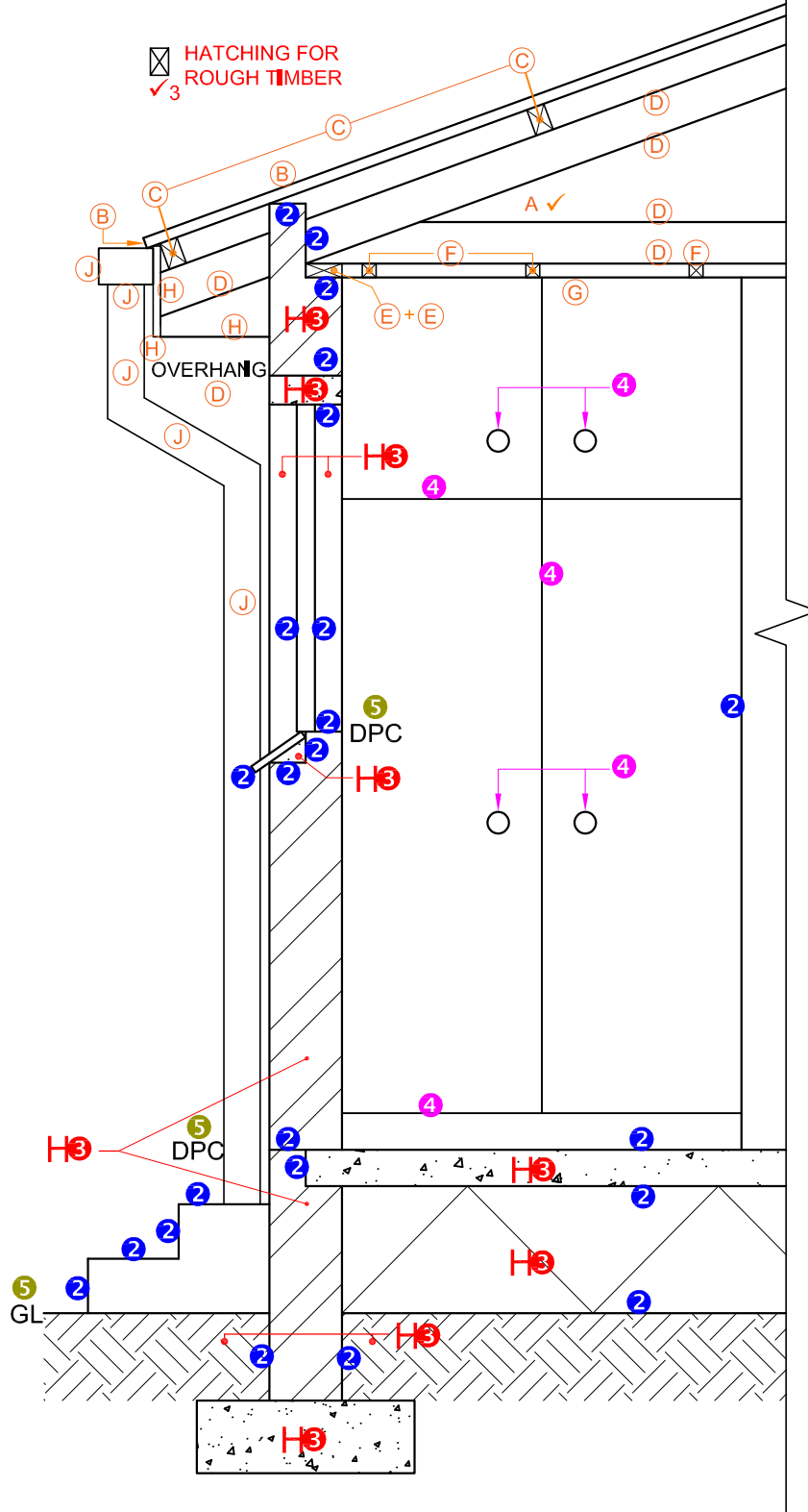


ASSESSMENT CRITERIA	
SOUTH-WEST ELEVATION	
1	ROOF + RWDP 9 ¹ / ₂
2	WALLS + STEP + FFL 4 ¹ / ₂
3	DOOR + WINDOW 8 ¹ / ₂
4	LABELS 1
SUBTOTAL	
23 ¹ / ₂	

PAPER 1 QUESTION 4
GRADE 12
2022
MARKING GUIDELINES

1. MARK ALLOCATION FOR ROOF

A: ROOF ANGLE	1
B: ROOF SHEET	1
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 + RWDP	2.5
TOTAL	13



SECTION A-A
SCALE 1 : 20

ASSESSMENT CRITERIA**DETAILED SECTION**

1	ROOF DETAIL	13
2	SLAB + WALL + WINDOW + STEP	11 $\frac{1}{2}$
3	HATCHING	5 $\frac{1}{2}$
4	B/C	2 $\frac{1}{2}$
5	LABELS	1 $\frac{1}{2}$
SUBTOTAL		34

PAPER 1 QUESTION 4
GRADE 12
2022
MARKING GUIDELINES