



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

ENGINEERING GRAPHICS AND DESIGN P1

NOVEMBER 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				$\frac{1}{2}$	SIGN	MODERATED				$\frac{1}{2}$	SIGN
RE-MARKING					$\frac{1}{2}$	SIGN					$\frac{1}{2}$	SIGN
1												
2												
3												
4												
TOTAL												
	2	0	0				2	0	0			

FINAL CONVERTED MARK

CHECKED BY

100

COMPLETE THE FOLLOWING:

CENTRE NUMBER

CENTRE NUMBER

EXAMINATION NUMBER

EXAMINATION NUMBER



LAND SURVEYOR'S CERTIFICATE OF THE CORNER HEIGHTS AND BOUNDARY LENGTHS OF STAND 3414			
CORNER HEIGHTS IN METRES		BOUNDARY LENGTHS IN MILLIMETRES	
A	1600	AB	24230
B	1600	BC	8370
C	1599	CD	18380
D	1599	DE	31200
E	1601	EA	32400

SYMBOL LEGEND	
	EVERGREEN TREES
	BUSHES
	2000 HIGH SECURITY FENCE
	1800 HALLISADE FENCE

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

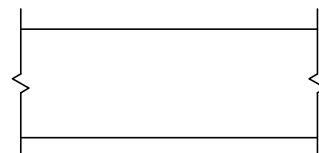
ARCHITECT'S SIGNATURE

CLIENT'S SIGNATURE

ANSWER 18

In the space below, draw, in neat freehand, the *SANS 10143* hatching (symbol) for a (18.1) FACE BRICK WALL, and graphical symbol for a (18.2) STAIRCASE.

18.1



18.2

2	07/01/22	ADD WATER METER	USA B
1	06/01/22	COLOUR NEW ADDITION RED	USA B
REVISION	DATE	DESCRIPTION	DRAWN

KOMBELLA, JOUBERT & MINNAAR
ARCHITECTURAL DESIGN
365 BORCHARDS AVENUE
ERASMIA
0183
012 685 1857 www.kjmdesign.co.za

PRINTED BY:	DATE OF PRINT:
STEVEN'S PRINTERS	08/01/2022

DRAWING TITLE: SITE PLAN

PROJECT: PROPOSED NEW ADDITION FOR
MR N KEENAN
ON STAND 3414,
21 DOMBEYA STREET, HARRIS SMITH

PROJECT NUMBER: FTW2022-59	DRAWING NUMBER: 1 OF 5
-------------------------------	---------------------------

DATE:	DRAWN:	CHECKED:	SCALE:
05/01/2022	CASPER	ANNIE Q	1 : 350

REFERENCE CODE:
K1N-2022

QUESTION 1: ANALYTICAL (CIVIL)

Given:

The site plan of an existing house with a proposed new extension, a title panel and a table of questions. The drawing has not been presented to the indicated scale.

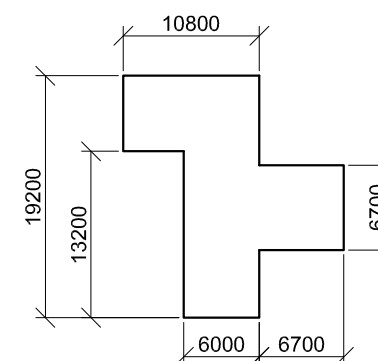
Instructions:

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 does the number FTW2022-59 refer to?		1	
2	Who is the client?		1	
3	What is the title of the drawing?		1	
4	What action was taken on 08/01/2022?		1	
5	Who was responsible for preparing the revisions to the drawing?		1	
6	How wide is the road reserve in millimetres?		1	
7	Whose signatures are required on the site plan?		2	
8	How many new inspection eyes are shown on the site plan?		1	
9	What does the abbreviation RWDP stand for?		1	
10	Which corner of STAND 3414 is the highest?		1	
11	Determine the shortest distance from the proposed new extension to boundary line AB in metres.		1	
12	What is indicated in BLUE on floor plans and/or sections?		2	
13	Name the feature at 1.		1	
14	What is indicated by the arcs at 2?		1	
15	Name the feature at 3.		1	
16	What does the ratio 1 : 40 on the new sewerage line indicate?		1	
17	Which elevation of the existing house faces the N3 national road?		2	
18	In the space in the title panel (ANSWER 18), draw, in neat freehand, the SANS 10143 hatching (symbol) for a (18.1) FACE BRICK WALL, and graphical symbol for a (18.2) STAIRCASE.		4	
19	In the space below (ANSWER 19), determine the total length of the 1800 high pallisade fence required for STAND 3414, in metres.		3	
20	In the space below (ANSWER 20), determine the total area of the house, including the new extension, in square metres. Show the answer to TWO decimal places.		3	
TOTAL			30	

ANSWER 19
Show ALL calculations.

ANSWER 20
Show ALL calculations.



EXAMINATION NUMBER

EXAMINATION NUMBER

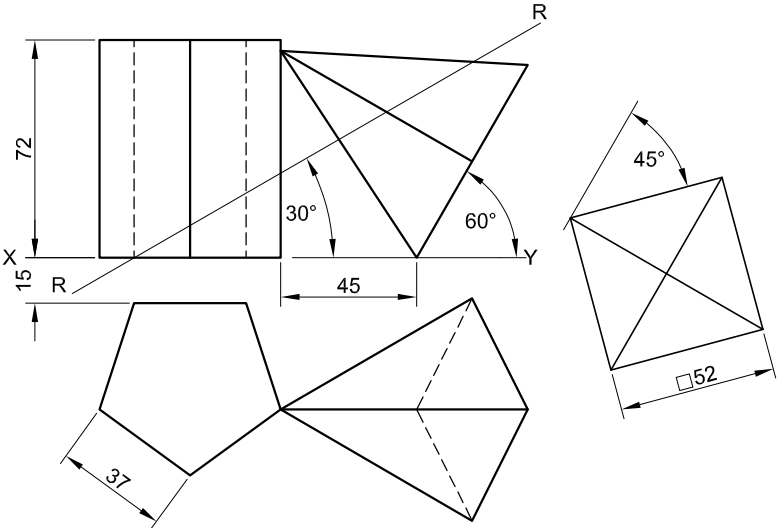
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QUESTION 2: SOLID GEOMETRY

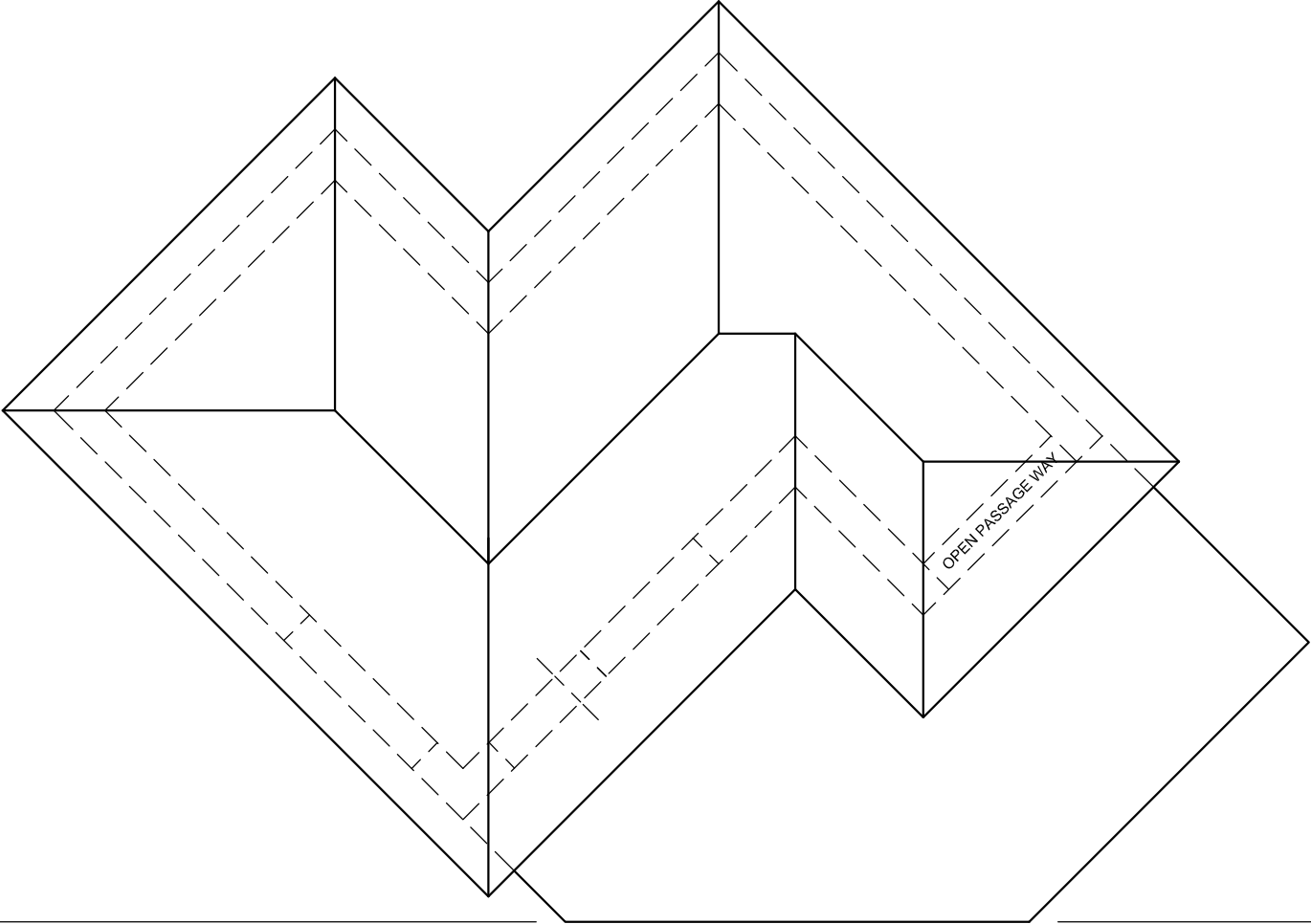
- Given:**
- The front view and top view of a right square pyramid that rests against a right regular pentagonal prism
 - An auxiliary view of the right square pyramid
 - Cutting plane R-R

- Instructions:**
- Draw, to scale 1 : 1, the following views of both solids:
- 2.1 The given front view
 - 2.2 A sectional top view with the parts above cutting plane R-R removed
 - 2.3 A sectional right view with the parts below cutting plane R-R removed
 - 2.4 The true shape of the cut surfaces of BOTH solids
- Planning is essential.
 - Show ALL hidden detail.
 - Show ALL construction.
- [37]

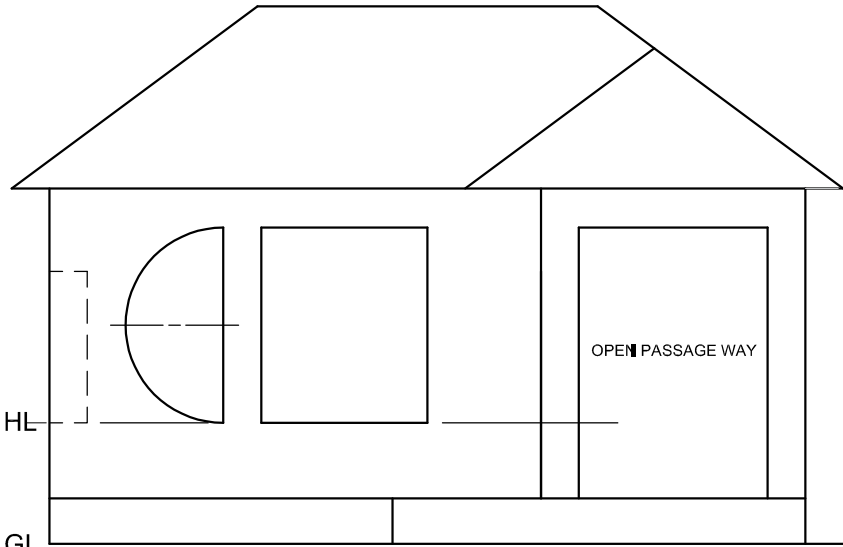


ASSESSMENT CRITERIA					
1	FRONT VIEW	7			
2	SECTIONAL TOP VIEW	12 ¹ / ₂			
3	SECTIONAL RIGHT VIEW	10			
4	TRUE SHAPE	6 ¹ / ₂			
5	CORRECT HATCHING	1			
PENALTIES (-)					
TOTAL		37			
EXAMINATION NUMBER					
EXAMINATION NUMBER					3

STAPLE



PP



SPI

QUESTION 3: PERSPECTIVE

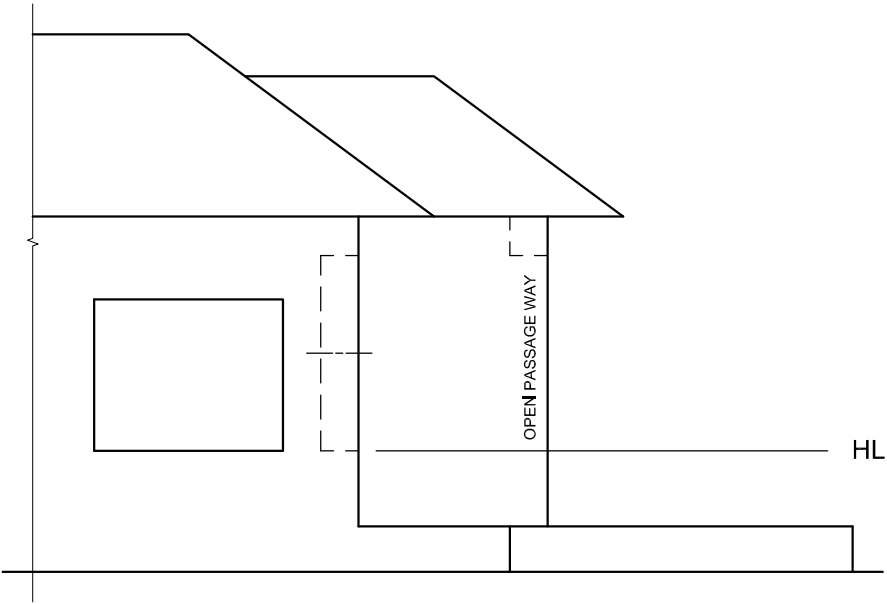
Given:
Three views of a club house and the information needed to draw a two-point perspective drawing
PP – Picture plane
HL – Horizon line
GL – Ground line
SP – Station point

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 windows.
- NO hidden detail is required.

[41]

ASSESSMENT CRITERIA					
1	CONSTRUCTION	6			
2	WALL + BASE	10 1/2			
3	WINDOWS + OPENING	10			
4	ROOF	7 1/2			
5	ARC	7			
PENALTIES (-)					
TOTAL		41			



EXAMINATION NUMBER	
EXAMINATION NUMBER	4

WINDOW OPENING
ROOF CAP
RIDGE COVER
150 x 100 mm GUTTER ON
300 x 20 mm FASCIA BOARD
DOUBLE SWING DOOR OPENING
FINISHED FLOOR LEVEL
250 x 150 mm STEP
GROUND LEVEL
Ø100 mm RWDP THAT STOPS 100 mm ABOVE GROUND LEVEL

INCOMPLETE SOUTH ELEVATION

LAUNDRY
BATHROOM
STUDY
KITCHEN
BEDROOM
LIVING ROOM

ROOM DESIGNATIONS

CHIMNEY DETAIL

FLOOR FINISHES

LAUNDRY: TILES
BATHROOM: TILES
STUDY: CARPET
KITCHEN: TILES
BEDROOM: CARPET
LIVING ROOM: WOOD

INCOMPLETE FLOOR PLAN

FEATURES

D1 DOOR
D2 DOUBLE SWING DOOR
W1 WINDOW
W2 WINDOW
W3 WINDOW

FIXTURES

WC TOILET
WB WASH BASIN
WT WASH TUB
S SINK
B BATH

ELECTRICAL FITTINGS

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

NOTE:
THE ARROW SHOWS THE LIGHT CONNECTION TO THE SWITCH.

DOOR AND WINDOW SCHEDULE

ELECTRICAL SYMBOLS

ROOF COMPONENTS

FIXTURES

INCOMPLETE SCHEMATIC DIAGRAM OF A ROOF TRUSS

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

20 mm CORRUGATED ROOF SHEETING ON
75 x 50 mm PURLINS @ 900 mm c/c

300 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 @ 540 mm c/c

INCOMPLETE FOUNDATION AND EXTERNAL WALL DETAIL

QUESTION 4: CIVIL DRAWING

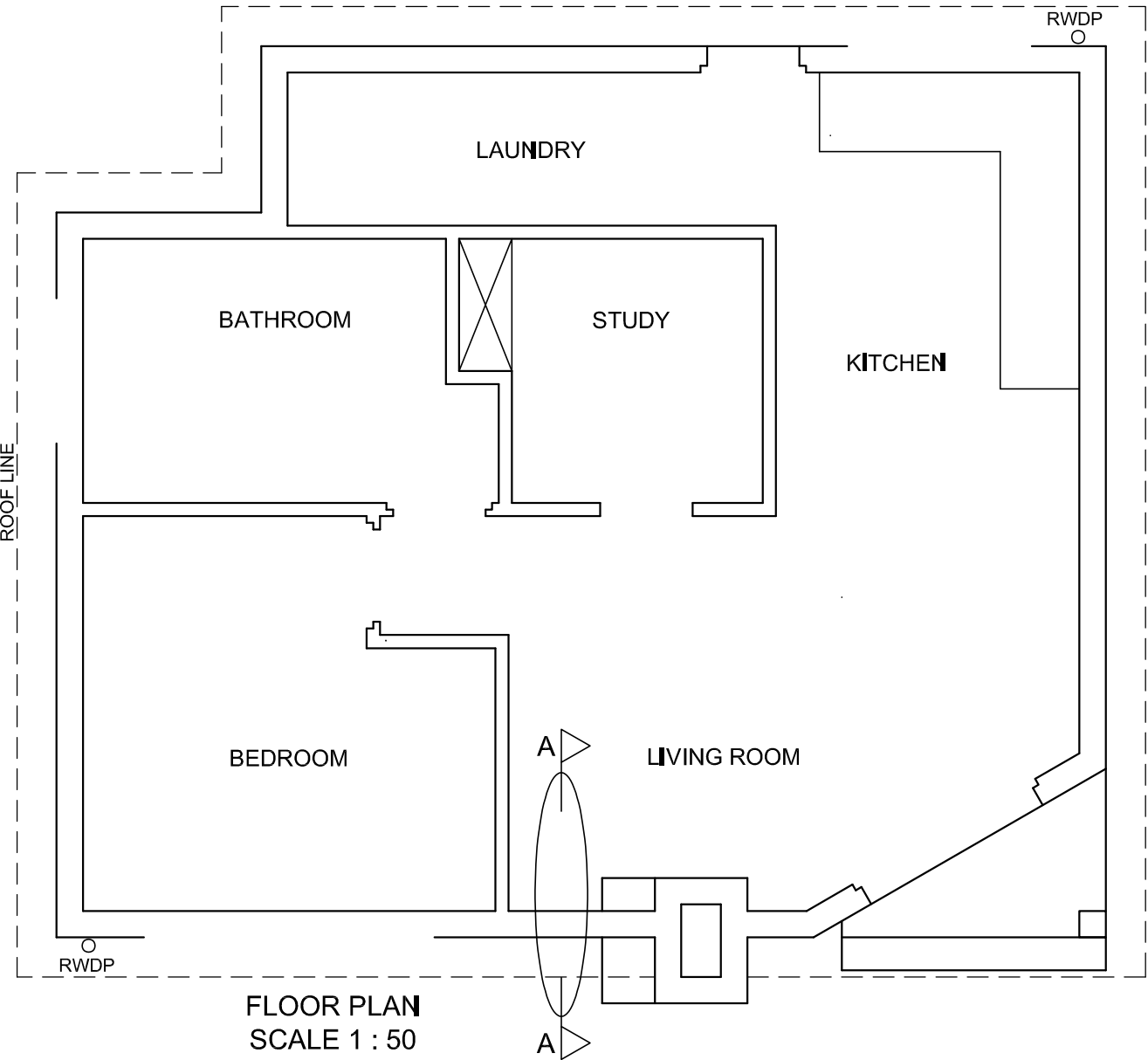
- Given:**
- The incomplete south elevation of a new house, showing the walls, window and double swing door openings, step, position of the chimney, roof and labels
 - The incomplete floor plan showing the walls, step, positions of the doors, windows, chimney and fixtures, as well as electrical layout
 - An incomplete schematic diagram of a roof truss and roof notes
 - The incomplete foundation and external wall detail
 - Room designations and floor finishes
 - A table with chimney detail
 - A door and window schedule
 - 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 the numbers
 - ALL the roof lines
 - ALL hatching detail
- 4.1.2 THE COMPLETE SOUTH ELEVATION
- Show the following features on the drawing:**
- The outside walls, step, chimney, window and double swing door detail
 - The roof detail, including the fascia boards, gutters and rainwater down-pipe
 - The finished floor level
- 4.2 Using the given incomplete 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 and external wall detail
 - The roof detail, including the fascia board and gutter
 - The chimney and the double swing door and frame to the right (east) of cutting plane A-A
 - ALL hatching detail. ONLY the substructure hatching may be drawn in neat freehand.

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



GL



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	MODERATED
1	DOORS + WINDOWS	11			
2	FIXTURES + ROOF LINES	15			
3	ELECTRICAL	10			
4	HATCHING	3			
5	LABELS	3			
SUBTOTAL		42			
SOUTH ELEVATION					
1	ROOF + RWDP	8 1/2			
2	WALLS + STEP + CHIMNEY + FFL	7			
3	DOOR + WINDOW	7			
4	LABELS	1			
SUBTOTAL		23 1/2			
DETAILED SECTION					
1	ROOF DETAIL	11 1/2			
2	SLAB + WALL + CHIMNEY	8			
3	HATCHING	3 1/2			
4	DOOR	2 1/2			
5	LABELS	1			
SUBTOTAL		26 1/2			
TOTAL		92			
PENALTIES (-)					
GRAND TOTAL					
EXAMINATION NUMBER					
EXAMINATION NUMBER					6



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GRADE 12

ENGINEERING GRAPHICS AND DESIGN P1

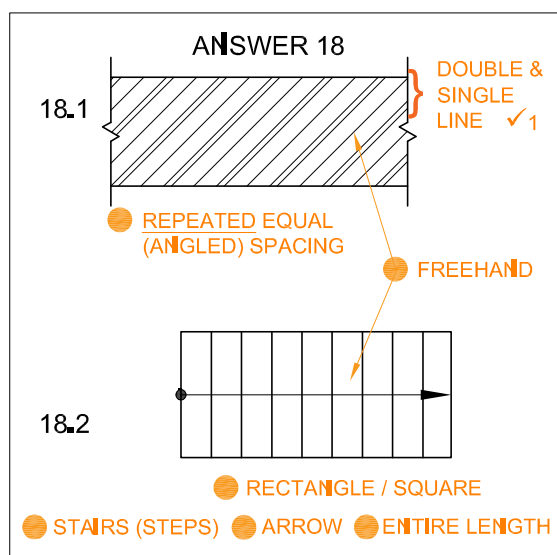
NOVEMBER 2022

MARKING GUIDELINES

MARKS: 100

These marking guidelines consist of 8 pages.

ANSWERS		
1	PROJECT NUMBER	1
2	MR N KEENAN	1
3	SITE PLAN	1
4	PRINTING	1
5	LISA B	1
6	15000	1
7	ARCHITECT and CLIENT / MR N KEENAN	2
8	2	1
9	RAINWATER DOWN-PIPE	1
10	E / SOUTH / TOP LEFT	1
11	4,57	1
12	NEW ✓ IRON / STEEL ✓	2
13	NORTH POINT	1
14	SWING / OPENING OF THE GATES	1
15	WATT METER / ELECTRICAL METER	1
16	FALL / GRADIENT / SLOPE / DROP	1
17	SOUTH WEST / SW	2
18	See below	4
19		3
20		3
	TOTAL	30



ANSWER 19
Show ALL calculations.
APPLYING CORRECT FORMULA ✓

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

$$= AB + BC + CD + DE (- \text{GATE})$$

$$= (24,23 + 8,37 + 18,38 + 31,2) - 3,6$$

$$= 78,58 \checkmark$$

ANSWER IN METRES ✓

ANSWER 20
Show ALL calculations.
APPLYING CORRECT FORMULA ✓

$$A = L \times B$$

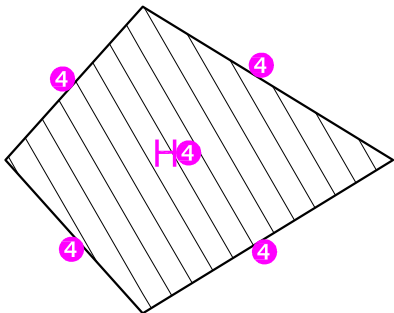
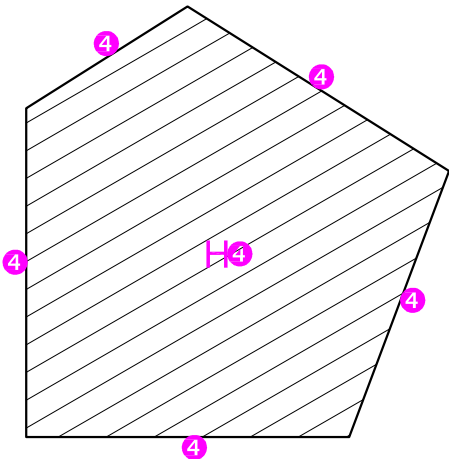
$$= (10,8 \times 6) + (13,2 \times 6) + (6,7 \times 6,7)$$

$$= 64,8 + 79,2 + 44,89$$

$$= 188,89 \checkmark \text{ m}^2$$

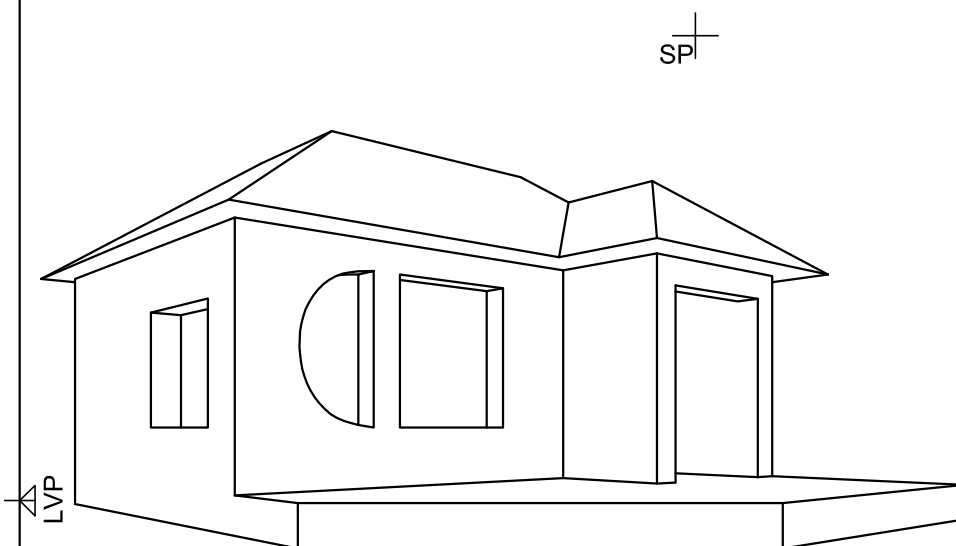
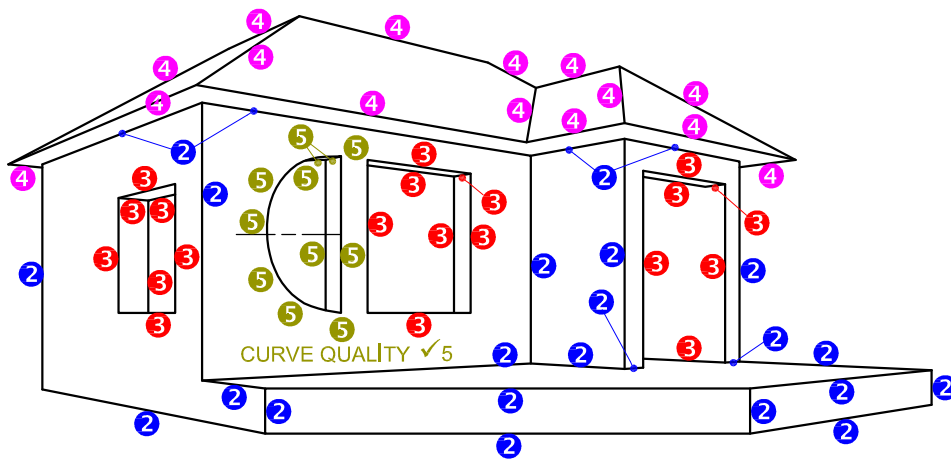
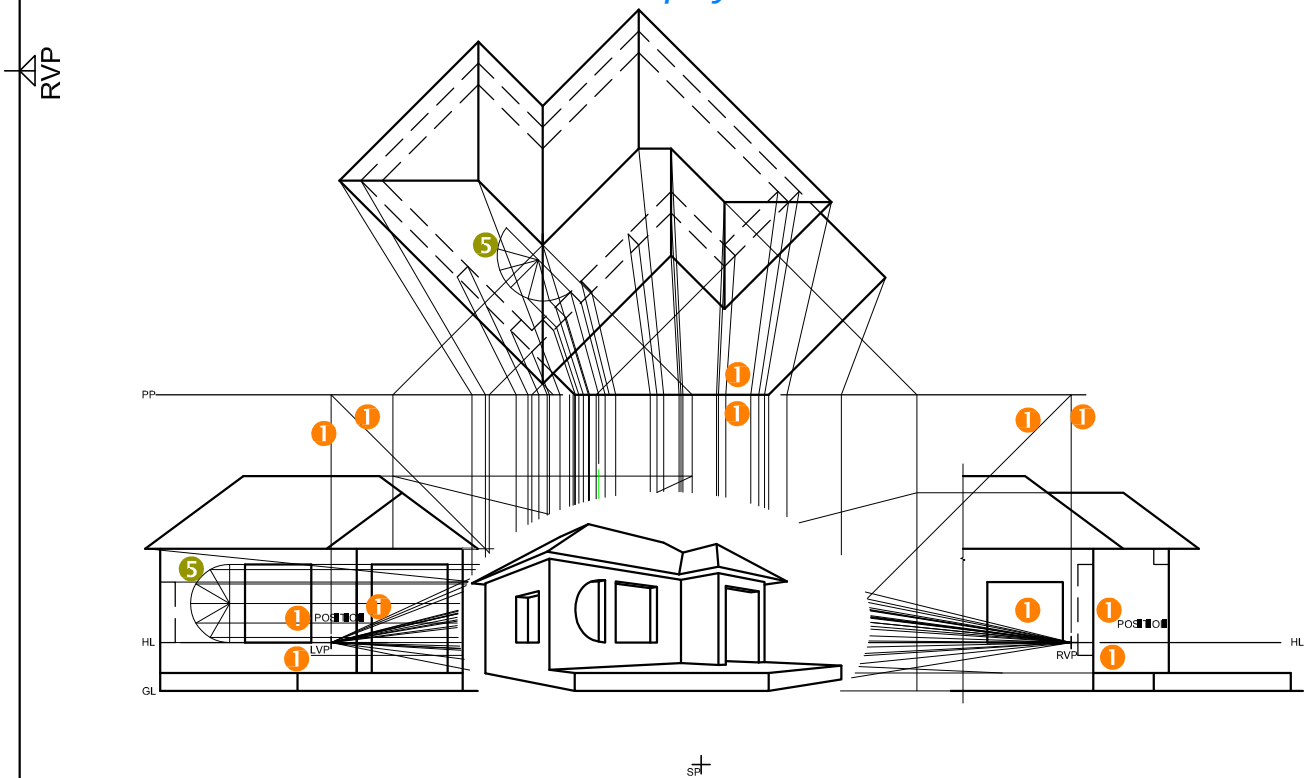
ANSWER IN SQUARE METRES AND m² SHOWN ✓

TRUE SHAPE
ANY RECOGNISED METHOD ✓ 4



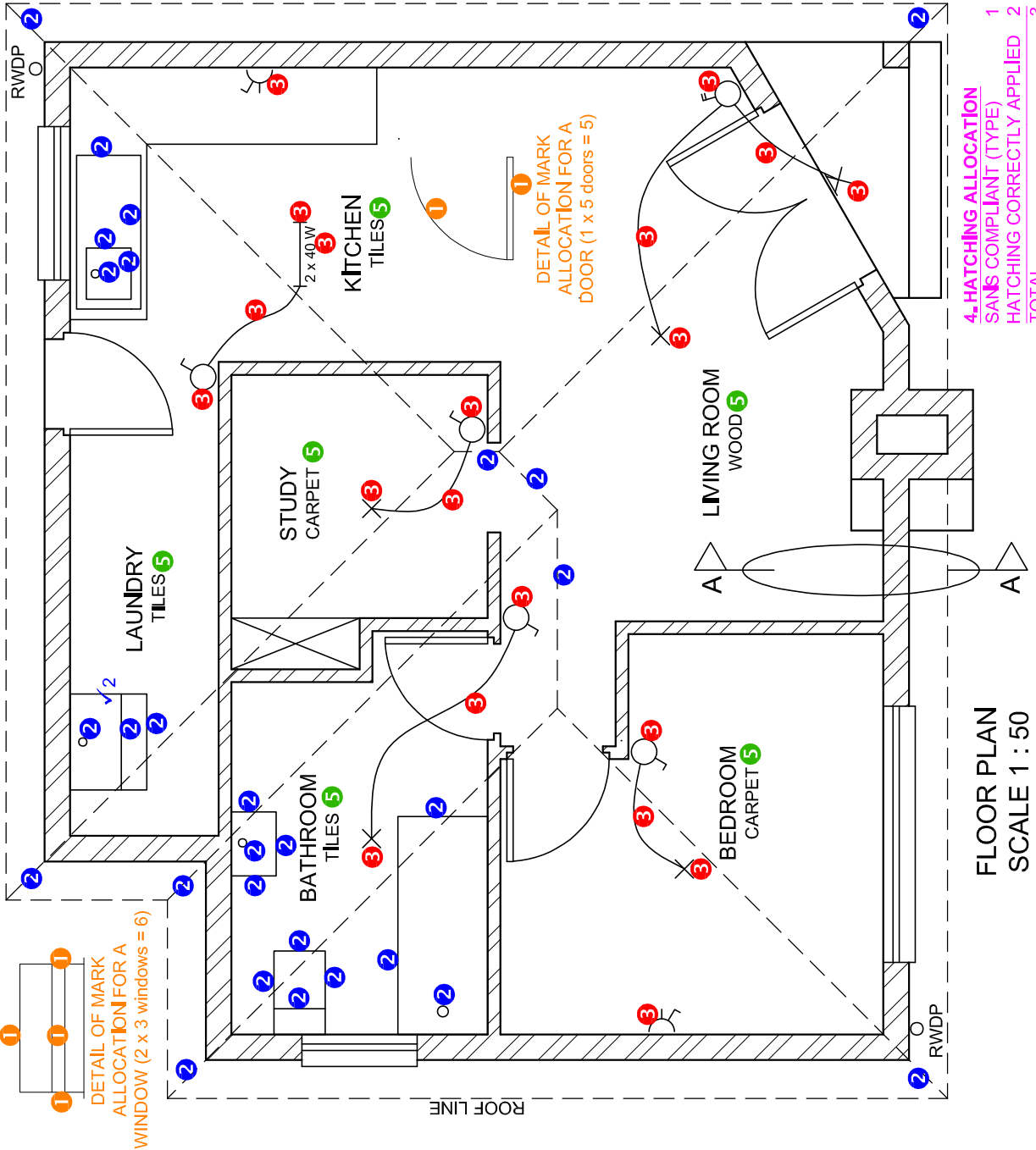
5. NOTE ON CORRECT HATCHING
DIFFERENT DIRECTIONS ✓ 5

ASSESSMENT CRITERIA		
4	TRUE SHAPE	6 ¹ / ₂
5	CORRECT HATCHING	1
SUBTOTAL		7 ¹ / ₂



ASSESSMENT CRITERIA		
1	CONSTRUCTION	6
2	WALL + BASE	10 $\frac{1}{2}$
3	WINDOWS + OPENING	10
4	ROOF	7 $\frac{1}{2}$
5	ARC	7
TOTAL		41

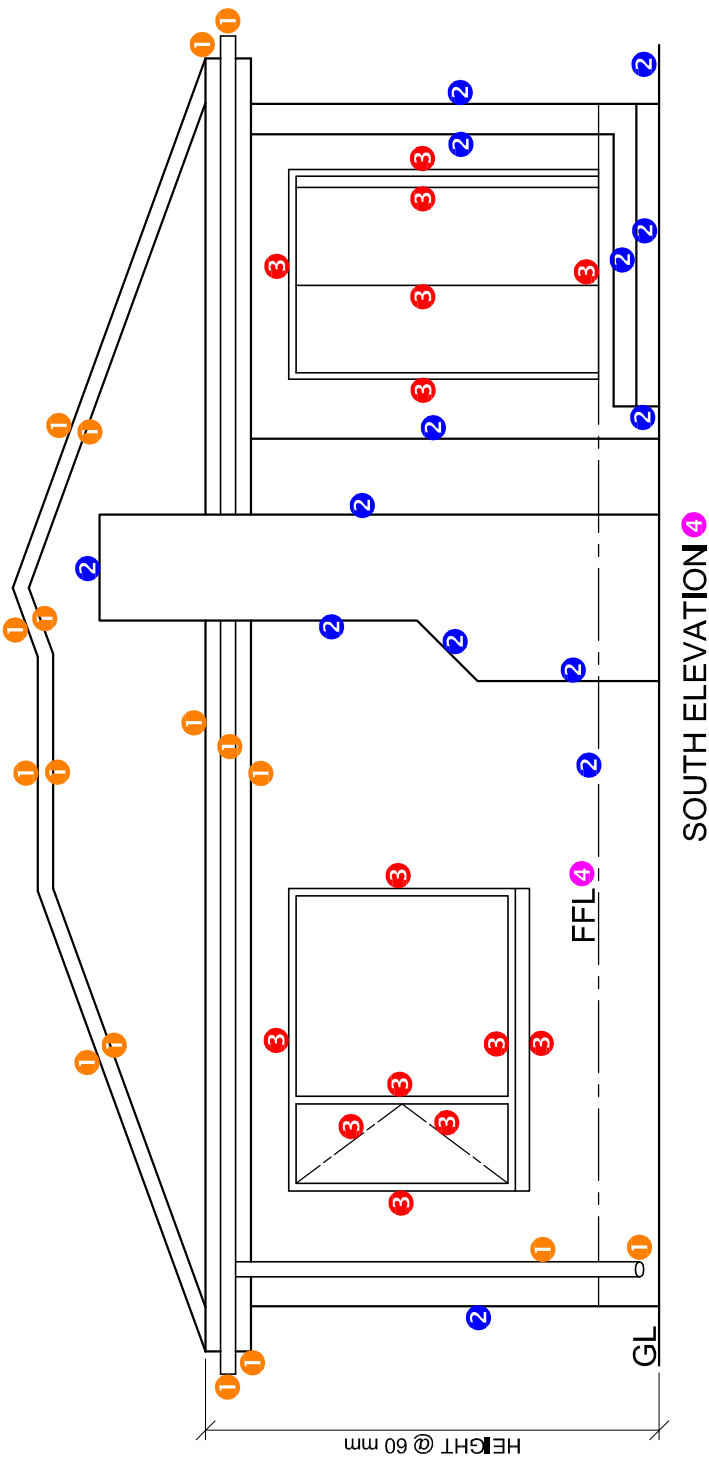
PAPER 1 QUESTION 3
GRADE 12
NOVEMBER 2022
MARKING GUIDELINES



ASSESSMENT CRITERIA	
FLOOR PLAN	
	POSSIBLE
1	DOORS + WINDOWS 11
2	FIXTURES + ROOF LINES 15
3	ELECTRICAL 10
4	HATCHING 3
5	LABELS 3
SUBTOTAL	
42	

4. HATCHING ALLOCATION
SAYS COMPLIANT (TYPE)
HATCHING CORRECTLY APPLIED
TOTAL

1
2
3

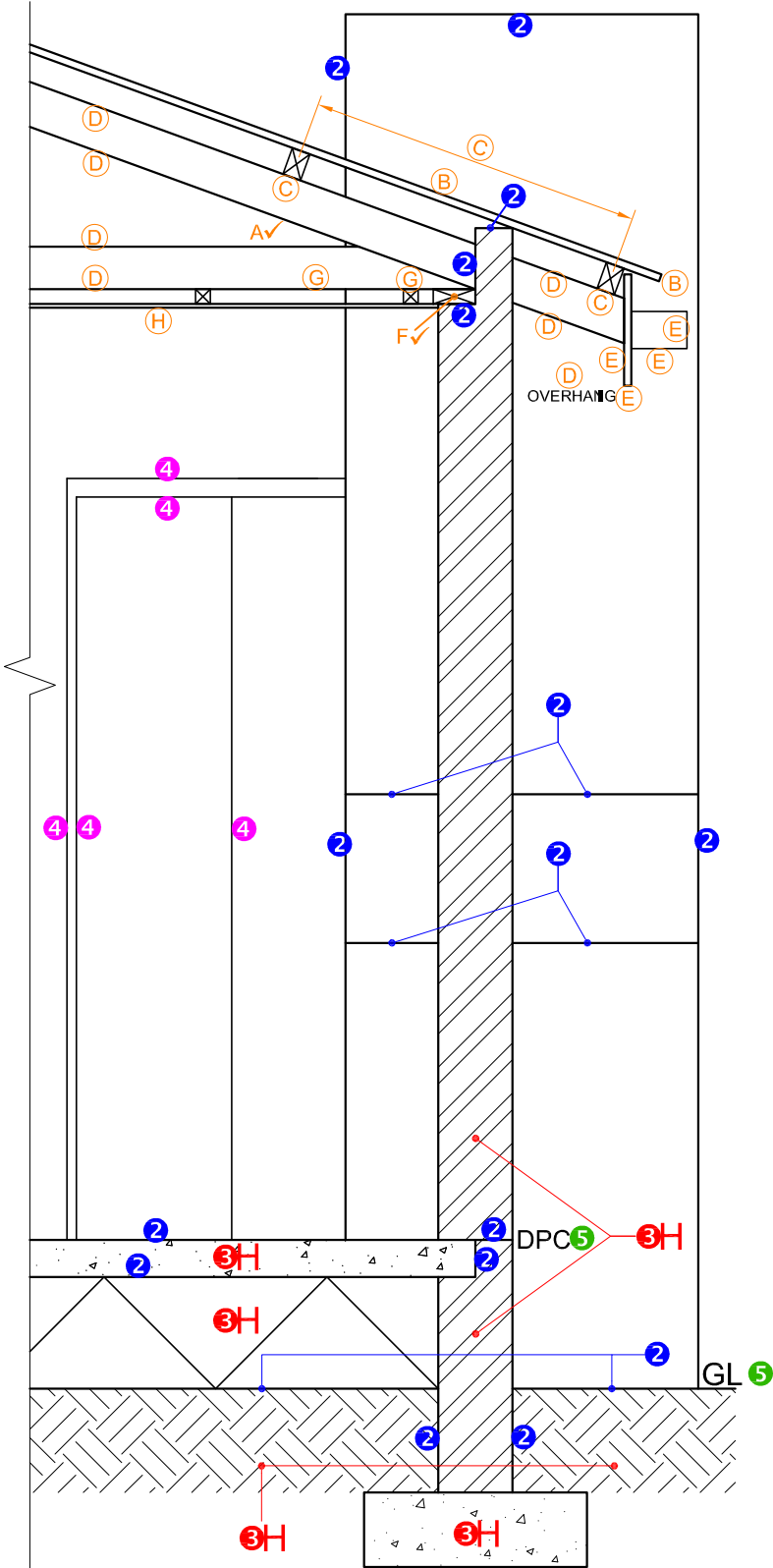


ASSESSMENT CRITERIA	
SOUTH ELEVATION	
1	ROOF + RWDP 8 ¹ / ₂
2	WALLS + STEP + CHIMNEY + FFL 7
3	DOOR + WINDOW 7
4	LABELS 1
SUBTOTAL	
23 ¹ / ₂	

1. MARK ALLOCATION FOR ROOF

A: ROOF ANGLE	1
B: ROOF SHEET	1
C: PURLIN + SPACING	1,5
D: TRUSS + OVERHANG	3,5
E: FASCIA BOARD + GUTTER	2
F: WALL PLATE	1
G: BRANDING + SPACING	1
H: CEILING BOARD	0,5
TOTAL	11,5

3. HATCHING FOR ROUGH TIMBER	
SANS COMPLIANT (TYPE)	0,5
HATCHING CORRECTLY APPLIED	0,5
TOTAL	1



ASSESSMENT CRITERIA		
DETAILED SECTION		
1	ROOF DETAIL	11 1/2
2	SLAB + WALL + CHIMNEY	8
3	HATCHING	3 1/2
4	DOOR	2 1/2
5	LABELS	1
SUBTOTAL		26 1/2

SECTION A-A
SCALE 1 : 20