STAPLE

basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL SENIOR CERTIFICATE**

**GRADE 12**

# ENGINEERING GRAPHICS AND DESIGN P1

**NOVEMBER 2016**

**MARKS: 100**
**TIME: 3 hours**

**This question paper consists of 6 pages.**

## 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 completed using 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. Proper planning 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.

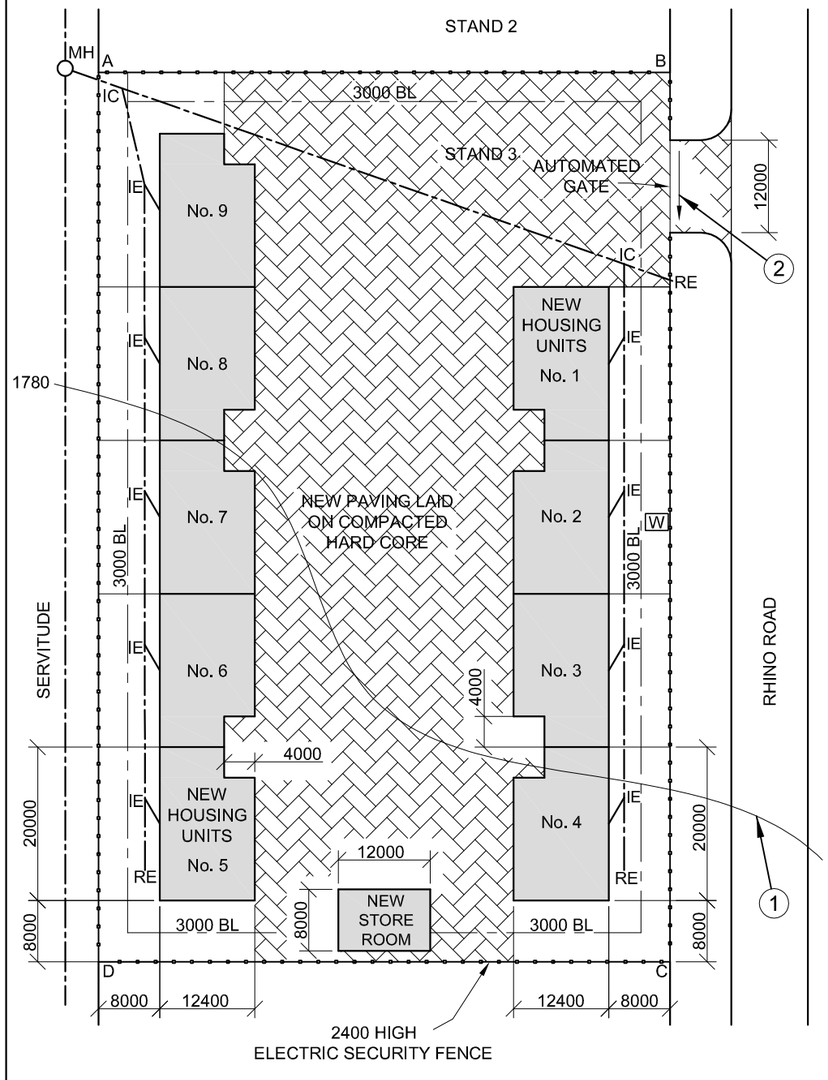
| FOR OFFICIAL USE ONLY | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QUESTION | MARKS OBTAINED | | | ½ | SIGN | MODERATED | | | ½ | SIGN | RE-MARKING | | | ½ | SIGN |
| 1 | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | |
| 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 |

STAPLE

| LAND SURVEYOR'S CERTIFICATE OF THE BOUNDARY LENGTHS AND CORNER HEIGHTS ON STAND 3. SURVEYED ON 2015-05-06 | |
|---|---|
| **BOUNDARY LENGTHS IN MILLIMETRES** | **CORNER HEIGHTS IN METRES** |
| AB = 74569 | A = 1780,6 |
| BC = 116000 | B = 1780,7 |
| CD = 74569 | C = 1779,7 |
| DA = 116000 | D = 1779,3 |




SITE PLAN
SCALE 1 : 800

**NOTE:**
- Contractors must verify all dimensions and levels on site before commencing work. Architects to be notified immediately of any discrepancies.
- All the houses are the same size.

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* graphic symbol for a BIDET.

| REVISION | DATE | DESCRIPTION |
|---|---|---|
| | | |

***ON-THE-DOT ARCHITECTS***
PO BOX 2000
LEOPARD VALLEY
1012

| PRINTED BY | DATE OF PRINT |
|---|---|
| NAT PRINTERS | 2015/07/09 |

DRAWING TITLE
SITE PLAN

PROJECT
PROPOSED NEW HOUSING UNITS IN A SECURITY COMPLEX ON STAND 3, RHINO ROAD, OBSERVATION PARK

| PROJECT NUMBER | DRAWING NUMBER |
|---|---|
| 2015-RR-07 | EP 3-01-2016 |

| DATE | DRAWN | CHECKED | SCALE |
|---|---|---|---|
| 2015/07/07 | WILLIAM | VERNON | 1 : 800 |

REFERENCE CODE
QV1-2016

**QUESTION 1: ANALYTICAL (CIVIL)**

**Given:**
The site plan for proposed housing units in a security complex, a title panel and a table of questions. The drawing has not been prepared to the indicated scale.

**Instructions:**
Complete the table below by neatly answering the questions, which refer to the accompanying drawing and title panel. **[30]**

| | QUESTIONS | ANSWERS | | | |
|---|---|---|---|---|---|
| 1 | How many signatures are required? | | 1 | | |
| 2 | Who prepared the drawing? | | 1 | | |
| 3 | What scale is indicated for the drawing? | | 1 | | |
| 4 | Who checked the drawing? | | 1 | | |
| 5 | Who was responsible for the printing of the site plan? | | 1 | | |
| 6 | How many times have the drawing been revised? | | 1 | | |
| 7 | When was the site surveyed? | | 1 | | |
| 8 | How many rodding eyes are shown on the site plan? | | 1 | | |
| 9 | What does the abbreviation *IC* stand for? | | 1 | | |
| 10 | In what colour should glass be indicated on a detailed drawing? | | 1 | | |
| 11 | Name the feature at 1. | | 1 | | |
| 12 | In what unit are the dimensions on the site plan? | | 1 | | |
| 13 | On what must the new paving be laid? | | 1 | | |
| 14 | What type of fence is proposed for the complex? | | 2 | | |
| 15 | What is indicated by the arrow at 2? | | 1 | | |
| 16 | Why would a residential development not be allowed on the land immediately south-west of STAND 3? | | 2 | | |
| 17 | Referring to the building regulations, why would this proposed site plan not be approved? | | 2 | | |
| 18 | In the space below (ANSWER 18), determine the length of the electric security fence in metres. | | 3 | | |
| 19 | In the space below (ANSWER 19), determine the combined total area of ALL the proposed buildings in square metres. | | 4 | | |
| 20 | In the space in the title panel (ANSWER 20), draw, in neat freehand, the front view and top view of the *SANS 10143* graphic symbol for a BIDET. | | 3 | | |
| | **TOTAL** | | **30** | | |

**ANSWER 18**
Show ALL calculations.

**ANSWER 19**
Show ALL calculations.

| EXAMINATION NUMBER | |
|---|---|
| | |
| EXAMINATION NUMBER | 2 |

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## QUESTION 2: SOLID GEOMETRY

**Given:**

- The front view and the top view of a right regular hexagonal pyramid and a right equilateral triangular prism. The axes of both solids lie in a common vertical plane.
- An auxiliary view of the triangular prism

**Specifications:**

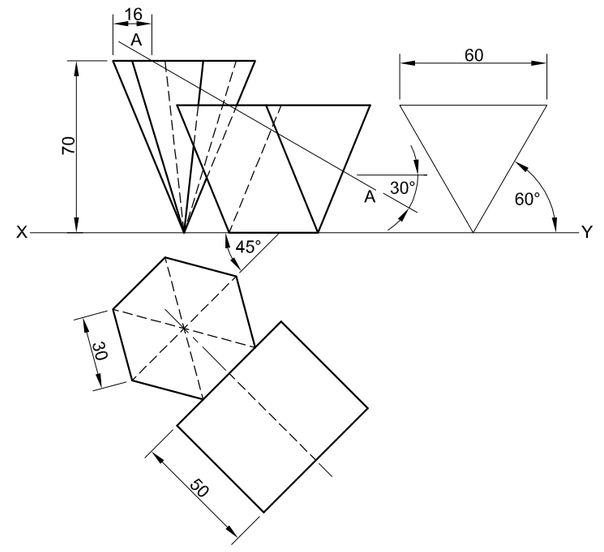
- The two solids do not touch.
- Both solids are cut by cutting plane AA.

**Instructions:**

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

2.1 The given front view
2.2 The sectional top view
2.3 The sectional right view

- Planning is essential.
- Show ALL necessary construction.
- Show ALL hidden detail on all three views. **[37]**




| ASSESSMENT CRITERIA | | | | | | |
|---|---|---|---|---|---|---|
| 1 | CONSTRUCTION | 3 | | | | |
| 2 | FRONT VIEW | 9 | | | | |
| 3 | SECTIONAL TOP VIEW | 11 | | | | |
| 4 | SECTIONAL RIGHT VIEW | 14 | | | | |
| PENALTIES (-) | | | | | | |
| | **TOTAL** | **37** | | | | |

EXAMINATION NUMBER

EXAMINATION NUMBER 3

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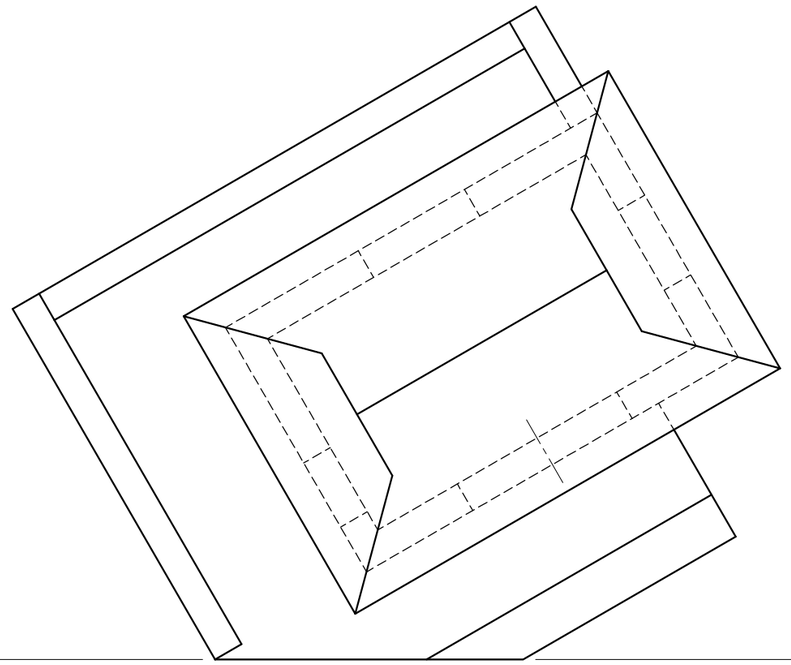
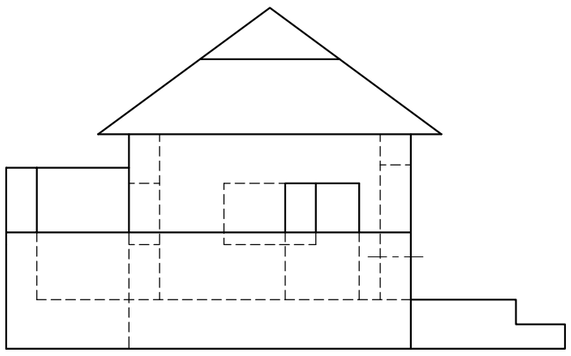
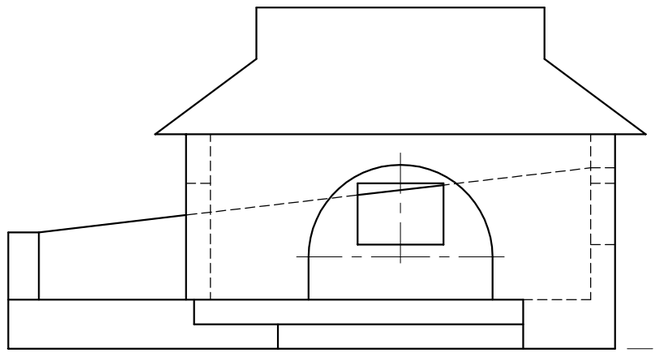


PP PP

HL HL



GL



SP

## QUESTION 3: PERSPECTIVE

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

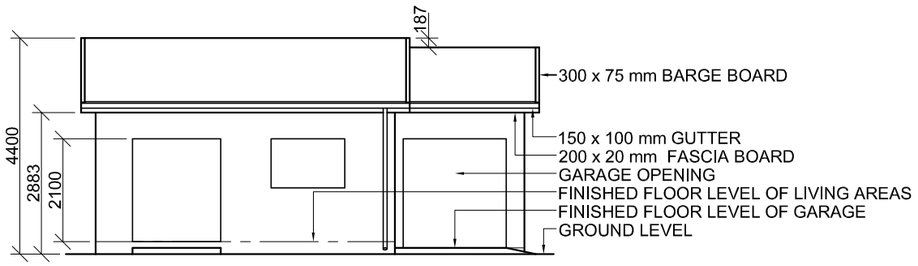
**Instructions:**
Complete the perspective drawing.

- Align the drawing sheet with the ground line (GL).
- Determine and label the vanishing points.
- Show ALL necessary construction.
- NO hidden detail is required. **[40]**

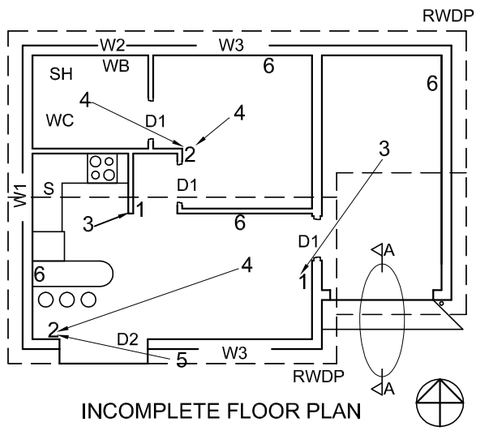
| ASSESSMENT CRITERIA | | | | | |
|---|---|---|---|---|---|
| 1 | CONSTRUCTION + VPs | 7 | | | |
| 2 | WALLS + DOORS | 22 | | | |
| 3 | ROOF | 5 | | | |
| 4 | CIRCULAR ARC | 6 | | | |
| | **TOTAL** | **40** | | | |

EXAMINATION NUMBER

EXAMINATION NUMBER 4




INCOMPLETE SOUTH ELEVATION



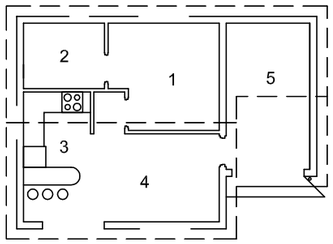

INCOMPLETE FLOOR PLAN

**FEATURES**
**D1** DOOR
**D2** SLIDING 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 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.**

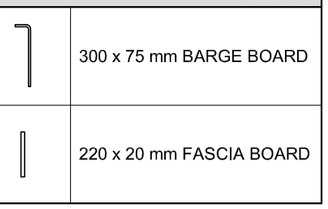



ROOM DESIGNATIONS

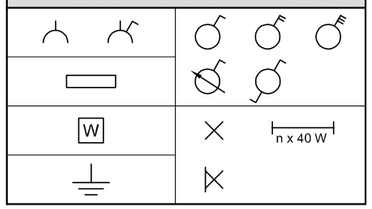
**FLOOR FINISHES**

| | | |
|---|---|---|
| 1 | BEDROOM: | CARPET |
| 2 | BATHROOM: | TILE |
| 3 | KITCHEN: | TILE |
| 4 | LOUNGE/DINING ROOM: | WOOD |
| 5 | GARAGE: | GRANO |

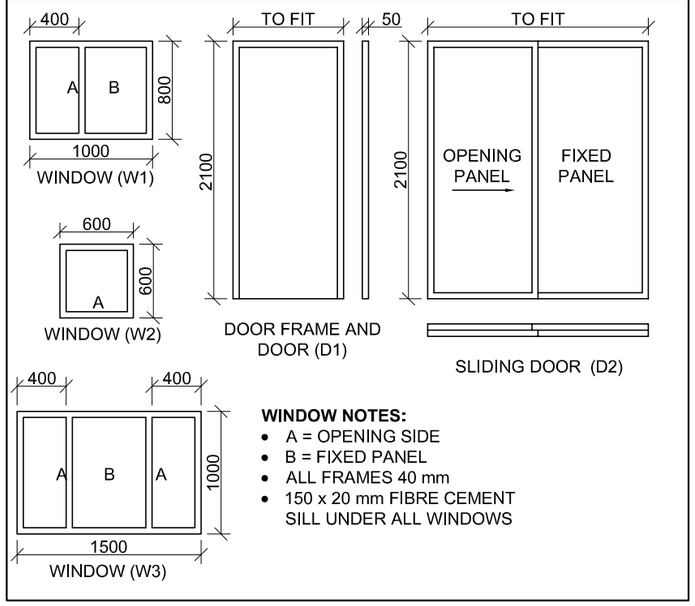
## ROOF COMPONENTS



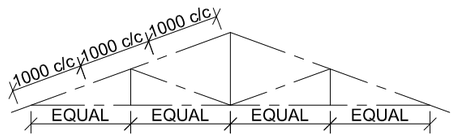

## ELECTRICAL SYMBOLS




## DOOR AND WINDOW SCHEDULE




**WINDOW NOTES:**
- A = OPENING SIDE
- B = FIXED PANEL
- ALL FRAMES 40 mm
- 150 x 20 mm FIBRE CEMENT SILL UNDER ALL WINDOWS




SCHEMATIC DIAGRAM OF A ROOF TRUSS FOR THE GARAGE

**ROOF NOTES:**
ROOF PITCH 20°

115 x 38 mm ROOF TRUSSES ON 115 x 38 mm WALL PLATES

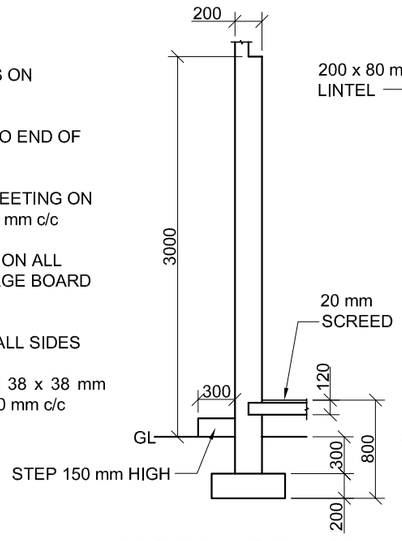
ROOF OVERHANG 300 mm TO END OF ROOF TRUSSES

ROOF COVER 40 mm IBR SHEETING ON 75 x 50 mm PURLINS @ 1000 mm c/c

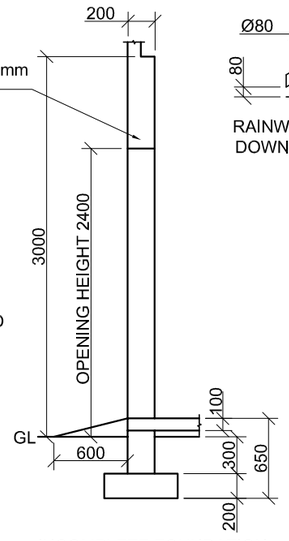
220 x 20 mm FASCIA BOARD ON ALL SIDES AND 300 x 75 mm BARGE BOARD ON GABLED ENDS

100 x 150 mm GUTTERS ON ALL SIDES

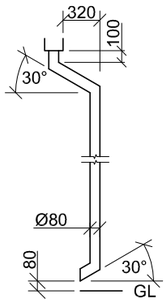
9 mm CEILING BOARDS ON 38 x 38 mm BRANDERING STRIPS @ 300 mm c/c




INCOMPLETE FOUNDATION AND EXTERNAL WALL DETAIL OF THE LIVING AREAS

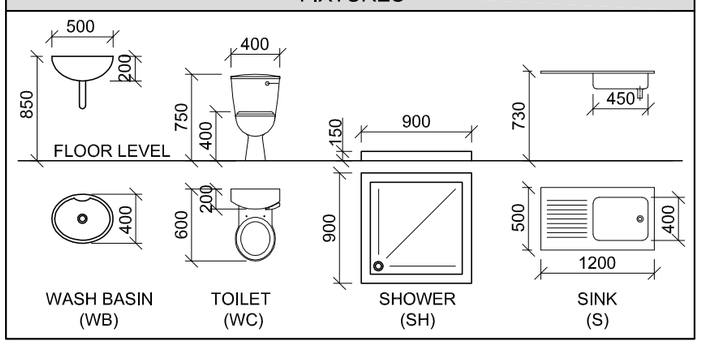



INCOMPLETE FOUNDATION AND EXTERNAL WALL DETAIL OF THE GARAGE




RAINWATER DOWN-PIPE

## FIXTURES




## QUESTION 4: CIVIL DRAWING

**Given:**
- The incomplete south elevation of a **new house**, showing the walls, the door, window and garage openings, the roof and notes
- The incomplete floor plan showing the walls, positions of the doors, windows, fixtures and the electrical layout
- A schematic diagram of a roof truss and roof notes
- The incomplete foundation and external wall details of the living areas and the garage
- Room designations and floor finishes
- The rainwater down-pipe
- A table of roof components
- A table of electrical symbols
- A door and window schedule
- A table of fixtures
- The incomplete floor plan of the **new house**, drawn to scale 1 : 50, and the incomplete foundation and the break line of 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, in first-angle orthographic projection and 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 hatching detail

4.1.2 **THE COMPLETE SOUTH ELEVATION**
**Show the following features on the drawing:**
- The outside walls, door and window details and the garage opening
- The roof detail, including the fascia boards, barge boards, gutters and rainwater down-pipes
- The finished floor level

4.2 Using the 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 foundation, wall and garage opening detail
- The roof detail, including the fascia board and gutter
- ALL the external features of the **new house** to the left (west) of the ellipse
- ALL hatching detail. ONLY the substructure hatching may be drawn in neat freehand.

**Label the following:**
- The south elevation
- The room designations and floor finishes
- Ground level (use the correct abbreviation and show it on ALL the relevant views)

**NOTE:**
ALL drawings must comply with the **guidelines** and **graphical symbols** contained in the *SANS 10143*. **[93]**

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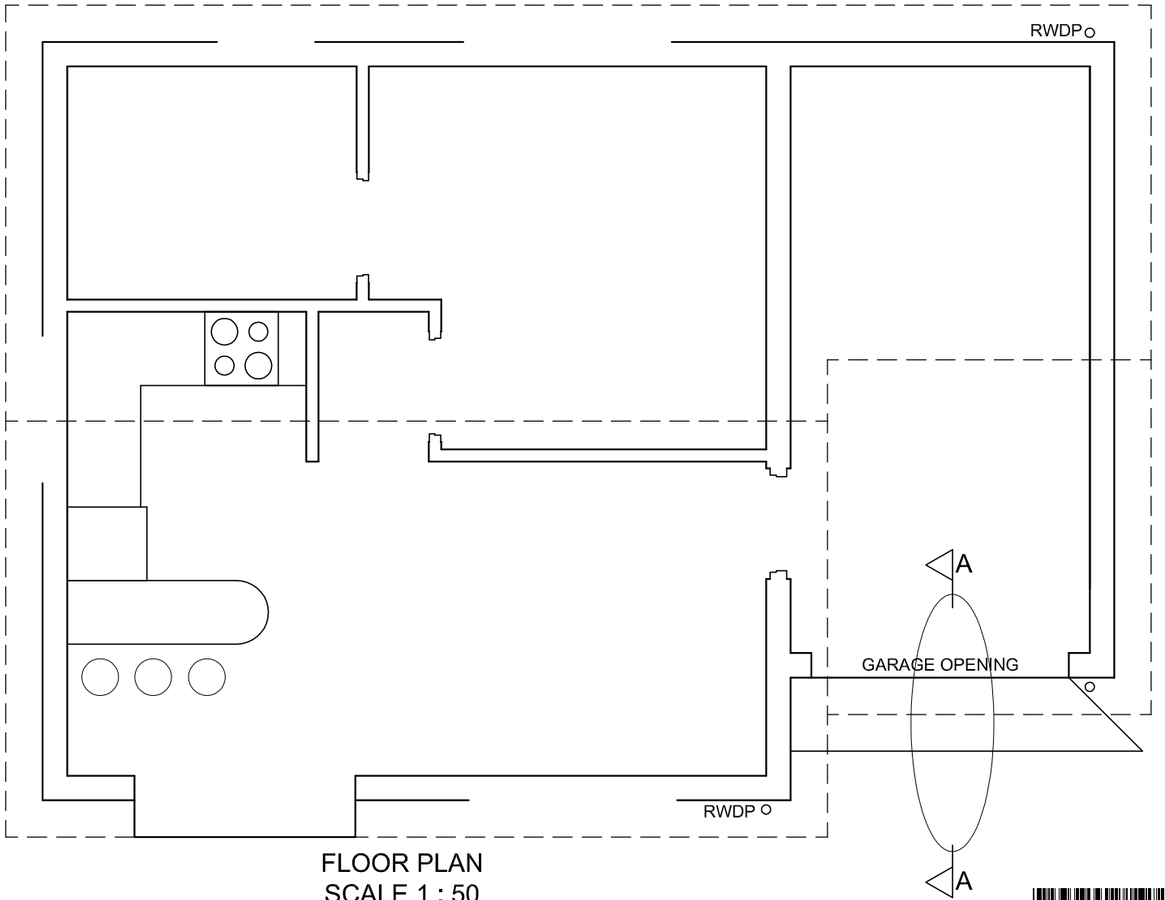
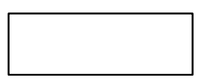



FLOOR PLAN
SCALE 1 : 50



SECTION A-A
SCALE 1 : 20

| 1. MARK ALLOCATION FOR SECTION OF ROOF | |
|---|---|
| A (1) | |
| B (1) | |
| C (1) | |
| D (2) | |
| E (1) | |
| F (1) | |
| G (1) | |
| H (1) | |
| I (2) | |
| **TOTAL** | |

| FOR OFFICIAL USE ONLY | |
|---|---|
| INCORRECT SCALE | |
| INCORRECT POSITIONING OF VIEWS | |
| NON-ALIGNMENT OF VIEWS | |
| | |
| | |
| | |
| **TOTAL** | |

| ASSESSMENT CRITERIA | | | | | |
|---|---|---|---|---|---|
| **FLOOR PLAN** | | | | | |
| 1 | DOORS + WINDOWS | 14 | | | |
| 2 | ELECTRICAL | 11 | | | |
| 3 | FIXTURES | 8 | | | |
| 4 | HATCHING | 4 | | | |
| 5 | LABELS | 5 | | | |
| **SUBTOTAL** | | **42** | | | |
| **SOUTH ELEVATION** | | | | | |
| 1 | ROOF | $5\frac{1}{2}$ | | | |
| 2 | WALLS + RWDP + FFL | 7 | | | |
| 3 | DOOR + WINDOW | 10 | | | |
| 4 | LABELS | 1 | | | |
| **SUBTOTAL** | | **$23\frac{1}{2}$** | | | |
| **DETAILED SECTION** | | | | | |
| 1 | ROOF | 11 | | | |
| 2 | FOUNDATION + WALLS + SLAB | 7 | | | |
| 3 | GUTTER + RWDP | 4 | | | |
| 4 | HATCHING | 5 | | | |
| 5 | LABELS | $\frac{1}{2}$ | | | |
| **SUBTOTAL** | | **$27\frac{1}{2}$** | | | |
| **TOTAL** | | **93** | | | |
| PENALTIES (-) | | | | | |
| **GRAND TOTAL** | | | | | |
| EXAMINATION NUMBER | | | | | |
| | | | | | |
| EXAMINATION NUMBER | | | | | 6 |