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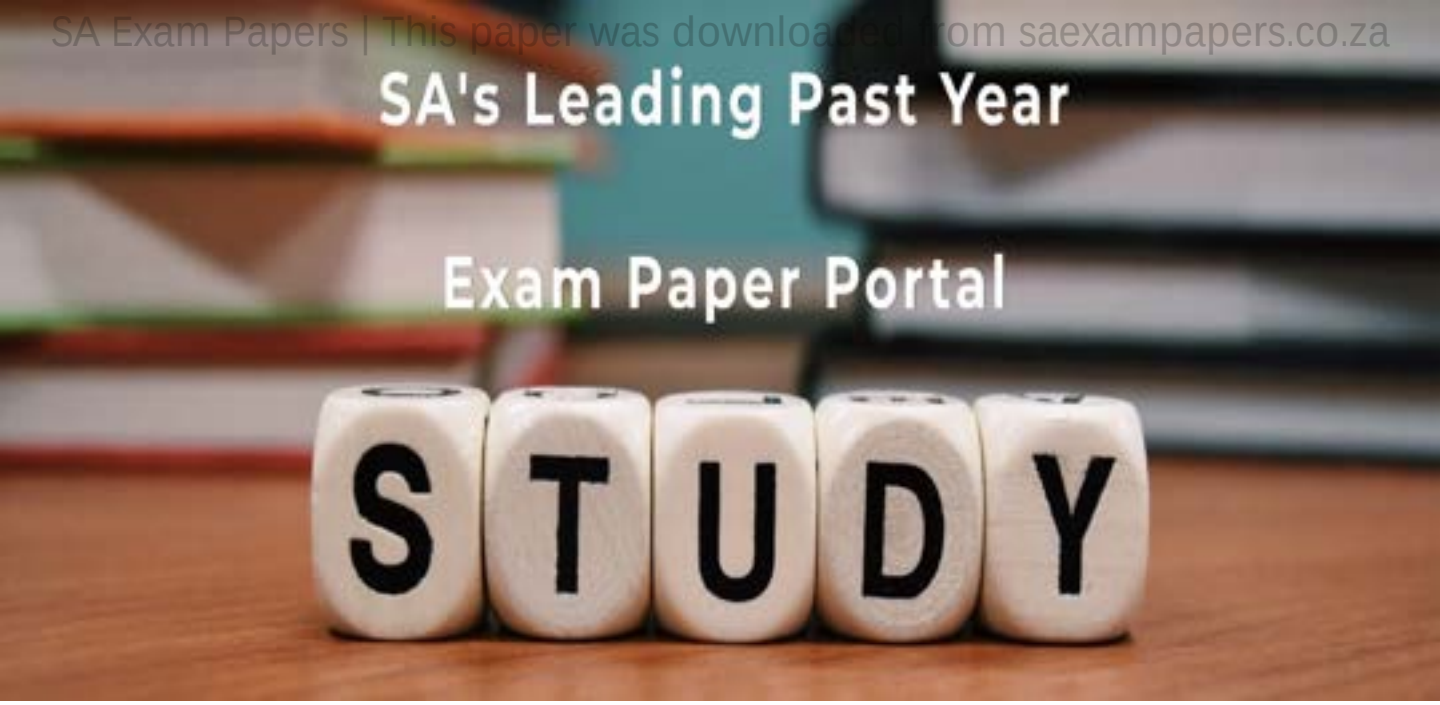


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REPUBLIC OF SOUTH AFRICA

**SENIOR CERTIFICATE EXAMINATIONS/**
**NATIONAL SENIOR CERTIFICATE EXAMINATIONS**

# CIVIL TECHNOLOGY: CIVIL SERVICES

**2023**

**MARKING GUIDELINES**

**MARKS: 200**

**These marking guidelines consist of 19 pages.**

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## INSTRUCTIONS FOR THE MARKERS

**1. Markers should:**

- Familiarise themselves with the question and answer before evaluating responses from candidates.
- Always interpret the responses of the candidates within the context of the question.
- Consider any relevant and acceptable answer during pre-marking but should strictly adhere to the answers after finalisation of the marking guideline.
- There are TWO approaches to answering questions; these are (1) to explain and (2) to describe.
  1. If a candidate is required to explain a process in a specific number of steps, only the first required number of responses should be considered.
  2. However, if for example a candidate is required to explain or describe a process, we need to consider that candidates may write a long description, not necessarily well organised. In this case the marker needs to evaluate the complete statement to judge if the candidate explained the required outcome satisfactorily and allocate marks on merit.
- Mark what the candidate wrote and do not interpret or predict responses.
- Indicate the tick or cross right at the position where the mark needs to be awarded or where the candidate made the error.
- Accept the letter corresponding with the correct answer as well as the answer written in full in multiple-choice or similar questions.
- Accept incorrect spelling in answers unless the spelling changes the meaning of the answer.
- If a learner writes two or more answers separated by a slash (/) mark only the first response, unless the additional answer/s are different names for the same item e.g., Yale lock/Night latch. In this case, the answer for the response should be awarded and the slash (/) should NOT be considered as an additional answer.

**2. For calculations:**

- A mark is only awarded if the correct unit is written next to the answer. If the question states that the answer must be in a specific unit, a mark will ONLY be awarded if the answer has the correct unit as indicated in the question.
- Marks will only be allocated for the correct values if the candidates add are instead of multiply. NO marks will be awarded for the calculations and the answer.



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- Where an incorrect answer is correctly carried over, the marker must recalculate the values, using the incorrect answer from the first calculation. If correctly used, the candidate should receive the full marks for subsequent calculations.
- Alternative methods of calculations must be considered, provided that the correct answer is obtained.
- For the calculation of quantities marks will be awarded for the correct use of the dimension paper.

**3. When marking drawings:**

- The member for which the mark should be awarded must be drawn correctly in the correct position to receive a mark.
- A member incorrectly drawn but wrongfully repeated in another position will be awarded the mark for the repeated incorrect member provided that the marking guideline provide for TWO or more marks for that member (positive marking).
- Marks can only be awarded for a label if the label is correctly indicating the correct member that was drawn. Do not consider labels for members that were provided with labels on the answer sheet.
- Scale drawings should always be marked using an appropriate mask.
- If the incorrect/wrong drawing was drawn, the candidate can be awarded for only what was provided for on the marking guideline.
- If a two-dimensional drawing is required and a line diagram/pictorial/isometric drawing is drawn, members will be marked according to the assessment criteria and no marks will be awarded for the correctness of the drawing.
- If candidates draw/give more information than what is required, mark strictly according to the assessment criteria.
- The marks for the correctness of the drawing will only be awarded if the entire drawing with all members/parts is correctly drawn.

**4. Incorrect numbering of questions:**

- If a candidate numbered an answer incorrectly, but the answer is in the correct position according to the sequence of the questions in the question paper, circle the incorrect numbering and mark the response.
- If questions were answered randomly not following the same sequence as in the question paper and the learner numbered incorrectly, the response should NOT be marked.

**5. Duplication of responses and questions answered in the incorrect place:**

- If a question is answered twice, mark the first response.
- If a question should be answered on an answer sheet and the candidate answered it on both the answer sheet and in the answer book, mark the response on the answer sheet and cancel the response in the answer book.
- If the question was answered in the answer book instead of on the answer sheet, mark the response in the answer book according to the assessment criteria on the marking guideline.



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**QUESTION 1: OHSA, MATERIALS, TOOLS, EQUIPMENT AND JOINING (GENERIC)**

1.1 1.1.1 Safety features omitted from the scaffold are:
- Baseplate ✓
- Soleplate ✓
- Kickboard/Toe-board ✓
- Guardrails

**ANY THREE OF THE ABOVE** (3)

1.1.2 Platform used as displayed:
- Vertical standards will sink into the ground ✓
- Can cause the scaffold/platform to tilt over ✓
- Can cause injuries to workers
- Tools may fall from the scaffold on the workers below
- Workers can fall from the scaffold

**ANY TWO OF THE ABOVE** (2)

1.2 1.2.1 Rust ✓ (1)

1.2.2 Zinc ✓ (1)

1.2.3 Keeping it moist ✓ (1)

1.2.4 Metal ✓ (1)

1.2.5 Plastic ✓ (1)

1.3 Height of guardrails (900 – 1 000 mm):
- To keep workers safe on the platform ✓
- To prevent workers from falling over the guard rails

**ANY ONE OF THE ABOVE** (1)

1.4 Precautions when storing a ladder:
- Store a ladder in a dry place after use ✓
- Never store material and equipment on a ladder
- Hang the ladder vertically/horizontally on wall brackets
- The ladder should be stored within easy reach

**ANY ONE OF THE ABOVE** (1)



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1.5 The operator must check if:
- The builders hoist is not overloaded ✓
- The gates are shut when the device is being used
- Overhead protection is provided
- Material is stacked firmly and correctly
- Emergency brakes are installed/operational
- Safety measures are displayed inside the cage

**ANY ONE OF THE ABOVE** (1)

1.6 Any person/Fire fighters will be able to identify exactly what specific type of fire extinguisher to use in case of a fire. ✓ (1)

1.7 A – Hexagonal nut ✓
B – Square nut/Four sided nut ✓
C – Wing nut/Butterfly nut ✓
D – Domed top/Domed nut/Dome nut/Acorn nut/Cap nut ✓ (4)

1.8 1.8.1 Tool that can be used:
- Laser level ✓
- Spirit level with straight edge
- Transparent pipe level
- Dumpy level

**ANY ONE OF THE ABOVE** (1)

1.8.2 Tool that can be used:
- Dumpy level ✓
- Laser level

**ANY ONE OF THE ABOVE** (1)
**[20]**



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**QUESTION 2: GRAPHICS AS MEANS OF COMMUNICATION (GENERIC)**

**ANSWER SHEET 2.**

| NO. | QUESTIONS | ANSWERS | MARK |
|---|---|---|---|
| 1 | Name the FIGURE that represents the first floor. Give ONE reason for your answer. | First floor: A/FIGURE A ✓<br>• Garage in FIGURE B ✓<br>• No arrows indicated in the staircase in FIGURE A<br>• No ramp in FIGURE A<br>• Balcony in FIGURE A<br>• Staircase<br>**ANY ONE OF THE ABOVE ANSWER AND REASON OR ANY OTHER ACCEPTABLE ANSWER** | 2 |
| 2 | Deduce from the building plan the number of windows in the building. | 10 ✓ | 1 |
| 3 | Identify number **1**. | Balcony ✓ | 1 |
| 4 | Identify number **2**. | Shower ✓ | 1 |
| 5 | Identify number **6**. | One way switch – double pole ✓ | 1 |
| 6 | Identify number **8**. | Ramp ✓ | 1 |
| 7 | Identify number **9**. | Wall mounted light ✓ | 1 |
| 8 | Identify number **10**. | Wash tub ✓ | 1 |
| 9 | Identify the number that indicates the garage door. | 7 ✓ | 1 |
| 10 | Deduce from the building plan the omitted dimension of number **11**. | 110 mm/110 ✓ | 1 |
| 11 | Deduce from the building plan the material that must be used for number **5**. | Concrete ✓ | 1 |



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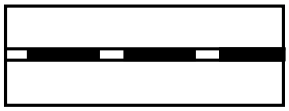
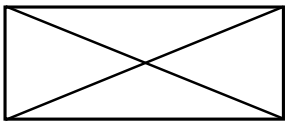
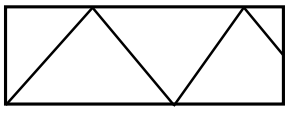
| | | | |
|---|---|---|---|
| 12 | Give the abbreviations for the following:<br>• Number **3**<br>• Number **4** | Number 3: WC ✓<br>Number 4: WB/WHB ✓ | 2 |
| 13 | Describe the purpose of a two-way switch. | Two-way switch:<br>• Used to switch the same light on or off ✓<br>• From TWO different positions ✓ | 2 |
| 14 | Recommend an appropriate floor covering for the kitchen. | Tiles/Novilon/Concrete/Vinyl/ Painted floors/Laminated timber flooring/Timber floors ✓<br>**ANY ONE OF THE ABOVE** | 1 |
| 15 | Who was responsible for the checking of the drawing? | P Kriel ✓ | 1 |
| 16 | Deduce ONE fault in the bathroom in FIGURE **A**. | No switch/electrical connection/wiring/light/door/door opening/bath/bidet ✓<br>**ANY ONE OF THE ABOVE** | 1 |
| 17 | Name an alternative light source that can be used during load shedding for a dwelling. | Rechargeable bulb/Candle/Paraffin lamp/Gas lamp/Battery powered lights/Torch/Solar/Cell phone ✓<br>**ANY ONE OF THE ABOVE** | 1 |
| 18 | State what was done during revision 1 and revision 2 of the house plan. | Revision 1: Drawing of Staircase ✓<br>Revision 2: Drawing of light fittings ✓ | 2 |
| 19 | Name the finish for the ramp as prescribed by the architect. | Paving ✓ | 1 |
| 20 | Draw the symbol for a damp-proof membrane. |  ✓✓ | 2 |
| 21 | Draw the symbol for finished wood. |  ✓✓ | 2 |
| 22 | Draw the symbol for hardcore filling. |  ✓✓ | 2 |



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<table>
<tr>
<td>23</td>
<td>Prove, by means of a control test, that the total horizontal dimensions on the top and bottom of the plan in FIGURE A are the same.</td>
<td>Total horizontal dimensions
<table>
<tr><th>Control test top</th><th>Control test bottom</th></tr>
<tr><td>220 ✓</td><td>220 ✓</td></tr>
<tr><td>4 110 ✓</td><td>4 820 ✓</td></tr>
<tr><td>3 510 ✓</td><td>3 020 ✓</td></tr>
<tr><td>220 ✓</td><td></td></tr>
<tr><td>= 8 060</td><td>= 8 060 ✓</td></tr>
</table>
OR<br>
Top:<br>
220 + 4 110 + 3 510 + 220 mm<br>
= 8 060 mm<br>
Bottom:<br>
220 + 4 820 + 3 020<br>
= 8 060 mm<br>
Note: If the alternative method is used, one mark should be allocated if both totals are the same.</td>
<td>8</td>
</tr>
<tr>
<td>24</td>
<td>Calculate the area of the floor plan in FIGURE B. Show ALL the calculations. Give your answer in m². Round your answers to TWO decimal places.</td>
<td>= 8,06 ✓ m x 6,05 ✓ m<br>
= 48,76 ✓m²<br>
OR<br>
= 8 060 mm x 6 050 mm<br>
= 48,76 m²</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TOTAL:</td>
<td>40</td>
</tr>
</table>



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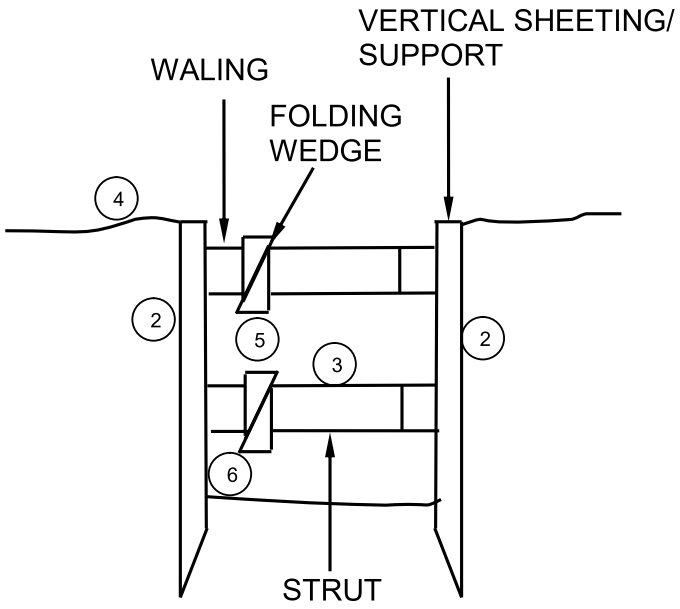
**QUESTION 3: CONSTRUCTION ASSOCIATED WITH CIVIL SERVICES, OHSA AND QUANTITIES (SPECIFIC)**

3.1 100 mm ✓ (1)

3.2 The lid of the concrete ring manhole should be set in frames ✓ with greased double seals to make it airtight.✓ (2)

3.3 215 mm ✓ (1)

3.4




CORRECTNESS OF SHORING: (1)

| NO. | ASSESSMENT CRITERIA | MARK |
|---|---|---|
| 1 | Correctness of shoring | 1 |
| 2 | Vertical sheeting/support | 2 |
| 3 | Strut | 1 |
| 4 | Ground level | 1 |
| 5 | Folding wedges | 1 |
| 6 | Waling | 1 |
| | **TOTAL:** | **7** |

(7)

3.5 Tools and accessories:
- Spirit level ✓ with a gradient template/incidence board ✓
- Spirit level (600 mm) with a 15 mm diameter piece of pipe (2)

3.6 Trained person ✓ (1)



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3.7 Before entering confined spaces:
- A competent person must inspect and declare the area safe ✓
- The air must be tested ✓
- Harmful fumes and gasses must be removed
- Make sure that worker has breathing apparatus/PPE

**ANY TWO OF THE ABOVE** (2)

3.8 Safety regulations for working in elevated positions:
- Ensure that the fall protection plan is adhered to ✓
- Workers must wear a safety harness/PPE ✓
- Ensure that the safety pin (D-clip) of a harness is hooked to the safety rope/rail

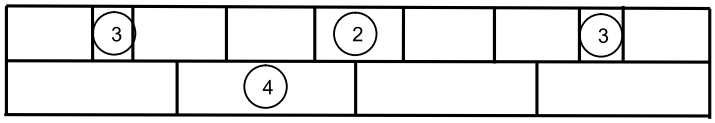
**ANY TWO OF THE ABOVE** (2)

3.9 3.9.1 Volume of a cubic water storage tank
= Area of base x height
= $s^3$
= 3,7 m ✓ x 3,7 m ✓ x 3,7 m ✓
= 50,65 $m^3$ ✓ (4)

3.9.2 Volume of water in tank
= 50,65 x 1 000 ✓ litres/cubic metre
= 50 650 ℓ ✓ (2)

3.10 3.10.1 Closer brick/Queen closer ✓ (1)

3.10.2




CORRECTNESS OF BRICK COURSE (1)

| NO. | ASSESSMENT CRITERIA | MARK |
|---|---|---|
| 1 | Correctness of brick course | 1 |
| 2 | Header course | 1 |
| 3 | Closer bricks/Queen closers | 2 |
| 4 | Stretcher course | 1 |
| | **TOTAL:** | **5** |

(5)
**[30]**



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**QUESTION 4: COLD AND HOT-WATER SUPPLY, TOOLS, EQUIPMENT AND MATERIALS (SPECIFIC)**

4.1 4.1.1 J ✓

4.1.2 A ✓

4.1.3 E ✓

4.1.4 K ✓

4.1.5 G ✓

4.1.6 F ✓

4.1.7 H ✓

4.1.8 I ✓ (8)

4.2 4.2.1 Full-way valve with lever handle/Shutoff valve ✓ (1)

4.2.2 A - Hand lever/Lever/Handle ✓
B - Gland seal ✓
C - Ball ✓ (3)

4.2.3 Part **C**/The ball will turn 90° ✓ (1)

4.2.4 To shut of water supply when needed. ✓ (1)

4.3 4.3.1 Drain-cleaning rods ✓ (1)

4.3.2 A - Rodding eye ✓
B - Bend 135° plain ✓
C - T/Y-junction 135° ✓ (3)

4.4 Compressed air test apparatus is used to check for:
- Problems/Leaks ✓
- Other pipe defects before the system are used

**ANY ONE OF THE ABOVE**

Centrifugal pump is used to:
- Move liquids ✓
- Convert kinetic energy of a spinning impeller to hydrodynamic energy

**ANY ONE OF THE ABOVE** (2)

4.5 Faulty ball valve/Faulty flushing system/Handle for flushing is stuck/Faulty washer ✓
**ANY ONE OF THE ABOVE** (1)



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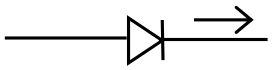
4.6 4.6.1 Red water diverter ✓ (1)

4.6.2 The valve diverts red water/luke warm water/cool water before it reaches the taps✓to a rainwater tank/storage tank/garden/pool. ✓ (2)

4.7 4.7.1 ✓ ✓ (2)

4.7.2  ✓ ✓ (2)

4.8 4.8.1 A - Evacuated tube ✓
B - Cold water inlet/Inlet ✓
C - Hot water outlet/Outlet ✓ (3)

4.8.2 Clear signs of malfunctioning of evacuated tubes:
- No hot water flowing from the tap ✓
- Leakage that resulted from a tube that exploded ✓ (2)



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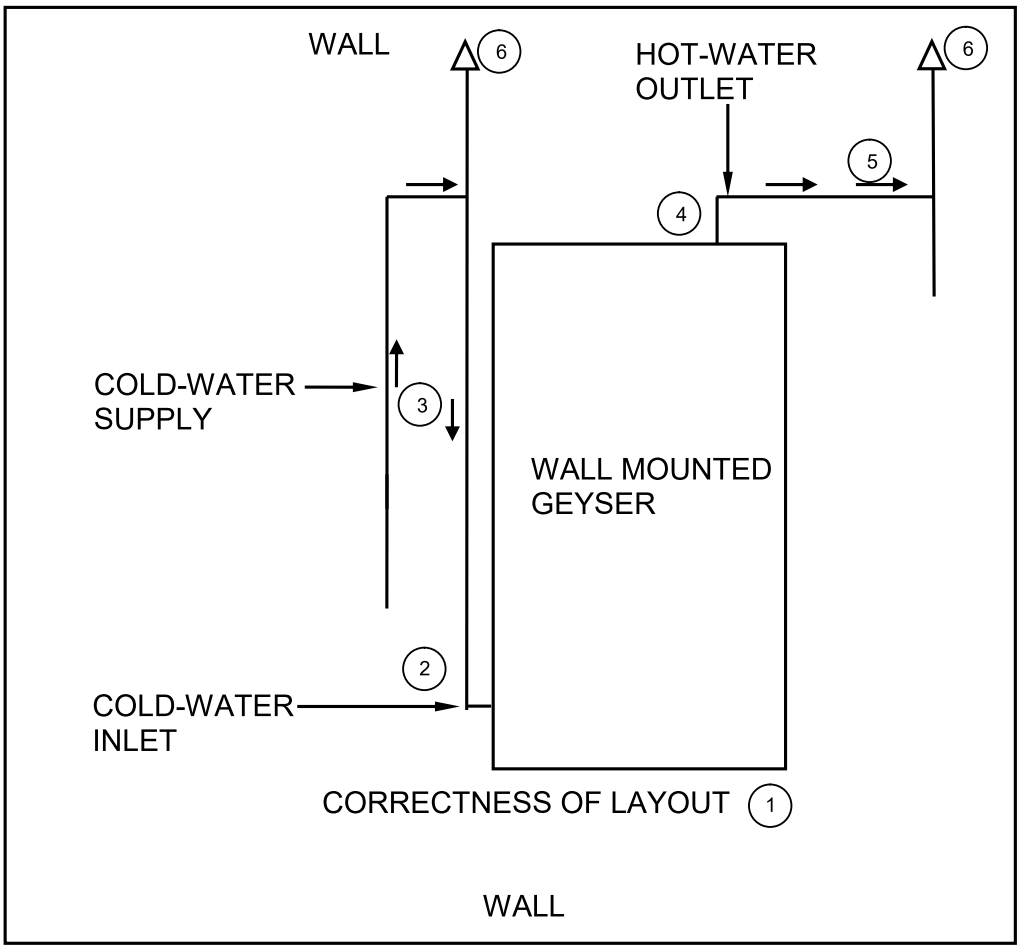
4.9




| NO. | ASSESSMENT CRITERIA | MARK |
|---|---|---|
| 1 | Correctness of layout | 1 |
| 2 | Cold-water inlet | 1 |
| 3 | Flow direction of cold-water | 1 |
| 4 | Hot-water outlet | 1 |
| 5 | Flow direction of hot-water | 1 |
| 6 | Vacuum breakers | 2 |
| | **TOTAL:** | **7** |

(7)
**[40]**



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**QUESTION 5: GRAPHICS AS MEANS OF COMMUNICATION, ROOF WORK AND STORM WATER (SPECIFIC)**

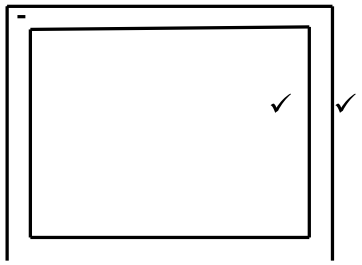
5.1 Factors to be determined:
- The pitch of the roof ✓
- Position of the battens or purlins ✓
- Materials needed
- Tools needed

**ANY TWO OF THE ABOVE** (2)

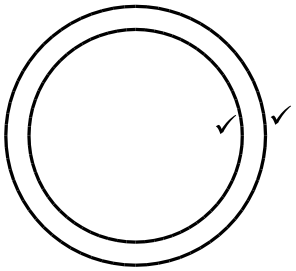
5.2 Artificial storm water channels must:
- Correspond with the natural flow of water ✓
- Not cause erosion ✓
- Not cause damage to the environment

**ANY TWO OF THE ABOVE** (2)

5.3



RECTANGULAR GUTTER OUTLET



ROUND GUTTER OUTLET (4)

5.4 Component used to secure downpipe to wall:
- Holder bats ✓
- Downpipe clips

**ANY ONE OF THE ABOVE** (1)



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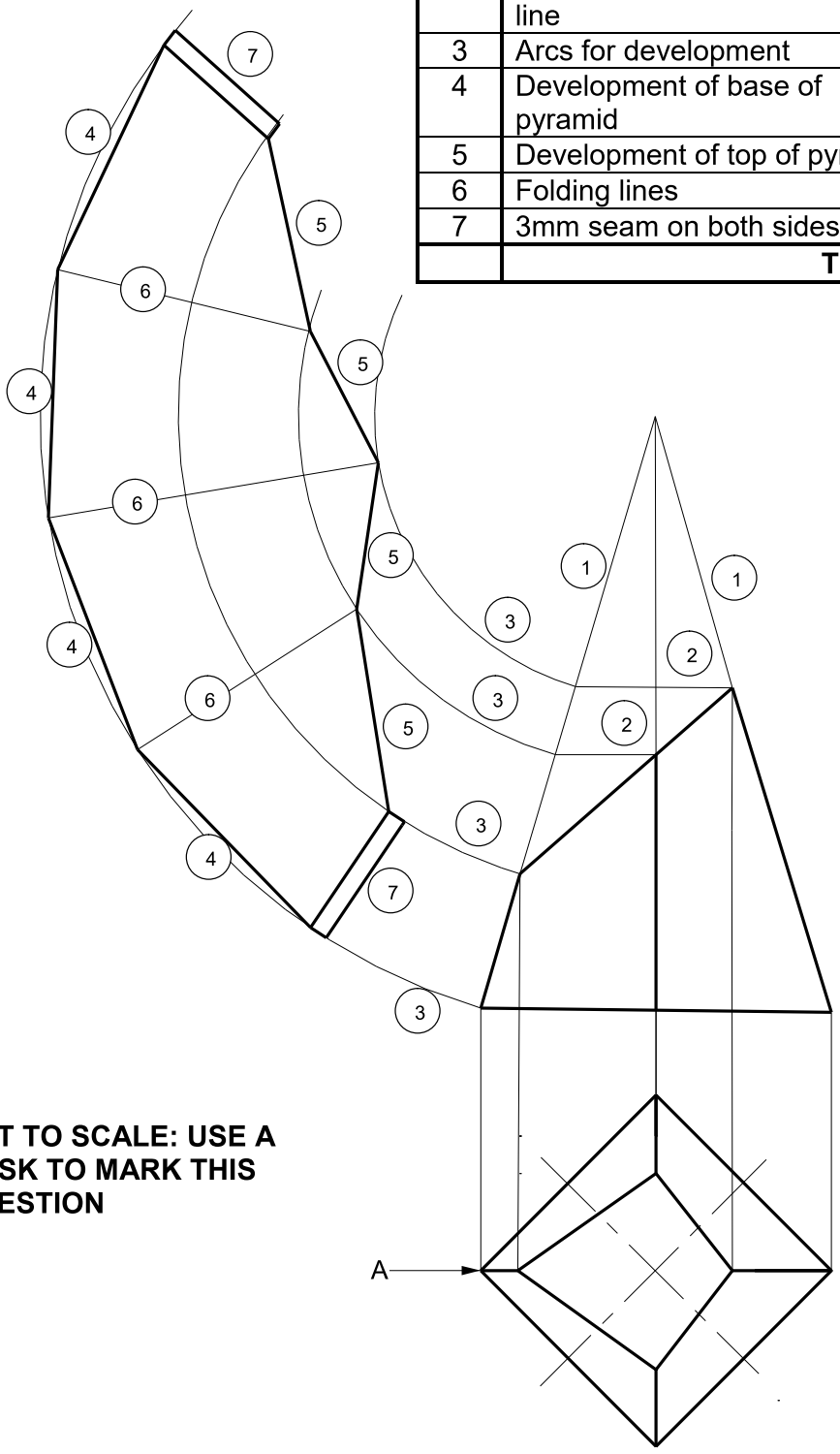
5.5

| NO. | ASSESSMENT CRITERIA | MARK |
|---|---|---|
| 1 | Projection lines to determine apex | 2 |
| 2 | Projection lines to true length line | 2 |
| 3 | Arcs for development | 4 |
| 4 | Development of base of pyramid | 4 |
| 5 | Development of top of pyramid | 4 |
| 6 | Folding lines | 3 |
| 7 | 3mm seam on both sides | 2 |
| | **TOTAL:** | **21** |




**NOT TO SCALE: USE A MASK TO MARK THIS QUESTION**

(21)
**[30]**



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## QUESTION 6: SEWERAGE, SANITARY FITTINGS AND JOINING (SPECIFIC)

| | | | |
|---|---|---|---|
| 6.1 | 6.1.1 | C ✓ | (1) |
| | 6.1.2 | A ✓ | (1) |
| | 6.1.3 | D ✓ | (1) |
| | 6.1.4 | B ✓ | (1) |
| | 6.1.5 | B ✓ | (1) |
| 6.2 | 6.2.1 | Cistern ✓ | (1) |
| | 6.2.2 | Flush pipe/Long radius PVC bend pipe ✓ | (1) |
| | 6.2.3 | Rubber cone ✓ | (1) |
| | 6.2.4 | Pan collar/Pan connector/Flexible pan connector ✓ | (1) |
| | 6.2.5 | Material used for the manufacture of the water closet pan:<br>• Glazed porcelain ✓<br>• Stainless steel<br>• Ceramic<br>**ANY ONE OF THE ABOVE** | (1) |
| | 6.2.6 | Fixing agents used to attach pan to the floor:<br>• Bolts ✓<br>• Silicone<br>• Cement<br>• Mortar<br>• Epoxy<br>**ANY ONE OF THE ABOVE** | (1) |



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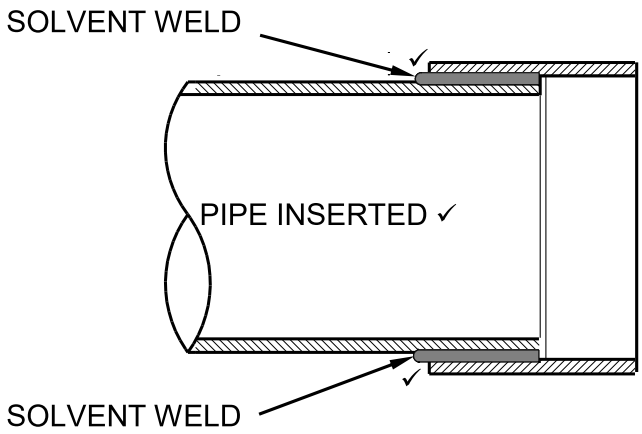
6.3




| ASSESSMENT CRITERIA | MARK |
|---|---|
| Correctness of joining pipe and socket | 1 |
| Solvent weld | 2 |
| **TOTAL:** | **3** |

(3)

6.4 6.4.1 Waterproof cement plaster/Plaster ✓ (1)

6.4.2 Purpose of waterproof cement plaster:
- Prevent liquid from penetrating the walls ✓
- Prevent solids from attaching to the insides of the walls
- Keep the walls durable

**ANY ONE OF THE ABOVE** (1)

6.4.3 Draw-off valve/Exhaust valve/Outlet valve/Street valve ✓ (1)

6.4.4 The draw-off valve is located close to the road to enable easy removal of the waste. (1)



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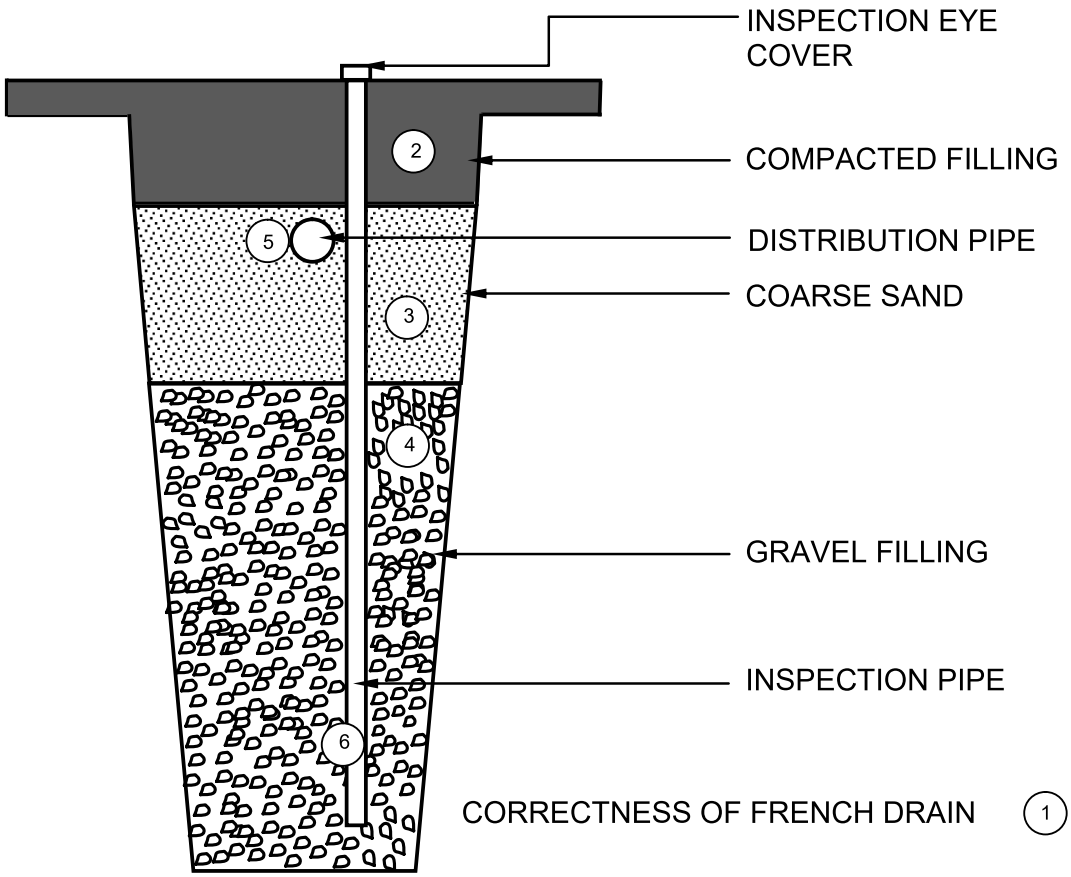
6.5




| NO. | ASSESSMENT CRITERIA | MARK |
|---|---|---|
| 1 | Correctness of French drain | 1 |
| 2 | Compacted filling | 1 |
| 3 | Coarse sand | 1 |
| 4 | Gravel filling | 1 |
| 5 | Distribution pipe | 1 |
| 6 | Inspection pipe with eye cover | 1 |
| | **TOTAL:** | **6** |

(6)



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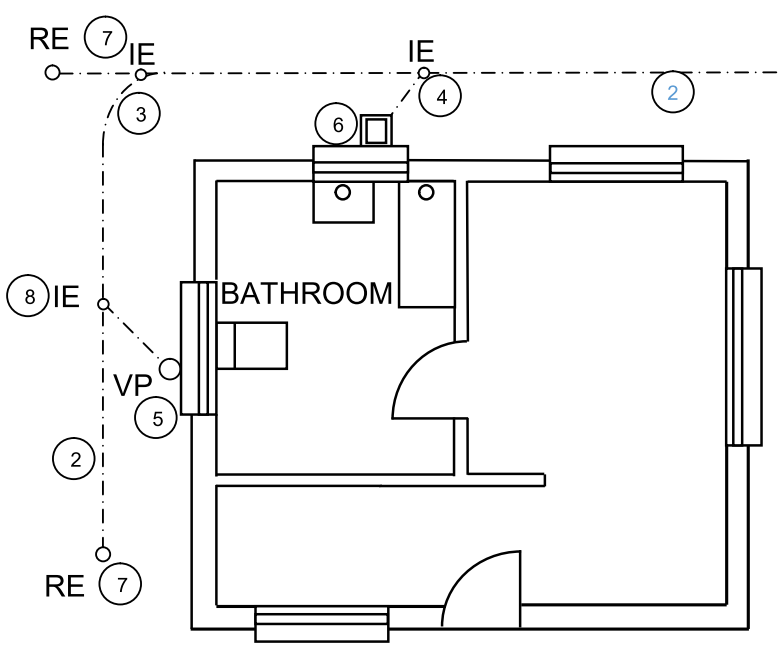
6.6

| ERROR ON PLAN | REASON |
|---|---|
| Incorrect line type for the sewer line ✓ | Dashed line used instead of chain type line ✓ |
| Branch pipe is placed in the incorrect direction✓ | Must be directed towards the municipal connection ✓ |
| The rodding eye positioned incorrectly✓ | Should be positioned at the farthest point/head/start of the main sewer line ✓ |
| The manhole is positioned incorrectly | Should be positioned before the municipal connection |
| There is no gulley/stub stack | Gulley/Stub stack should be positioned at waste pipe from the sink |
| No inspection eye/The inspection eye is incorrectly labelled | Abbreviation is incorrectly indicated as RE |

**ANY THREE OF THE ABOVE** (6)

6.7




NOTE:
ALTERNATE ABBREVIATIONS FOR VENT PIPE ARE VV/SVP.

CURVES AT MAIN SEWER PIPES CAN BE REPLACED BY A 45° LINE.

MH MAY BE REPLACED BY RE NEAR

CORRECTNESS OF SEWERAGE INSTALLATION (1)
(3)

| NO. | ASSESSMENT CRITERIA | MARK |
|---|---|---|
| 1 | Correctness of sewerage layout | 1 |
| 2 | Main sewer lines | 2 |
| 3 | Junction of main sewer lines: 45°/Quarter round | 1 |
| 4 | Branch pipes | 1 |
| 5 | Vent pipe | 1 |
| 6 | Gully | 1 |
| 7 | Rodding eyes | 2 |
| 8 | Inspection eyes | 1 |
| | **TOTAL:** | **10** |

(10)
**[40]**

**TOTAL: 200**

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