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# basic education

Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

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

**CIVIL TECHNOLOGY: CIVIL SERVICES**

**2022**

**MARKING GUIDELINES**

**MARKS: 200**

**These marking guidelines consist of 19 pages**

**INSTRUCTIONS FOR THE MARKERS****1. Markers should:**

- Familiarise themselves with the question and answer before evaluating the responses of 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 describe and (2) to explain.
  - If a candidate is required to explain, e.g. a process in 4 steps, only the first 4 responses should be considered.
  - However, if for example a candidate is required to explain or describe how to transfer heights from one point to another using a transparent pipe level we need to consider that candidates may write a long description, not necessarily well organised, as an intellectual response may do. 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. The marker should apply his/her professional judgement with these types of questions.
- Mark what the candidate wrote and do not award marks for answers that the marker thinks the candidate meant with what was written.
- 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 questions.
- Accept incorrect spelling in one-word answers unless the spelling changes the meaning of the answer.

**2. For calculations:**

- A mark is only awarded if the correct unit is written next to the answer.
- If TWO marks are awarded ONE mark is awarded for the answer and ONE mark for the correct unit.
- Where the candidate made a principle error, e.g. added instead of multiplying, no marks will be awarded for the steps. If the answer is correct according to what the candidate did, the mark for the answer can be awarded for the application of skills.

- Where an incorrect answer could be carried over to the next step, the first answer will be deemed incorrect. However, should the incorrect answer be carried over correctly, the marker has to recalculate the values, using the incorrect answer from the first calculation. If correctly used, the candidate should receive the full marks for subsequent calculations.
- Markers should consider when and where a candidate has rounded off in a calculation, as well as the subsequent effect it has on the final answer obtained. The calculation should therefore be awarded marks on merit.
- Alternative methods of calculations must be considered, provided that the correct answer is obtained.

**3. When marking drawings:**

- The member for which the mark should be awarded should 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.
- Scale drawings should always be marked using an appropriate mask.

**When a candidate drew the wrong drawing, e.g.:**

- A horizontal section instead of a vertical section, no marks will be allocated to the drawing as the candidate did not respond to the expected outcome.
- An orthographic view instead of sectional view, no marks will be allocated to the drawing as the candidate did not respond to the expected outcome.
- An orthographic view instead of an isometric view, no marks will be allocated to the drawing as the candidate did not respond to the expected outcome.
- If the incorrect drawing was drawn, the candidate can be awarded for only what was asked but mark/s for the correctness of the drawing will not be awarded e.g., if a King Post roof truss was asked in the question, and candidate drew SA-Howe Truss

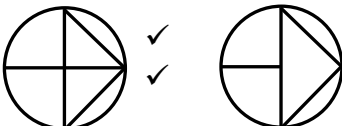
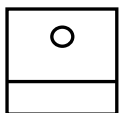


**QUESTION 1: OHSA, MATERIALS, TOOLS, EQUIPMENT AND JOINING (GENERIC)**

- 1.1      1.1.1      Thermo plastic/Thermo plastic powder coating ✓ (1)
- 1.1.2      Electroplating ✓ (1)
- 1.1.3      Curing ✓ (1)
- 1.1.4      Paint/Varnish ✓ (1)
- 1.1.5      Galvanising ✓ (1)
- 1.2      1.2.1      Non-skid material should be fitted to:  
                  • Prevent ladders from moving when workers are using them ✓  
                  • Ensure stability of the ladder when in use  
**ANY ONE OF THE ABOVE** (1)
- 1.2.2      Wooden ladders are better:  
                  • To prevent electrical shock ✓  
                  • Because it is a poor conductor of electricity  
**ANY ONE OF THE ABOVE** (1)
- 1.2.3      Aluminium ladder is:  
                  • Lighter ✓  
                  • More durable  
                  • Easier to handle  
                  • Easy to clean  
                  • Stronger  
                  • Suitable to extend to higher heights  
**ANY ONE OF THE ABOVE** (1)
- 1.2.4      Wooden ladders can be treated with:  
                  • Linseed Oil/Oil ✓  
                  • Clear varnish/Varnish ✓  
                  • Wood preservative/Preservative  
**ANY TWO OF THE ABOVE** (2)
- 1.3      The scaffold platform:  
                  • Must have guard rails ✓  
                  • Must have toe boards ✓  
                  • Should have sufficient room between the structure and the platform for the worker to sit and work  
                  • Must be free of any obstruction/waste/projecting nails/equipment that can cause injury  
                  • Must be non-slip  
                  • Should not be filled with unnecessary equipment/Overloaded  
**ANY TWO OF THE ABOVE** (2)

- 1.4 A safety net can be erected:
- Above an entrance ✓
  - At passageways ✓
  - At areas where persons work while work is being performed above them
  - To prevent falling objects from injuring workers
- ANY TWO OF THE ABOVE** (2)
- 1.5 1.5.1 Rawlbolt/Expansion bolt/Anchor bolt ✓ (1)
- 1.5.2
- Drill hole ✓
  - Remove debris/Clean the hole ✓
  - Remove the bolt and washer/insert the shield ✓
- (3)
- 1.6 Dumpy level determines:
- Levels and heights ✓
  - Differences between levels and vertical heights
  - Levels and slopes
  - Distances
- ANY ONE OF THE ABOVE** (1)
- Protect the dumpy level by:
- Placing the telescope in its case directly after use ✓
  - Not bumping the instrument against objects
  - Not dropping the instrument
  - Performing the collimation test regularly to ensure accuracy
  - Keeping it dry
- ANY ONE OF THE ABOVE** (1)
- [20]**

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

NO.	QUESTIONS	ANSWERS	MARKS
1	Identify the scale that was used for the site plan and the floor plan respectively.	1:500 ✓ 1:100 ✓	2
2	Who is responsible for checking the building plan?	C. Lee ✓	1
3	What type of fencing does the architect recommend for the new dwelling?	Precast concrete fencing ✓	1
4	Name the town where the new dwelling will be erected.	Jeffreys Bay ✓	1
5	What was done as revision 1?	Window in room A ✓	1
6	Identify number 1.	Municipal sewer line/Sewer line ✓	1
7	Identify number 3 by giving the abbreviation.	MH ✓	1
8	Identify number 4.	New dwelling ✓	1
9	Identify number 5.	Earth ✓	1
10	Identify number 9.	Distribution board/DB ✓	1
11	Identify number 11.	One-way switch-double pole ✓	1
12	Identify number 12.	Sink unit-single/Single bowl sink/Sink ✓	1
13	Identify the number that indicates the boundary line.	8 ✓	1
14	Describe the purpose of number 2.	For pedestrians/Area dedicated for walking ✓	1
15	Deduce the plot number of the existing dwelling from FIGURE A.	Plot 73 ✓	1
16	What is omitted in Maple Street with reference to number 6?	Municipal connection/Municipal manhole ✓	1

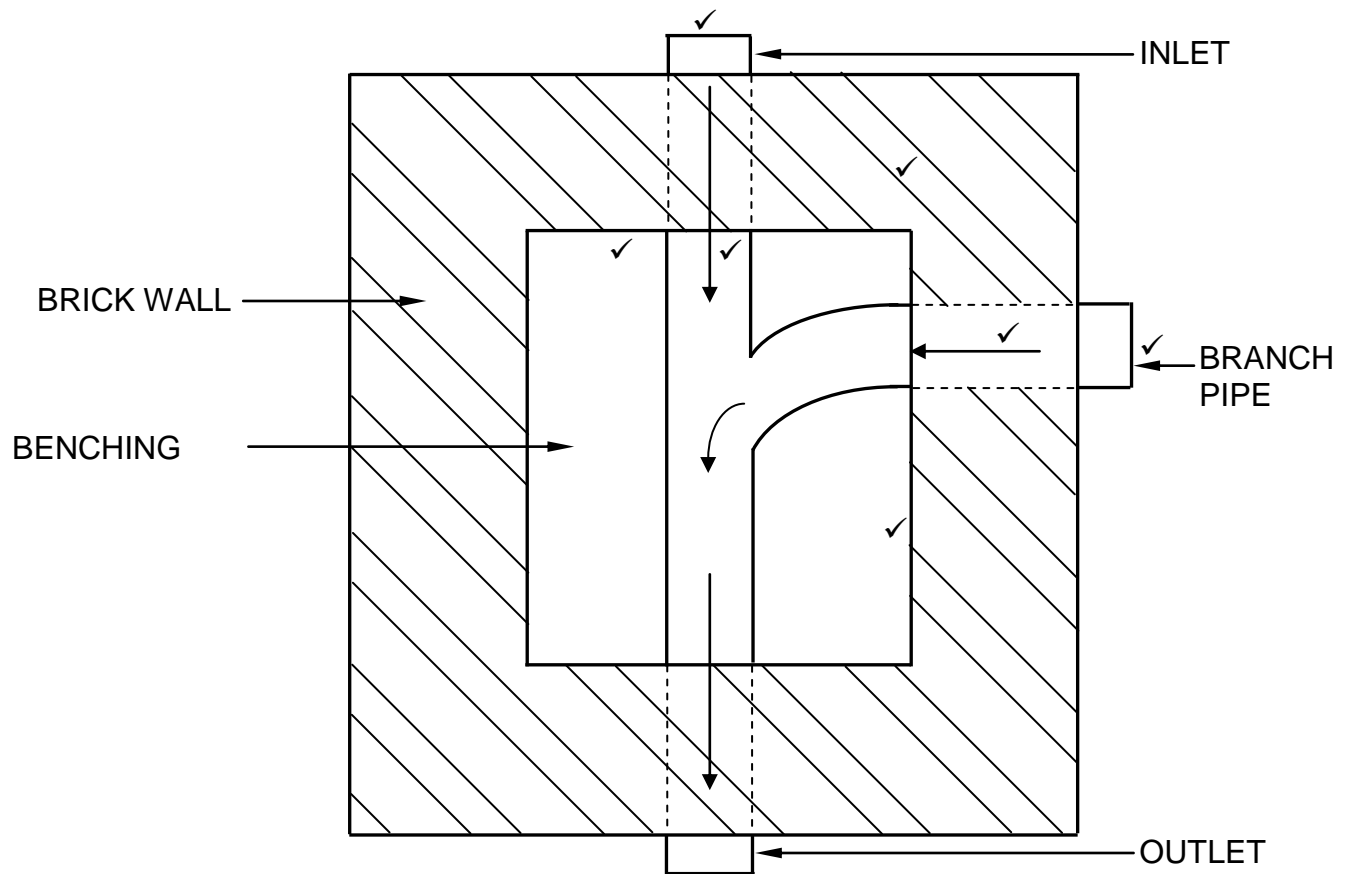
17	What leisure feature is located on the site plan?	Swimming pool ✓	1
18	Draw the north symbol to show that the driveway side is facing east.	 OR Direction ✓	3
19	What is the purpose of the north symbol on a house plan?	To indicate the direction/ elevation ✓	1
20	Which feature indicates that this is a double storey building?	Staircase/Stairs ✓	1
21	Deduce THREE faults from bedroom 2.	Dimension incorrectly indicated as 110 mm of outside wall ✓ No electrical connection from light switch to the light fitting/ ✓ No wiring ✓ Window symbol incorrect	3
22	Draw the symbol for a wash tub.	 ✓ ✓	2
23	Draw the symbol for a bath.	 ✓ ✓	2
24	Draw the symbol for a water meter.	 ✓ ✓	2
25	Describe TWO reasons why the local municipality would not approve FIGURE A.	<ul style="list-style-type: none"> <li>Omitted dimensions/ Measurements ✓</li> <li>No levels/heights/invert levels/corner heights indicated ✓</li> <li>Impossible to position new dwelling</li> <li>No north symbol</li> <li>Incomplete sewage layout</li> <li>No contour lines indicated</li> </ul>	2
26	Calculate the length of the house. Give your answer in m. Show all calculations.	$  \begin{array}{r}  \overbrace{4\,000 + 5\,000}^{\checkmark} + \overbrace{4\,000 + 4\,000}^{\checkmark} \\  \underbrace{+ 220 + 220}_{\checkmark} + \underbrace{+ 110 + 110 + 110}_{\checkmark} \\  = 17\,770 \checkmark \\  = 17,77 \checkmark \text{ m}  \end{array}  $	6
		<b>TOTAL:</b>	<b>40</b>



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

- 3.1      3.1.1      76 mm x 50 mm ✓ (1)
- 3.1.2      Water-logged ground ✓ (1)
- 3.1.3      1:90 ✓ (1)
- 3.1.4      Spirit level ✓ (1)
- 3.1.5      150 mm ✓ (1)
- 3.2.1      Precautions that are used to safeguard the area around an opened manhole:
- The area must be cordoned off/Use a barrier net/barrier tape ✓
  - Warning signs/safety signs must be posted.
  - Warning lights must be placed around the perimeter.
- ANY ONE OF THE ABOVE** (1)
- 3.2.2      Ways to enter a manhole:
- Step irons ✓
  - Safety harness and rope/rope ✓
  - Ladder
- ANY TWO OF THE ABOVE** (2)

3.3



Application of ✓

Mark this drawing with a mask.

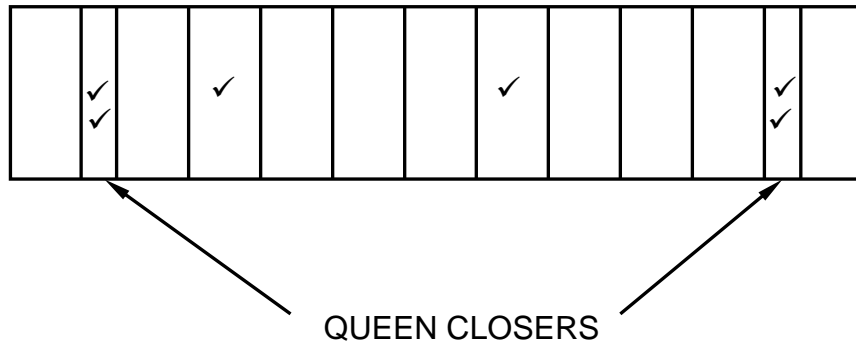
ASSESSMENT CRITERIA	MARK
Correctness of drawing:	
Thickness of the wall	2
Ø110 mm main pipe and channel	1
Ø110 mm branch pipe and channel	1
Hatching lines of the wall	1
Direction of flow	2
Application of scale	1
<b>TOTAL:</b>	<b>8</b>

## 3.4

A	B	C	D	
			<b>Area of walls</b>	
1/ ✓	6,82 m ✓		Centre line of walls = 6,82 m	
	<u>1,3 m</u> ✓	8,866 m <sup>2</sup> ✓	Height of wall for manhole = 1 300 mm	(4)
			Area of walls is 8,866 m <sup>2</sup>	
			<b>Number of bricks</b>	
2/ ✓	8,866 ✓		Area of walls = 8,87 m <sup>2</sup>	
	<u>50</u> ✓	886,6 bricks	Height of wall for manhole = 1 300 mm	(4)
			50 bricks per m <sup>2</sup> for a ½ brick wall	
			887 bricks are needed ✓	
	<b>OR</b>			
1/	8,866			
	<u>100</u>	886,6 bricks	887 bricks are needed	
	<b>OR</b>			
2/	6,82 m			
	1,3 m			
	<u>50</u>	886,6 bricks	887 bricks are needed	
	<b>OR</b>			
1/	6,82 m			
	1,3 m			
	100	886,6 bricks	887 bricks are needed	

(8)

3.5



ASSESSMENT CRITERIA	MARK
Correctness of drawing:	
Header course	2
Queen closers	4
<b>TOTAL:</b>	<b>6</b>

**[30]**

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

- 4.1      4.1.1      I ✓ (1)
- 4.1.2      D ✓ (1)
- 4.1.3      J ✓ (1)
- 4.1.4      F ✓ (1)
- 4.1.5      B ✓ (1)
- 4.1.6      A ✓ (1)
- 4.1.7      H ✓ (1)
- 4.1.8      C ✓ (1)
- 4.2      4.2.1      Pressure-control valve ✓ (1)
- 4.2.2      Hot-water storage tank ✓ (1)
- 4.3      Fault when cold water flows from hot-water tap:
- Power is off ✓
  - Pipes were incorrectly connected
  - Setting of the thermostat may be too low
  - Thermostat is malfunctioning
  - Element is malfunctioning
- ANY ONE OF THE ABOVE** (1)
- 4.4      4.4.1      Step 1: Loosen the compression nut ✓  
                  Step 2: Use a pipe cutter to cut off the piece of pipe containing  
                  the compression ring/ferrule ✓  
                  Step 3: Ream the pipe after cutting it ✓  
                  Step 4: Insert compression nut and new ring over pipe and fasten ✓ (4)
- 4.4.2      Open the water supply to check for leaks. ✓ (1)
- 4.5      Water-saving wash basin taps:
- Electronic tap/Electric tap/Tap with sensors ✓
  - Metered taps ✓
  - Demand taps
- ANY TWO OF THE ABOVE** (2)

- 4.6      4.6.1      Flat plate collector ✓ (1)
- 4.6.2      To receive direct sunlight for the entire day ✓ (1)
- 4.6.3      Non-return valve ✓ (1)
- 4.6.4      THREE disadvantages of solar heating panels:
- Can be a safety hazard – the tubes can explode due to build up of heat that cannot be pumped out in time ✓
  - Heating capacity depends on the sun – in winter the system may not function at full capacity ✓
  - There is no guarantee that the water will always be hot ✓
  - Leakage that results when tubes explode can damage ceilings and furniture
  - Corrosion of the components
  - Initially requires high capital investment
  - If one glass tube breaks, the system must be shut down
- ANY THREE OF THE ABOVE** (3)
- 4.7      4.7.1      T-junction 90° single reducing ✓ (1)
- 4.7.2      uPVC ✓ /unplasticised polyvinyl chloride/PVC (1)
- 4.7.3      This fitting can be used:
- For T-shaped connection of soil pipes and waste pipes with a different diameter ✓
  - To join 110 mm pipes in a straight line and 40/50 mm pipes at 90°
- ANY ONE OF THE ABOVE** (1)
- 4.7.4      The purpose of the inspection eye is for:
- Inspection and testing purposes ✓
  - Access to plumbing rods to clear out blockages
- ANY ONE OF THE ABOVE** (1)
- 4.8      4.8.1      Capstan head ✓ (1)
- 4.8.2      The jumper holds the washer in place. ✓ /moves up and down, and moves washer upwards or downwards. (1)
- 4.8.3      If the washer is not fitted:
- Water will leak from the pillar tap ✓
  - The inlet water supply will not be sealed
- ANY ONE OF THE ABOVE** (1)
- 4.8.4      The pillar tap can be used for a:
- Bath ✓
  - Wash hand basin
  - Sink
  - Wash tub
- ANY ONE OF THE ABOVE** (1)

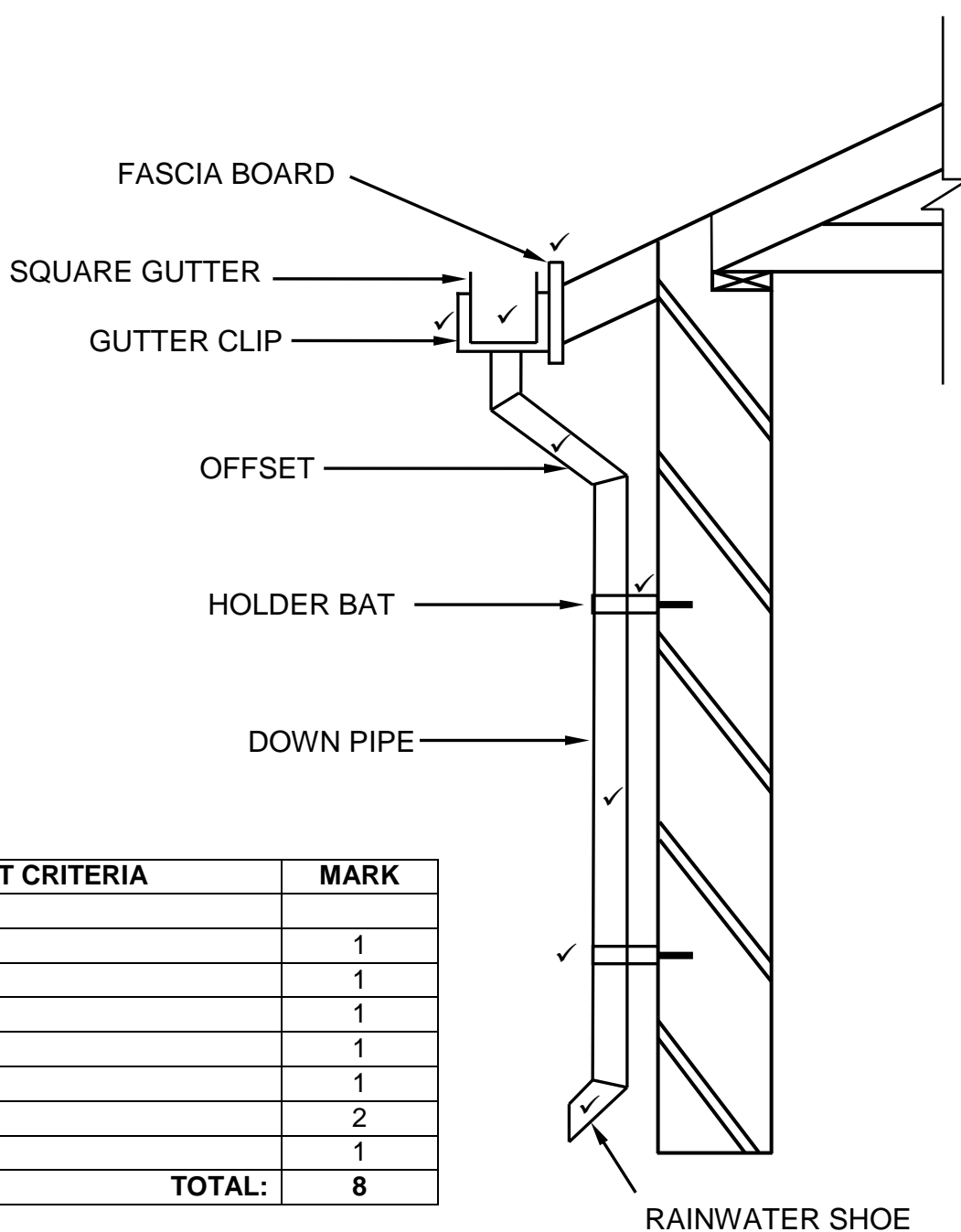
- 4.9      4.9.1      • Drain-cleaning machine/Jetting machine ✓ (1)
- 4.9.2      The elements that will ensure the efficient removal of blockages:
- High pressure ✓
  - Flow rate of the solution ✓
  - Type of cleaning solution used
  - Heat setting of the machine
- ANY TWO OF THE ABOVE** (2)
- 4.10      It is important to clean the drain rods after use in order to remove:
- Harmful bacteria ✓
  - Unpleasant smells
- ANY ONE OF THE ABOVE** (1)
- 4.11      To avoid galvanic corrosion ✓ (1)
- 4.12      A visible sign of dezincification:
- A white powder on the metal surface ✓
  - Brass turns red ✓ (2)
- 4.13      Hydrochloric acid ✓ (1)
- [40]**

**QUESTION 5: GRAPHICS AS MEANS OF COMMUNICATION, ROOF WORK AND STORMWATER (SPECIFIC)****5.1.1 Pre-fabricated surface channel:**

- It is stronger than mass concrete ✓
- Withstand the force of water flow ✓
- Handles water flow/large volumes of water flow

**ANY TWO OF THE ABOVE****(2)****5.1.2 Concrete shoe should have a fall/slope:**

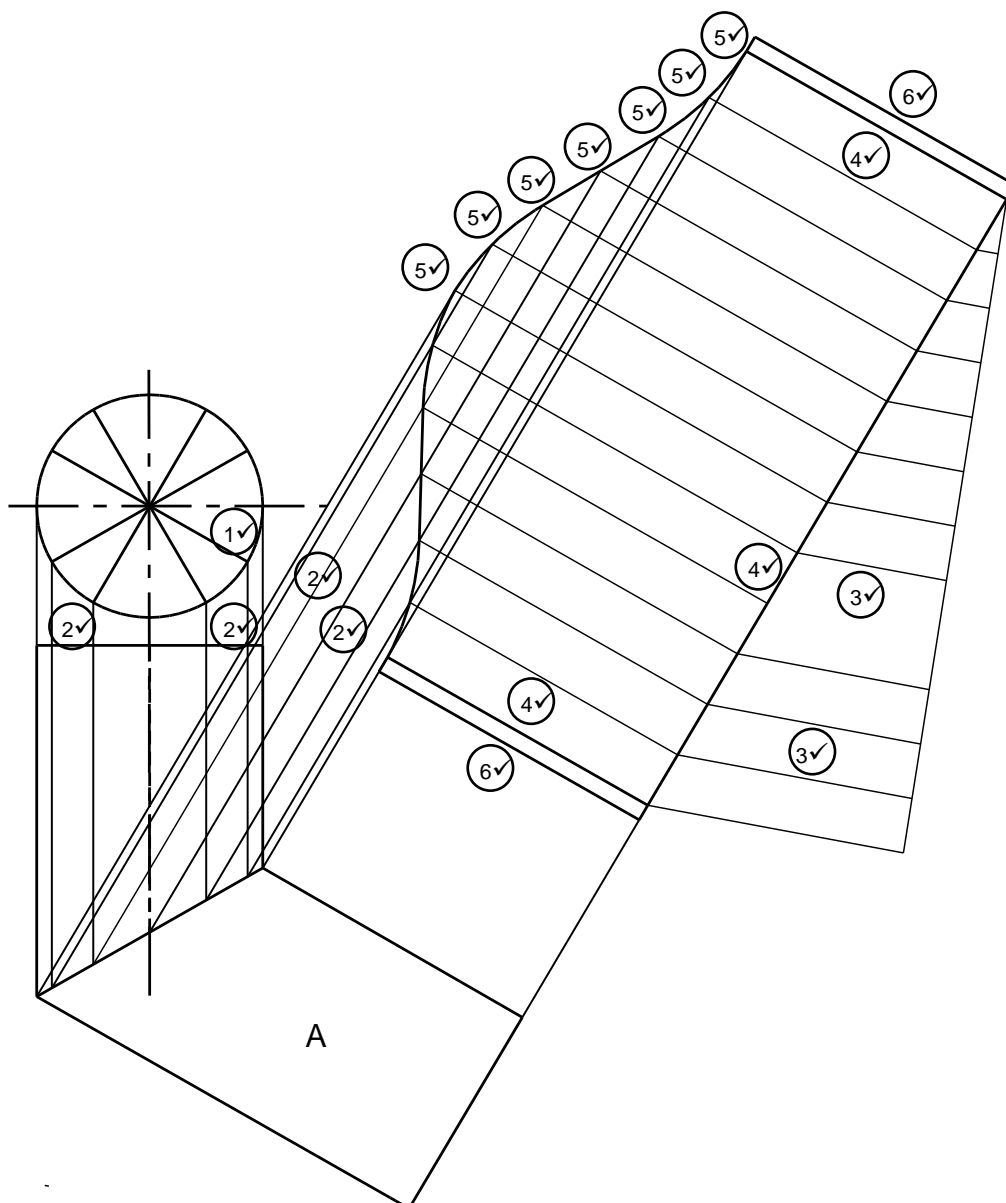
To allow water to flow away from the building. ✓

**(1)****5.2**

ASSESSMENT CRITERIA	MARK
Correctness of drawing:	
Fascia board	1
Square gutter	1
Gutter clip/bracket	1
Offset	1
Down pipe	1
Holder bats	2
Rainwater shoe	1
<b>TOTAL:</b>	<b>8</b>



## 5.3



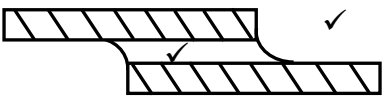
**USE A MASK TO MARK DRAWING**

- A MAXIMUM OF 17 MARKS WILL BE AWARDED IF THE DEVELOPMENT OF PIPE A WAS NOT CORRECTLY PROJECTED.
- A MAXIMUM OF 5 MARKS WILL BE AWARDED IF PIPE A WAS NOT DEVELOPED (1 MARK - DIVIDING CIRCLE; 2 MARKS - VERTICAL PROJECTION LINES; 2 MARKS - DIVIDING CIRCUMFERENCE)

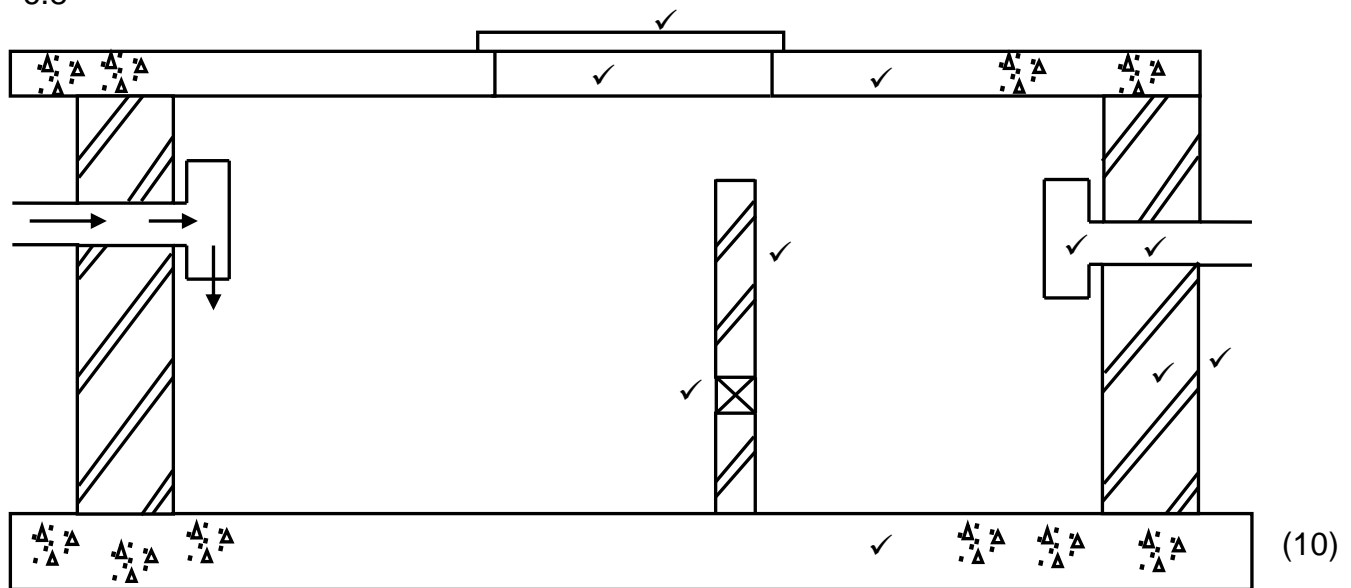
NO	ASSESSMENT CRITERIA	MARK
	Correctness of drawing:	
1	Dividing circle in 12 parts (auxiliary view)	1
2	Projection lines	4
3	Dividing development into 12 parts (Any acceptable method)	2
4	Outside lines of base and sides	3
5	Outside lines of development (curve)	7
6	3 mm seam on both sides	2
	<b>TOTAL:</b>	<b>19</b>

(19)  
[30]

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

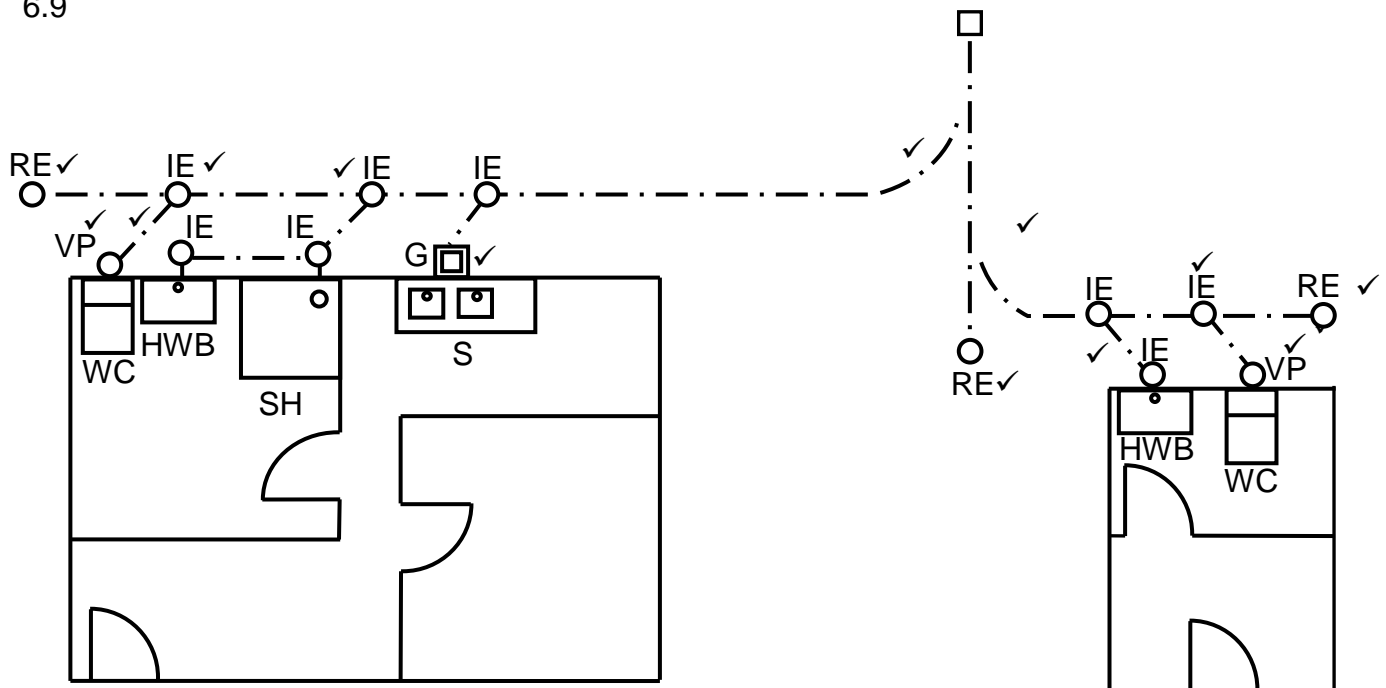
- 6.1      6.1.1      C ✓ (1)
- 6.1.2      B ✓ (1)
- 6.1.3      A ✓ (1)
- 6.1.4      B ✓ (1)
- 6.1.5      C ✓ (1)
- 6.2      6.2.1      A - Overflow ✓  
                         B - Wiped joint ✓  
                         C - P-trap ✓ (3)
- 6.2.2      P-trap:  
                         • Traps water ✓  
                         • To make a seal to keep bad odours out ✓ (2)
- 6.2.3      Overflow:  
                         • Allows extra water to flow through the waste pipe ✓  
                         • Ensures that water does not over flow the hand wash basin  
                         **ANY ONE OF THE ABOVE** (1)
- 6.3       (2)
- 6.4      60 degrees ✓/60° (1)
- 6.5      Flux:  
                         • To clean the material to be soldered ✓  
                         • Promotes the flow of solder during soldering  
                         **ANY ONE OF THE ABOVE** (1)
- 6.6      French drain:  
                         • Allows the liquid from the septic tank to seep into the ground ✓  
                         • Grey water channelled to a French drain will seep into the ground  
                         **ANY ONE OF THE ABOVE** (1)
- 6.7      The water in the borehole can become contaminated. ✓ (1)

6.8



ASSESSMENT CRITERIA	MARK
Correctness of drawing:	
Concrete base	1
Outside wall	1
Partition wall	1
Opening	1
Outlet	2
Concrete slab on top	1
Manhole cover	2
Hatching (Any ONE wall)	1
<b>TOTAL:</b>	<b>10</b>

6.9



**FOR THE JUNCTIONS OF THE TWO MAIN SEWER LINES 45° LINES WILL ALSO BE ACCEPTED**

ASSESSMENT CRITERIA	MARK
Correctness of drawing:	
Branch pipes (ANY TWO)	2
Vent pipes	2
Gully	1
Junction of two main sewer pipes (curved/45° angle)	2
Rodding eyes	3
Inspection eyes (ANY THREE)	3
<b>TOTAL:</b>	<b>13</b>

**[40]****TOTAL:: 200**