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

## **NATIONAL SENIOR CERTIFICATE**

**GRADE 12**

**CIVIL TECHNOLOGY: CIVIL SERVICES**

**NOVEMBER 2018**

**MARKING GUIDELINES**

**MARKS: 200**

**These marking guidelines consist of 18 pages.**

**QUESTION 1: OHSA, MATERIALS, TOOLS, EQUIPMENT AND JOINING (GENERIC)****1.1**

- |       |     |     |
|-------|-----|-----|
| 1.1.1 | F ✓ | (1) |
| 1.1.2 | A ✓ | (1) |
| 1.1.3 | G ✓ | (1) |
| 1.1.4 | E ✓ | (1) |
| 1.1.5 | B ✓ | (1) |

**1.2**

- Do not throw any tools or materials from a scaffold. ✓
- Never jump on to and off a scaffold. ✓
- Never overload a scaffold.
- Remove or cover sharp edges or corners.
- Always attach free-standing scaffoldings to a building.
- Use a ladder to get on and off a scaffold.
- Keep free of waste or any other obstruction.
- Never jump on a scaffold while working on it.
- Responsible/qualified person must ensure that scaffolding is safe, rigid, stable and firm or has no defects.
- Scaffold must be supplied with guard rails/toe boards.
- Scaffolds must be levelled on uneven ground.
- Do not work on a scaffold in bad weather.
- Wear a safety harness when working on scaffolding.
- Do not throw tools on/off a scaffold.

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

**1.3**

- It prevents workers from falling off the scaffold. ✓
- It is used as a handrail. ✓
- It is used to strap on safety harnesses.
- To protect the worker working on the scaffold.

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

**1.4**

- The primary purpose of painting is to protect metals, wood and other material against corrosion and decay. ✓
- Provides a decorative/aesthetic appearance/finishing. ✓
- Protects surfaces from moisture penetration.
- Protects surfaces from rust/uv rays.

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

## 1.5 The curing of concrete:

- Increases the strength of concrete. ✓
- Decreases the permeability of hardened concrete.
- Improves durability of concrete by reducing cracks.
- Makes concrete more watertight.
- Minimises shrinkage cracks in concrete.
- Provides volume stability.
- Cured concrete can carry more weight without breaking/crumbling than uncured concrete.
- Prevents rapid drying of concrete.
- Curing ensures that the hydration process continues.

**ANY ONE OF THE ABOVE**

(1)

## 1.6

## 1.6.1 Multi detector ✓

(1)

## 1.6.2 Tool A is used:

- to detect materials found in/behind walls, ceilings and underneath floors, including ferrous and non-ferrous metals, electrical wiring, wood and metal studs. ✓
- to locate steel bars and copper pipes. ✓
- in carpentry, plumbing, and construction.
- to measure the distance to/from covered objects.

**ANY TWO OF THE ABOVE**

(2)

## 1.6.3 The batteries must be removed from the tool:

- to prevent the battery from running flat/battery can die. ✓
- to prevent acid leaks from batteries damaging the tool.

**ANY ONE OF THE ABOVE**

(1)

## 1.7

1.7.1 A – Bolt and nut/Bolt ✓  
B – Rawl bolt ✓

(2)

1.7.2 **Bolt and nut**

- Bolts and nuts are used to secure pipe supports to metal parts. ✓
- To join components together.

**Rawl bolt**

- A Rawl bolt is used to fix a truss hanger to a wall. ✓
- To fix brackets/structures/panels to a wall/concrete.
- For construction, renovation and industrial work

**ANY TWO OF THE ABOVE**

(2)

**[20]**

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

NO.	QUESTIONS	ANSWERS	MARKS
1	Identify FIGURE A.	South Elevation/Elevation ✓	1
2	Identify FIGURE B.	Ground floor plan/Floorplan ✓	1
3	Identify number 4.	First floor level/Second floor level/Suspended floor/Floor level/Dash line/ FFL/Expansion joint ✓	1
4	Identify number 5.	Window Sill ✓	1
5	Identify number 9.	Hand wash basin/Wash basin/Washing basin/HWB/Basin ✓	1
6	Identify number 10.	Water closet/WC/Toilet pan ✓	1
7	Identify number 11.	Bath/B ✓	1
8	On what date was the plan printed?	2018/10/02 ✓	1
9	Who drew the building plan?	JP Maloi ✓	1
10	Name the feature in the column for the notes in FIGURE 2 that must be installed in front of the sliding door.	Ramp ✓	1
11	Name the feature in the column for the notes in FIGURE 2 that must give access to the first floor.	Staircase/Stairs/Stairway✓	1
12	Identify the type of roof that is used for the building in FIGURE A.	Gable roof ✓	1
13	Explain the purpose of number 1.	To cover the opening/close the gap between the two slopes of the roof. ✓ Prevent water and other elements from entering the roof. <b>ANY ONE OF THE ABOVE</b>	1

14	Explain the purpose of number 2.	<ul style="list-style-type: none"> <li>To prevent water from falling onto the ground ✓</li> <li>To collect rainwater</li> <li>To channel the rainwater into the downpipe</li> <li>To protect the wall from water</li> <li>To hide the rafters/finish off the roof</li> </ul> <b>ANY ONE OF THE ABOVE</b>	1
15	Explain the abbreviation FFL at number 6.	Finished floor level ✓	1
16	Explain the purpose of number 7.	To channel the water from the gutter to the ground. ✓	1
17	Explain the meaning of the arrow on the feature that must be installed in front of the sliding door.	It indicates the direction of the slope of the ramp/it indicates the slope. ✓	1
18	Explain what is meant by 1:10 indicated on the symbol in the notes.	It indicates the slope or the gradient of the ramp/for every 10 metres horizontally rises 1 metre vertically. ✓	1
19	Which room will feature 15 serve?	The bathroom. ✓	1
20	Explain the short dash lines on the windows.	<ul style="list-style-type: none"> <li>Indicates what direction the window is opening/window opening. ✓</li> <li>Indicates the location of the hinges.</li> <li>Indicates the location of the casement stay.</li> </ul> <b>ANY ONE OF THE ABOVE</b>	1
21	Deduce the height of window 2 from the window schedule.	1,2 m or 1 200 mm ✓(Ignore units)	1
22	Deduce the width of window 3 from the window schedule.	2 m or 2 000 mm ✓(Ignore units)	1
23	On what elevation of the building is the bathroom window situated?	Western elevation/Western side ✓	1

24	Differentiate between component number <b>3</b> and component number <b>8</b> .	3 – window/window frame/reveal frame stile/casement stile ✓  8 – sliding door /door frame/ door/reveal /sliding door stile ✓	2
25	Differentiate between the light in the lounge and the light in the bathroom.	The light in the lounge is a fluorescent light/1 x 40W/2x40/3x40 fluorescent light ✓ and the light in the bathroom is a normal ceiling light ✓	2
26	Recommend a suitable floor covering for the bathroom.	Tile/ Vinyl flooring(Novilon)/ Coloured screed/Polished or stained concrete flooring/Water proof laminated floor/carpet. ✓  ANY ACCEPTABLE ANSWER	1
27	Recommend an appropriate scale to which FIGURE <b>A</b> should be drawn, according to SANS.	1:50/100/200 ✓	1
28	Recommend an alternative sanitary fitment to replace number <b>11</b> that will serve a similar purpose.	Shower ✓	1
29	Calculate the internal area of the office in m <sup>2</sup> Show ALL calculations.	4 m ✓ x 3 m ✓ = 12 m <sup>2</sup> ✓ OR 12 4 000✓ X 3 000✓ = 12 000 000mm <sup>2</sup>	3
30	Calculate the perimeter of the building. Show ALL calculations.	Positive marking  (220 + 3 000 + 110 + 2 800 + 220) ✓ x 2 ✓ = 6 350 x 2 =12 700 mm ✓  (220 + 4 000 + 110 + 2 000 + 220) ✓ x 2 ✓ = 6 550 x 2 = 13 100 mm ✓  12 700 + 13 100 mm = 25 800 mm ✓ OR = 25,8 m	7
		<b>TOTAL</b>	<b>40</b>

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

- 3.1 3.1.1 A manhole is a chamber that allows entrance to a drain. ✓ (1)  
Allow access to the sewage pipes of a sewage system.

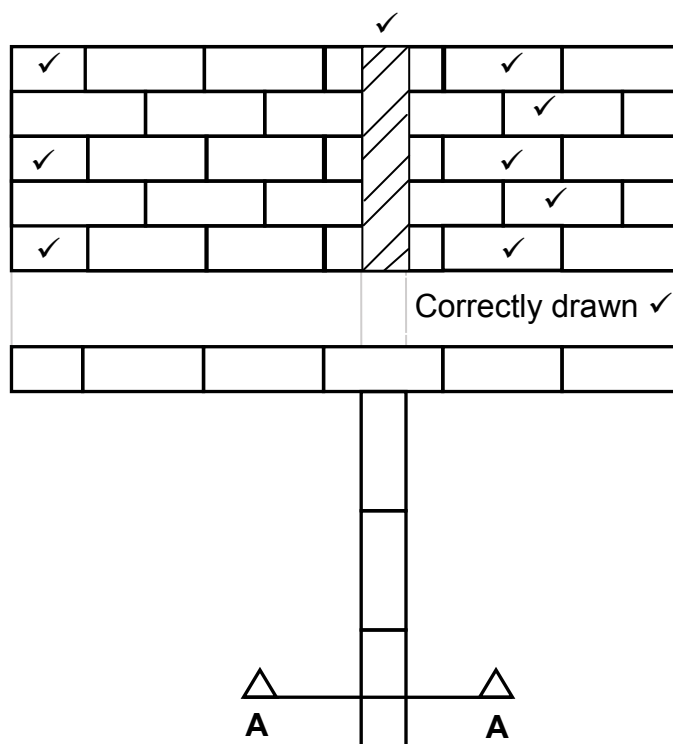
**ANY ONE OF THE ABOVE**

- 3.1.2 Benching/Sloping/Haunching ✓ (1)

- 3.1.3 Pipe channel/Open channel/Channel ✓ (1)

- 3.1.4 Manholes are set in frames and have greased double seals for the following reasons: (2)
- To make the manhole airtight. ✓
  - To make the manhole watertight. ✓
  - To ensure that gasses cannot escape.
  - To ensure that liquids cannot escape.

3.2



ASSESSMENT CRITERIA	MARK	LEARNER MARK
FIVE courses of bricks in stretcher bond correctly drawn	5	
Alternate half bricks on left side	3	
Section correctly drawn	1	
Hatching lines	1	
<b>TOTAL:</b>	<b>10</b>	

(10)



- 3.3
- If the sides are not properly supported, no person is allowed to work in the trench. ✓
  - The supervisor ensures that no load, material or heavy machinery is placed near the edge of any excavation. ✓
  - Excavations must be adequately protected by a fence. ✓
  - Red warning lights and signs should be placed at regular intervals and be clearly visible.
  - Orange warning signals must always be visible.
  - Deep trenches should have shoring.
  - Wear a harness.
  - Any person entering an excavation trench must wear personal protective equipment.

**ANY THREE OF THE ABOVE**

(3)

- 3.4      3.4.1      Shoring A ✓

(1)

- 3.4.2      Vertical members/poling boards are closer together. This means loose or waterlogged soil cannot filter through the openings. ✓  
The loose or waterlogged soil will easily filter through the openings of B.

**ANY ONE OF THE ABOVE**

(1)

- 3.5      3.5.1      Manhole ✓

(1)

- 3.5.2      Lifeline ✓

(1)

3.6

3.6.1	A	B	C	D
				<b>Volume of concrete for foundation:</b>
				Volume = l x b x h
	1/	<u>1,150</u> ✓		
		<u>1,0</u> ✓		
		<u>0,125</u> ✓	<u>0,14 m³</u> ✓	<u>0,14 m³</u> of concrete is needed
3.6.2				<b>Number of bricks needed for the manhole:</b>
	1/	<u>4,96</u> ✓		Centre line of wall = <u>4,96 m</u>
		<u>1,0</u> ✓		
		<u>100</u> ✓	<u>496</u> ✓	496 bricks are needed

(4)

(4)  
[30]

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

4.1

- 4.1.1 High pressure geyser/Electrical geyser ✓ (1)
- 4.1.2 Element ✓ (1)
- 4.1.3 Gas geyser/Solar geyser/Coal/Biofuel/Wood geyser/Donkey/Solar panel ✓ (1)

4.2

- 4.2.1 A dripping geyser overflow may be an indication that the pressure control/relief valve/vacuum breaker is faulty/pipe joint leakage. ✓ (1)
- 4.2.2 If there is no hot water, one of the following may be the cause:
- No power to the geyser ✓
  - Circuit breaker is faulty
  - Electricity supply is interrupted
  - Thermostat may be faulty
  - Element may be faulty
  - Blocked hot-water pipe
  - No sun for solar geyser
  - No gas for gas geyser

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

- 4.2.3 If water is leaking through the ceiling, one of the following may be the reason:
- Burst geyser or major leak. ✓
  - Drip tray outlet pipe is blocked or overflowing.
  - The drip tray may be cracked/no drip tray.
  - Pipe joint leakage.

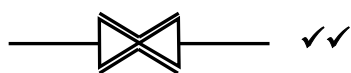
**ANY ONE OF THE ABOVE** (1)

4.3

- 4.3.1 F ✓ (1)
- 4.3.2 G ✓ (1)
- 4.3.3 E ✓ (1)
- 4.3.4 D ✓ (1)
- 4.3.5 B ✓ (1)

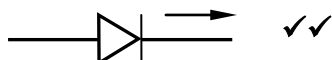
## 4.4

4.4.1



(2)

4.4.2



(2)

4.4.3



(2)

## 4.5

- Cut the damaged section from the pipe, using a pipe cutter/. ✓
  - Move the pipe slightly sideways to allow the fixing of compression fittings. ✓
  - Measure and cut the length of pipe to be replaced. ✓
  - Slip the nuts over the pipes followed by the ferrules. Push the pipes into the fittings and tighten using the correct tools. ✓
- OR**
- Dismantle the joint
  - Ensure sealing of joint (thread sealing tape)
  - Replace compression joint
  - Tighten all nuts properly
  - Test for leaks

(4)

## 4.6

4.6.1 P-Trap/Water trap ✓

(1)

4.6.2 PVC/Plastic/Rubber✓

(1)

4.6.3 B ✓

(1)

4.6.4 The seal will ensure a watertight seal and prevent it from leaking. ✓

(1)

## 4.7

4.7.1 A Bibcock/Bib tap ✓

(1)

B Stopcock/Stop tap ✓

(1)

4.7.2 A A bibcock can be used for sanitary fittings such as kitchen sinks, wash troughs, washbasins, dishwashers, washing machine, fridges, ice machines and baths. ✓  
Outside of a house for hose pipes.

(1)

**ANY ONE OF THE ABOVE**

B A stopcock is used to close or shut off the water supply. ✓

(1)

- 4.7.3
- Plastic taps do not have the same resale value ✓ as brass taps and is therefore not worth stealing/cheaper.
  - Plastic taps are cheaper than brass taps. (1)
- 4.8
- To enable local authorities/consumer to calculate the amount of water consumed by a household. ✓
  - To indicate if there is a leakage in water pipes.
  - To enable the user to upload pre-paid water coupons. (1)
- 4.9
- 4.9.1 Description of dezincification:
- Dezincification is the selective leaching of zinc from copper alloys. ✓
  - It is an electrochemical reaction between zinc and water. ✓ (2)
- 4.9.2 Problems caused:
- Zinc gradually dissolves from the surface of an alloy. ✓
  - The material that remains is a weak, spongy copper layer. ✓
  - It can progress through the part/fitting, causing leaks. ✓
  - It can form blockages if it forms a deposit. (3)

**ANY THREE OF THE ABOVE**

- 4.10 Electrolytic cleaning/chemicals/scrubbing with wire brush/sand paper. ✓ (1)
- 4.11 Hydro-dynamic energy ✓ (1)
- 4.12
- Drain cleaning rods ✓
  - Jetting machine/drain cleaning machine/plunger

**ANY ONE OF THE ABOVE**

- 4.13 Compressed-air test apparatus ✓ (1)

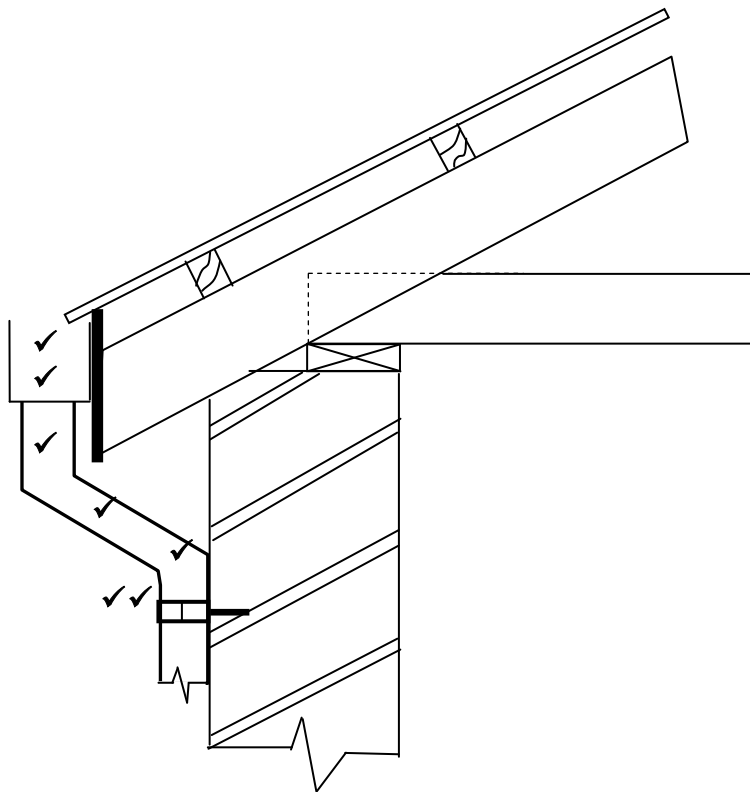
**[40]**

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

5.1

- 5.1.1 Stop end ✓ (1)
- 5.1.2 Pitch of the roof ✓ (1)
- 5.1.3 Galvanised sheet metal ✓ (1)
- 5.1.4 Gutter ✓ (1)
- 5.1.5 Kerb ✓ (1)

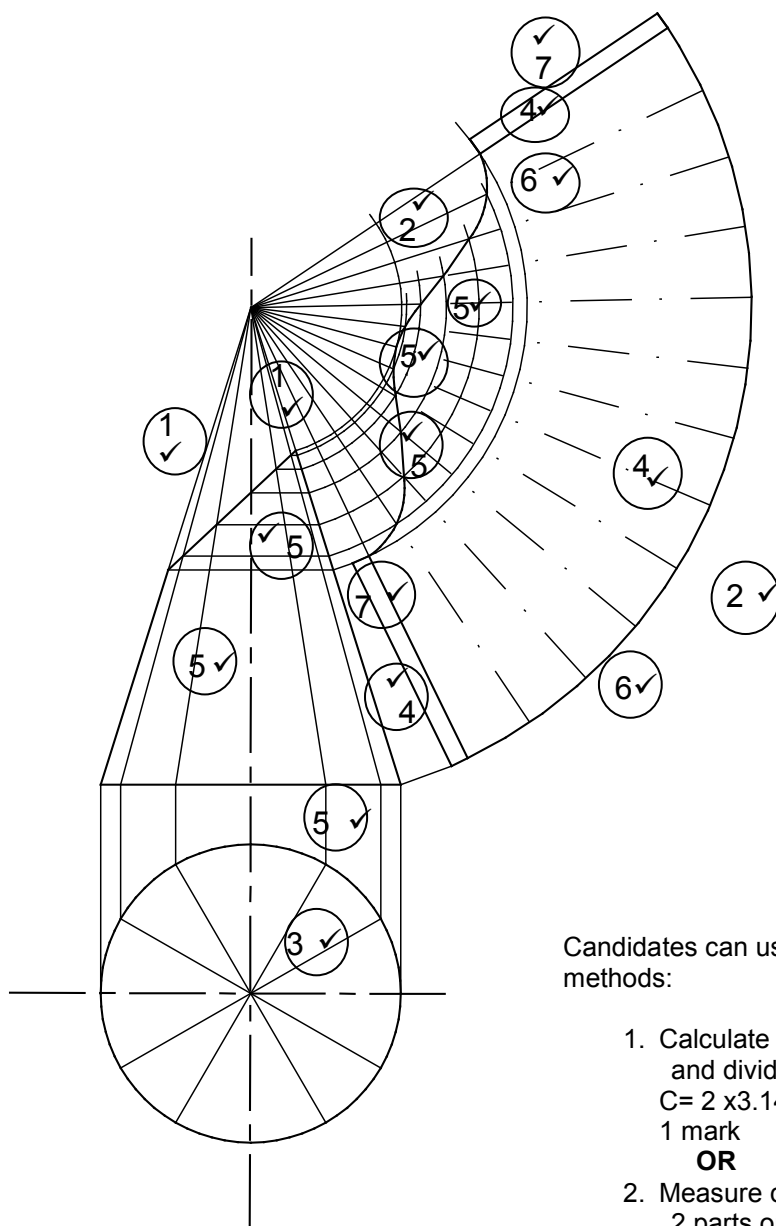
5.2



ASSESSMENT CRITERIA	MARK	LEARNER MARK
Square gutter	2	
Downpipe with offset	3	
Holder bat	2	
<b>TOTAL:</b>	<b>7</b>	

(7)

5.3



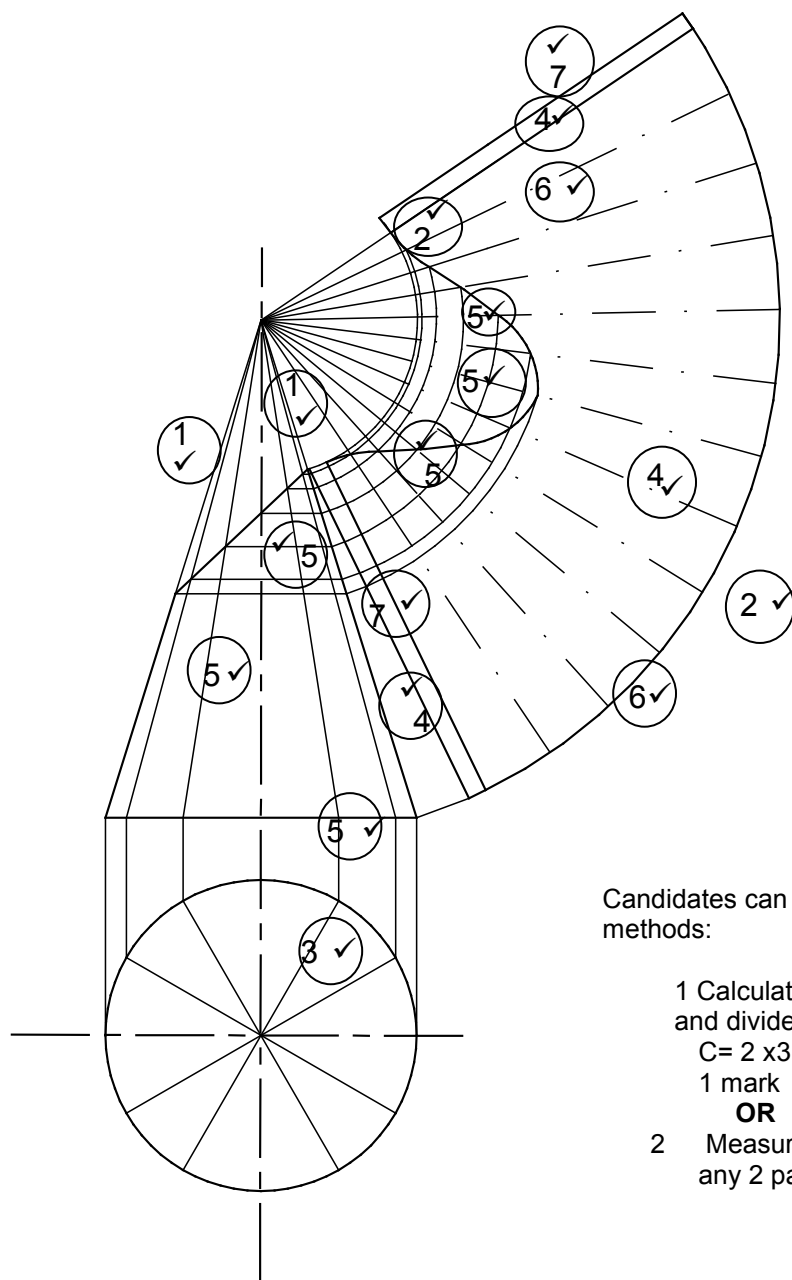
Candidates can use any one of the 2 methods:

1. Calculate the circumference and divide by 12  
 $C = 2 \times 3.14 \times 25 = 157/12 = 13$   
 1 mark  
**OR**
2. Measure distance between any 2 parts on top view(circle)

ASSESSMENT CRITERIA		MARK	CM
Construction lines to top of cone	1	2	
Construction lines of outer circle	2	2	
Divide outer circle in 12 parts	3	1	
Construction lines from top of cone to outer circle	4	3	
Cone measurement (marked/transferred) from front view to determine top part of development (ONE mark for every FOUR coordinates = 3)	5	6	
Outside lines of development	6	2	
3 mm seam on both sides	7	2	
<b>TOTAL:</b>		<b>18</b>	

**OR**

5.3



Candidates can use any one of the 2 methods:

1 Calculate the circumference and divide by 12  
 $C = 2 \times 3.14 \times 25 = 157/12 = 13$   
 1 mark

**OR**

2 Measure distance between any 2 parts on top view(circle)

ASSESSMENT CRITERIA		MARK	CM
Construction lines to top of cone	1	2	
Construction lines of outer circle	2	2	
Divide outer circle in 12 parts	3	1	
Construction lines from top of cone to outer circle	4	3	
Cone measurement (marked/transferred) from front view to determine top part of development	5	6	
Outside lines of development	6	2	
3 mm seam on both sides	7	2	
<b>TOTAL:</b>		<b>18</b>	

[30]

**QUESTION 6: SEWERAGE, SANITARY FITTINGS AND JOINING (SPECIFIC)****6.1**

- |       |     |     |
|-------|-----|-----|
| 6.1.1 | B ✓ | (1) |
| 6.1.2 | A ✓ | (1) |
| 6.1.3 | A ✓ | (1) |
| 6.1.4 | C ✓ | (1) |
| 6.1.5 | B ✓ | (1) |

**6.2**

- |       |   |     |
|-------|---|-----|
| 6.2.1 | C Waste junction 135°/Y-junction 135° ✓ | (1) |
|-------|---|-----|

- |       |   |  |
|-------|---|--|
| 6.2.2 | <ul style="list-style-type: none"><li>• To allow access to the drainage system. ✓</li><li>• To remove blockages from the drainage system.</li></ul> |  |
|-------|---|--|

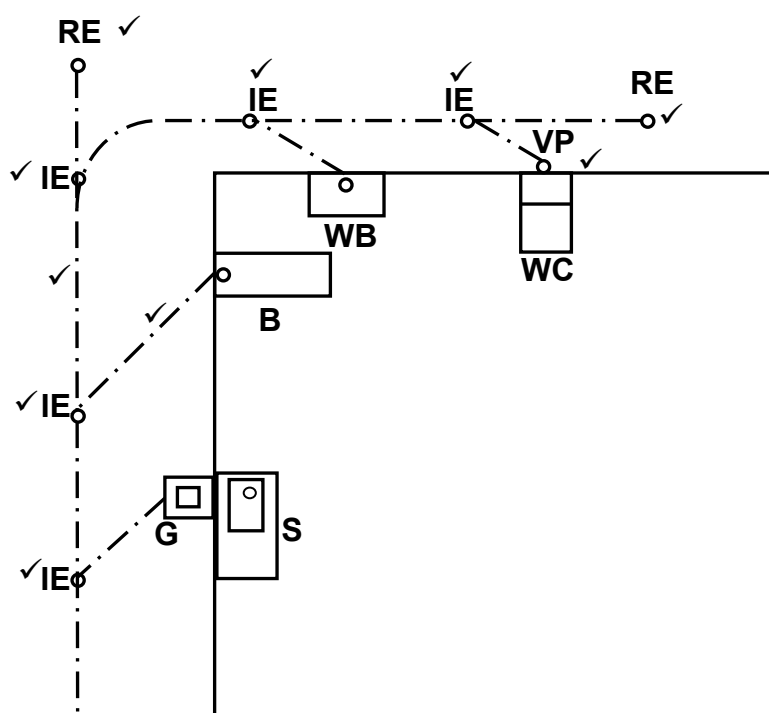
<b>ANY ONE OF THE ABOVE</b>	(1)
-----------------------------	-----

- |       |   |  |
|-------|---|--|
| 6.2.3 | <ul style="list-style-type: none"><li>• So that drain rods can be inserted easily into the pipe with the direction of flow. ✓</li><li>• A 90° junction at this point will make it impossible to use drain rods.</li><li>• A 90° junction will damage the main sewerage pipe if drain rods are forced into the pipe.</li></ul> |  |
|-------|---|--|

<b>ANY ONE OF THE ABOVE</b>	(1)
-----------------------------	-----



6.3



ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
2 x rodding eyes correctly positioned	2	
5 x inspection eyes correctly positioned	5	
1 x ventilation pipe correctly positioned	1	
Drain pipes drawn correctly (Main and branch pipes)	2	
<b>TOTAL</b>	<b>10</b>	

(10)

6.4.1 15 mm ✓ (1)

6.4.2 Shower rose/head ✓ (1)

6.4.3 To channel the water towards C. ✓ (1)

- 6.4.4
- The shower trap allows water to flow down the drainage pipes. ✓
  - Keeps unwanted odours from entering the atmosphere.
  - To ensure that water flows to the shower trap.

(1)

6.4.5 Capillary joint/Soldered joint ✓ (1)

6.5 The function of an anti-siphonage pipe is:

- To supply air to the short branch pipe of the lower fixture at the time of suction to prevent loss of the water seal. ✓
- To act as a ventilation pipe for the lower fixtures.

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

- 6.6 **FIGURE A:** Used above ground where soil pipe must bend. ✓  
Where access to sewage pipes are needed/unblocking of pipes.  
To join sewage pipes at 90°.

**FIGURE B:** Used to connect soil pipes at an angle. ✓  
To join three soil pipes at an angle of 135° (2)

- 6.7
- Water closet ✓
  - Bidet
  - Urinal

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

6.8

- 6.8.1  ✓✓ (2)

Urinal

- 6.8.2  ✓✓ (2)

Grease trap

- 6.8.3  ✓✓ (2)

Shower

- 6.9 Materials that are commonly used for sanitary fittings are:

- Ceramics ✓
- Cast iron ✓
- Stainless steel
- Plastic/PVC
- Pressed steel
- Terrazzo
- Glass fibre/fibreglass
- Copper/aluminium (2)

**ANY TWO OF THE ABOVE**

- 6.10
- 50/50 solder (plain/tinman's solder) ✓
  - Wiping solder (plumber's solder) ✓
  - 60/40 solder (fine solder)
  - Lead-free solder

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

6.11 Chemical anchors can be used to:

- Mount air conditioners ✓
- Fit outdoor lights
- Fix brackets to walls
- Fix brackets to secure I-beams
- *Fix balconies*
- *Fix railings*
- *Repair bathrooms*

**ANY ONE OF THE ABOVE**

(1)

6.12

6.12.1 Rivet head ✓

(1)

6.12.2 Flange is created by the rivet gun to complete the bond between the two pieces of material/keep/secure the two parts together. ✓

(1)

**[40]**

**TOTAL: 200**