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Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE/ NATIONAL SENIOR CERTIFICATE

GRADE 12

CIVIL TECHNOLOGY: CIVIL SERVICES

NOVEMBER 2020

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.
If, however a candidate is required to e.g., 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, SAFETY, MATERIALS, TOOLS, EQUIPMENT AND JOINING (GENERIC)

- 1.1 1.1.1 E ✓ (1)
- 1.1.2 C ✓ (1)
- 1.1.3 D ✓ (1)
- 1.1.4 H ✓ (1)
- 1.1.5 B ✓ (1)
- 1.1.6 F ✓ (1)
- 1.1.7 A/I ✓ (1)
- 1.1.8 G/K ✓ (1)
- 1.2 Galvanising:
- Adds strength to the original, uncoated metal. ✓
 - Make it last longer/Preservation/Durable.
 - Decorative/Enhance appearance.
 - Makes metal thicker than the uncoated metal.
 - Nails and screws prevent staining.
 - Prevent the material from rusting/corroding.
- ANY ONE OF THE ABOVE** (1)
- 1.3 • Material safety data sheet. ✓
- Sufficient information regarding the protection of health and safety.
- ANY ONE OF THE ABOVE** (1)
- 1.4 • Materials can be moved manually/by means of a wheelbarrow/trolley. ✓
- Materials can be moved by means of machinery/builders hoist/truck/
 crane/tractor/conveyor/fork lift. ✓ (2)
- 1.5 Water-based paint:
- Dry quickly. ✓
 - Allows marks/smudges to be easily cleaned with water. ✓
 - Give an elastic flexible finish.
 - Durable
 - Gives a decorative finish.
 - Enhances the appearance.
 - Resistant to cracking.
 - Cost effective/Cheaper
 - Easy to apply.
- ANY TWO OF THE ABOVE** (2)

- 1.6 1.6.1 Multi detector ✓ (1)
- 1.6.2 Care of the multi detector:
- Place the multi-detector in its holder directly after use. ✓
 - Do not bump the instrument against objects or drop it. ✓
 - Protect the multi-detector against moisture and direct sunlight.
 - If the measuring tool is not used for a long period, remove the battery.
 - Wipe away dirt or spots with a dry, soft cloth.
 - Switch off the device before storing.
- ANY TWO OF THE ABOVE** (2)
- 1.7 • Drill a hole in the wall. ✓
- Insert the plastic plug into the hole. ✓
 - Align the hole in the bracket with the hole in the wall and fasten the screw. ✓
- (3)
[20]

QUESTION 2: GRAPHICS AS MEANS OF COMMUNICATION (GENERIC)

NO.	QUESTION	ANSWER	MARKS
1	Identify the elevation in FIGURE A.	South Elevation ✓	1
2	Describe the type of house that is indicated in FIGURE A.	Double-storey house/Building/Multi-storey building ✓	1
3	Identify number 1.	Ridge Capping/Ridge tile/Ridge plate/Ridge ✓	1
4	Identify number 3.	Fascia board ✓	1
5	Identify number 4.	Overhang/Eave/Dimension line ✓	1
6	Identify the fastener indicated by number 5.	Holder bat/Clamp/Clip ✓	1
7	Identify number 6.	Window/Window frame/Casement/Casement frame ✓	1
8	Identify number 7.	Shoe/Down pipe outlet/Spout ✓	1
9	Identify number 8.	Natural ground level/NGL ✓	1
10	What does <i>DPM</i> stands for, as indicated in the notes?	Damp proof membrane ✓	1
11	Identify number 10.	Built-in cupboard/BIC ✓	1
12	Recommend a suitable material that can be used for the manufacturing of number 2 in FIGURE A.	Fibre cement/Galvanised sheeting/Sheet metal/Timber/Wood/Plastic/Fibre glass/Aluminium sheeting ✓	1
13	Name the TWO elevations on which number 2 is installed.	West elevation ✓ East elevation ✓	2
14	Describe the purpose of number 3.	The gutter is fixed against it. ✓ It finishes off the roof. Protect roofs/rafters from rainwater.	1
15	Deduce ONE feature that has been omitted from the elevation in FIGURE A.	Step missing at the door ✓ Sill missing at the window	1
16	Recommend any TWO sanitary fitments carrying waste water other than a bath that can be installed in the room indicated by number 11.	Hand basin/Wash hand basin/Hand basin/Basin/WB/WHB/HB ✓ Shower/SH ✓	2

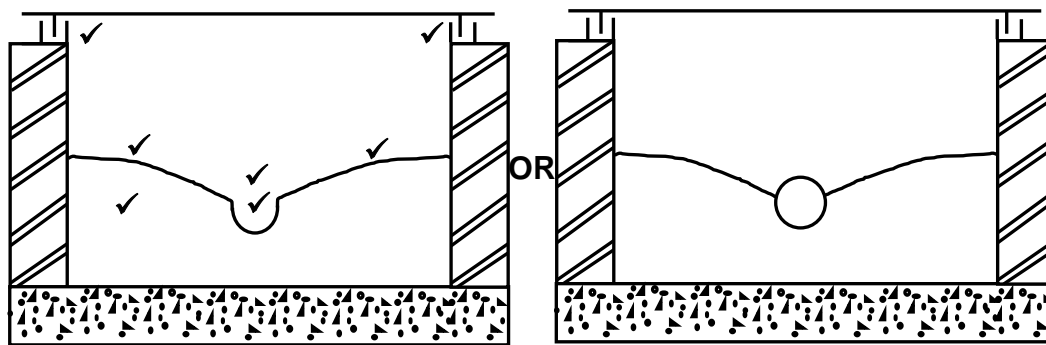
17	What sanitary fixture carrying soil water can be installed in the room indicated by number 12?	Water closet/WC ✓ Bidet/BT	1
18	Describe the error that appears at number 6 in the elevation in FIGURE A.	The two side windows are opening to the wrong sides/No window sill/The window drawn in FIGURE A is not the same as that in the window schedule/Window opening. ✓	1
19	State the reference code for this plan.	QP 4 - 2020 ✓	1
20	Which room will number 13 serve?	Bedroom 2 ✓	1
21	What does the line between numbers 13 and 14 represent?	Electrical wiring/cable/connection Wiring/Wiring from light switch to light/Shows which switch operates which electrical fitting	1
22	Differentiate between number 15 in FIGURE B and number 17 in the notes.	15: Single tube fluorescent light/ 17: Double/ tube fluorescent light. 15: Will use less electricity/Watt than 17/ 15: Will provide less light than 17/ 15: Running cost will be cheaper than 17. 15: Has one tube/1 x 40 Watt. ✓ 17: Has two tubes/2 x 40 Watt. ✓	2
23	Explain the installation of brick force from the top of the window to the wall plate, as indicated by the architect.	Brick force must be installed between every course above the window up to wall plate. ✓	1
24	Recommend a possible finish for the outside walls of the house.	Face bricks ✓ Plaster and paint/Plaster/Paint/Plaster finish (Smooth finish/Splatter finish/Wavy finish/Bagging finish) Cladding/Tiling	1
25	Deduce from FIGURE 2 which elevation does NOT have windows.	East elevation ✓	1
26	Deduce the thickness of the external wall from FIGURE 2.	220 mm ✓	1
27	Name a material that can be used to close the open sides of number 16.	Wood/Timber/Stainless steel/Mild steel/Steel/Aluminium/Glass/Perspex ✓	1
28	Name the town in which the proposed dwelling will be build.	Cradock ✓	1
29	Calculate the area of the bathroom. Show ALL calculations. Give your answer in m ² .	$l \times b$ $= 2 \text{ m} \times 2 \text{ m}$ ✓ $= 4 \text{ m}^2$ ✓ OR $2\,000 \text{ mm} \times 2\,000 \text{ mm}$ $= 4 \text{ m}^2$	3

30	Calculate the total length of the wall on the eastern side of the building. Show ALL calculations. The length must be indicated in metres.	$220 \checkmark + 3\,000 \checkmark + 110 \checkmark$ $+ \overbrace{1\,400 + 110 + 2\,000} \checkmark + 220 \checkmark$ $= 7\,060 \text{ mm}$ $= 7,06 \text{ m } \checkmark$ <p>OR</p> $220 + 3\,000 + 110 + 3\,510 + 220$ $= 7\,060 \text{ mm}$ $= 7,06 \text{ m}$	6
		TOTAL:	40

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

- 3.1 3.1.1 Hard ground ✓ (1)
- 3.1.2 Moderately firm ground ✓ (1)
- 3.1.3 Moderately firm ground ✓ (1)
- 3.1.4 Loose and waterlogged ground ✓ (1)
- 3.1.5 OHS ✓ (1)
- 3.2 Methods of backfilling trenches are:
 • Compaction/Fill and compact ✓
 • Jetting/Flowable fill ✓ (2)
- 3.3 3.3.1 English bond ✓ (1)
- 3.3.2 Queen closer/Closer ✓ (1)
- 3.3.3 55 mm ✓ (1)
- 3.4 Workers must:
 • wear safety goggles. ✓
 • wear face shield. ✓
 • wear rubber gloves/gloves.
 • wear gum boots.
 • wear overall.
 • wear a respirator.
 • ensure that all open wounds are properly covered.
 ANY TWO OF THE ABOVE (2)
- 3.5 3.5.1 Protects ✓ (1)
- 3.5.2 Competent ✓ (1)

3.6



ASSESSMENT CRITERIA	MARK
Manhole cover and frame	3
Pipe channel	2
Sloping concrete/mortar/haunching	2
Correctness of drawing	1
TOTAL:	8

3.7

3.7.1

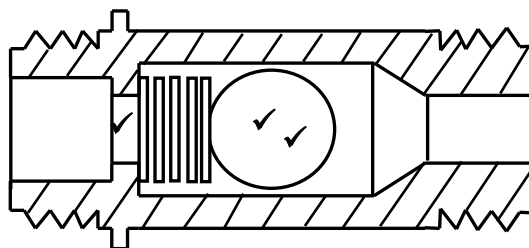
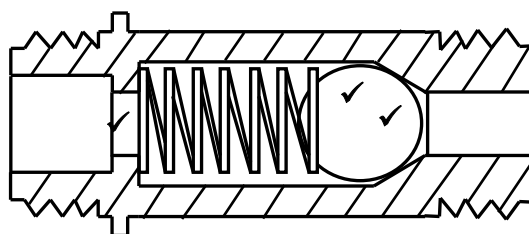
A	B	C	D
			<u>Volume of tank</u>
1/	$\frac{22}{7}$ ✓		Volume = $\pi r^2 h$
	0,9 ✓		Note: $\pi = \frac{22}{7}$
	0,9 ✓		
	<u>2,8</u> ✓		
		7,13 m ³ ✓	
OR			
			<u>Volume of tank</u>
1/	$\frac{22}{7}$ ✓		Volume = $\pi r^2 h$
	(0,9) ² ✓✓		
	<u>2,8</u> ✓		
		7,13 m ³ ✓	
			<u>Volume of water in the tank</u>
1/	7,13 ✓		= volume of tank x 1 000
	<u>1 000</u> ✓		
		7 130 ℓ ✓	

3.7.2

(8)
[30]

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

4.1

**OPEN NON-RETURN VALVE****CLOSED NON-RETURN VALVE**

ASSESSMENT CRITERIA	MARK
Open non-return valve	
Correct position of ball	2
Correct position of spring	1
Closed non-return valve	
Correct position of ball	2
Correct position of spring	1
TOTAL:	6

(6)

- 4.2 4.2.1 Water meter ✓ (1)
- 4.2.2 To enable local authorities to calculate the amount of water used by a household. ✓ (1)
- 4.2.3 The municipality/local authority/Council ✓ (1)
- 4.3 Water that has been contaminated by/or carries human waste ✓ or other pollutants. ✓
Water from basin, bath and sink is not the desired answer but may be accepted when candidates provided it. (2)
- 4.4 4.4.1 To join the water closet pan to the sewer pipe. ✓ (1)
- 4.4.2 To connect soil pipes at a 135° angle. ✓ (1)
- 4.4.3 Where soil pipes have to bend/change direction. ✓ (1)

- 4.5 Compressed-air test apparatus ✓ (1)
- 4.6 Advantages of the red water diverter:
- It uses no electricity ✓
 - No on-going costs ✓
 - No new wiring to new locations ✓
 - No energy wastage from pumps
 - No heat loss in recirculating pipes
 - Saves water
 - Saves money
- ANY THREE OF THE ABOVE** (3)
- 4.7 A coupling that can be used to repair a leaking galvanised pipe is:
- Johnson pipe coupling ✓
 - Long screw fitting
 - Galvanised union
 - Socket/T-piece/45° bend/90°-bend
- ANY ONE OF THE ABOVE** (1)
- 4.8 4.8.1 Components that are incorrectly installed:
- Pressure-reducing valve ✓
 - Vacuum breaker ✓
 - Space between geyser and drip tray
- ANY TWO OF THE ABOVE** (2)
- 4.8.2 Recommended solutions:
- Move the pressure reducing valve next to the stop cock before the cold water draw off to other taps. ✓
 - Install the two vacuum breakers in line with each other, minimum 300 mm above the geyser. ✓
 - Reduce the space between the geyser and drip tray to ensure that the drip tray properly support the geyser. (2)
- ANY TWO OF THE ABOVE**
- 4.8.3 Thermostat ✓ (1)
- 4.8.4 It protects the geyser from corrosion. ✓ (1)
- 4.8.5 Pipe-thread cutting machine ✓ (1)
- 4.9 4.9.1 Evacuated tube ✓ (1)
- 4.9.2 A – Outer glass tube/Glass ✓
B – Radiation absorbing coating ✓
C – Inner glass tube ✓
D – Fluid tube ✓ (4)
- 4.9.3 Water pressure testing pump ✓ (1)
- 4.10 Both are a form of corrosion. ✓ (1)

- 4.11 4.11.1 Galvanic corrosion ✓ (1)
- 4.11.2 A – Copper pipe ✓
 B – Galvanised steel pipe ✓ (2)
- 4.12 Using a drain cleaning machine instead of drain cleaning rods:
 • The drain cleaning machine requires a lot less effort/force. ✓
 • The drain cleaning machine is already fully assembled. ✓
 • The drain cleaning machine is self-propelled and no force is necessary
 from a worker.
 • The drain cleaning machine works faster.
 ANY TWO OF THE ABOVE (2)
- 4.13 Measures to consider when taking care of the bearings of a centrifugal pump:
 • Clean the bearing bracket if it contains any oil. ✓
 • Lubricate the bearing regularly. ✓
 ANY TWO OF THE ABOVE (2)
- [40]**

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

- 5.1 Methods that are used to channel water away from buildings are:
- Gutters on roofs collect rainwater and feed it to down pipes. ✓
 - Channels or inclined surfaces can lead water away from buildings. ✓
 - Manholes connected to storm-water drains will carry the water away from inhabited areas to be safely discharged into rivers or dams.
 - Furrows can channel water to catchments areas.
 - Water tanks.

ANY TWO OF THE ABOVE

(2)

- 5.2 The owner of the property. ✓

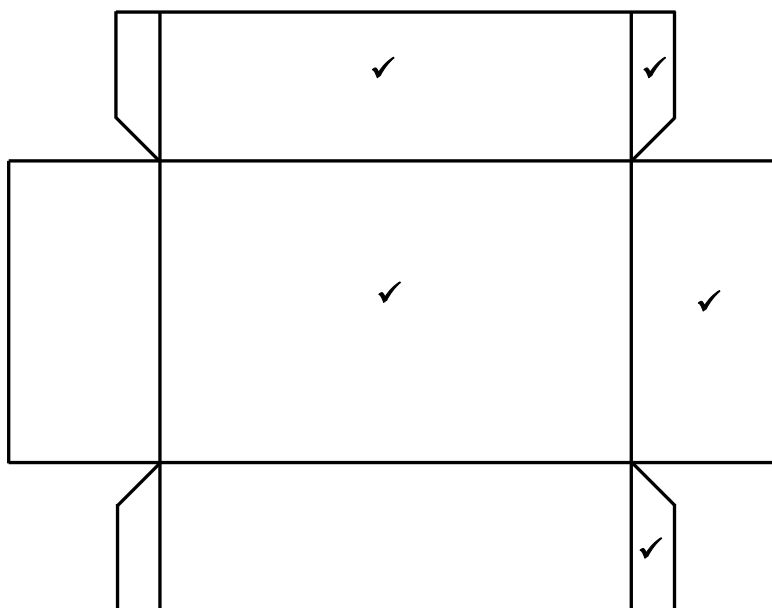
(1)

- 5.3 The purpose of a road kerb:
- Storm water from roads flows along a road kerb until it reaches the storm water drain. ✓
 - Channels storm water into the storm water drain.

ANY ONE OF THE ABOVE

(1)

5.4



ASSESSMENT CRITERIA	MARK
125 mm x 40 mm side	1
80 mm x 40 mm side	1
125 mm x 80 mm centre	1
Seam	2
TOTAL:	5

(5)

- 5.5
- Stop ends are used to seal the gutter off at the ends. ✓
 - Prevent water flowing out at the gutter ends.

ANY ONE OF THE ABOVE

(1)

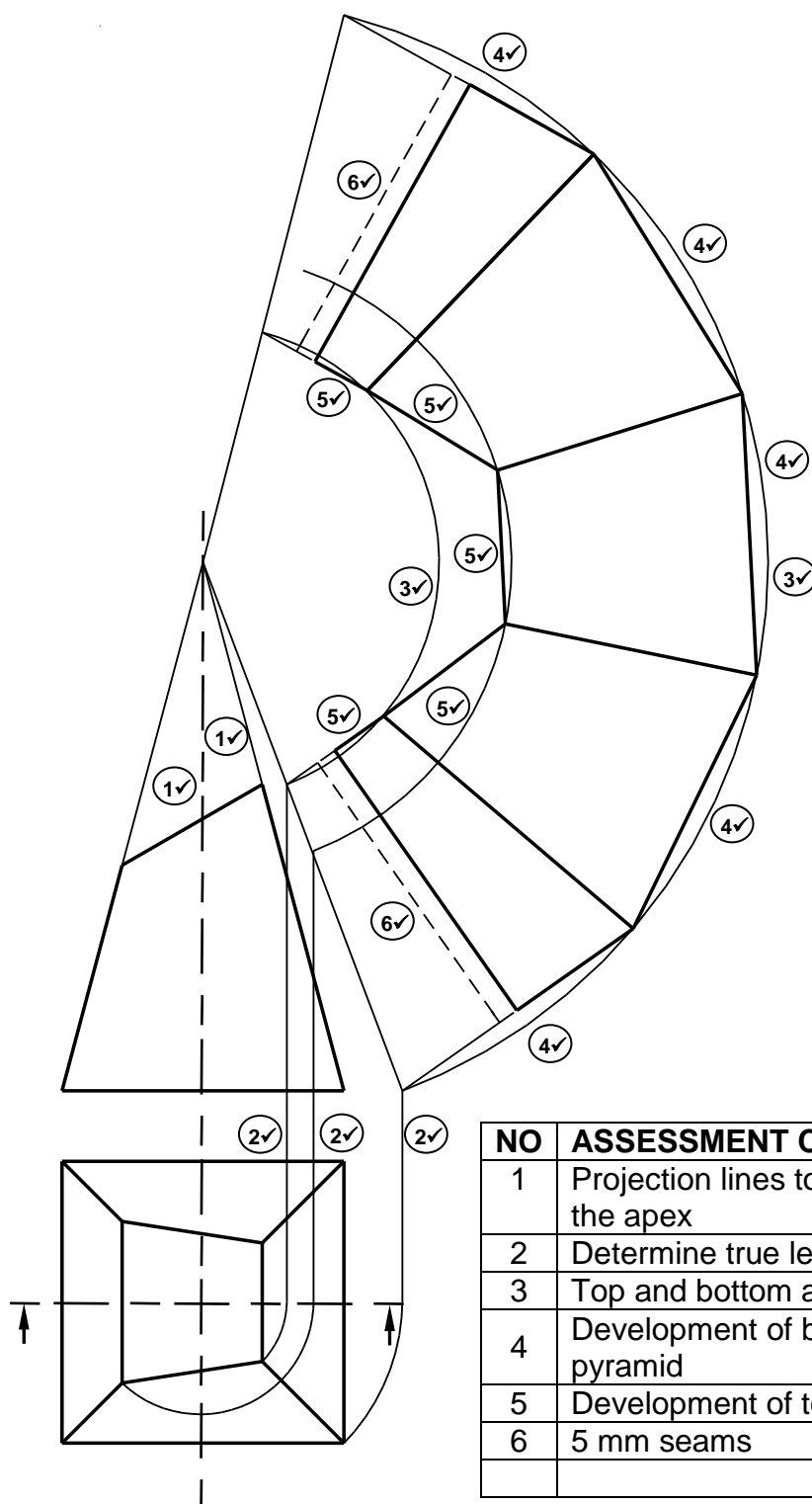
5.6 Flashing material:

- Copper ✓
- Galvanised sheet metal
- Lead
- Bitumastic patents/Bituman
- Rubber sealant

ANY ONE OF THE ABOVE

(1)

5.7



NO	ASSESSMENT CRITERIA	MARK
1	Projection lines to determine the apex	2
2	Determine true length	3
3	Top and bottom arc of pyramid	2
4	Development of base of pyramid	5
5	Development of top of pyramid	5
6	5 mm seams	2
TOTAL:		19

(19)
[30]

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

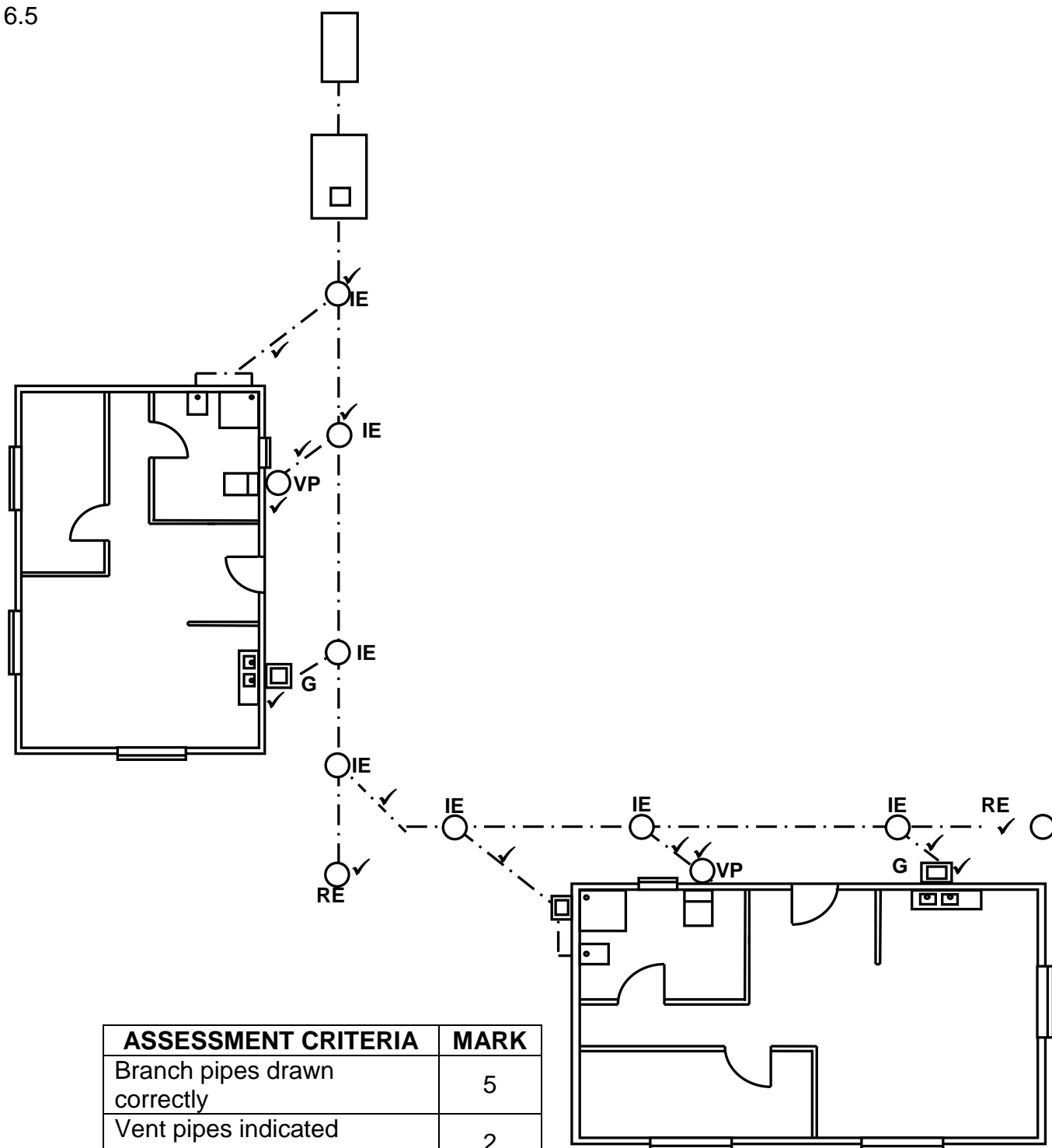
- | | | | |
|-----|-------|--|-----|
| 6.1 | 6.1.1 | C ✓ | (1) |
| | 6.1.2 | B ✓ | (1) |
| | 6.1.3 | A ✓ | (1) |
| | 6.1.4 | C ✓ | (1) |
| | 6.1.5 | A ✓ | (1) |
| 6.2 | 6.2.1 | A – Compression joint ✓
B – O-ring compression connection ✓ | (2) |
| | 6.2.2 | A – Used to fix waste pipes into the outlet of the waste trap under basins/baths/sinks/sanitary fitments. ✓
B – Used to join drain pipes. ✓ | (2) |
| 6.3 | 6.3.1 | A - Overflow ✓
Allows water to flow out if the tap is not closed before the water reaches the point of overflowing. ✓ | (2) |
| | 6.3.2 | 22 mm/15 mm/20 mm ✓ | (1) |
| | 6.3.3 | P – Trap/Gully trap ✓ | (1) |
| | 6.3.4 | If no inspection eyes are installed: <ul style="list-style-type: none"> • there will be no access to the pipe ✓ • it will not be possible to clear blockages. ✓ • it will not be possible to inspect for blockages. ANY TWO OF THE ABOVE | (2) |
| | 6.3.5 | Water seal/Water level/Water ✓ | (1) |

6.4 Requirements for a sewerage system are:

- The gradient of the pipe installations must be correct – 1:40 or 1:60. ✓
- The diameter of any drainage pipe must be big enough to carry the sludge. ✓
- Pipes must conform to SABS standards. ✓
- Pipes must be properly sealed at the joints to prevent gases from escaping the system.
- Sharp inclines and angles should be avoided.
- Sewer pipes should be at least 100 mm in diameter.
- All connections must be made at 45°/135°.
- Sufficient volumes of water must be discharged into the system.
- Pipes must be smooth on the inside and made of a strong, durable material.
- Approved tools must be used for installations.
- Rodding and inspection eyes need to be installed in the system.
- A manhole must be constructed where two or more pipes meet, at the main pipeline junction, or where a distance exceeds 25 metres, measured along the line of the drain from a rodding eye or other permanent means of access.
- There should be at least one vent pipe in the sewer system.
- Trenches in close proximity to foundations should be backfilled with concrete.
- Pipes should be laid in a straight line.

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

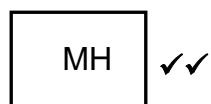
6.5



ASSESSMENT CRITERIA	MARK
Branch pipes drawn correctly	5
Vent pipes indicated correctly	2
Gulleys indicated correctly	2
Junction of two main sewer pipes	1
Rodding eyes	2
Inspection eyes	2
TOTAL:	14

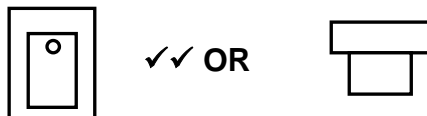
(14)

6.6 6.6.1



(2)

6.6.2

**ACCEPT ANY ROTATION OF SYMBOL AS LONG AS IT IS
CORRECTLY DRAWN.**

(2)

6.7 6.7.1 Black ✓

(1)

6.7.2 Green ✓

(1)

6.8 The purpose of a septic tank is to collect/decompose/treat sewage. ✓

(1)

[40]**TOTAL: 200**