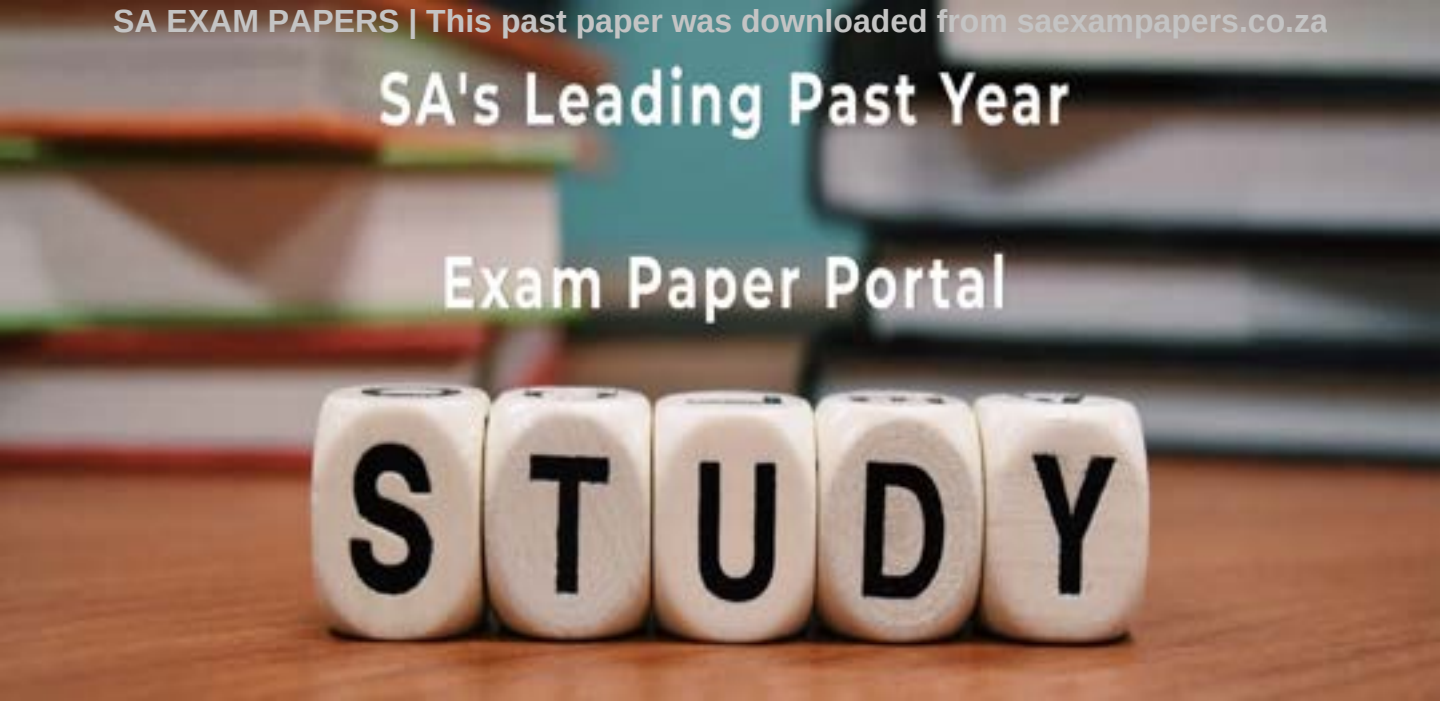

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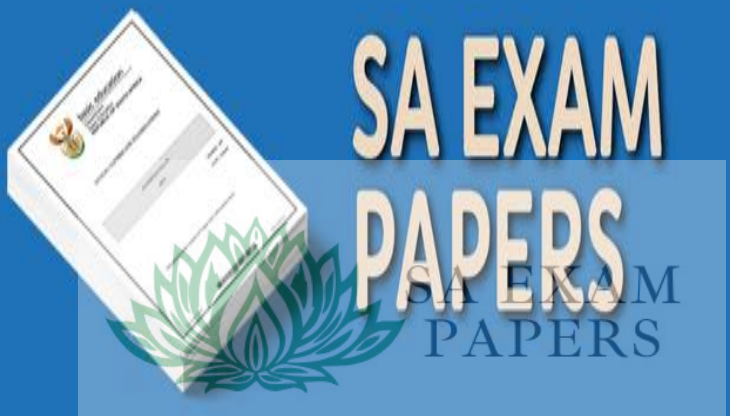


basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

CIVIL TECHNOLOGY: CIVIL SERVICES

NOVEMBER 2023

MARKING GUIDELINES

MARKS: 200

These marking guidelines consist of 19 pages.

INSTRUCTIONS FOR 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.
    1. If a candidate is required to explain e.g., a process in 4 steps, only the first 4 responses should be considered.
    2. However, if for example candidate is required to explain or describe a process, we need to consider that 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 questions or similar questions.
- Accept incorrect spelling in one-word 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 instead of multiply. NO marks will be awarded for the calculations and the answer.
- 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 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.
- If the incorrect/wrong drawing was drawn, the candidate can be awarded for only what was provided for on the marking guideline.
- If a line diagram or an orthographic view instead of a pictorial drawing (isometric/oblique/perspective) is drawn, the first assessment criteria for each member will be marked wrong, but marks will be awarded for the subsequent members if TWO or more marks are awarded for the same member.
- If candidates draw/give more information than what is required, mark strictly according to the assessment criteria.

4. Incorrect numbering of questions:

- If a candidate numbered an incorrectly, but the answer is in the correct position according to the sequence of the questions in the question paper, circle then 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 correct place:

- If a question has been 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 has been 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.

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

1.1	1.1.1	B ✓	(1)
	1.1.2	B ✓	(1)
	1.1.3	D ✓	(1)
	1.1.4	D ✓	(1)
	1.1.5	C ✓	(1)
	1.1.6	C ✓	(1)
	1.1.7	A ✓	(1)
	1.1.8	A ✓	(1)
	1.1.9	D ✓	(1)
	1.1.10	C ✓	(1)
	1.1.11	B ✓	(1)
	1.1.12	A ✓	(1)
1.2.1	1.2.1	Rawlbolt/Coach screw with a plug /Threaded rod/Bolt and nut /Plastic plug with a screw ✓	(1)
	1.2.2	Raw bolts/Coach screw with a plug/Threaded rod/Bolt and nut/ Plastic plug with a screw: • Are strong fasteners ✓ • Resists pull out failure ✓ • Have excellent mechanical properties • Have excellent carrying capacity/Ability/Carry heavy weight • Are suitable for tensile strength and yield stress • Are suitable for variance of hole sizes **ANY TWO OF THE ABOVE**	(2)

1.2.3
- Drill holes into the pier and remove the debris. ✓
- Remove bolts and washers and insert shields into holes. ✓
- Insert bolts with washers through the hinges and tighten. ✓

OR

- Drill holes into the pier and remove the debris.
- Insert plastic plugs into the holes.
- Insert rawl bolts/coach screws with plugs/threaded rods/bolts /plastic plugs with screws through the hinges and tighten.

OR

- Drill holes through the pier and remove the debris.
- Insert the threaded rod/bolt into the hole and add the nuts.
- Tighten the nuts (3)

1.3
- The circuit board of the laser level can be damaged. ✓
- Moisture can damage the laser level.
- The laser level might not function properly.

ANY ONE OF THE ABOVE (1)

1.4
- Perform regular collimation tests on the dumpy level.✓
- Calibrate the dumpy regularly. (1)

ANY ONE OF THE ABOVE **[20]**

QUESTION 2: GRAPHICS AS MEANS OF COMMUNICATION (GENERIC)

NO.	QUESTIONS	ANSWERS	MARKS
1.	Give ONE reason why FIGURE B represents the first floor plan.	Window next to sliding door/patio door on balcony/Staircase arrows pointing upwards/Arrows on staircase ✓	1
2.	Name the SI unit that is used to indicate dimensions on building plans.	Millimetre/mm ✓	1
3.	Identify number **1**.	Sliding door/Patio door ✓	1
4.	Identify the number indicating the emergency exit.	2 ✓	1
5.	What is the purpose of number **3**?	To support the handrails/To fill the spaces between the posts/For aesthetic purposes/To prevent people from falling off the balcony/For safety purposes ✓	1
6.	Identify number **4**.	Window sill/Sill ✓	1
7.	Identify number **5**.	Gutter ✓	1
8.	Identify number **6**.	Downpipe/Rainwater pipe/Rainwater downpipe/RWDP ✓	1
9.	Identify number **7**.	Balcony/Cantilever balcony/Balcony slab /Concrete slab ✓	1
10.	Deduce from the window schedule the dimensions of the window that is installed at number **8**.	900 mm ✓ x 600 mm ✓ **OR** 0,9 m x 0,6 m	2
11.	Who is the owner of the new dwelling?	Mr Ntombi ✓	1
12.	Name the elevation where the sink is located.	East elevation/East ✓	1
13.	Identify the safety error in FIGURE A.	No balusters/rails/safety rails on balcony ✓	1
14.	Deduce from the building plan why it was not approved after the first submission.	Drawing of internal staircase/ Internal staircase was omitted ✓	1

15.	Name the material that must be used for the balusters.	Aluminium ✓	1
16.	Deduce from the notes column the type of roof illustrated in FIGURE A.	Lean-to-roof ✓	1
17.	How many signatures must be indicated on this building plan?	2 ✓	1
18.	What are the dimensions for the balusters as indicated by the architect?	Ø 50 mm ✓ x 1 200 mm ✓	2
19.	Name the material that must be used for the final finishing of the outside wall.	Plaster and paint ✓	1
20.	Describe the end shape of the balustrades.	Round/Circular/Circle/Cylindrical ✓	1
21.	How many hinged openings are indicated on Window 1 in the window schedule?	3 ✓	1
22.	Draw the symbol for finished wood for the boardroom table.	 ✓	2
23.	Draw the electrical symbol for a three-pole one-way switch.		2
24.	How many fluorescent tubes are indicated in the office?	2 ✓	1

25.	Calculate the total height of the wall on the left side of the building from the finished floor level. Give your answer in meter.	2,955 ✓+ 2,955 ✓ + 3,0 ✓ = 8,91 m ✓ OR 2 955 + 2 955 + 3 000 = 8,91 m	4
26.	Calculate the area of the exterior wall on the ground floor, that will consist of bricks, from the finished floor level to the top of the floor slab in the south elevation in FIGURE A. Show ALL calculations.	(2,955 ✓ x 8 ✓) – (2,4 ✓ x 1,2 ✓) = 23,64 ✓ - 2,88 ✓ = 20,76 ✓ m² ✓ OF (2 955 x 8 000) - (2 400 x 1 200) =23 640 000 – 2 880 000 = 20 760 000 mm²	8
		TOTAL:	**40**

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

3.1 3.1.1 A- Safety harness/Harness ✓
B- Locking snap hook/Hook /D Clip/Clip ✓ (2)

3.1.2 Rope grab/Life line/Safety rope/Rope ✓ (1)

3.1.3 Workers must wear:
- Safety goggles ✓
- Gum boots
- Face shield
- Gloves
- Respiratory mask/Respirator/Breathing apparatus
- Overall/Liquid repellent coverall

ANY ONE OF THE ABOVE (1)

3.2 3.2.1 **A** - Benching ✓
B - Branch channel ✓
C - Inlet/Inlet pipe ✓ (3)

3.2.2 Faults on the drawing of the manhole:
- The walls are not double-skin walls ✓
- Corner bricks not bonding properly ✓
- Incorrect bonding of bricks
- The branch channel is at a 90º angle and not 45º
- The flow direction in branch channel indicated incorrectly

ANY TWO OF THE ABOVE (2)

3.2.3
- Concrete ring manhole ✓
- Round concrete manhole
- Pre-cast concrete manhole
- PVC/Plastic manhole
- Fibre glass manhole

ANY ONE OF THE ABOVE (1)

3.2.4 When a manhole cover is removed:
- Cordon off the area ✓
- Warning signs must be posted

ANY ONE OF THE ABOVE (1)

3.3 Fall/Gradient of 100 mm pipe = 1:40 ✓

$$\text{Fall of pipe} = \frac{1✓}{40} \times \frac{2\,000✓}{1}$$

$$= 50 \text{ mm} ✓$$

OR

Fall of pipe = 1/40
= 0,025 x 2
= 0,05 m
= 50 mm (4)

3.4 Backfilling is the process of putting soil back into a trench or excavation.✓ (1)

3.5 3.5.1 Pipe carrying mixed (temperature) water/Mixed water pipe ✓ (1)

3.5.2
- Copper ✓
- Galvanised mild steel
- Pex pipe: (Cross-linked polythene pipe)/Polythene

ANY ONE OF THE ABOVE (1)

3.5.3 15 mm/22 mm ✓ (1)

3.5.4 Hot-water pipe ✓ (1)

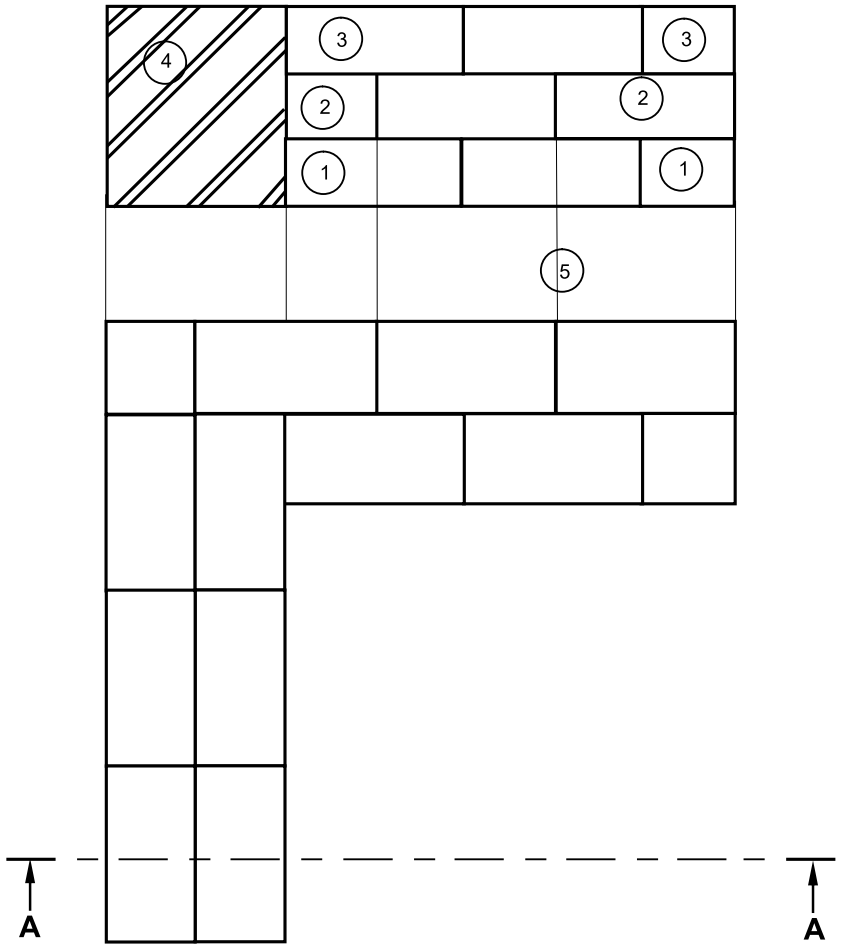
3.5.5
- Copper ✓
- Galvanised mild steel
- Pex pipe: (Cross-linked polythene pipe)/Polythene

ANY ONE OF THE ABOVE (1)

3.5.6
- Stop cock ✓
- Full-way valve
- Full-way valve with lever handle

ANY ONE OF THE ABOVE (1)

3.6



NO.	ASSESSMENT CRITERIA	MARK
1	First course	2
2	Second course	2
3	Third course	2
4	Hatching of bricks	1
5	Projection lines	1
	TOTAL:	**8**

(8)
[30]

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

4.1 4.1.1 Anode ✓

4.1.2 Red water diverter ✓

4.1.3 Electric isolator switch/Isolator switch/Isolator ✓

4.1.4 Copper/Brass ✓

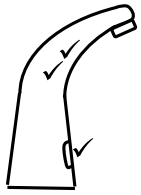
4.1.5 Pressure control valve/PCV ✓

4.2 4.2.1 Demand pillar tap/Metered tap ✓ (1)

4.2.2 Demand pillar tap/Metered tap:
- Only allows water to flow ✓ as long as the top button is pressed ✓
- Allows water to flow for a few seconds after the button has been pressed
- Duration of water flow can be pre-set and adjusted to deliver a minimum amount of water

ANY TWO OF THE ABOVE (2)

4.2.3



ANY OTHER ACCEPTABLE ANSWER (3)

4.3 4.3.1 Johnson coupling ✓ (1)

4.3.2 Galvanized pipe ✓ (1)

4.3.3 Fixing a pipe with a Johnson pipe coupling:
- Shut off the water supply ✓
- Cut and remove the damaged part of the pipe ✓
- Replace the damaged pipe with a new piece ✓
- Place/Tighten a Johnson coupling over the joint between the two pipes on both ends ✓ (4)

4.4 Centrifugal pump ✓ (1)

4.5 Causes of a geyser dripping at the overflow:
- A faulty pressure-control valve ✓
- Faulty thermostat/Excessive heat build-up in the geyser ✓
- A faulty relief valve
- A faulty filter in the relief valve
- A faulty O-ring in the relief valve
- A faulty spring in the relief valve

ANY TWO OF THE ABOVE (2)

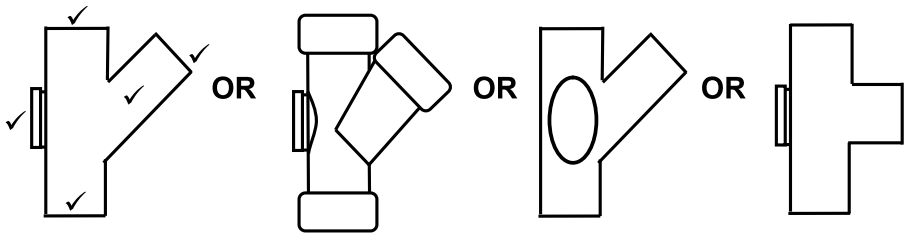
4.6 Water hammer/Hammering of the pipes ✓ (1)

4.7 4.7.1 Pressure-reducing valve ✓
PRV ✓ (2)

4.7.2 Pressure switch ✓
PS ✓ (2)

4.7.3 Non-return valve ✓
NRV ✓ (2)

4.8 T-WASTE JUNCTION WITH INSPECTION EYE



(5)

4.9 4.9.1 C ✓

4.9.2 A ✓

4.9.3 G ✓

4.9.4 F ✓

4.9.5 E ✓

(5)

4.10 Dezincification:
- Is the selective leaching (removal) of Zinc from copper alloys ✓
- Is an electrochemical reaction between zinc and water

ANY ONE OF THE ABOVE

Galvanic corrosion:
- Is an electrochemical process that takes place between two different metals or alloys ✓ (2)

4.11 Galvanic corrosion can be prevented by:

- Electrically insulating the two metals(electrolysis) ✓
- Ensuring that there is no contact with electrolytes
- Applying an antioxidant paste
- Using metals with similar electrode potentials
- Connecting direct current to oppose the corrosive galvanic current

ANY ONE OF THE ABOVE (1)

[40]

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

5.1 5.1.1 Stop ends/End caps ✓ (1)

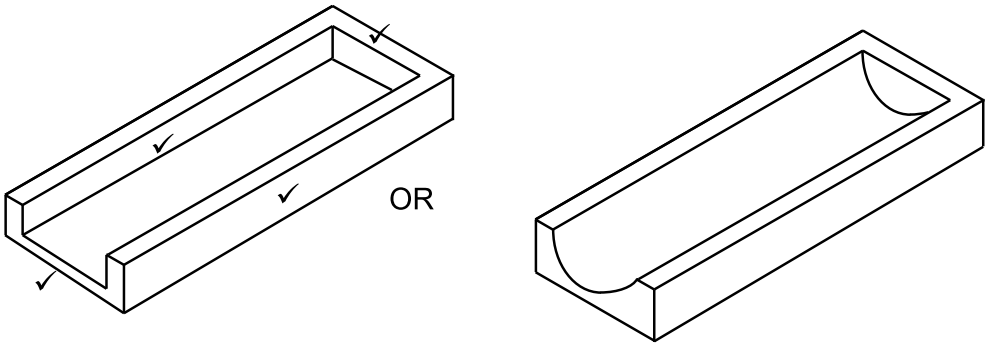
5.1.2 Fastener used to attach the downpipe to the wall:
- Holder bats ✓
- Downpipe clips

ANY ONE THE ABOVE (1)

5.1.3 Offset ✓ (1)

5.2 Installation of a galvanised mild steel gutter brackets:
- Mark off the position of the screws for the first gutter bracket ✓
- Measure the slope and mark the position of the screws at the opposite end of the fascia board ✓
- Snap a chalk line between the two points ✓
- Mark out evenly (not exceeding one meter) the positions of the brackets in between the marked points ✓
- Screw brackets onto the marked positions on the fascia board ✓ (5)

5.3



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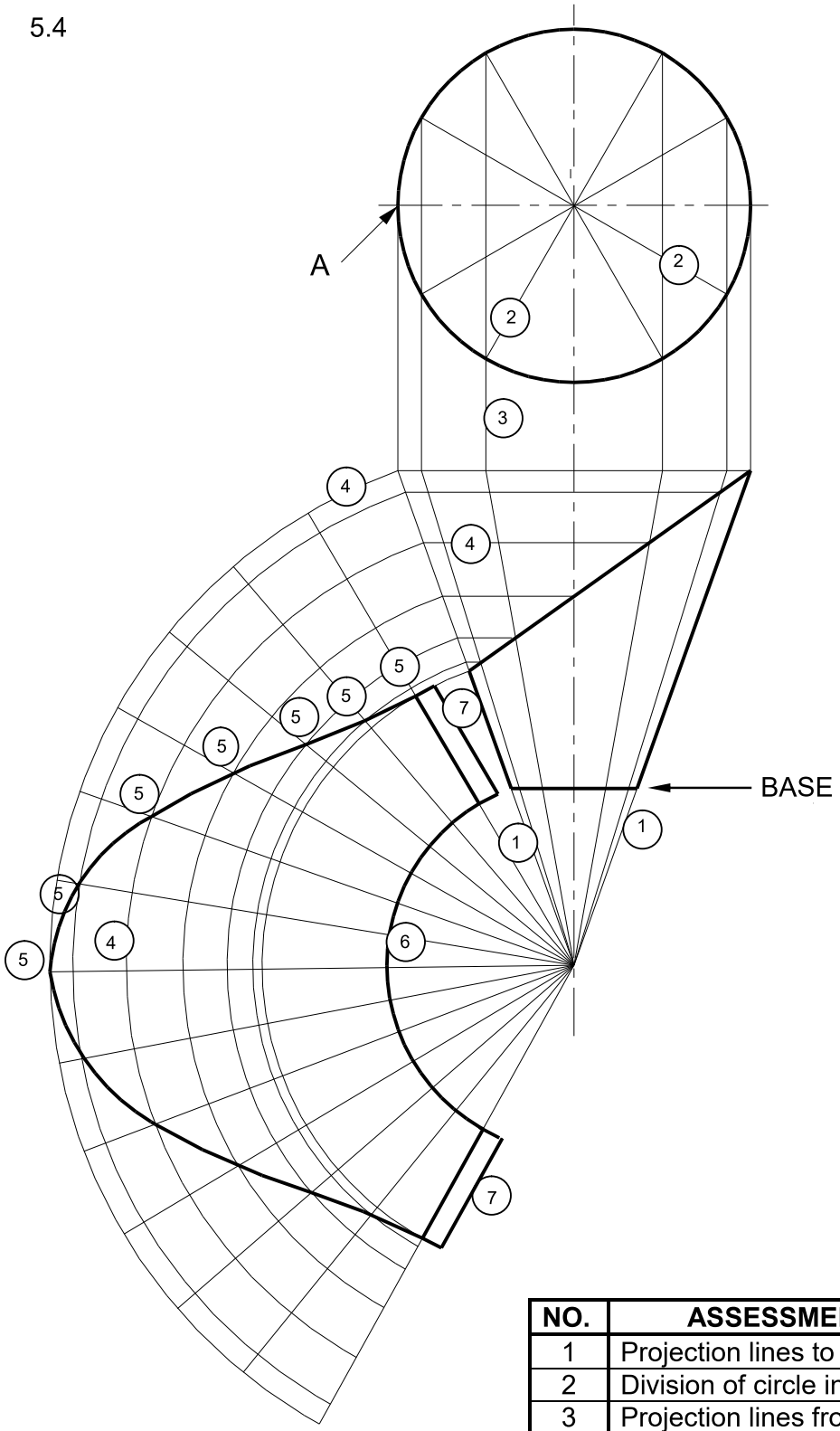
5.4



NO.	ASSESSMENT CRITERIA	MARK
1	Projection lines to apex	2
2	Division of circle into 12 parts	2
3	Projection lines from circle	1
4	Construction lines and arcs from cone	3
5	Development of top of cone	7
6	Development of base of cone	1
7	3 mm seam on both sides	2
	TOTAL:	**18**

[30]

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

6.1 Process of joining capillary elbow to copper pipes:
- Remove the debris with sanding paper/steel wool and apply flux ✓
- Insert pipe into elbow ✓
- Heat the pipe and elbow ✓
- Apply solder to the joint allowing the solder to fill around the joint ✓ (4)

6.2 Uses of the spring toggle fixer:
- Fixing brackets, timber and small frames against plasterboard ✓
- Fixing objects to hollow-core bricks ✓
- Fixing lights and chandeliers to the ceiling

ANY TWO OF THE ABOVE (2)

6.3 Cast iron pipes:
- Have superior strength when compared to other pipes ✓
- Is corrosion resistant ✓ (2)

6.4 6.4.1 Compressed air test ✓ (1)

6.4.2 Manometer ✓ (1)

6.4.3 Drain stopper/Stopper ✓ (1)

6.4.4 The compressed air test:
- Slide the stoppers into the pipes at all openings ✓
- Turn the wing nuts of the stoppers tightly so that they expand and seal the pipes ✓
- Air is now pumped into the system, until it reaches sufficient pressure ✓ (3)

6.4.5 There is a leak in the system. ✓ (1)

6.5 6.5.1 A manhole ramp should be constructed:
- When the ground slopes steeply to the connection point ✓
- Where the maximum gradient/fall/slope cannot be applied

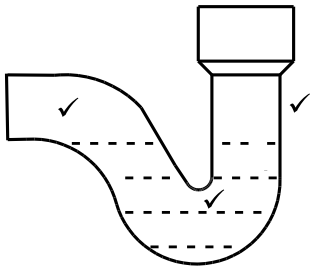
ANY ONE OF THE ABOVE (1)

6.5.2 The advantages of a manhole ramp:

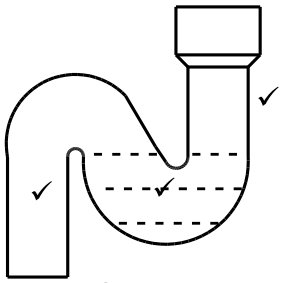
- It acts as an intermediate to join two different drain levels ✓
- When a blockage occurs, the manhole ramp pressurises the blocked pipe further down the flow and temporarily stores the waste and effluent matter, which could flow horizontally into the manhole ✓
- Allows the maintaining of a constant slope in pipes against steep slopes by rapidly dropping to lower levels for short distances

ANY TWO OF THE ABOVE (2)

6.6



P-TRAP



S-TRAP (6)

6.7 6.7.1 RE ✓ (1)

6.7.2 Connect a 45º/135º bend to the sewer lines ✓ (1)

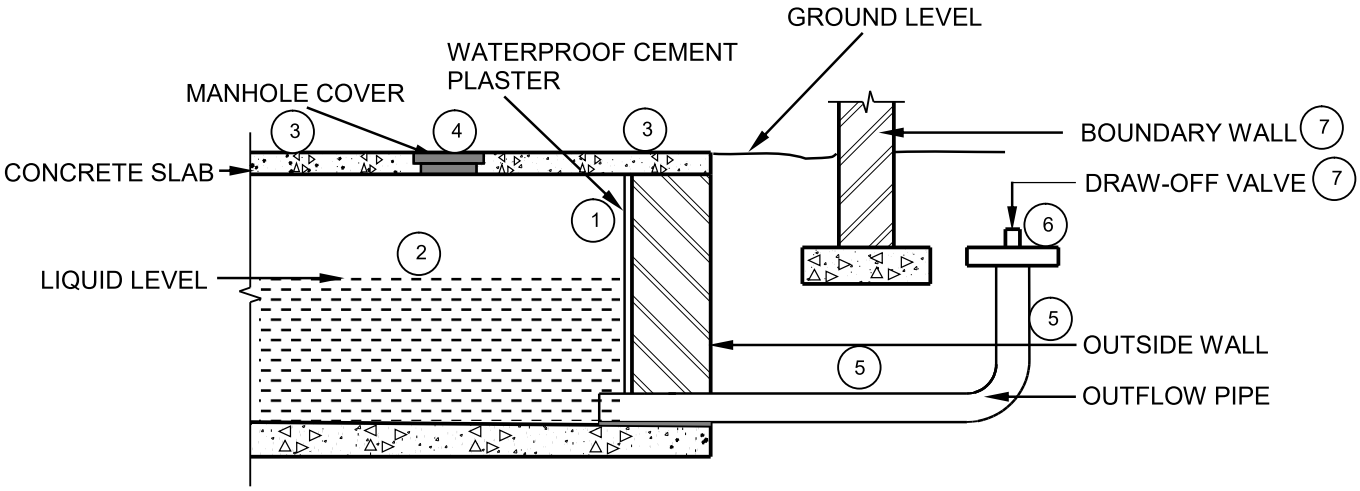
6.7.3 C - Vent pipe/Ventilation pipe/VP/Vent valves/VV ✓ (1)

6.7.4 Municipal connection ✓ (1)

6.7.5 45º/135º ✓ (1)

6.7.6 The branch pipe runs through/into the wall ✓ (1)

6.8



NO.	ASSESSMENT CRITERIA	MARK
1	Waterproof cement plaster	1
2	Liquid level	1
3	Upper concrete slab	2
4	Manhole cover	1
5	Outflow pipe	2
6	Draw-off valve	1
7	Any TWO labels	2
	TOTAL:	**10**

(10)
[40]

TOTAL: 200