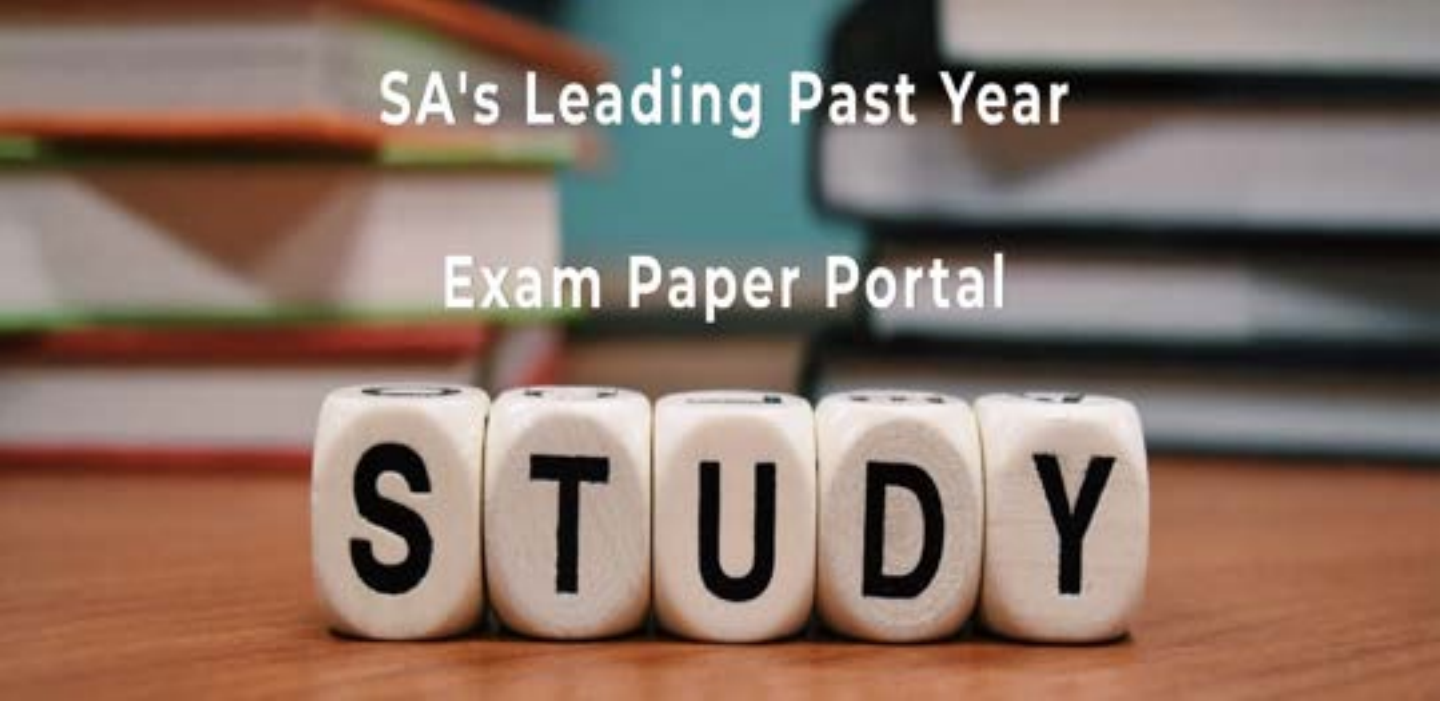

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SENIOR CERTIFICATE EXAMINATIONS/ NATIONAL SENIOR CERTIFICATE EXAMINATIONS

CIVIL TECHNOLOGY: CIVIL SERVICES

2019

MARKING GUIDELINES

MARKS: 200

These marking guidelines consist of 18 pages.

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

1.1 1.1.1 G ✓ (1)

1.1.2 E ✓ (1)

1.1.3 A ✓ (1)

1.1.4 C ✓ (1)

1.1.5 D ✓ (1)

1.2
- When heavy materials/loads are not lifted/lowered/handled correctly. ✓
- Wrong posture when lifting materials.
- Not using safety apparel.

ANY ONE OF THE ABOVE (1)

1.3 ✓ ✓
1 : 4 **OR** 76° (2)

1.4
- A qualified person must operate the device. ✓
- The device must never be overloaded. ✓
- The gates and wire components of the lift of the hoisting device must be at least 1 980 mm high.
- The gates must be shut when the device is being used.
- Emergency brake mechanisms must be installed.
- Safety measures must be displayed inside the cage.
- Inspections and maintenance work should be carried out regularly (at least six-monthly) by qualified persons.
- Overhead protection must be provided to protect workers from falling objects.
- When material or equipment is being hoisted, it must be stacked firmly and correctly, and secured properly.
- The hoist must be inspected weekly by a qualified person.

ANY TWO OF THE ABOVE (2)

1.5.1 A = Laser level ✓
B = Dumpy level ✓ (2)

1.5.2

Laser level (A)	Dumpy level (B)
To determine levels when: • installing ceilings and floor tiles. ✓ • installing chair rails for example in a dining room. • installing receptacles for power inside a building during construction. • hanging pictures. • excavating for new buildings. • aligning and levelling floors. • when installing doors and windows. • aligning shelves and cabinets. • levelling post and beams on decks, fences and porches. • setting out buildings on a site. • aligning fences, post and decks. • determining gradient/slope for drainage and irrigation. • establishing contours for farming or drainage. • To determine levels and slopes when installing sewer pipes.	The dumpy level is used when: • determining differences between levels and vertical heights, especially over longer distances ✓ • determining levels and slopes. • setting out buildings • transferring levels and heights. • determining/measuring the distances between two points.

ANY ONE IN EACH COLUMN ABOVE (2)

1.6 1.6.1 Rawl bolt ✓ (1)

1.6.2 **A** – Drill a hole of the required diameter and depth. ✓
B – Remove debris and thoroughly clean the hole with a brush or by blowing into it. ✓
C – Remove the bolt and washer, insert the sleeve/shield into the hole and align the fixture (for example base plate, etc…) with the hole. ✓
D – Insert the bolt with washer through the fixture and tighten to the recommended torque. ✓ (4)

1.6.3 Rawl bolts:
- are stronger fasteners than a screw with a plastic plug. ✓
- are designed to resist pull-out failure.
- have excellent mechanical properties such as tensile and yield stress.
- have excellent carrying capacity.
- have excellent tolerance to variance in the hole size.

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 elevation shown in FIGURE A.	Eastern/East elevation/East✓	1
2	Name the scale of FIGURE B.	1 : 100 ✓	1
3	Identify number 1.	Barge board ✓	1
4	Identify number 2.	Roof overhang/Eave/Open eave ✓	1
5	Recommend a suitable finish for number 3.	Plaster/Paint/Face brick/Tiles/ Cladding ✓	1
6	What is indicated by number 4?	Door/Entrance door/Door opening ✓	1
7	Identify the drawing symbol indicated by number 5.	Finished floor level/FFL ✓	1
8	Identify the drawing symbol indicated by number 6.	Natural ground level/NGL ✓	1
9	What is indicated by number 7?	Step ✓	1
10	Give the date on which the building plan was printed.	2019/06/16 ✓	1
11	Who checked the building plan?	P Blade ✓	1
12	Name the electrical drawing symbol in the column for the notes in FIGURE 2 that must be placed at a staircase.	Two-way switch ✓	1
13	Name the electrical feature in the column for the notes in FIGURE 2 that must be placed at the entrance door of the house.	Wall light ✓	1

DO NOT MARK THESE QUESTIONS

14	Identify the type of roof that is used on the building in FIGURE A.	Gable roof ✓	1
15	Explain the purpose of number 1.	To cover ends of purlins/battens/fixed to the purlins/battens for a neat appearance. To finish of the gable end of the roof. ✓	1
16	Who is the owner of this house?	Mr H Smith ✓	1
17	In which street is the proposed dwelling situated?	Jupiter street ✓	1
18	Identify number 8.	Rainwater down pipe/Downpipe ✓	1
19	What is the sanitary fitting indicated by number 9 used for?	To wash your face/Body ✓ Brush your teeth Wash your hands Washing/Rinsing	1
20	Recommend an alternative sanitary fitting to replace number 10 that will serve a similar purpose.	Bath ✓	1
21	Explain the purpose of number 11 as indicated on the staircase.	Landing to serve as resting place or change of direction of staircase. ✓	1
22	What is indicated by number 13?	Emergency light/External light Thickness of wall/110 mm ✓	1
23	What is indicated by number 15?	North- symbol/direction/point ✓	1
24	Deduce the height of window 1 from the window schedule.	1,8 m or 1 800 mm ✓	1
25	Deduce the width of window 2 from the window schedule.	2,4 m or 2 400 mm ✓	1
26	Name the elevations of the building on which the staircase is situated.	Western/West elevation/West ✓ Southern/South elevation/South ✓	2

27	Differentiate between the electrical symbols indicated by numbers 12 and 14.	12 – One way light switch single pole/ lever ✓ 14 – One way light switch double pole/ lever ✓	2
28	Recommend a suitable floor covering for the lounge.	Tiles/Novilon/Carpets/Laminated flooring/Wooden flooring.✓	1
29	Calculate the area of the lounge in m². Show ALL calculations.	6 m ✓ x 3 m ✓ = 18 m² ✓ **OR** 6 000 mm x 3 000 mm = 18 m²	3
30	Calculate the perimeter of the building. Show ALL calculations.	(220 + 3 000 + 110 + 3 000 + 220) ✓ x 2 ✓ = 6 550 x 2 =13 100 mm ✓ (220 + 6 000 + 220) ✓ x 2 ✓ = 6 440 x 2 = 12 880 mm ✓ 13 100 + 12 880 = 25 980 mm ✓ **OR** = 25,98 m	7
		TOTAL:	**40**

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

3.1 3.1.1

- The sewage runs into the system at **A** ✓ and exits the system at **D**.✓

OR

- Sewage flows from **A** to **D**. (2)

3.1.2 Branch/Open channel ✓ (1)

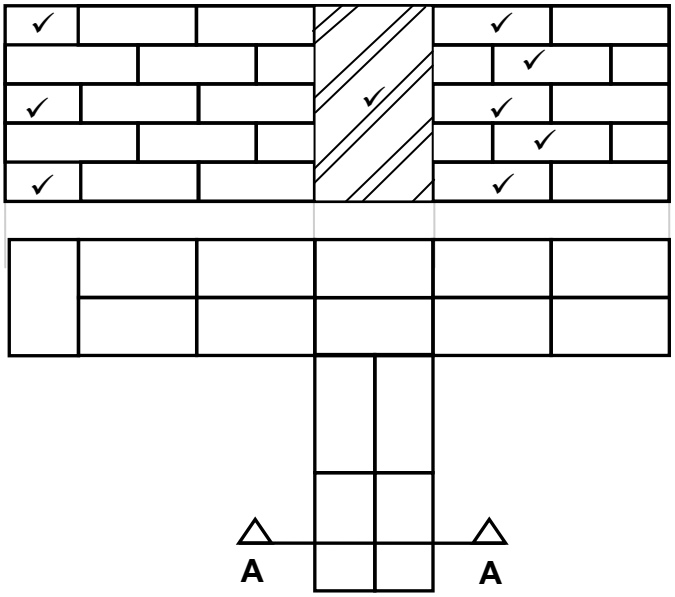
3.1.3 Benching must be installed at a slope for the following reasons:

- To ensure that sewage spills slide back into the channel. ✓
- So that rats or other vermin cannot settle there.

ANY ONE OF THE ABOVE (1)

3.1.4 Engineering brick/Face brick/Common brick/Plaster brick ✓ (1)

3.2



Section correctly drawn ✓

ASSESSMENT CRITERIA	**MARK**
Five brick courses in stretcher bond	5
Half brick on alternate plan courses on left side	3
Section correctly drawn	1
Hatching lines (Accept any type of hatching for brick work)	1
TOTAL:	**10**

(10)

3.3 3.3.1 Moderately firm ground ✓ (1)

3.3.2 **A** - Poling boards/planks ✓
B - Strut ✓ (2)

3.4 Respirator/Breathing apparatus ✓ (1)

3.5 Regulations when working in high places:

- Appoint a competent person, responsible for the preparation of a fall plan.✓
- Ensure that a fall protection plan is implemented, amended where and when necessary, and maintained as required. ✓
- Ensure that steps are taken in order to continue adherence to the fall protection plan. ✓ (3)

3.6

A	B	C	D
			Total length of partition wall
			1/ 1 200 mm - 2 /220 ✓
			= 760 mm ✓ (2)
			Area of partition wall
1/	0,76 ✓		
	1,2 ✓	0,91 m^2 ✓	(3)
			Number of bricks needed for partition wall excluding 5% for breakage
1/	0,91 ✓		
	50 ✓	45,5 ✓	46 bricks are needed (3)

[30]

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

4.1 4.1.1 Solar geyser ✓ (1)

4.1.2 Sunlight ✓ (1)

4.1.3 Disadvantages of using a heat pump are:
- It runs on electricity. ✓
- It is costly. ✓
- Does not work well in all climates.
- Supplementary heat is needed for lower temperatures.

ANY TWO OF THE ABOVE (2)

4.2 4.2.1 Preventing poor hot water pressure:
- Replace geyser if it is faulty with new/modern one with a higher pressure rating. ✓
- Replace blocked pipes.
- Replace the valves if it is faulty.
- Clean pipes

ANY ONE OF THE ABOVE (1)

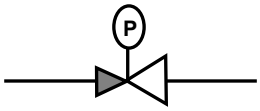
4.2.2 Preventing ware not being hot enough:
- Adjust the thermostat to a higher temperature. ✓
- Replace the thermostat and element if it is faulty.
- Replace the geyser if it is faulty.

ANY ONE OF THE ABOVE (1)

4.2.3 Prevent dripping geyser overflow:
- Replace the pressure control/relief valve. ✓
- Clean the filter of the relief valve.
- Replace the o-ring in the relief valve.
- Replace the spring in the relief valve.

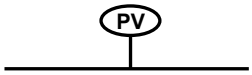
ANY ONE OF THE ABOVE (1)

4.3 4.3.1



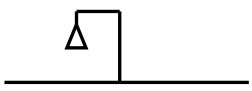
✓✓ (2)

4.3.2



✓✓ (2)

4.3.3



✓✓ (2)

4.4 4.4.1 Full-way valve/Gate valve ✓ (1)

4.4.2 A - Hand wheel ✓
B - Gland nut ✓ (2)

4.4.3 This valve can be used at:
- geysers. ✓
- water meters.
- a place in a system where water supply needs to be shut off.
- a water supply system in a building.
- Inside/outside a building.

ANY ONE OF THE ABOVE (1)

4.5 Devices that can reduce water consumption are:
- water-saving aerator device on tap. ✓
- sensor/electronic taps. ✓
- metered taps.
- demand pillar taps.
- water saving shower heads.
- flushing devices with two buttons, to save water.

ANY TWO OF THE ABOVE (2)

4.6 How to repair a galvanised pipe by using a Johnson pipe coupling:
- Shut off the water supply. ✓
- Use a pipe cutter/hacksaw and cut the damaged section from the supply line. ✓
- Put the Johnson pipe coupling over the one side of the pipe, ensuring that the tapered rubber seal is in place and secure it to the centre-coupling piece. ✓
- Add a new length of pipe. ✓
- Put the Johnson pipe coupling over the other side of the pipe and fasten it on both sides. ✓
- Test for leaks.

ANY FIVE OF THE ABOVE (5)

4.7 4.7.1 E ✓ (1)

4.7.2 B ✓ (1)

4.7.3 A ✓ (1)

4.7.4 F ✓ (1)

4.7.5 C ✓ (1)

4.8 Problems that can be caused by dezincification are:
- In the presence of oxygen and water, zinc gradually dissolves from the surface of an alloy; the material that will remain is a weak, spongy copper layer. ✓
- It can progress through the part and cause leaks. ✓
- It can cause blockages if it forms a deposit.

ANY TWO OF THE ABOVE (2)

4.9 Methods to prevent galvanic corrosion in metals are:
- electrically insulating the two metals. ✓
- making sure that there is no contact with an electrolyte. ✓
- applying an antioxidant paste to copper and aluminium surfaces.
- choosing metals that have similar electrode potentials.
- connecting a direct current (DC) supply to oppose the corrosive galvanic current.

ANY TWO OF THE ABOVE (2)

4.10 4.10.1 Pipe thread cutting machine ✓ (1)

4.10.2
- To thread pipes ✓
- To cut pipes
- To ream pipes
- To thread and cut bolts and nuts

ANY ONE OF THE ABOVE (1)

4.10.3 Factors to be considered when taking care:
- Maintain tool with care. ✓
- Keep cutting tools sharp and clean. ✓
- Check for misalignment or binding of moving parts, breakage of parts and any other conditions that may affect the operation of the tool.
- Use only accessories that are recommended by the manufacturer.
- Grease surface of pipe before cutting.
- Start the cutting of threads slowly at first and then move to a steady pace.
- Secure the machine to a bench or stand.
- Keep the covers in place.
- Support long heavy pipes.
- Do not wear gloves or loose clothing's that can get caught in moving parts.
- Do not use the machine if the foot switch is broken.
- Tighten the chuck wheel and engage the rear centring device before turning on the machine.
- Lock the foot switch when the machine is not in use to prevent accidental starting.
- Use the clamp or any other practical way to secure and support the work piece.

ANY TWO OF THE ABOVE (2)

4.11 Water pressure testing pump is used to test the pressure of water systems. ✓ (1)

4.12 Factors to be considered when taking care of this water pressure testing pump:

- Keep the tank and pump system clean. ✓
- The suction pipe is provided with a filter to prevent dirt from entering the system. Remove and clean the filter with water when it becomes clogged. ✓
- Grease the piston regularly with water repellent grease.
- Be careful not to damage the piston.
- After use, turn off the test pump, disconnect it from the system and store it safely.
- Use only liquids specified for the test.
- No acids or other corrosive liquids may be used.
- Use only clean water; oil can be used as an alternative.
- Check the pump for damaged or defective parts before use.
- The pump should not be used if pressure hoses or any other parts are faulty or damaged.

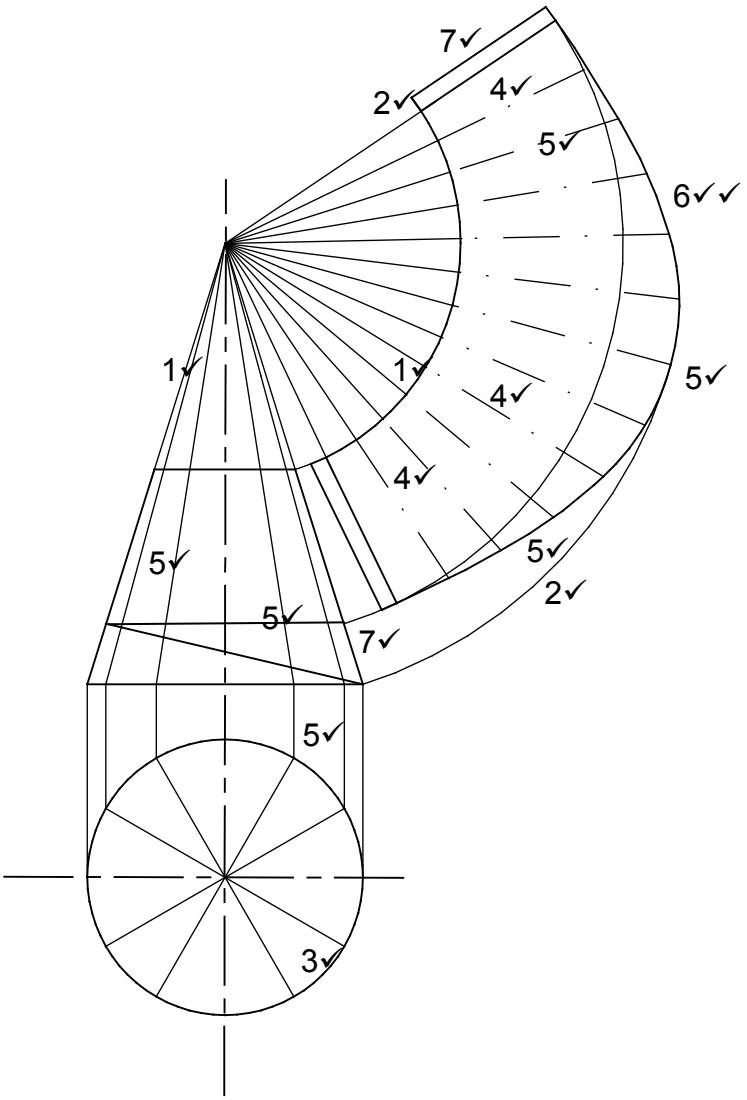
ANY TWO OF THE ABOVE (2)

[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	Flashing ✓	(1)
	5.1.3	Hacksaw ✓	(1)
	5.1.4	Union clip ✓	(1)
	5.1.5	Fascia board ✓	(1)
5.2	5.2.1	Square gutter/Gutter ✓	(1)
	5.2.2	Offset ✓	(1)
	5.2.3	Holder bat – is used to keep the downpipe anchored to the wall. ✓	(1)
5.3	5.3.1	Grid ✓	(1)
	5.3.2	Other methods of channelling water to catchment areas are: • Gutters on roofs collect rainwater and feed it to down pipes. ✓ • 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 catchment areas. **ANY TWO OF THE ABOVE**	(2)
	5.3.3	Poorly constructed or managed storm water systems can result in: • discomfort of occupants or the public. ✓ • loss of life. • damage to properties. • pollution of the environment. • negative environmental impact. **ANY ONE OF THE ABOVE**	(1)

5.4



Candidates can use any one of the two methods:

1. Calculate the circumference and divide by 12
   OR
2. Measure distance between any two parts on top view (circle)

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

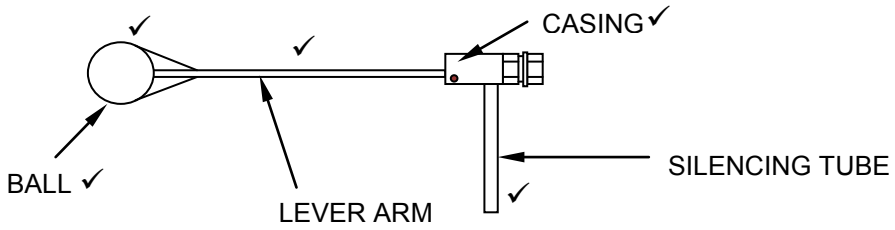
ASSESSMENT CRITERIA	**Code**	**M**
Construction lines to top of cone	1	2
Construction lines of outer circle	2	2
Divide outer circle in 12 parts	3	1
Construction lines from top of cone to outer circle	4	3
Cone measurement (marked/transferred) from front view to determine top part of development (ONE mark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

(18)
[30]

QUESTION 6: DRAINAGE SYSTEMS AND SANITARY FITTINGS (SPECIFIC)

6.1	6.1.1	B ✓	(1)
	6.1.2	A ✓	(1)
	6.1.3	C ✓	(1)
	6.1.4	A ✓	(1)
	6.1.5	C ✓	(1)
6.2	6.2.1	Trap **A** – has the shape of a S. ✓ Trap **B** – has the shape of a P. ✓	(2)
	6.2.2	It forms a water seal to prevent gasses and bad smells from the sewerage system to enter the atmosphere. ✓	(1)
6.3	6.3.1	Cistern/Water container ✓	(1)
	6.3.2	Rubber cone is malleable/elastic. ✓ Can make a watertight seal between the pipe and the water closet. **ANY ONE OF THE ABOVE**	(1)
	6.3.3	Access junction ✓ – if there is no access junction there will be no access to the pipe to clean blockages. ✓ **OR** Inspection eye – if there is no inspection eye there will be no access to the pipe to clean blockages. **OR** Soiled water will flow out. Gasses would escape.	(2)
	6.3.4	Drain-cleaning rods/Plunger/Coil spring ✓ **ANY ONE OF THE ABOVE**	(1)

6.3.5

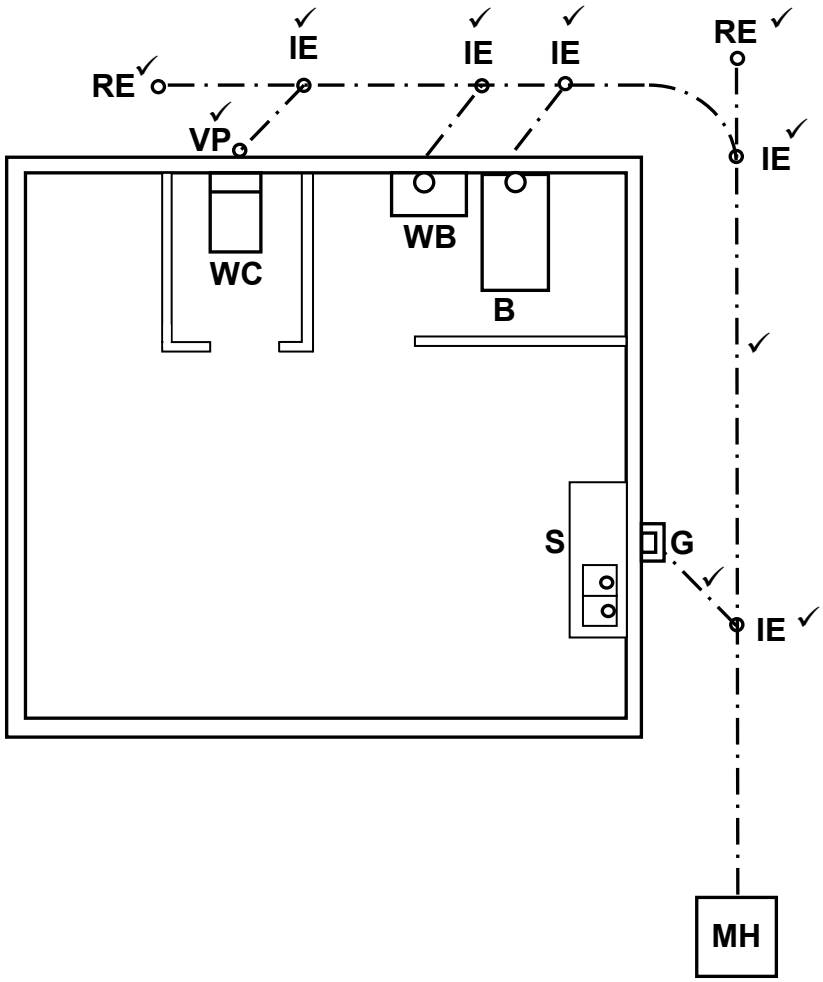


Line diagrams will also be accepted

ASSESSMENT CRITERIA	**MARK**
Shape of the ball	1
Lever arm	1
Casing with silencing tube	1
Any TWO labels	2
TOTAL:	**5**

(5)

6.4



ASSESSMENT CRITERIA	MARK
2 x rodding eyes correctly positioned	2
5 x inspection eyes correctly positioned	5
1 x ventilation pipe correctly positioned	1
Sewerage pipes drawn correctly (main and branch pipes)	2
TOTAL	**10**

(10)

6.5 6.5.1 French drain ✓ (1)

6.5.2 The grey water will kill the bacteria in the septic tank. ✓ (1)

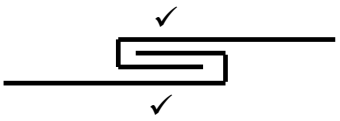
6.6
- Vacuum tanks are installed anywhere where there is no municipal sewerage systems. ✓
- Farms
- Rural areas
- New developments

ANY ONE OF THE ABOVE (1)

6.7 Inspection chamber ✓ (1)

6.8 Copper pipes can be joined by means of:
- capillary/soldered joints. ✓
- brass compression joints. ✓ (2)

6.9



(2)

6.10 6.10.1 **A** – Tension force ✓
B – Shear force ✓ (2)

6.10.2 The position of the soldering iron is important because:
- proper contact of the soldering iron to the metal will ensure that the metal heats up to the melting point of the solder. ✓
- heat is transferred from the tip of the soldering iron to the metal. ✓
- it melts the solder and keeps it in liquid form during the soldering process.

ANY TWO OF THE ABOVE (2)
[40]

TOTAL: 200