



# **basic education**

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

## **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: OHS&A, 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		<b>Laser level (A)</b>	<b>Dumpy level (B)</b>	
		<p>To determine levels when:</p> <ul style="list-style-type: none"> <li>• installing ceilings and floor tiles. ✓</li> <li>• installing chair rails for example in a dining room.</li> <li>• installing receptacles for power inside a building during construction.</li> <li>• hanging pictures.</li> <li>• excavating for new buildings.</li> <li>• aligning and levelling floors.</li> <li>• when installing doors and windows.</li> <li>• aligning shelves and cabinets.</li> <li>• levelling post and beams on decks, fences and porches.</li> <li>• setting out buildings on a site.</li> <li>• aligning fences, post and decks.</li> <li>• determining gradient/slope for drainage and irrigation.</li> <li>• establishing contours for farming or drainage.</li> </ul> <p>• To determine levels and slopes when installing sewer pipes.</p>	<p>The dumpy level is used when:</p> <ul style="list-style-type: none"> <li>• determining differences between levels and vertical heights, especially over longer distances ✓</li> <li>• determining levels and slopes.</li> <li>• setting out buildings</li> <li>• transferring levels and heights.</li> <li>• determining/measuring the distances between two points.</li> </ul>	
		<b>ANY ONE IN EACH COLUMN ABOVE</b>		(2)
1.6	1.6.1	Rawl bolt ✓		(1)
	1.6.2	<p><b>A</b> – Drill a hole of the required diameter and depth. ✓</p> <p><b>B</b> – Remove debris and thoroughly clean the hole with a brush or by blowing into it. ✓</p> <p><b>C</b> – Remove the bolt and washer, insert the sleeve/shield into the hole and align the fixture (for example base plate, etc...) with the hole. ✓</p> <p><b>D</b> – Insert the bolt with washer through the fixture and tighten to the recommended torque. ✓</p>		(4)
	1.6.3	<p>Rawl bolts:</p> <ul style="list-style-type: none"> <li>• are stronger fasteners than a screw with a plastic plug. ✓</li> <li>• are designed to resist pull-out failure.</li> <li>• have excellent mechanical properties such as tensile and yield stress.</li> <li>• have excellent carrying capacity.</li> <li>• have excellent tolerance to variance in the hole size.</li> </ul> <p><b>ANY ONE OF THE ABOVE</b></p>		(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 m <sup>2</sup> . Show ALL calculations.	6 m ✓ x 3 m ✓ = 18 m <sup>2</sup> ✓ <b>OR</b> 6 000 mm x 3 000 mm = 18 m <sup>2</sup>	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 ✓ <b>OR</b> = 25,98 m	7
		<b>TOTAL:</b>	<b>40</b>

**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)

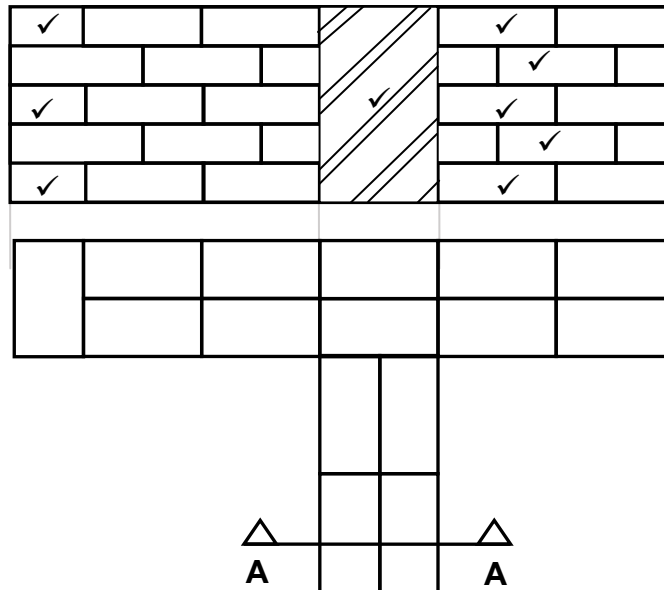
- 3.1.3 Benching must be installed at a slope for the following reasons:

- 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
<b>TOTAL:</b>	<b>10</b>

(10)

- 3.3 3.3.1 Moderately firm ground ✓ (1)
- 3.3.2 **A** - Poling boards/planks ✓ (2)  
**B** - Strut ✓
- 3.4 Respirator/Breathing apparatus ✓ (1)
- 3.5 Regulations when working in high places: (3)
  - 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. ✓

3.6

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

(2)

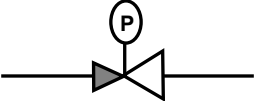
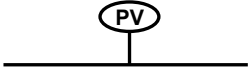

(3)

(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.

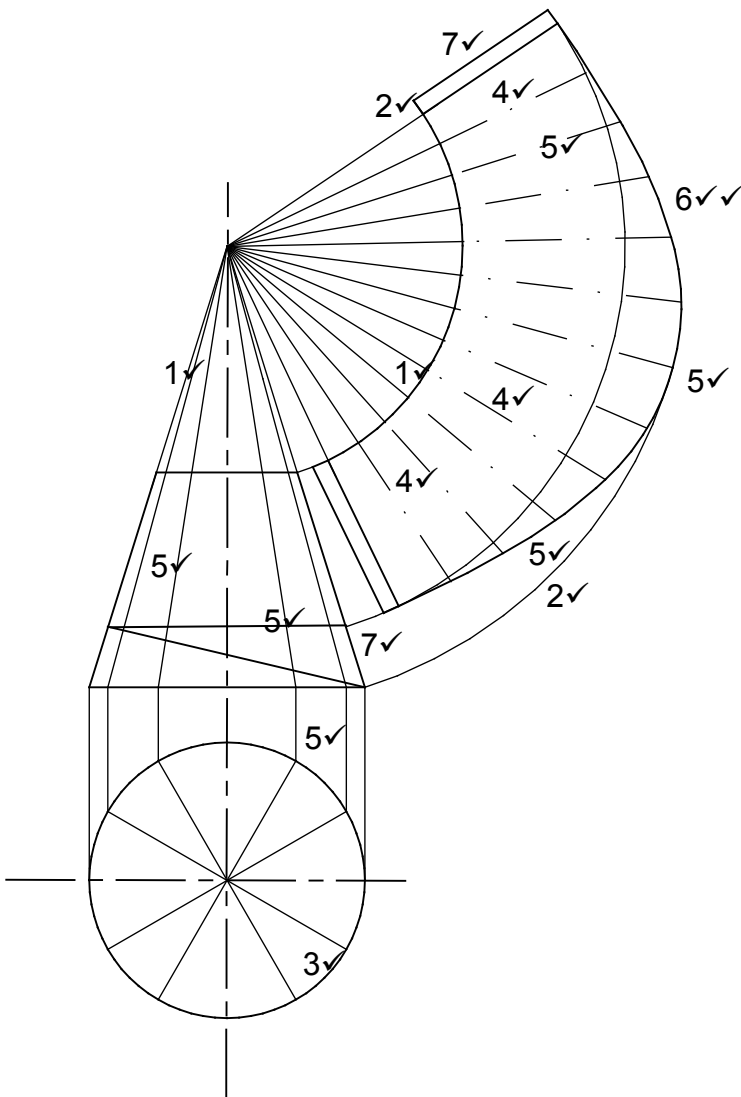
**ANY TWO OF THE ABOVE**

(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**

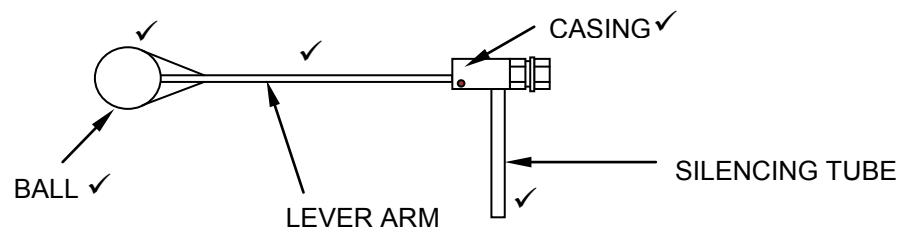
ASSESSMENT CRITERIA	Code	M
Construction lines to top of cone	1	2
Construction lines of outer circle	2	2
Divide outer circle in 12 parts	3	1
Construction lines from top of cone to outer circle	4	3
Cone measurement (marked/transferred) from front view to determine top part of development (ONE mark for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

(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



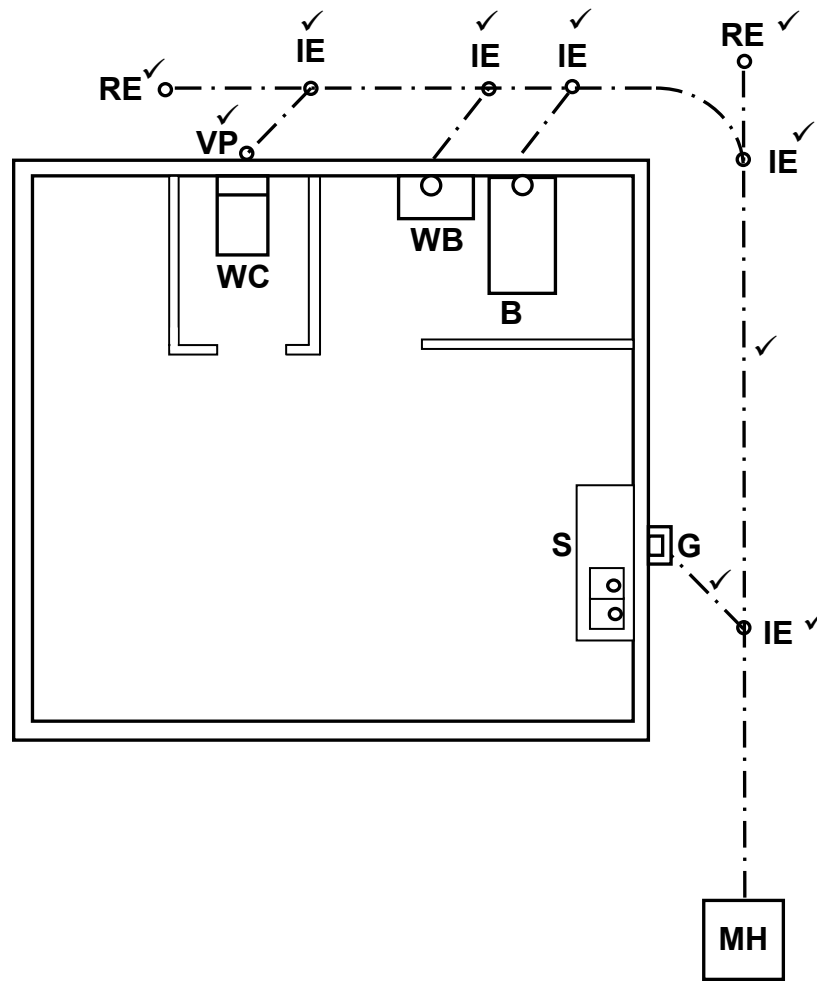
Line diagrams will also be accepted

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

(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
<b>TOTAL</b>	<b>10</b>

(10)

6.5 6.5.1 French drain ✓

(1)

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

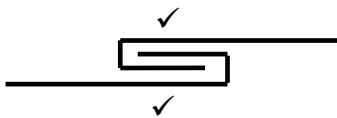
(1)

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**