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Basic Education  
**REPUBLIC OF SOUTH AFRICA**

## **NATIONAL SENIOR CERTIFICATE**

**GRADE 12**

**CIVIL TECHNOLOGY: CIVIL SERVICES**

**NOVEMBER 2019**

**MARKING GUIDELINES**

**MARKS: 200**

**These marking guidelines consist of 16 pages.**

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

- 1.1      1.1.1      B ✓ (1)
- 1.1.2      I ✓ (1)
- 1.1.3      A ✓ (1)
- 1.1.4      G/H ✓ (1)
- 1.1.5      C ✓ (1)
- 1.1.6      F ✓ (1)
- 1.1.7      J ✓ (1)
- 1.1.8      E ✓ (1)
- 1.2      Electroplating:
- protects metals against corrosion. ✓
  - improves the engineering- and mechanical properties of metal. ✓
  - may be used to increase the thickness of undersized parts.
  - is decorative.
  - will extend the life span.
- ANY TWO OF THE ABOVE** (2)
- 1.3      Curing ✓ (1)
- 1.4      The moisture:
- delays/prevents the rapid drying of fresh concrete.
  - prevents concrete from cracking. ✓
  - ensures that fresh concrete hardens properly.
  - allows adhesive bonding.
  - increases strength of fresh concrete.
- ANY ONE OF THE ABOVE** (1)
- 1.5      • When material is transported in bulk, it must be secured firmly. ✓
- When material is transported to higher levels, make sure that workers maintain a safe distance from the material being moved overhead. ✓
- When heavy material is transported with a lift/hoist/machine, a qualified person must take charge of operations.
- Wear appropriate personal protective equipment(PPE).
- Material must be transported in a safe way.
- Transport should not be overloaded with material.
- ANY TWO OF THE ABOVE** (2)

- 1.6 Scaffold planks should:
- be made of a solid wood at least 228 mm wide and 38 mm thick. ✓
  - be able to support the load.
  - be free from defects.
  - not be painted as it will hide defects/be slippery.
  - be supported at distances not exceeding 1,25 m.
  - not project less than 70 mm and not more than 230 mm beyond the ends of the last prop.
  - be firmly secured to prevent its displacement.
  - be placed in such a way to prevent materials and tools from falling through.

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

- 1.7 1.7.1 Dumpy level ✓ (1)

- 1.7.2 If the dumpy level is not set up level:
- it will give inaccurate readings. ✓
  - wrong levels will be transferred.
  - true levels will not be transferred.

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

- 1.8 1.8.1 A – Plastic plug/Plug/Rawl plug/Fisher plug/Fibre plug ✓ (1)

- 1.8.2 A screw ✓ (1)

- 1.8.3 Plastic plugs are used to secure:
- cupboards against a wall. ✓
  - mirrors against a wall.
  - portraits and similar objects against a wall.
  - objects, limited to certain weight, against walls.

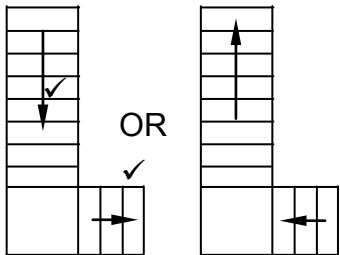
**ANY ONE OF THE ABOVE** (1)

**[20]**

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

NO.	QUESTIONS	ANSWERS	MARKS
1	Identify the elevation in FIGURE A.	West Elevation ✓	1
2	Identify the type of roof that is used on the building in FIGURE A.	Hipped roof ✓	1
3	Identify number 1.	Ridge Capping/Ridge plate/Ridge tile/Hip cap ✓	1
4	Identify number 4.	Balcony/Floor slab of balcony/Cantilever/Concrete slab ✓	1
5	Identify number 5.	External door/Entrance door/Door/Outside door ✓	1
6	Identify number 7.	Gutter ✓	1
7	Identify number 8.	Rainwater down pipe/RWDP/Down pipe ✓	1
8	Identify number 12.	Wash trough/Wash tub ✓	1
9	Identify number 13.	Built-in cupboard/BIC ✓	1
10	Identify number 15.	Landing ✓	1
11	Identify the company that printed the building plan.	Dlamini printers ✓	1
12	Name a suitable material that can be used for the manufacturing of number 2.	Fibre cement/Galvanised sheeting/Timber/Plastic/PVC/Polyvinylchloride✓	1
13	Name the drawing symbol in the column for the notes in FIGURE 2 that must be installed in the kitchen.	Electricity meter/Electrical meter/Watt meter/Prepaid meter ✓	1
14	Name the drawing symbol in the column for the notes in FIGURE 2 that indicates the type of bricks for the building.	Face brick ✓	1
15	Name a material that should NOT be used to manufacture the frame of number 9 for coastal areas.	Steel/Mild steel/Iron/Ferrous metals ✓	1

16	Name a material that can be used to manufacture the sanitary fitting indicated by number 11.	Stainless steel/Plastic/Ceramic/Granite/Acrylic/Fibre Glass/Concrete✓	1
17	Who checked the building plan?	P Carter ✓	1
18	How many types of windows are used in FIGURE B?	2 ✓	1
19	What does the abbreviation <i>NGL</i> at number 6 stand for?	Natural ground level ✓	1
20	Give the reference code for this plan.	QP 2-2019 ✓	1
21	Which room will electrical symbol 16 serve?	Lounge ✓	1
22	Describe the purpose of number 3.	Prevent people from falling off/through. ✓✓	2
23	Explain what the curved lines between the electrical installations in FIGURE B indicate.	Electrical wiring/Wiring/Electrical cable/Wiring from light switch to light/Shows which switch operates which electrical fitting. ✓✓	2
24	Explain why the light switch is mounted on the outside of the bathroom.	To prevent steam/moisture entering the switch/To prevent electrical shock due to moisture/For safety purposes ✓	1
25	Identify in FIGURE 2 which elevation does NOT have windows.	North elevation ✓	1
26	Identify the thickness of the internal wall in FIGURE 2.	110 mm ✓	1
27	Differentiate between symbols 13 and 15 in terms of their purpose.	13 – Built-in cupboard: to store items. ✓ 15 – Landing: to rest/safety feature/change of direction of stairs ✓	2
28	Justify why FIGURE B is a ground floor plan.	Ground floorplan: <ul style="list-style-type: none"> <li>• does not indicate the roofline ✓</li> <li>• does not indicate the balcony</li> <li>• indicate an entrance door to the house</li> <li>• indicate a step at the entrance door</li> <li>• the position of the windows and door correlate with the positions of the window and door on the west elevation</li> </ul>	1

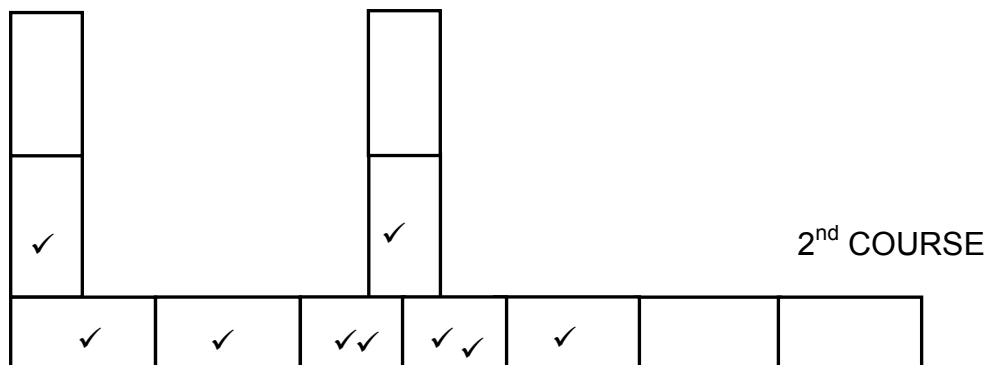
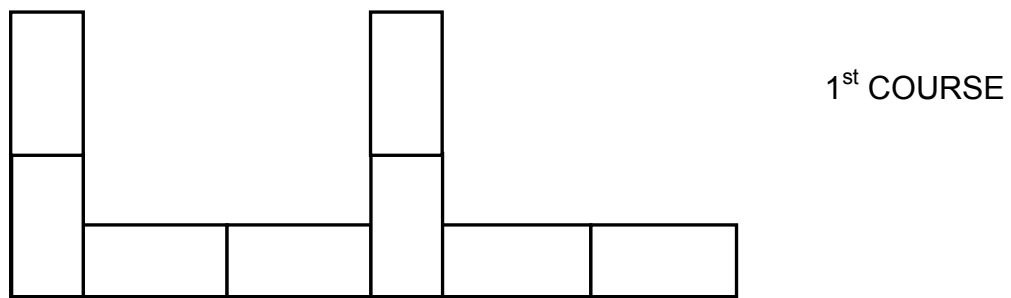
29	Predict what will happen if number 10 is NOT installed.	Water/Damp will penetrate into the wall. ✓	1
30	Redraw the staircase in FIGURE B in the adjacent column and indicate the direction of the flight with arrows.		2
31	Calculate the total length of the wall on the eastern side of the building. Show ALL calculations.	$220 \checkmark + 2\,600 \checkmark + 110 \checkmark + 3\,400 \checkmark + 220 \checkmark$ $= 6\,550 \text{ mm or } 6,55 \text{ m } \checkmark$ <b>IF INCORRECT METHOD IS USED TO CALCULATE THE ANSWER USE THE FOLLOWING SLIDING SCALE:</b> <ul style="list-style-type: none"> <li>• 4 MARKS WILL BE AWARDED IF ALL FIVE VALUES ARE CORRECT</li> <li>• 3 MARKS FOR FOUR VALUES CORRECT</li> <li>• 2 MARKS FOR THREE VALUES CORRECT</li> <li>• 1 MARK FOR 2 VALUES CORRECT</li> </ul>	6
		<b>TOTAL:</b>	<b>40</b>

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

- 3.1.1 Step irons/Ladder/Concrete/Cast iron lid **(ANY ONE)** ✓ (1)
- 3.1.2 Step irons/Ladder/Concrete/Cast iron lid **(ANY ONE)** ✓ (1)
- 3.2 3.2.1 Wedge ✓ (1)
- 3.2.2 300 mm ✓ (1)
- 3.3 3.3.1 4 ✓ (1)
- 3.3.2 3 ✓ (1)
- 3.3.3 L x b x h **OR** Area of base x height **OR** Side x side x side **OR** S<sup>3</sup>  
           = 2,7 ✓ x 2,7 ✓ x 2,7 ✓  
           = 19,68 m<sup>3</sup> ✓ (4)
- = 19,68 m<sup>3</sup> x 1 000 ℓ ✓  
           = 19 680 ℓ **OR** 19 683 ℓ ✓ (2)
- 3.4 3.4.1 D- Clip ✓ (1)
- 3.4.2 Rope grab ✓ (1)
- 3.4.3 Breathing apparatus ✓ (1)
- 3.4.4 Transparent pipe level ✓ (1)
- 3.4.5 Manhole ✓ (1)
- 3.5 A – Spirit level ✓  
       B – Long straight edge/Straight edge ✓  
       C – Steel peg/Peg ✓ (3)



3.6

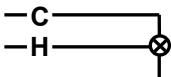



Correctness ✓

ASSESSMENT CRITERIA	MARK
Bricks at corner drawn correctly	2
2 x $\frac{3}{4}$ bricks	4
Full bricks on each side of $\frac{3}{4}$ bricks	2
Full brick at T-junction	1
Correctness of drawing	1
<b>TOTAL:</b>	<b>10</b>

(10)  
[30]

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

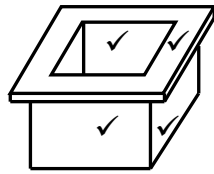
- 4.1 4.1.1 Solar geyser system/Solar panel with geyser ✓ (1)
- 4.1.2 Water will get cold. ✓ (1)
- 4.1.3 To ensure maximum operation/efficiency. ✓  
So that dirt cannot accumulate on the glass panel.  
**ANY ONE OF THE ABOVE** (1)
- 4.2 An airlock is a pocket of air ✓ that is trapped inside ✓ a pipe and it prevents constant water flow. ✓ (3)
- 4.3 Causes of water hammer are:  
  - Sudden drop in secondary supply pipes ✓
  - Loose jumpers in taps ✓
  - Pipes in walls are not properly caulked
  - Pipes are not properly secured in roof spaces above the ceiling
  - Draw-off pipe is bigger than the supply pipe
  - Bad/Poor installation**ANY TWO OF THE ABOVE** (2)
- 4.4 4.4.1 Balancing device (hot water control) ✓ (1)
- 4.4.2 Shower (movable)/Movable shower ✓ (1)
- 4.5 4.5.1  ✓ ✓  
Correctness of symbol = 2 marks (2)
- 4.5.2  ✓ ✓  
Correctness of symbol = 2 marks (2)
- 4.6 4.6.1 S-Trap ✓ (1)
- 4.6.2 40/50 mm ✓ (1)
- 4.7 4.7.1 A – T Junction (Plain) ✓  
B – 90° bend with inspection eye ✓ (2)
- 4.7.2 A – Where three soil pipes with the same diameter meets/Where the branch pipe connects to the main sewerage pipe. ✓  
B – Above ground where soil pipes have to change direction at a 90° angle/Outside the external wall where the water closet is installed. ✓ (2)

- 4.8      4.8.1      Pipe-thread cutting machine ✓ (1)
- 4.8.2      Water pressure testing pump ✓ (1)
- 4.8.3      Drain-cleaning machine/Jetting machine ✓ (1)
- 4.9      Functions of the centrifugal pump:
- To pump water out of excavations or trenches. ✓
  - To move liquids through pipes or pipelines. ✓
  - To move slurries or liquid containing suspended matter.
  - To convert rotational motion/kinetic energy to hydrodynamic energy.
  - To increase the pressure of water in pipes.
- ANY TWO OF THE ABOVE** (2)
- 4.10      It is not recommended that copper pipes are joined to galvanised pipes because:
- Negative effects on the pipeline can be caused due to the chemical reactions between the metals and acidic water. ✓
  - Pit marks are caused by the chemical reaction between the two metals. ✓
  - An electrochemical reaction can take place between two dissimilar metals causing corrosion/dezincification.
- ANY TWO OF THE ABOVE** (2)
- 4.11      4.11.1      Pillar tap ✓ (1)
- 4.11.2      A pillar tap can be used at:
- Sinks/Kitchen ✓
  - Baths/Bathroom/En-suite ✓
  - Basins/Bathroom/En-suite
- ANY TWO OF THE ABOVE** (2)
- 4.12      4.12.1      Water meter ✓ (1)
- 4.12.2      Full way valve/Stop cock ✓  
To shut off the water supply ✓ (2)
- 4.12.3      Bibcock/Bib tap/Garden tap ✓ (1)
- 4.12.4      No reaction will take place/No ✓ (1)
- 4.12.5      Dezincification ✓ (1)
- 4.13      Water saving devices:
- Sensor taps ✓
  - Demand pillar taps ✓
  - Metered taps
- ANY TWO OF THE ABOVE** (2)

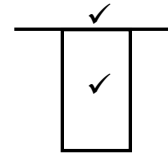
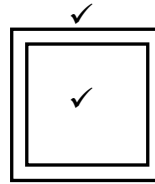
- 4.14 Pressure control valve reduces/control the incoming water pressure to a building. ✓ (1)
- Temperature and pressure safety valve will reduce/relieve pressure in a hot water system in case of excessive pressure building up in the geyser. ✓ (1)
- [40]**

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

5.1 5.1.1



Correctness – 4 marks

**ORTHOGRAPHIC VIEWS WILL  
ALSO BE ACCEPTED - ONLY 2  
MARKS**

(4)

5.1.2 Fascia board/Rafter ✓

(1)

5.2 5.2.1 Surface channel ✓

(1)

5.2.2 Rainwater shoe/Concrete shoe✓

(1)

5.2.3 Road kerb/Kerb ✓

(1)

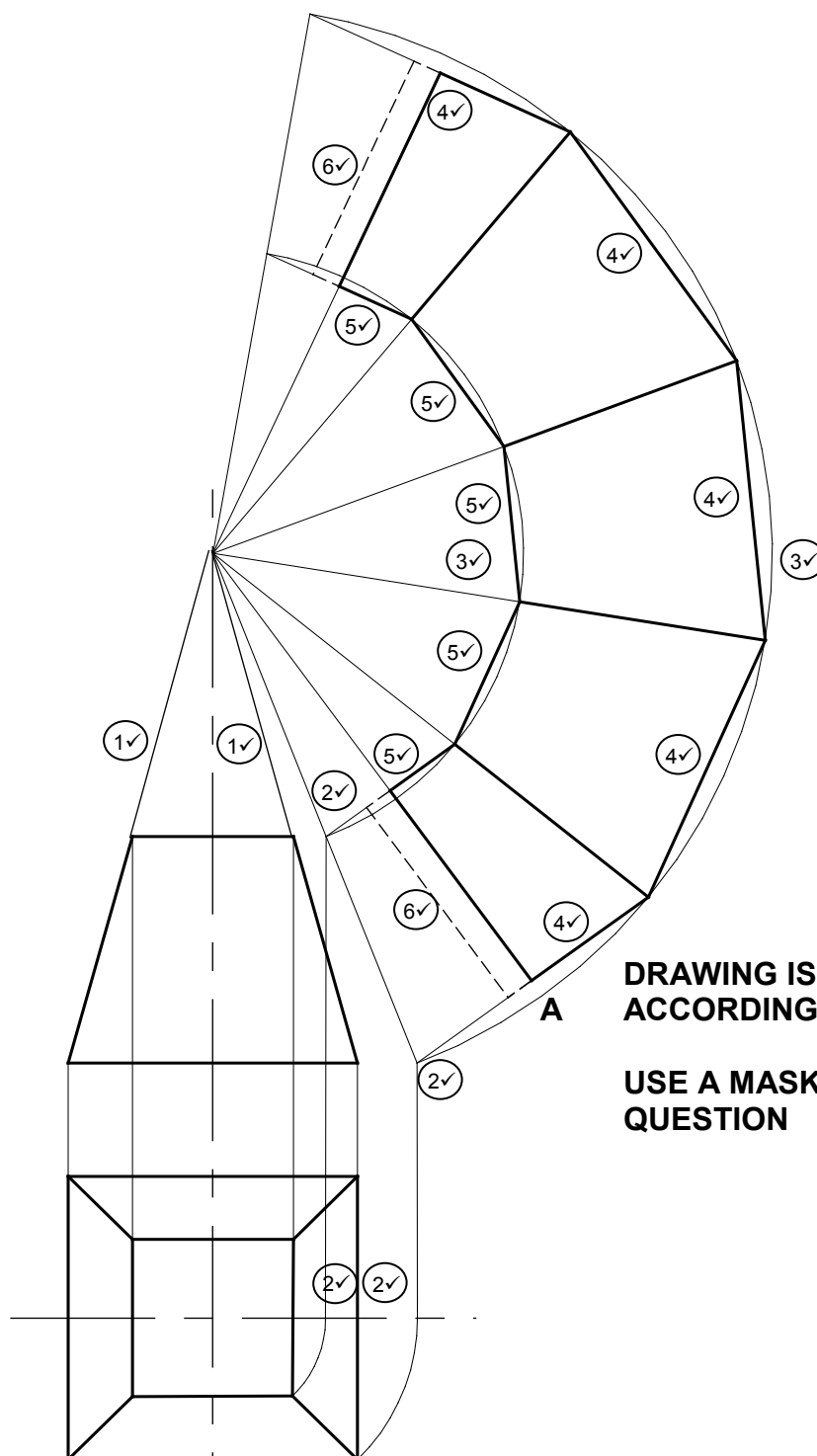
5.2.4 Flashing ✓

(1)

5.3 Municipality/Local Government/Local Authorities. ✓

(1)

5.4



**DRAWING IS NOT  
ACCORDING TO SCALE**

**USE A MASK TO MARK THIS  
QUESTION**

**ANY ALTERNATIVE METHOD  
TO OBTAIN TRUE LENGTH  
WILL BE ACCEPTED**

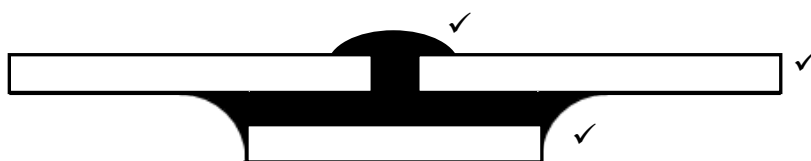
NO.	ASSESSMENT CRITERIA	MARK
1	Projection lines to determine the apex	2
2	Determine true length	4
3	Top and bottom arc of pyramid	2
4	Development of base of pyramid	5
5	Development of top of pyramid	5
6	3 mm seams	2
<b>TOTAL:</b>		<b>20</b>

(20)  
[30]

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

- 6.1      6.1.1      D ✓ (1)
- 6.1.2      A ✓ (1)
- 6.1.3      D ✓ (1)
- 6.1.4      B ✓ (1)
- 6.1.5      C ✓ (1)

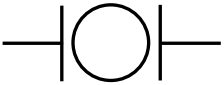



6.2



ASSESSMENT CRITERIA	MARK
Solder	1
Plates	1
Cover strip	1
<b>TOTAL:</b>	<b>3</b>

(3)

6.3

DRAINAGE ABOVE GROUND	DRAINAGE BELOW GROUND
6.3.1 ✓ OR Water meter OR 	6.3.2 ✓ OR Sewerage line OR 
6.3.4 ✓ OR Washbasin OR 	6.3.3 ✓ OR Inspection eye OR 

(4)

- 6.4      6.4.1      135° ✓ (1)
- 6.4.2      The purpose of the inspection eye is to gain access to the sewer pipe to:
- inspect it. ✓
  - clear blockages/allow for cleaning.
- ANY ONE OF THE ABOVE** (1)

- 6.5      Fittings in a drainage system should:
- be made of material that is suitable for the piping. ✓
  - remain watertight under normal working conditions. ✓
  - be able to withstand internal water pressure of 50 kPa and external pressure of 30 kPa without leaking.
- ANY TWO OF THE ABOVE** (2)
- 6.6      • Ventilation pipes/Vent pipe ✓ (2)
- Vent valves ✓

## 6.7 Septic tanks:

- Must be cleaned when the sludge level rises above the outlet and starts flowing out. ✓
- Soil water is discharged into a French drain. ✓

(2)

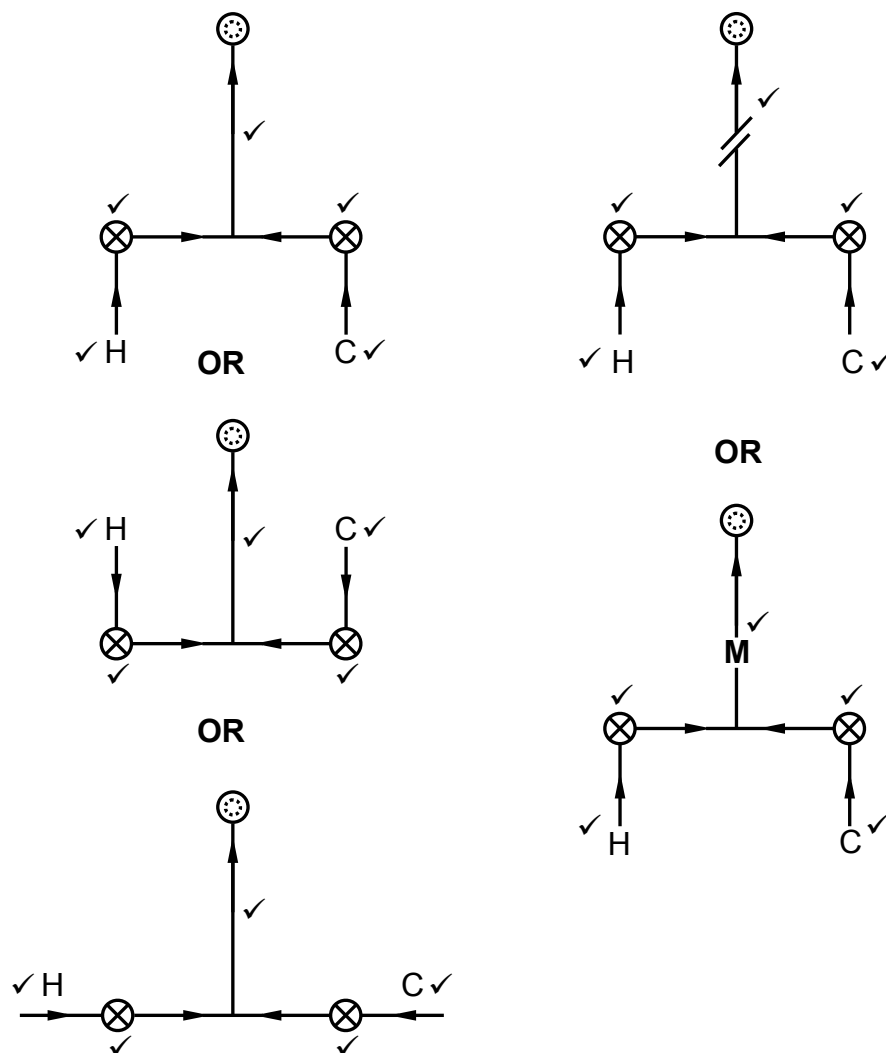
## Vacuum tanks:

- Must be emptied when it reaches its maximum capacity. ✓
- Must be cleaned more regularly than a septic tank.
- Sewage is stored until it is pumped out by the local municipality. ✓

**ANY TWO OF THE ABOVE**

(2)

## 6.8



ASSESSMENT CRITERIA	MARK
Cold water inlet	1
Hot water inlet	1
Cold water tap (NO mixer taps)	1
Hot water tap (NO mixer taps)	1
Flow direction on mixed pipe	1
<b>TOTAL:</b>	<b>5</b>

(5)



6.9

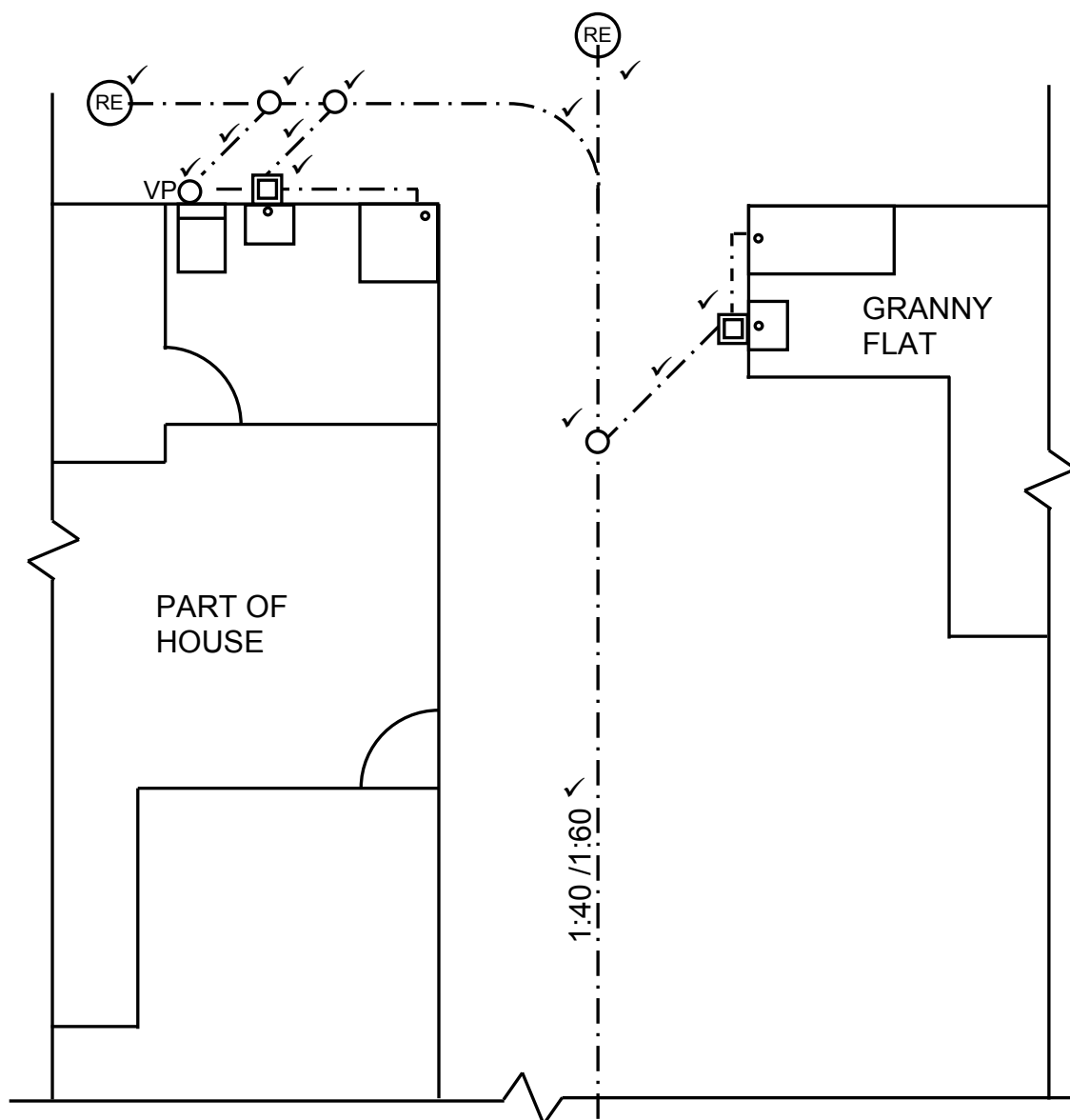


FIGURE 6.9

**ABBREVIATIONS ALSO ACCEPTED IN THE PLACE OF THE SYMBOL**

**A MAXIMUM OF 2 MARKS WILL BE AWARDED IF THE WRONG LINE TYPES ARE USED FOR THE BRANCH PIPES.**

ASSESSMENT CRITERIA	MARK
BRANCH PIPES	3
VENT PIPE	1
GULLEY'S	2
JUNCTION OF TWO MAIN SEWER PIPES	1
RODDING EYES	2
INSPECTION EYES	3
GRADIENT	1
<b>TOTAL:</b>	<b>13</b>

(13)  
[40]

**TOTAL: 200**