

GAUTENG DEPARTMENT OF EDUCATION

SENIOR CERTIFICATE EXAMINATION

**PLUMBING AND SHEET
METALWORK SG**

**QUESTION 1
PURIFICATION**

- 1.1 Five advantages of a mechanical pressure filter over a sand filter
- It is much smaller and needs less space. (1)
 - It has a much faster tempo of filtration. (1)
 - It is very easy to backwash. (1)
 - It is easy to service. (1)
 - It is easy to install/the whole installation appears neat. (1)
- 1.2 Disadvantages of mechanical pressure filters
- They are not as effective as the regular sand filter. (1)
 - Because of the number of pumps needed, they are much more expensive to maintain. (1)
- 1.3 Purpose of filter layers in the pressure filter
- Top layer: coarse silica gravel for primary purification (2)
 - Middle layer: polarite (iron oxide) for oxidation and cleaning (2)
 - Bottom layer: fine silica gravel for the final filtration (2)
- 1.4.1 Chlorine kills all organic matter and bacteria that might have escaped the filtration process. (1)
- 1.4.2 Chlorine is added during the final stage of the purification process. (1)
- 1.5 Aluminium sulphate (alum) is added to the water to encourage the density of the floating particles and bacteria so as to make them heavier and sink to the bottom. (2)
- 1.6 See page 6.

QUESTION 2 DRAINAGE

- 2.1 See page 7.
- 2.2 The effect of Aids on our country's economy and development.
- Loss of income
 - High medical expenses
 - Labour shortages
 - Financial cost of awareness programmes
 - Hampers the development of the country, owing to the shortage of manpower
- Any four (4)

QUESTION 3 SAFETY MEASURES

- 3.1 Two safety measures when excavating drain trenches of considerable depth
- Trench sides must be supported effectively.
 - Excavated soil and other material must be kept between 450 mm and 600 mm away from trench sides.
 - Children should not be allowed to play on the excavated soil or in the trenches.
 - Trenches should be barricaded.
 - Temporary crossings across trenches should be safe and secure.
- (Any 2) 2 marks each (4)
- 3.2 Oxyacetylene welding apparatus
- Use effective welding goggles
 - Open cylinder valves slowly
 - Do not point the flame to any person or cylinder.
 - Ensure that both cylinders stand upright and that they are well supported.
 - Pipes must be in a good condition
- (Any four) 1 mark each (4)
- 3.3 If the minimum depth of a sewerage pipeline cannot be obtained
- The sewerage pipe should then be set in concrete. (2)
- 3.4 The result if the angle of the sewerage pipeline is more than the maximum that is allowed.
- The water will flow too rapidly, leaving some of the heavier solids behind. This can result in blockage of the drain. (2)
- 3.5 Would you consider covering a French drain with a steel plate? Give reasons for your answer.
- No
 - Gasses cannot escape.
 - Moisture cannot be absorbed into the ground.
 - Plants growing on top cannot absorb some of the water.
 - When the steel plate corrodes (rusts), the top soil will spill into the gaps between the stones and block the drain. (5)

- 3.6 To remove blood that may be contaminated.
- Use rubber gloves or plastic bags to prevent direct contact with the contaminated blood.
 - Make sure that you have this protection readily available at all times. (2)
- 3.7 Safety measures to prevent the possible transmission of Aids in the workplace.
- Treat all blood as if it is contaminated.
 - First aid kits which include protective gloves are available in the workplace.
 - Employees must be trained to prevent HIV transmission when helping an injured person. (6)
- [25]

QUESTION 4 TOOLS, WORKING TECHNIQUES AND METHODS

- 4.1 A – cutting of sheet metal
- 4.2 B – fine and accurate filing
- 4.3 C – cutting round bar
- 4.4 D – bending of sheet metal
- 4.5 E – scribing straight lines on metal
- 4.6 F – scribing a circle
- 4.7 G – drilling holes
- 4.8 H – chiselling of material
- 4.9 I – heating up the soldering iron
- 4.10 J – soldering
- 4.11 K – measuring
- 4.12 L – marking out of a rectangle (12)
- 4.2 1 – snips
- 2 – file
- 3 – metal vice
- 4 – metal saw (hacksaw)
- 5 – hammer (metal or wood)
- 6 – scriber
- 7 – divider
- 8 – drill bit
- 9 – cold chisel
- 10 – gas burner
- 11 – soldering iron
- 12 – steel rule or tape measure
- 13 – tri-square (13)
- [25]

QUESTION 5 SANITARY FITMENTS

- 5.1 The use of slab urinals
- In men's toilets
 - In public buildings (2)

- | | | |
|-------|----------------------------|-----|
| 5.2.1 | 100 mm PVC pipe | (1) |
| | 50 mm connection pipe | (1) |
| | 100 mm PVC elbow with IE | (1) |
| | 100 mm PVC elbow (regular) | (1) |
| | Clamp | (1) |
| | Rubber seal | (1) |
| | Coupling | (1) |
| | Cement | (1) |
| 5.2.2 | } see page 8. | |
| 5.2.3 | | |

QUESTION 6 CENTRAL HEATING

- 6.1 The function of each of the following components of a central heating system
- A. Boiler: heats the water which circulates in the system, thus warming the heaters
 - B. Expansion tank: allows for sufficient room for expansion of the water when it is heated
 - C. Bleeding valve: allows for steam and hot air to escape
 - D. Accelerator: (booster pump): accelerates the movement of water through the system
 - E. Return pipes: water that has cooled down is conveyed in the return pipes to the boiler to be re-heated
 - F. Flow pipe: conveys the hot water from the boiler to the heaters
- 2 marks each (12)
- 6.2 Advantages and disadvantages of the two-pipe system as compared to the one-pipe system
- ADVANTAGES**
- A higher temperature is maintained throughout (2)
 - A uniform temperature is maintained by various heaters. (2)
- DISADVANTAGES**
- It is more expensive (material and labour). (2)
 - It is a more complex pipe system. (2)
- 6.3 What is understood by **central heating**?
- Heating of a building by means of a boiler.
 - Water is heated at a central point by means of a boiler.
 - The hot water is conveyed from the heater through the flow pipes.
 - Water that has become cooled is returned to be reheated.
 - The heaters warm the room.
- (5)
[25]

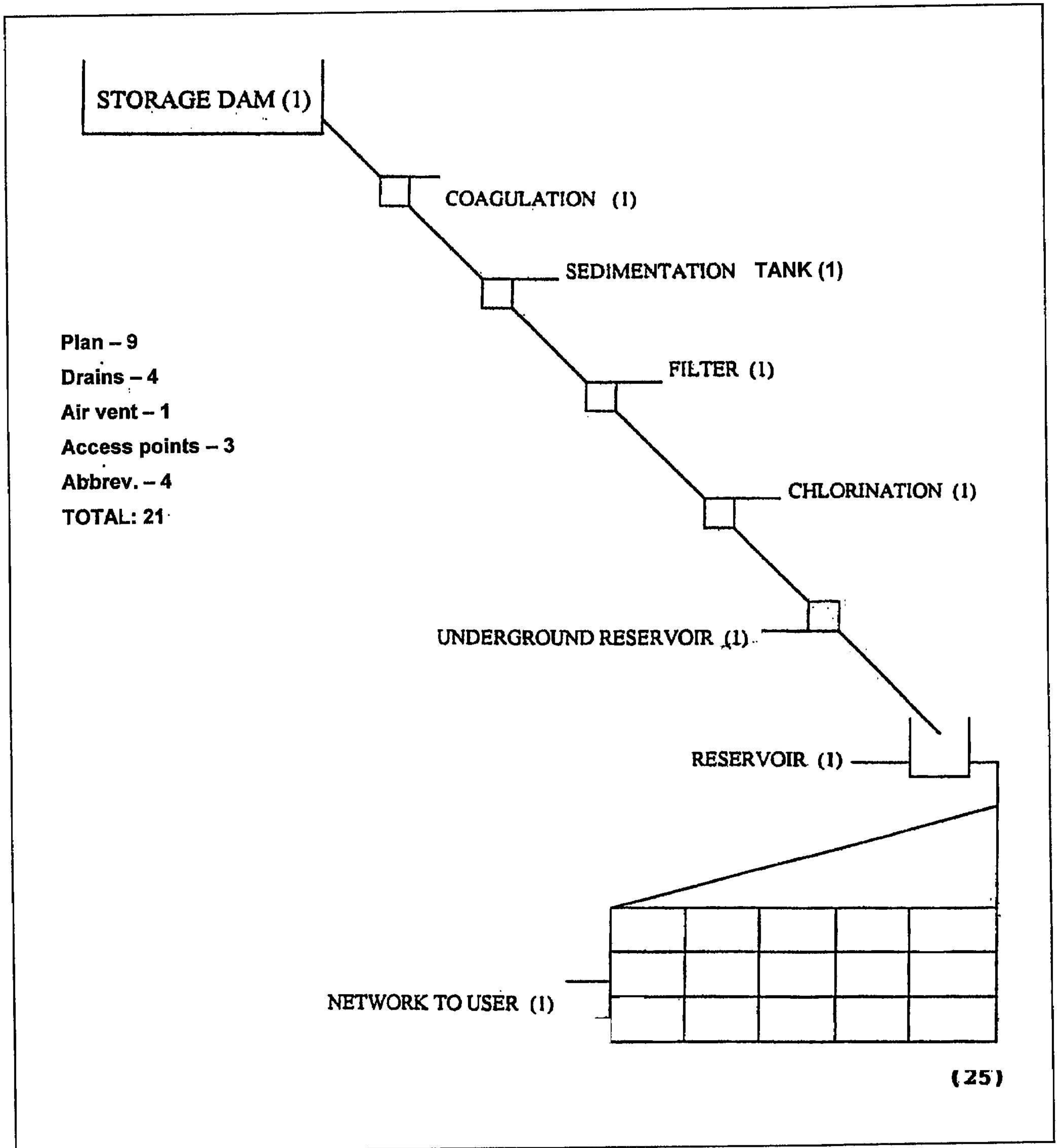
QUESTION 7 VENTILATION AND CENTRAL AIR-CONDITIONING

- 7.1 Name in sequence SIX important stages in the treatment of air in a large air-conditioning system. Give a brief description of each stage.

- **EXTRACTOR FAN**
A strong, power-driven centrifugal fan draws in fresh air and discharges it into the system from where it is distributed in the building. (2)
 - **MOISTURISING**
Air passes through a mist or a water screen to increase the moisture content. (2)
 - **PRIMARY FILTERS**
Filters consist of replaceable linen covers, removing dust and other impurities from the air. (2)
 - **MOISTURE-ABSORBING**
To reduce the moisture content, the air passes through metal screens. The excess water condensates on the screens. (2)
 - **HIGH EFFICIENCY FILTERS**
Consists of replaceable carbon or charcoal activated filters, which remove dust particles, smoke, odours and impurities. (2)
 - **HEATING OR COOLING OF AIR**
Depending on the weather conditions, air is automatically heated or cooled. Air temperature is automatically controlled by means of thermostats. (2)
- 7.2 The type of ventilation system used in each of the following applications
- 7.2.1 A school classroom – natural ventilation
 - 7.2.2 The kitchen of a hostel – extractor fans
 - 7.2.3 A large theatre – combined air-conditioning system
- Two marks each (6)
- 7.3 Three aids which could assist the natural ventilation of a building:
- Doors
 - Windows
 - Ventilators
 - Air bricks
 - Chimneys
 - Louvers
- (Any three) 2 marks each (6)
- 7.4 The main advantage of natural ventilation
- It is cheap / inexpensive. (1)
- [25]**

QUESTION 1.6

Water Supply from Dam to user



[25]

QUESTION 2.1

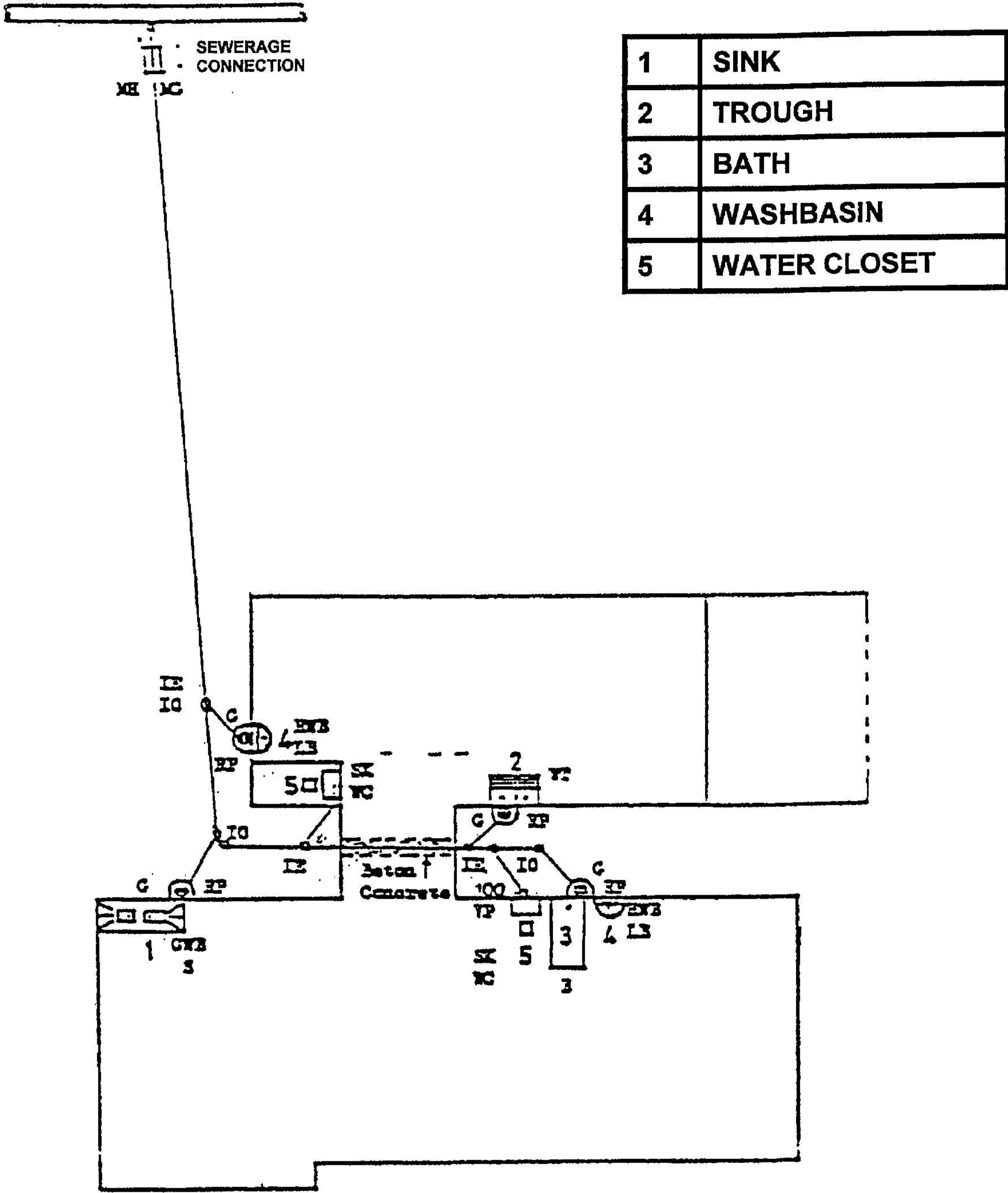
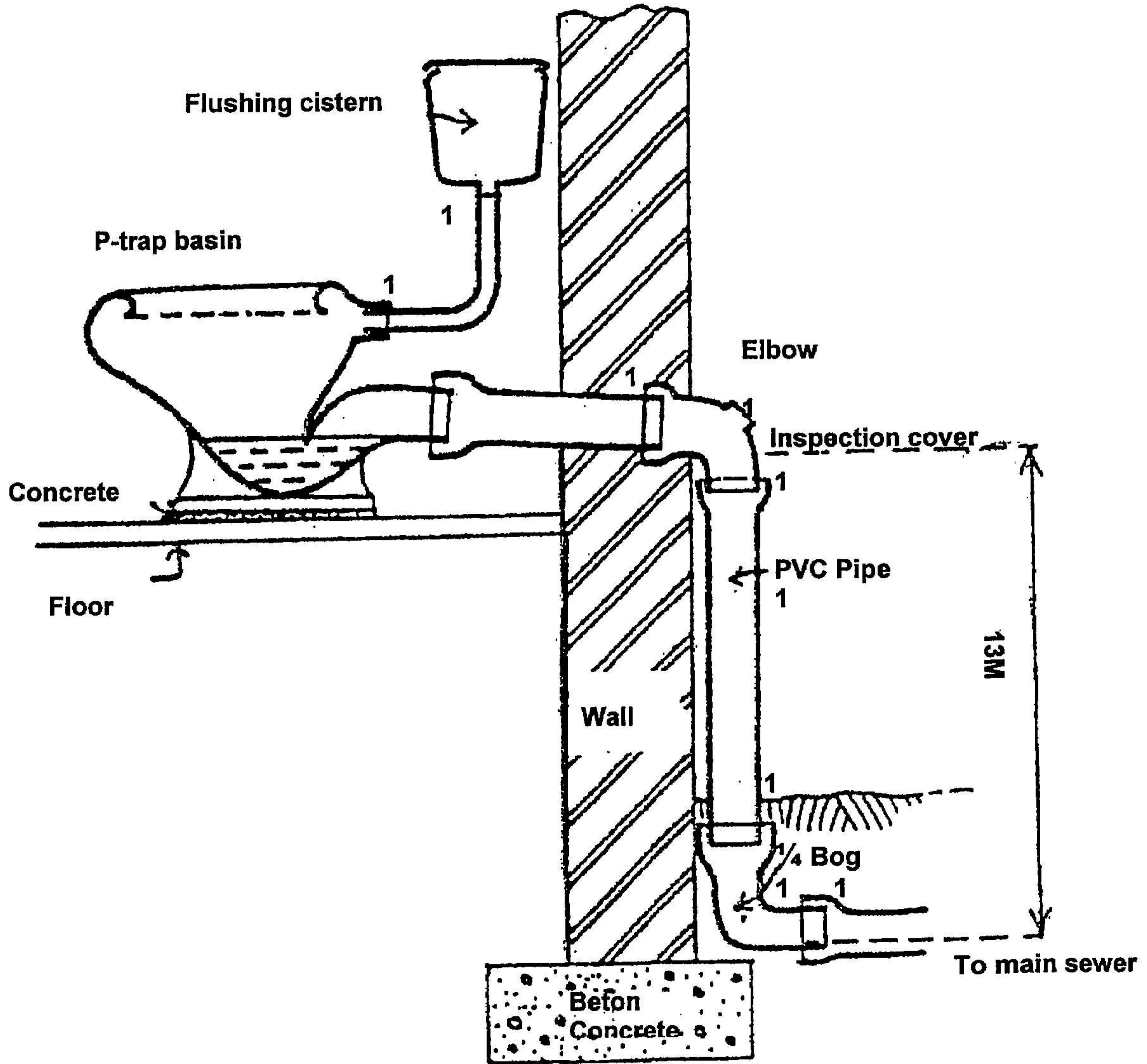


Figure 5
QUESTION 5.2.2. and 5.2.3

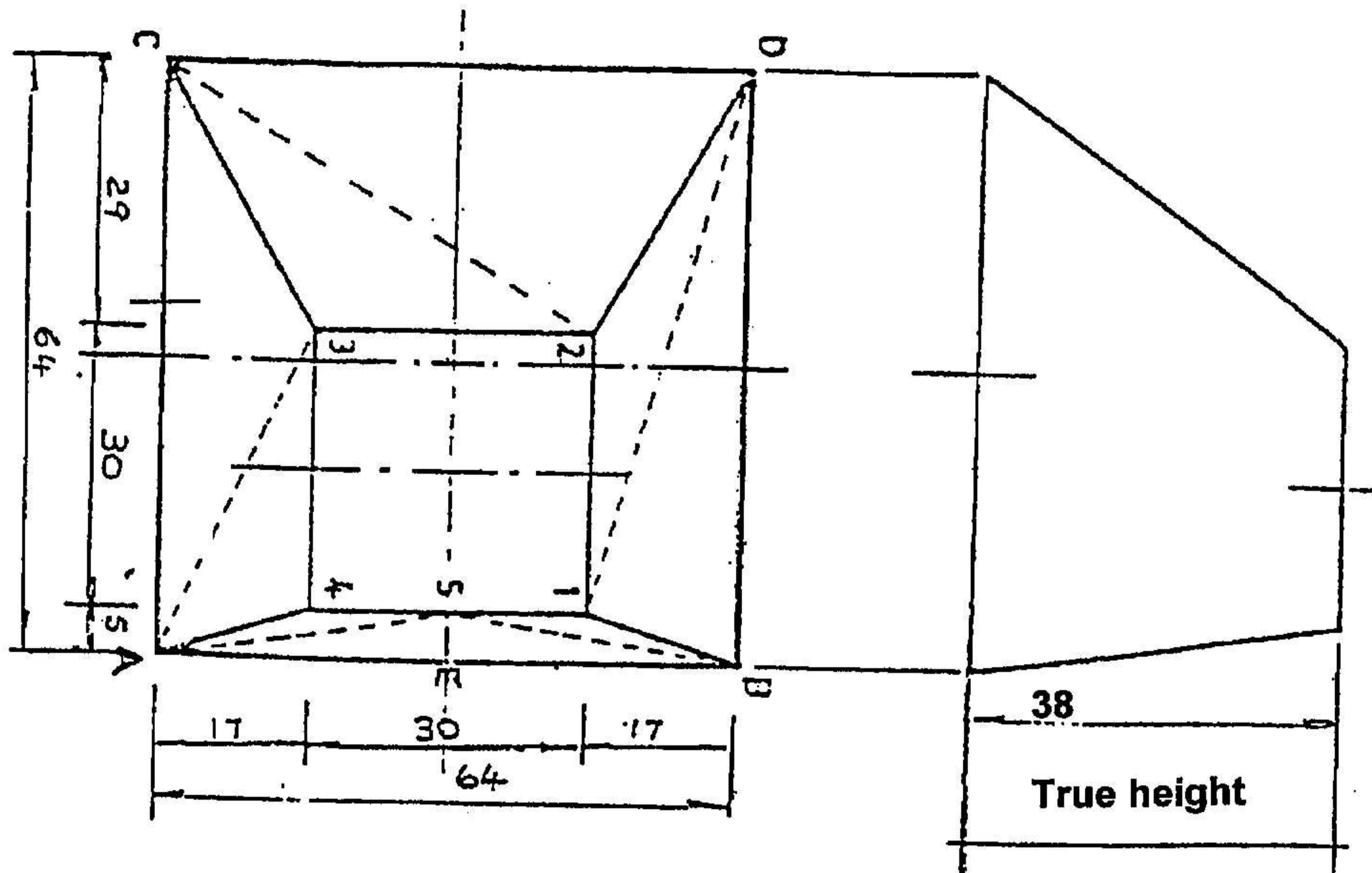
Cistern 1	
P-trap basin	1
100 mm PVC pipe	1
50 mm connecting pipe	1
PVC elbow with IE	1
PVC elbow (plane)	1/5



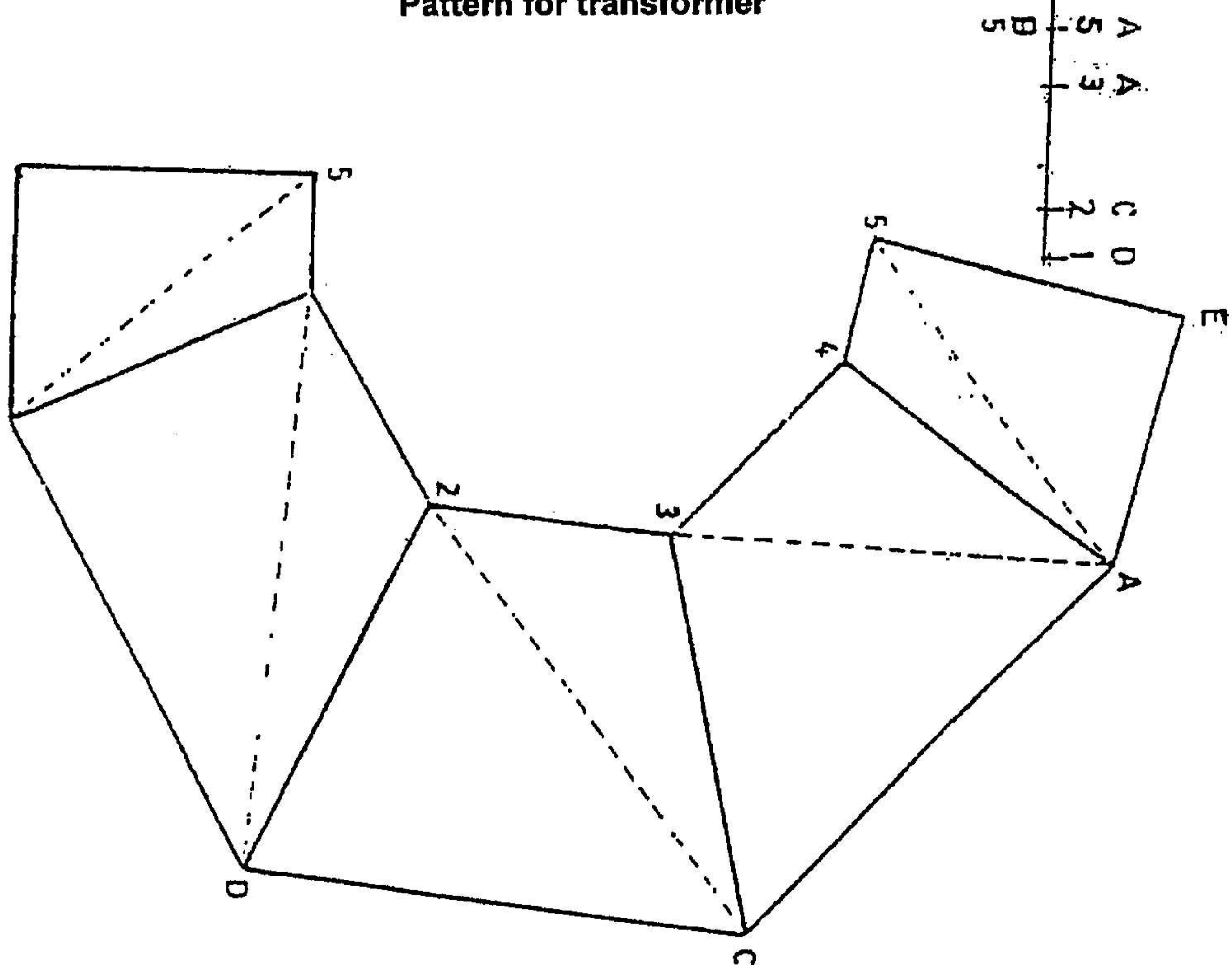
P-TYPE WATER CLOSET

QUESTION 8

- Front View - 4
- Plan - 4
- Developing - 12
- Measurement - 3
- Line work - 2
- (25)**



Pattern for transformer



SQUARE TO SQUARE

END

GAUTENGSE DEPARTEMENT VAN ONDERWYS

SENIORSERTIFIKAAT-EKSAMEN

LOODGIETERY EN
PLAATMETAALWERK SGVRAAG 1
WATERSUIWERING

- 1.1 Vyf voordele van 'n meganiese drukfilter bo 'n sandfilter
- Dit is baie kleiner en benodig minder ruimte (1)
 - Dit het 'n baie vinniger tempo van filtrering (1)
 - Dit is maklik om terug te spoel (1)
 - Dit is maklik om te versien (service) (1)
 - Dit is maklik om te installeer, die hele aanleg vertoon netjies (1)
- 1.2 Nadele van meganiese drukfilters
- Dit is nie so doeltreffend soos 'n gewone sandfilter nie. (1)
 - As gevolg van die groter aantal pompe wat benodig word, is dit duurder om in stand te hou. (1)
- 1.3 Doel van filtreerlae in die drukfilter
- Boonste laag: growwe silikagruis vir primêre filtrasie (suiwering) (2)
- Middelste laag: polariet (ysteroksied) vir oksidering en suiwering (2)
- Onderste laag: fyn silikasand vir finale filtrasie (2)
- 1.4.1 Chloor vernietig alle organiese stowwe en bakterieë wat die filtreerproses vrygespring het. (1)
- 1.4.2 Chloor word in die laaste stadium van die suiweringsproses bygevoeg (1)
- 1.5 Aliminiumsulfaat (aluin) word by die water gevoeg om die digtheid van die swewende deeltjies en bakterieë te bevorder en dit swaarder te maak, sodat dit na onder afsak (2)
- 1.6 Kyk op bladsy 6.

VRAAG 2 RIOLERING

- 2.1 Kyk op bladsy 7.
- 2.2 Invloed van Vigs op ons land se ekonomie en ontwikkeling.
- Verlies aan inkomste
 - Hoë mediese koste
 - Arbeidstekorte
 - Finansiële koste van bewusmakingsprogramme
 - Benadeel land se ontwikkeling weens tekort aan mannekrag (Enige vier) (4)

VRAAG 3 VEILIGHEIDSMATREËLS

- 3.1 Twee veiligheidsmaatreëls wanneer diep rioolslote gegrawe word
- Walle van slote moet doeltreffend gestut word.
 - Los grond en ander materiaal moet tussen 450 mm en 600 mm van slootwalle af gehou word.
 - Kinders mag glad nie op die grond wat uitgegrawe is of in die slote speel nie.
 - Versperrings moet om die slote aangebring word.
 - Tydelike oorgange oor die slote moet veilig en stewig wees (Enige 2) 2 punte elk (4)
- 3.2 Die oksiasetileensweistoestel
- Gebruik 'n doeltreffende sweisbril.
 - Maak die silinderkleppe stadig oop.
 - Moenie die vlam na 'n persoon of na die silinder toe rig nie.
 - Maak seker dat die silinders regop staan en stewig vasgemaak is.
 - Maak seker dat die pype (slange) in 'n goeie toestand is. (Enige 4) 1 punt elk (4)
- 3.3 Indien die minimum vereiste gronddiepte nie bereik kan word nie.
- Die rioolpyp moet in 'n betonomhulsel gelê word. (2)
- 3.4 Die gevolg as 'n rioolpyplyn se helling te groter as die maksimum is wat toegelaat word.
- Die water sal te vinnig vloei en van die swaarder, vaste stowwe laat agterbly. Dit kan verstopping van die riool tot gevolg hê. (2)

3.5 Sou jy 'n stapelriool met 'n staalplaat toemaak? Gee redes vir jou antwoord.

- Nee
- Gasse kan nie ontsnap nie.
- Vogtigheid in die grond kan nie verdamp nie.
- Plante wat bo-oor groei kan nie van die water absorbeer nie.
- As die plaat deurgeroes het, val die grond tussen die klippe in en verstop die riool.

(5)

3.6 Om bloed wat moontlik besmet is, te verwyder.

- Gebruik rubberhandskoene of plastieksakke om te voorkom dat jy in aanraking kom met die besmette bloed.
- Maak seker dat hierdie soort beskerming altyd byderhand is.

(2)

3.7 Veiligheidsmaatreëls om die verspreiding van Vigs in die werksplek te bekamp.

- Behandel alle bloed asof dit besmet is.
- Eerstehulpkissies wat beskermende handskoene en ander middels insluit, moet by die werksplek beskikbaar wees.
- Werknemers moet opgelei word om HIV-infeksie te voorkom as hulle 'n beseerde persoon help.

(6)
[25]

VRAAG 4

GEREEDSKAP, BEWERKINGSTEGNIEKE EN-METODES

- 4.1 A – sny van plaatmetaal
- 4.2 B – fyn en akkurate vylwerk
- 4.3 C – sny van ronde stawe
- 4.4 D – buig van plaatmetaal
- 4.5 E – om reguit lyne op metaal te kras
- 4.6 F – die kras van 'n sirkel
- 4.7 G – boorwerk
- 4.8 H – kap van materiaal
- 4.9 I – die warmmaak van die soldeerbout
- 4.10 J – soldeerwerk
- 4.11 K – meetwerk
- 4.12 L – uitmerk van 'n driehoek

(12)

- 4.2 1 – blikskêr
- 2 – vyl
- 3 – metaalskroef
- 4 – metaalsaag (ystersaag)
- 5 – hamer (hout of metal)
- 6 – kraspen
- 7 – steekpasser
- 8 – boorpunt
- 9 – koubeitel
- 10 – gasbrander

- 11 – soldeerbout
 12 – staalliniaal of maatband
 13 – winkelhaak
- (13)
[25]

VRAAG 5 SANITÊRE MEUBLEMENTE

- 5.1 Die gebruik van bladurinale
- Manstoilette (2)
 - Publieke geboue
- 5.2.1 100 mm PVC-pyp (1)
 50 mm aansluitingspyp (1)
 100 mm PVC-elmboog met inspeksie-oog (1)
 100 mm PVC-elmboog (gewone tipe) (1)
 Klamp (1)
 Rubberseël (1)
 Koppelstuk (1)
 Sement (1)
- 5.2.2 }
 5.2.3 } kyk op bladsy 8

VRAAG 6 SENTRALE VERWARMING

- 6.1 Die funksie van elk van die volgende onderdele van 'n sentrale verwarmingstelsel
- A. Die ketel: verwarm die water wat deur die stelsel sirkuleer, wat dan weer die verwarmers verwarm
 - B. Die uitsittenk: verskaf voldoende ruimte vir water om uit te sit sodra dit verwarm word
 - C. Die luglaatklep: laat stoom en warm lug ontsnap
 - D. Die versneller: versnel die beweging van die water wat deur die sisteem vloei
 - E. Terugvloei-pype: voer water wat afgekoel het, terug na die ketel om weer verwarm te word
 - F. Vloei-pyp: voer die warm water vanaf die ketel na die verwarmers
- 2 punte elk (12)
- 6.2 Voor- en nadele van die tweepypstelsel bo die eenpypstelsel:
- VOORDELE**
- 'n Hoër temperatuur word deurgaans gehandhaaf (2)
 - 'n Eenvormige temperatuur word deur verskeie verwarmers gehandhaaf (2)
- NADELE**
- Dit is duurder (materiaal en arbeid). (2)
 - Dit is 'n meer ingewikkelde pypstelsel. (2)

6.3 Wat word verstaan onder **sentrale verwarming**?

- Dit verwys na verwarming van 'n gebou deur middel van 'n ketel.
- Water word op 'n sentrale plek deur middel van 'n ketel verwarm.
- Die warm water word vanaf die ketel deur die vloerpype vervoer.
- Afgekoelde water word deur pype teruggevoer na die ketel om weer verwarm te word.
- Die verwarmers verhit die vertrek.

(5)
[25]

VRAAG 7
VENTILASIE EN SENTRALE LUGVERSORGING

7.1 Noem, in volgorde, SES belangrike stadiums in die behandeling van lug in 'n groot lugversorgingstelsel en gee 'n kort beskrywing van elke stadium.

- **SUIGWAAIER**
'n Sterk, kragaangedrewe sentrifugale waaier suig die vars lug in en stuur dit deur die stelsel wat dit deur die gebou versprei. (2)
- **BEVOGTIGING**
Die lug word deur 'n mis- of waterskerm gestuur wat die voggehalte verhoog. (2)
- **PRIMÊRE FILTERS**
Die filters bestaan uit vervangbare linneskermes en verwyder stof en ander swewende deeltjies uit die lug. (2)
- **ONTVOGTIGING**
Om die voggehalte te verlaag, word die lug deur metaalskermes gestuur. Die oortollige waterdamp kondenseer daarop. (2)
- **HOË DOELTREFFENDHEIDSFILTERS**
Bestaan uit 'n aantal vervangbare, geaktiveerde koolstof- of houtskool filters, wat baie fyn stofdeeltjies, rook en reuke en onsuiverheid verwyder. (2)
- **VERWARMING OF VERKOELING VAN LUG**
Na gelang van weerstoestand word die lug verwarm of verkoel. Die lugtemperatuur word outomaties deur termostate beheer. (2)

7.2 Die soort ventilasiestelsel wat in elk van die volgende gevalle gebruik word:

- 7.2.1 Skoolklaskamer: natuurlike ventilasie
7.2.2 Kombuis van 'n koshuis: suigwaaiers
7.2.3 'n Groot skouburg: saamgestelde lugversorgingstelsel

2 punte elk (6)

7.3 Drie hulpmiddels wat kan meehelp met die natuurlike ventilasie van 'n gebou:

- Deure
- Vensters
- Ventilators
- Lugstene
- Skoorstene
- Hortjies

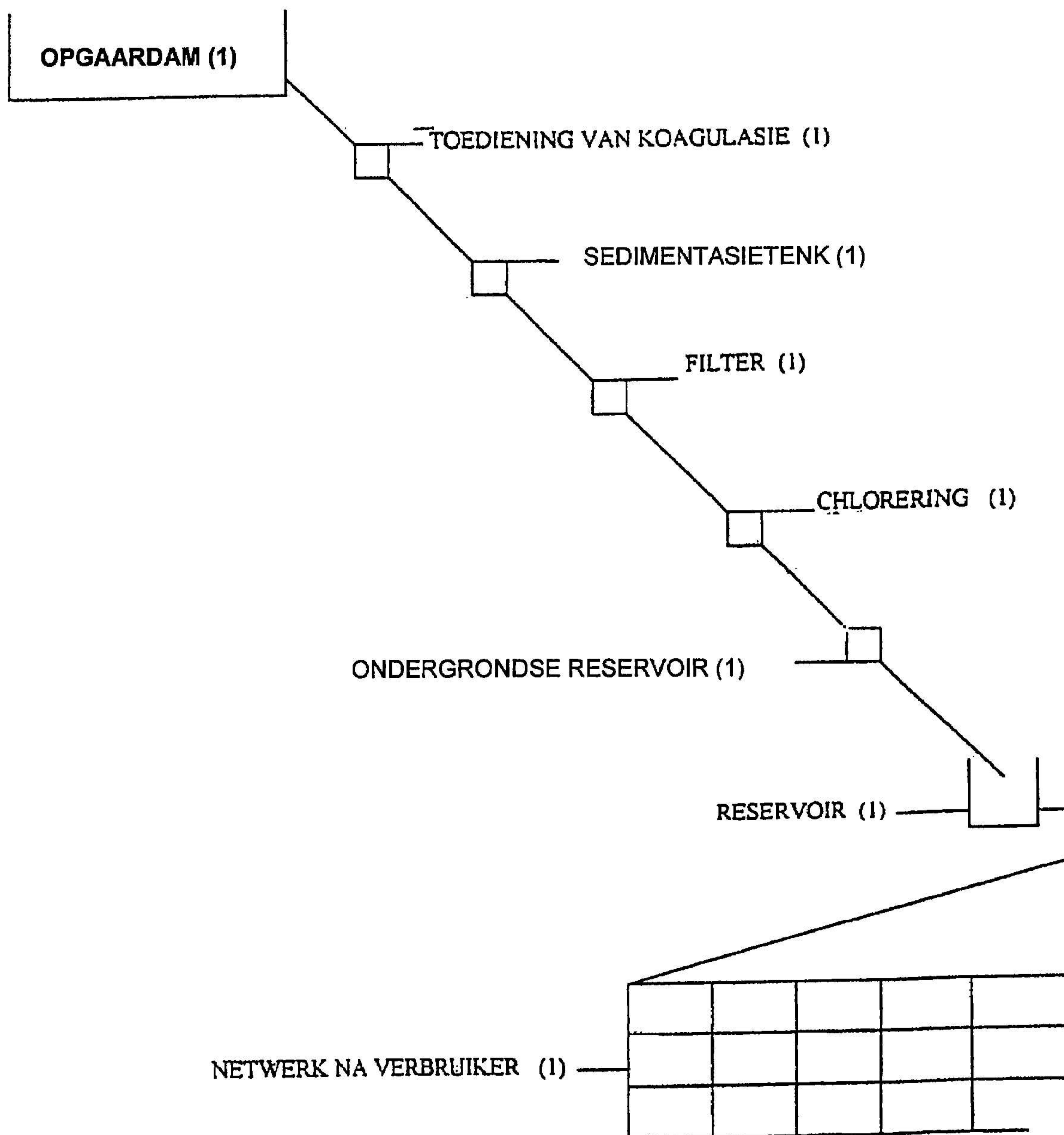
(Enige 3) 2 punte elk (6)

7.4 Die belangrikste voordeel van natuurlike ventilasie bo meganiese ventilasie:

Dit is baie goedkoop (verniet).

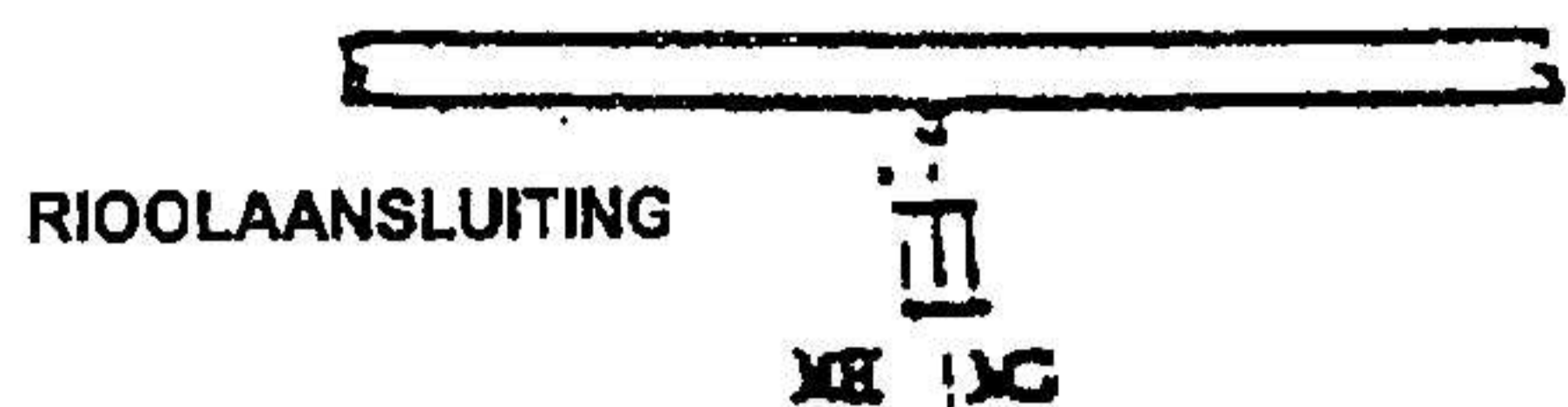
(1)
[25]

VRAAG 1.6

WATERTOEOVOER VAN DIE BRON TOT BY VERBRUIKER

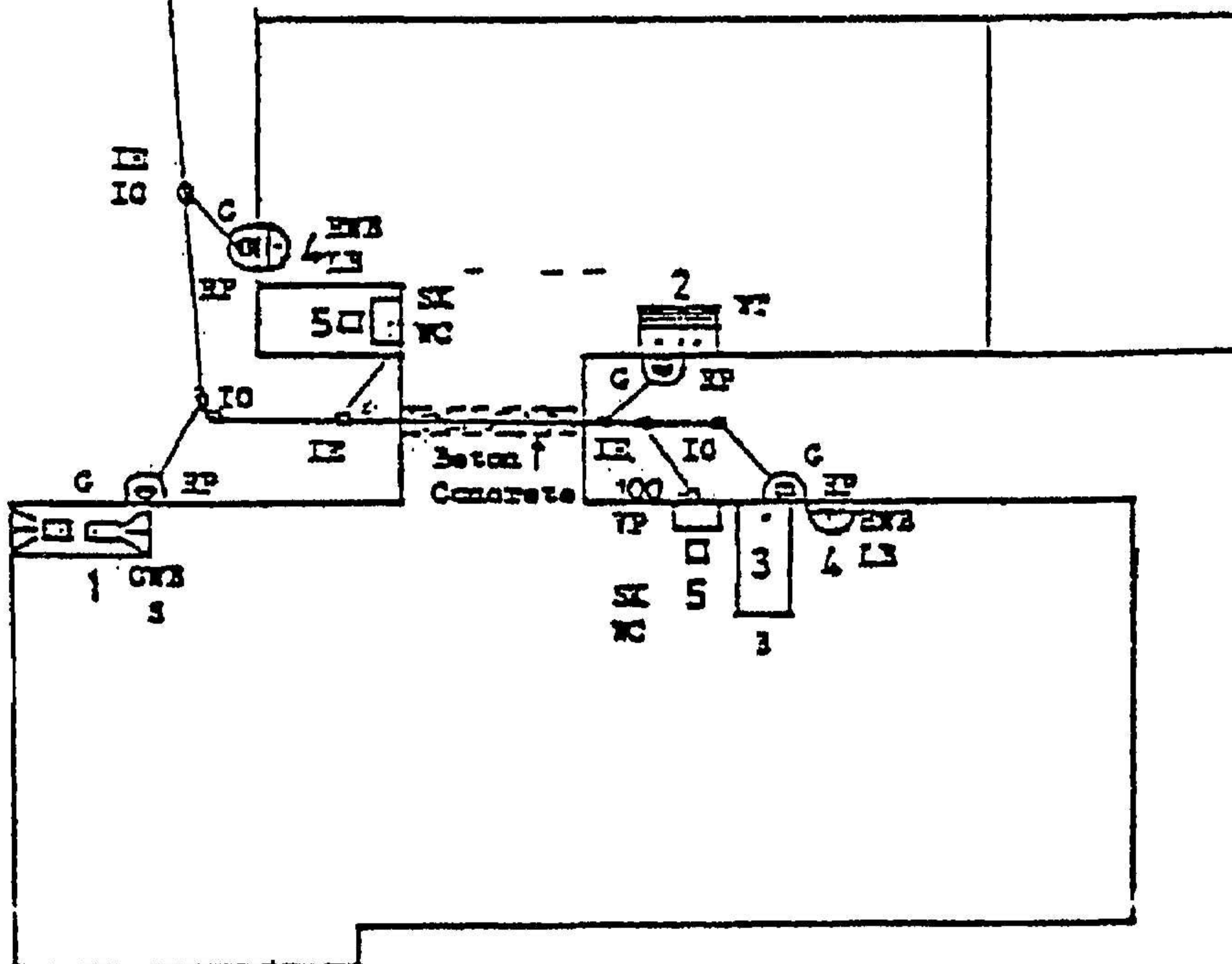
[25]

VRAAG 2.1



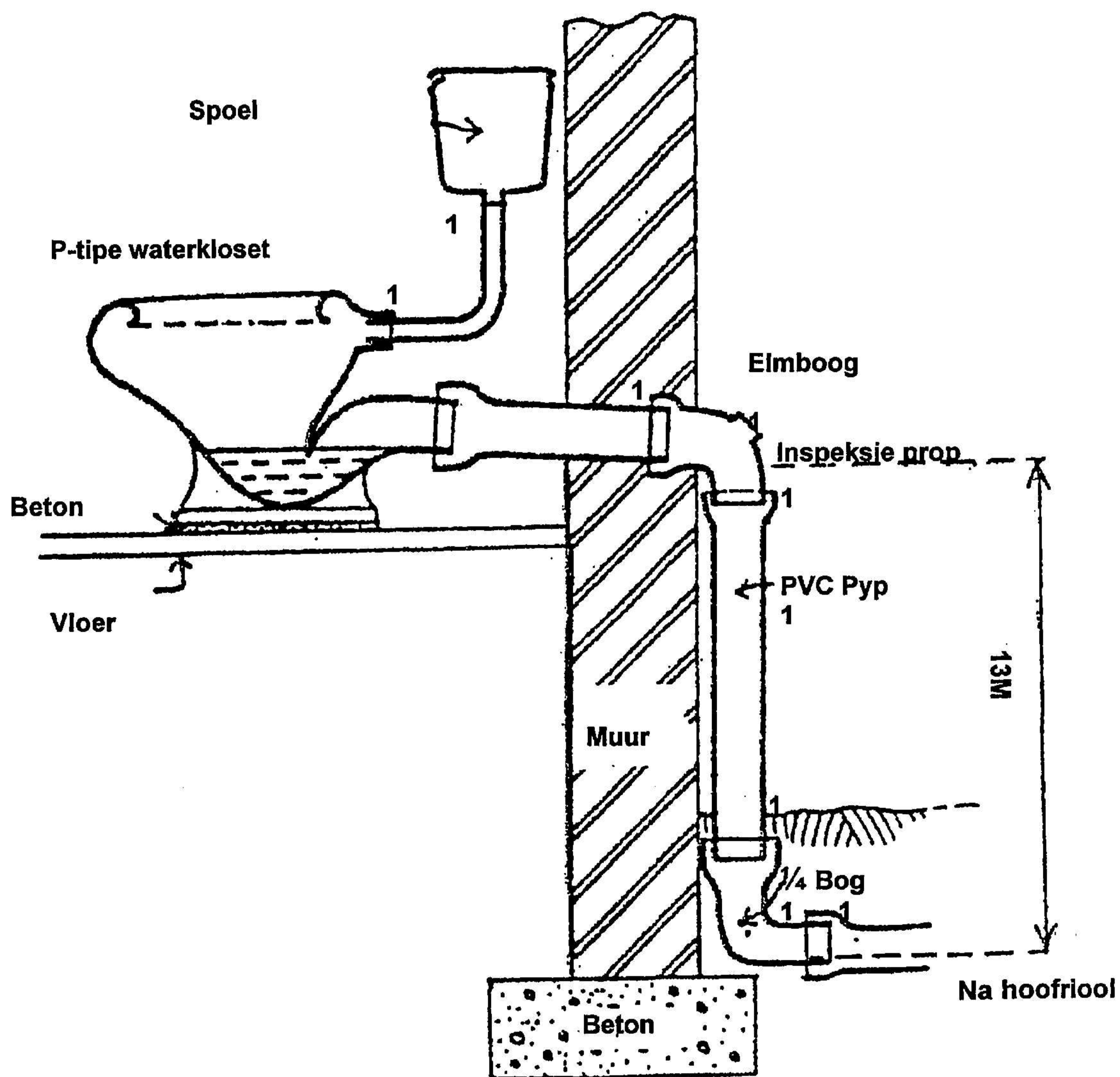
1	OPWASBAK
2	WASTROG
3	BAD
4	HANDEWASBAK
5	SPOELKLOSET

PLAN - 9
 Rioolputte - 4
 Lugpyp - 1
 Toegangspunte - 3
 Afkortings - 4
TOTAAL: 21



VRAAG 5.2.2 en 5.2.3

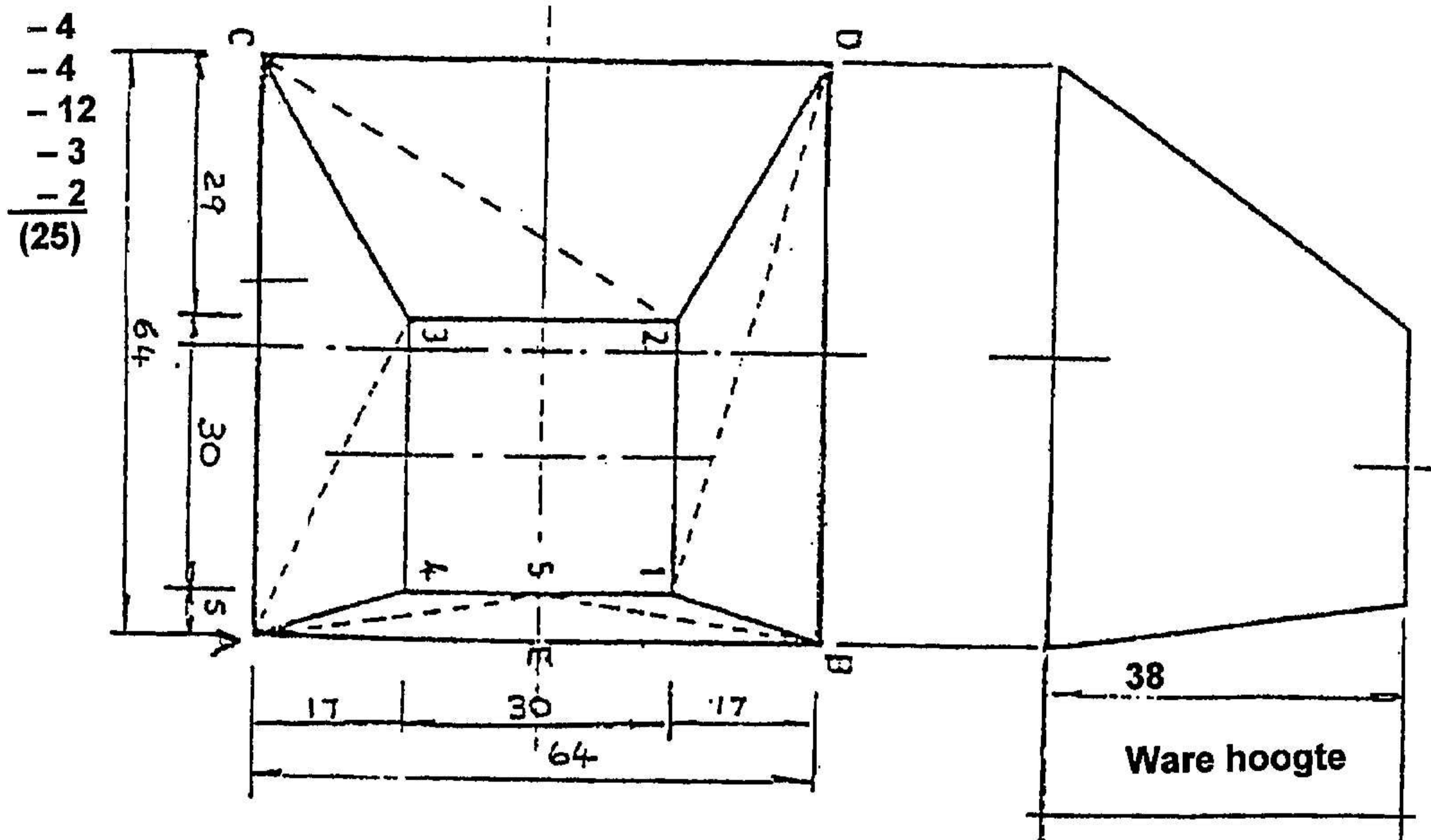
Spoelbak 1	1
P-tipe waterkloset	1
100 mm PVC pyp	1
50 mm aansluitingspyp	1
PVC elmboog met IO	1
PVC elmboog (gewone tipe)	$\frac{1}{5}$



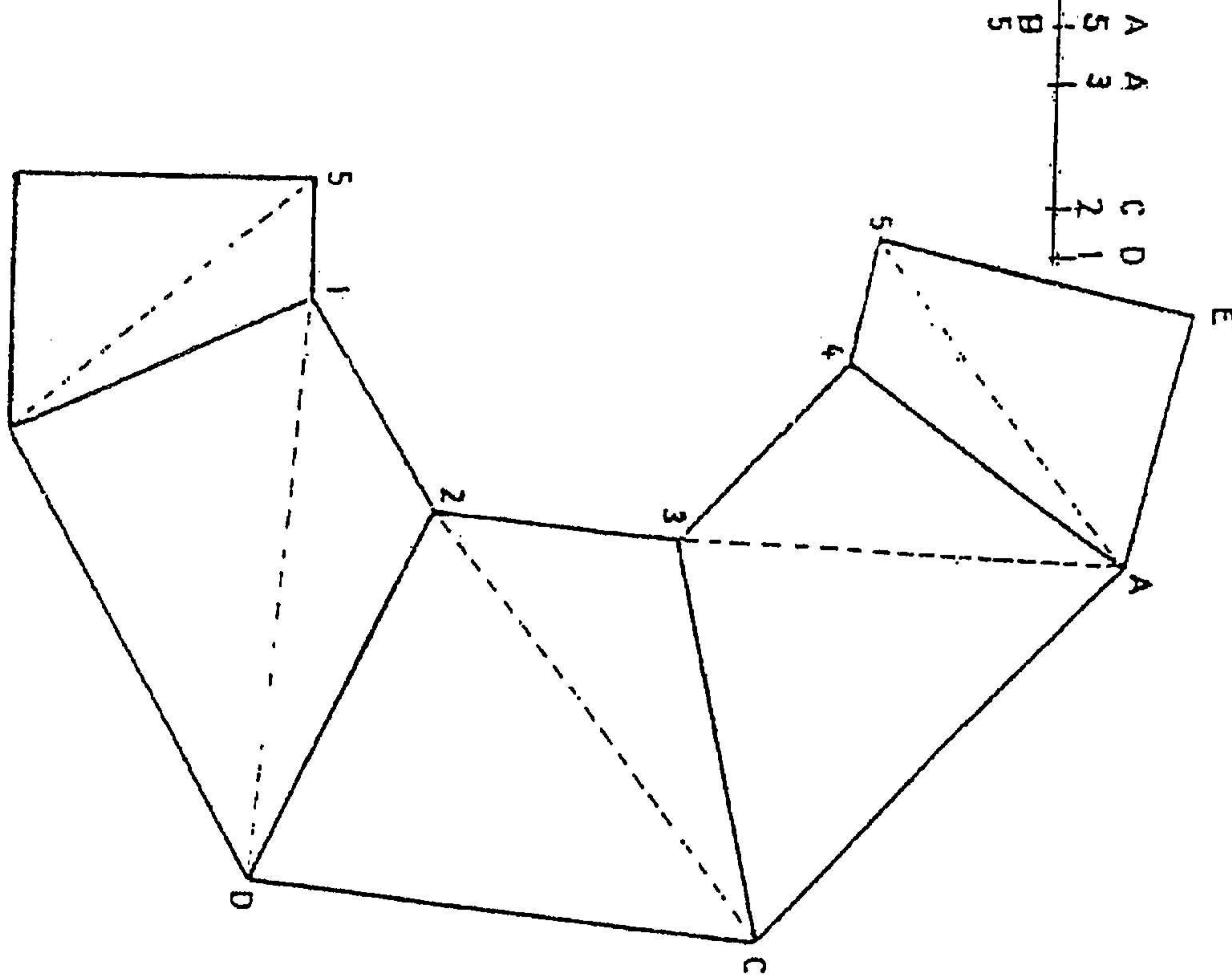
P-TIPE WATER KLOSET

VRAAG 8

Vooraansig
Plan
Ontvouting
Afmetings
Lynwerk



Ontvouting vir oorgangstuk



VIERKANT NA VIERKANT