

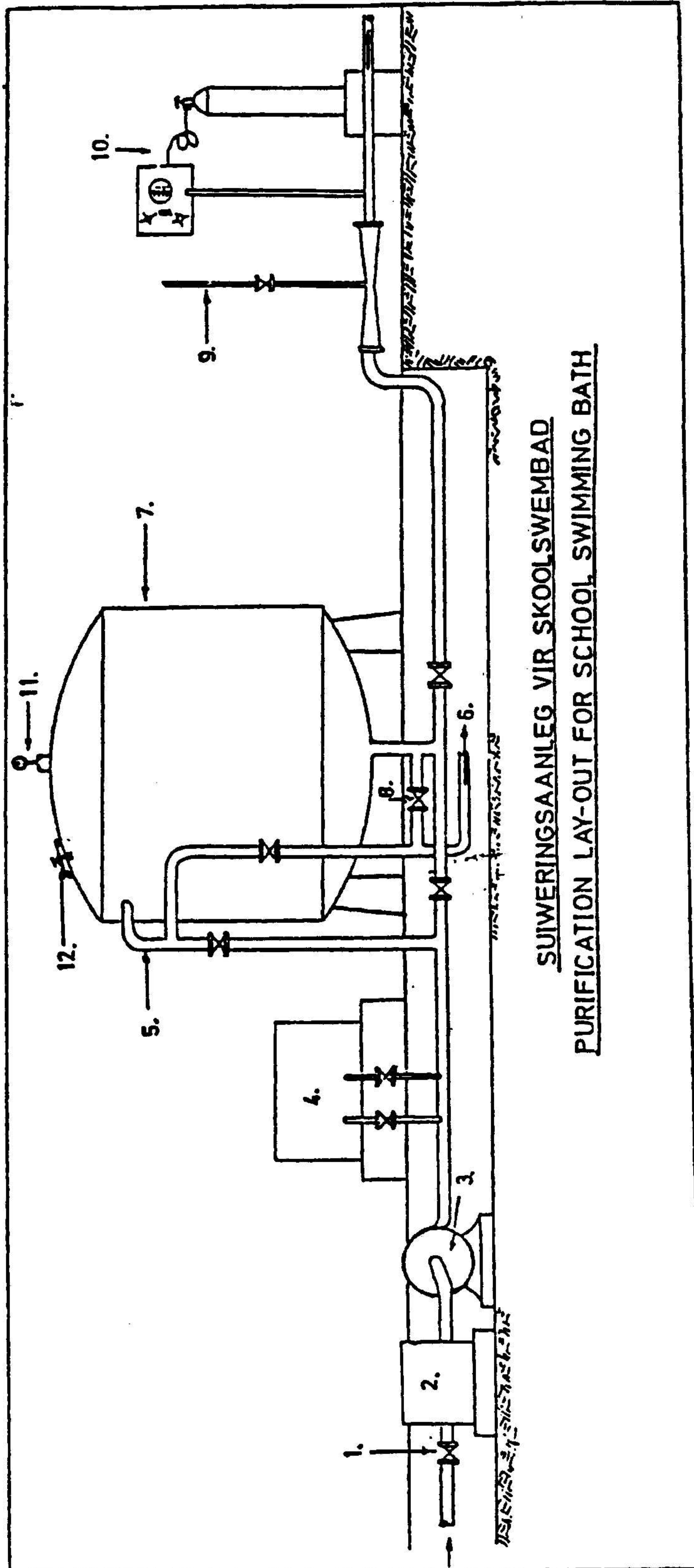
**GAUTENG DEPARTMENT OF EDUCATION
SENIOR CERTIFICATE OF EXAMINATION**

POSSIBLE ANSWERS FOR : PLUMBING AND SHEET METALWORK SG

**QUESTION 1
PUBLIC WATER PURIFICATION**

- 1.1 Labels for parts of purification assembly of a school swimming pool
1. Inlet valve
 2. Sieve
 3. Centrifugal pump
 4. Dosage tank
 5. Inlet for impure water
 6. outlet for back wash water
 7. Pressure filter
 8. Drainage valve
 9. Venturi air inlet
 10. Chlorinating apparatus
 11. Pressure gauge
 12. Inspection hole

QUESTION 1.1



SUIWERINGSANLEG VIR SKOOLSWEMBAD
PURIFICATION LAY-OUT FOR SCHOOL SWIMMING BATH

- 1.2 NAME THREE WAYS THAT YOU WOULD RECOMMEND TO SOFTEN HARD WATER
- 1.2.1 Boil the water
- 1.2.2 Use Clark's method (lime)
- 1.2.3 Add sodium carbonate
- 1.2.4 Use the permutate process
- 1.2.5 By distillation
- (Any three) (3)
- 1.3 HOW WOULD YOU ESTABLISH WHETHER IT IS NECESSARY FOR THE PRESSURE FILTER TO BE CLEANED?
- By keeping an eye on the pressure in the filter and the rate of filtration. When the pressure in the filter begins to increase and the rate of filtration decreases, it is necessary for the filter to be cleaned.
- (4)
- 1.4 HOW IS CHOLERA SPREAD?
- 1.4.1 Cholera spreads in water.
- 1.4.2 Rain washes the faeces into the river and dams.
- 1.4.3 Children swimming in the rivers or dams can get cholera.
- (3)
[25]

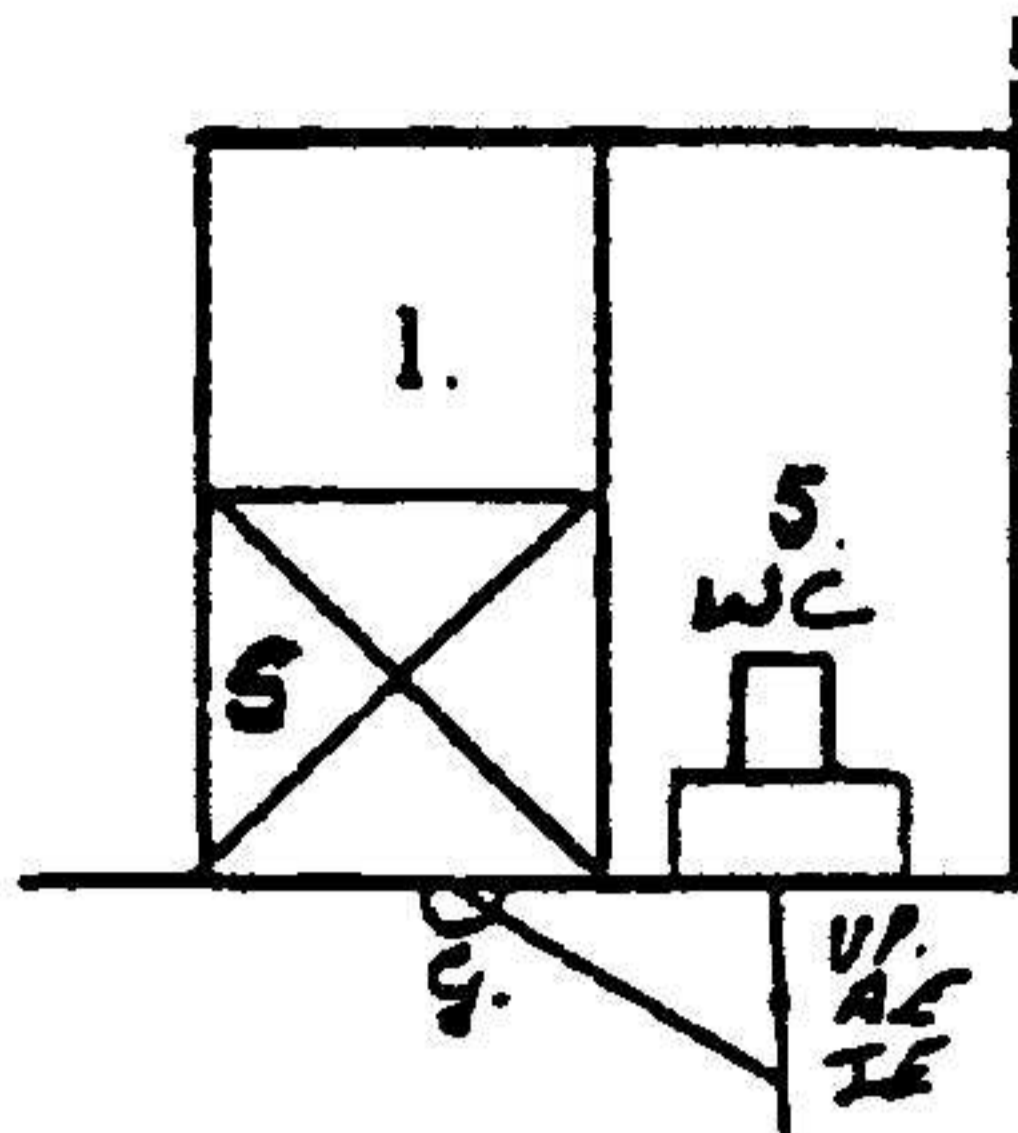
QUESTION 2 SEWERAGE

- 2.1 INDICATE THE STANDARD ABBREVIATION FOR EACH OF THE FOLLOWING:
- 2.1.1 Soil vent pipe – SVP
- 2.1.2 Gulley – G
- 2.1.3 Cast iron – CI
- 2.1.4 Inspection eye – IE
- 2.1.5 Invert depth – ID
- 2.1.6 Cleaning eye – CE
- 2.1.7 Water closet – WC
- (7)
- 2.2 NAME THE STANDARD COLOUR CODE FOR THE FOLLOWING:
- 2.2.1 New drains – brown
- 2.2.2 Existing drains – black
- 2.2.3 Soil pipes – red
- (3)

QUESTION 3 SAFETY PRECAUTIONS

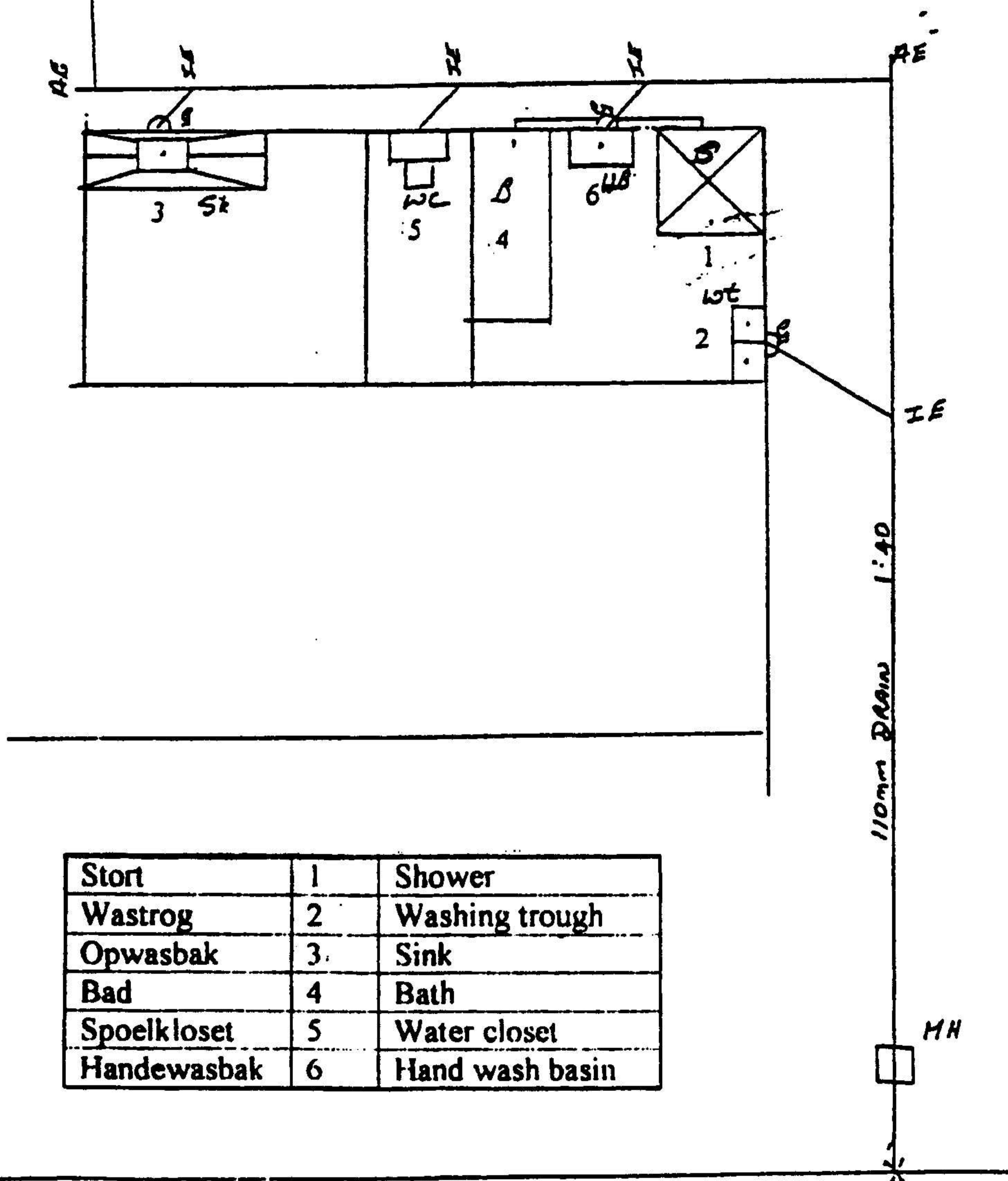
- 3.1 NAME THE SAFETY PRECAUTIONS THAT YOU WILL TAKE WHEN USING THE FOLLOWING APPARATUS:
- 3.1.1 EMERY GRINDING WHEEL
- 3.1.1.1 Use effective safety glasses (goggles)
- 3.1.1.2 No loose clothing, i.e. ties, sleeves, etc.
- 3.1.1.3 Check that the work piece is 3 mm from the wheel and right angles.
- 3.1.1.4 Small objects must be handled with a pair of pliers or a suitable clamp.
- 3.1.1.5 Heavy pieces of work should not be pushed against the wheel.
- (Any four) (4)

QUESTION 2
SECTION OF HOUSE PLAN



- Connections/ Aansluitings (4)
- Gulley (2)
- Access/ Toegang (3)
- Abbreviations/ Afkortings (2)
- Sewerage/ Riool (2)
- Fitments/ Meublemente (2)

[15]



Stort	1	Shower
Wastrog	2	Washing trough
Opwasbak	3	Sink
Bad	4	Bath
Spoelkloset	5	Water closet
Handwasbak	6	Hand wash basin

MUNICIPAL MAIN SEWAGE

3.1.2 THE OXY-ACETYLENE WELDING APPARATUS

- 3.1.2.1 Use effective welding goggles.
- 3.1.2.2 Open cylinder valves slowly.
- 3.1.2.3 Do not point open flames to any person or cylinder.
- 3.1.2.4 Place both cylinders upright and support them well.
- 3.1.2.5 Pipes must be in a good condition.

(Any four) (4)

3.2 NAME THE SAFETY PRECAUTIONS YOU WOULD PRESCRIBE TO SAFEGUARD YOUR EMPLOYEES AND MEMBERS OF THE PUBLIC DURING THE EXCAVATION OF VERY DEEP DRAIN TRENCHES.

- 3.2.1 Trench sides must be supported effectively.
- 3.2.2 Excavated soil and other material must be kept between 450 mm and 600 mm away from trenches.
- 3.2.3 Children should not be allowed to play on the excavated soil or in the trenches.
- 3.2.4 Trenches should be barricaded.
- 3.2.5 Trench crossings should be safe and secure.

(5)

3.3 NAME FOUR PRECAUTIONARY MEASURES THAT YOU WOULD TAKE WHEN A DRAIN PASSES UNDERNEATH A BUILDING.

- 3.3.1 If earthenware pipes are used under the building, they must be reinforced with concrete.
- 3.3.2 Cast-iron pipes should to be used.
- 3.3.3 The pipes may not change direction under the building.
- 3.3.4 The system may not branch out underneath the building.
- 3.3.5 Manholes should be provided where the drain enters the building and where it leaves the building.
- 3.3.6 A free zone of 50 mm should be allowed around the pipe where it penetrates the foundation.

(Any four – 2 marks each) (8)

3.4 NAME FOUR PRECAUTIONARY MEASURES THAT CAN BE TAKEN TO PREVENT THE SPREADING OF CHOLERA.

- 3.4.1 Boil the water for at least 2 minutes and allow it to cool before use.
- 3.4.2 Add one teaspoon of a bleaching agent, to 25 liters of water and allow to stand for 10 minutes, before using.
- 3.4.3 Do not drink water from a river or dam before treating the water.
- 3.4.4 Do not allow children or adults to swim or play in rivers and dams.

(4)

[25]

QUESTION 4
A BOILER-TYPE WATER HEATING SYSTEM

4.1 MATERIAL REQUIRED:

	TOTAL	MARKS
4.1.1 15 mm diameter pipe	+ 9 m	3
4.1.2 Elbows	11	5½
4.1.3 T-pieces	3	1½
		<u>10</u>

4.2 PIPE CONNECTION

	Marks
Supply pipe	2
Primary flow pipe	2
Primary return pipe	2
Draw off pipe	2
Expansion pipe	2
Connection: sink, bath, w.h.b.	2
Overflow pipe	2
Neatness	<u>1</u>
	15

[25]

QUESTION 5
INTERPRETATION OF BASIC BUILDING
DRAWINGS BY IDENTIFYING GIVEN INFORMATION

5.1.1	B	5.1.2	A
5.1.3	A	5.1.4	A
5.1.5	A	5.1.6	C
5.1.7	B	5.1.8	A
5.1.9	B	5.1.10	C
5.1.11	A	5.1.12	C
5.1.13	B	5.1.14	A
5.1.15	A	5.1.16	C
5.1.17	B	5.1.18	B

INTERPRETATION OF BASIC BUILDING DRAWINGS
IDENTIFY THE FOLOWING SYMBOLS

5.2.1	A	5.2.2	B
5.2.3	A	5.2.4	C
5.2.5	A	5.2.6	C
5.2.7	B		

[25]

QUESTION 6
CENTRAL HEATING

6.1 Name THREE principles of heating and give an example of how each is applied in a central heating system.

6.1.1 RADIATION: (1 mark)

- (i) The fire radiates heat to the metal casing of the boiler.
(ii) Heaters radiate heat to the immediate environment. (People and objects)
(Any one – 2 marks) (3)

6.1.2 CONDUCTION: (1 mark)

- (i) Heat from the fire is conducted to the water by means of the metal casing.
- (ii) Heat is conducted from the metal casing to the water.
- (iii) Heat from the heater is conducted from the metal casing to the surrounding area.

(Any one – 2 marks) (3)

6.1.3 CONVECTION: (1 mark)

- (i) The hot water in the boiler flows by means of convection currents along the pipes to the heater.
- (ii) Water that has cooled down flows by means of convection current in the return pipes to the boiler to be reheated.
- (iii) Hot air, heated by means of radiation, is distributed by means of convection currents, to heat the room.

(Any one – 2 marks) (3)

6.2 EXPLAIN WHAT IS MEANT BY CENTRAL HEATING?

6.2.1 Heating of a building by means of hot water.

6.2.2 Water is heated at a central point by means of a boiler.

6.2.3 The hot water is conveyed from the heater through the flow pipes.

6.2.4 Water that has cooled down is returned to the boiler to be re-heated.

6.2.5 The heaters (radiator) warm the rooms.

6.2.6 A booster pump accelerates the flow of the water.

One mark each (6)

6.3 ACCORDING TO WHICH TWO METHODS ARE THE PIPES OF A CENTRAL HEATING SYSTEM ARRANGED?

- (i) One pipe system
- (ii) Two pipe system

(2)

6.4 EXPLAIN THE FUNCTION OF THE FOLLOWING COMPONENTS OF A CENTRAL HEATING SYSTEM:

- (i) RETURN PIPES
Water that has cooled down is conveyed in the return pipes to the boiler to be re-heated. (2)
- (ii) BLEEDING VALVE
To release air pockets that has accumulated in the system. (2)
- (iii) BOOSTER PUMP
Speeds up the circulation of water in the system. (2)

(iv) EXPANSION TANK

- a) It allows for the expansion of water when it is heated.
- b) The outlet pipe is fixed at the top of the tank to release hot air and steam.
- c) Supply the required pressure so that the flow of water accelerates within the system. (Any one – 2 marks) (2)

QUESTION 7
VENTILATION AND CENTRAL AIR-CONDITIONING

7.1 WHAT ARE THE PRINCIPLES OF VENTILATION?

The statement that a room is well-ventilated, means:

- (i) that the air is pure and fresh.
- (ii) that the atmosphere promotes healthy living for people living in the room.
- (iii) that the people can live comfortably.

(Two marks each)

(2)

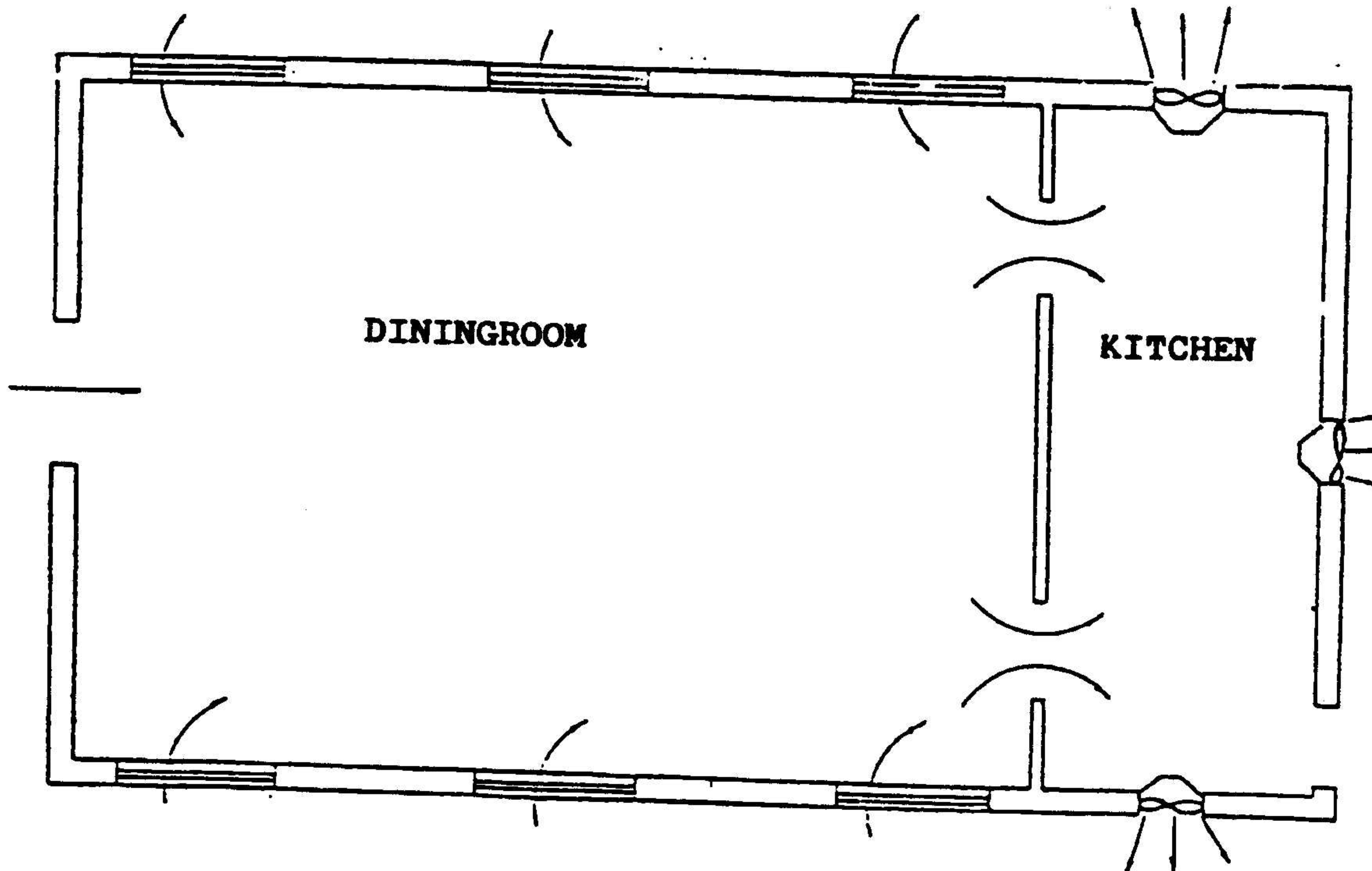
7.2 NAME TWO WAYS IN WHICH VENTILATION CAN BE BROUGHT ABOUT IN BUILDINGS.

- (i) Natural ventilation
- (ii) Mechanical ventilation

(2)

7.3 DRAW A NEAT SKETCH OF AN EXTRACTION SYSTEM FOR A KICHEN.

Design	-	5
Extraction system	-	4
Neatness	-	<u>2</u>
		11



7.4 NAME IN SEQUENCE, SIX IMPORTANT STAGES IN THE TREATMENT OF THE AIR IN A LARGE AIR-CONDITIONING SYSTEM

- (i) Extract fans
- (ii) moisture
- (iii) Primary filters
- (iv) Moisture absorbing
- (v) Highly efficient filters
- (vi) Heating of air

(One mark each) (6)
[25]

QUESTION 8 PATTERN DEVELOPMENT

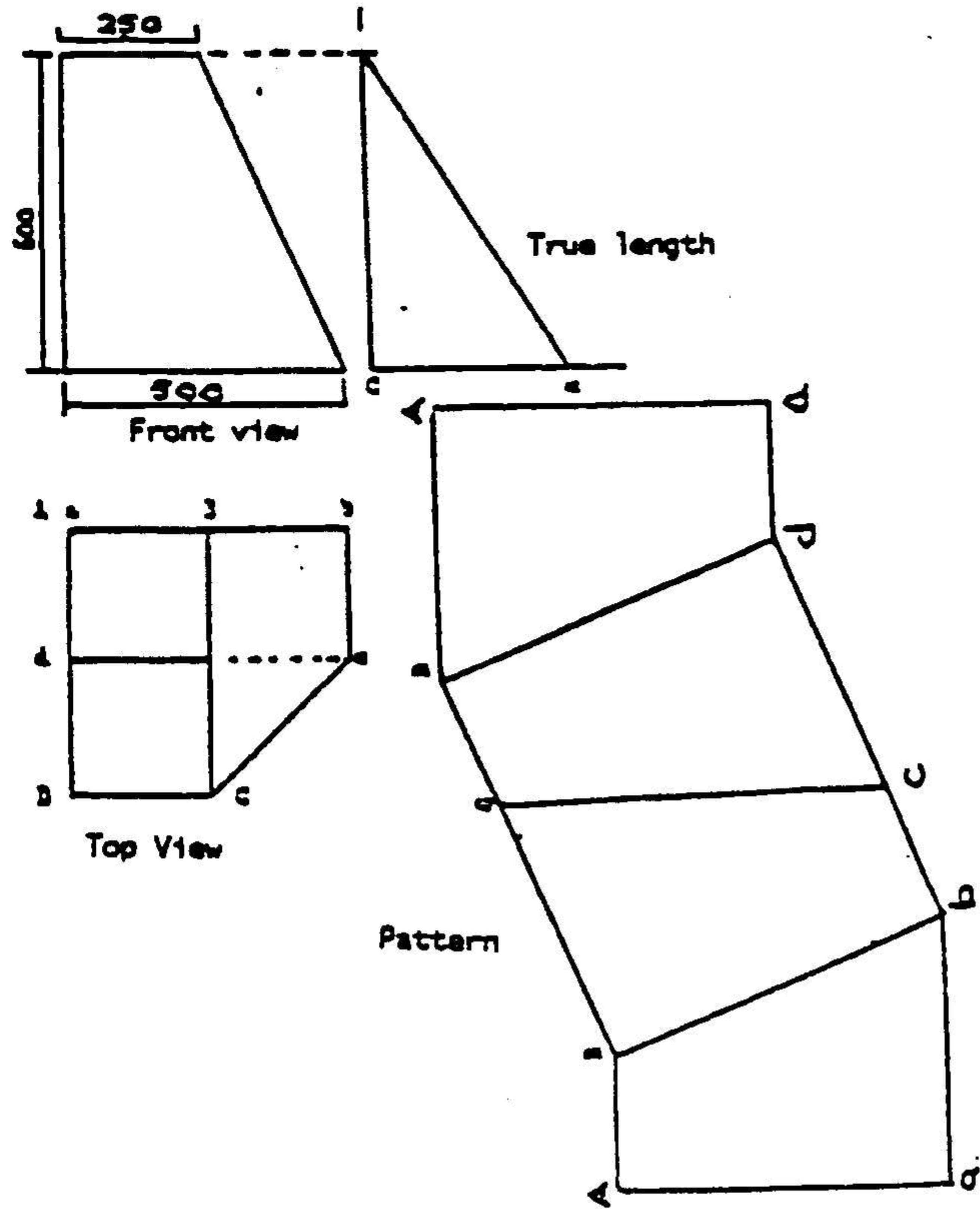
8.1 NAME THREE DEVELOPMENT METHODS WHICH COULD BE APPLIED IN PATTERN DEVELOPMENT IN SHEET METALWORK

1. Triangulated method
2. Radius method
3. Parallel line method

2 marks each (6)

8.2 DEVELOPING OF THE PATTERN FOR A 90° TWISTED RECTANGULAR CONNECTING PIECE

Front view	2
Top view	2
Scale	2
Neatness	1
Pattern	$4 \times 3 = 12$
	<u>19</u>



TOTAL: 200

GAUTENGSE DEPARTEMENT VAN ONDERWYS
SENIORSERTIFIKAAT-EKSAMEN

MOONTLIKE ANTWOORDE VIR : LOODGIETERY EN PLAATMETAALWERK SG

VRAAG 1

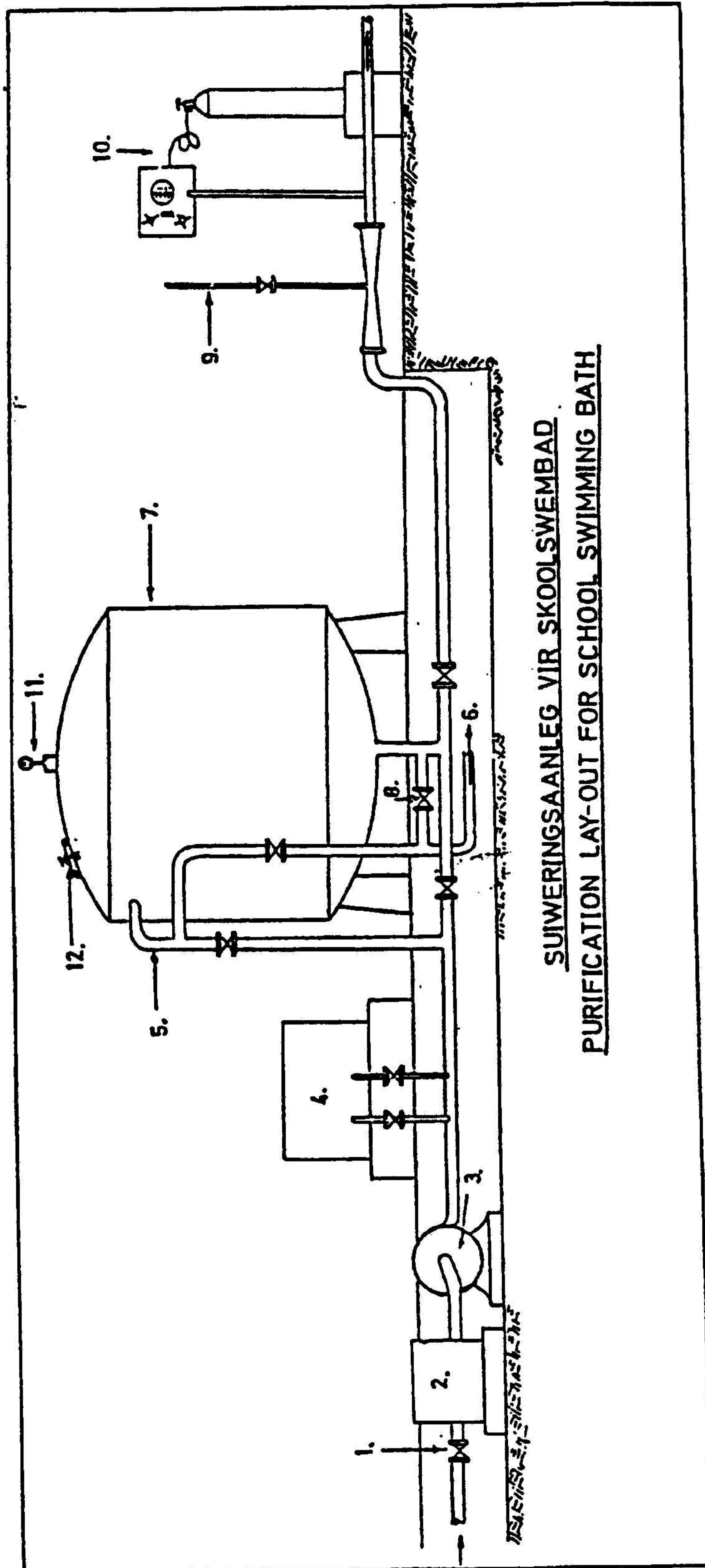
1. WATERSUIWERING

NAME VAN GENOMMERDE ONDERDELE VAN DIE SUIWERINGSAANLEG VIR 'N
SKOOL SE SWEMBAD:

1. Inlaatklep
2. Sif
3. Sentrifugale pomp
4. Doseringsstenk
5. Inlaat vir onsuier water
6. Afloop vir terugspoelwater
7. Drukfilter
8. Dreineerklep
9. Venturi-luginlaat
10. Chloreringsapparaat
11. Drukmeter
12. Inspeksiegat

(enige tien – 1½ punt elk) (15)

VRAAG 1.1



SUIWERINGSANLEG VIR SKOOLSWEMBAD
PURIFICATION LAY-OUT FOR SCHOOL SWIMMING BATH

1.2 NOEM DRIE METODEDES WAT JY SAL AANBEVEEL OM HARDE WATER SAG TE MAAK.

- 1.2.1 Kook die water
- 1.2.2 Gebruik die Clarke-metode (kalk)
- 1.2.3 Voeg wassoda (Natriumkarbonaat) by
- 1.2.4 Gebruik die permutasieproses
- 1.2.5 Deur distillering

(Enige drie) (3)

1.3 HOE SAL JY VASSTEL OF DIT NODIG IS OM DIE DRUKFILTER SKOON TE MAAK?

Deur 'n oog te hou op die druk in die filter en die filtreertempo. As die druk in die filter begin toeneem en die filtreer tempo begin afneem, is dit nodig om die filter skoon te maak

(4)

1.4 HOE WORD CHOLERA VERSPREI?

- 1.4.1 Cholera versprei in water.
- 1.4.2 Reën spoel die uitwerpsel in riviere en damme in.
- 1.4.3 Kinders wat in die riviere of damme swem kan cholera opdoen.

(3)

[25]

VRAAG 2 RIOLERING

2.1 NOEM DIE STANDAARD AFKORTINGS VIR ELK VAN DIE VOLGENDE:

- 2.1.1 Vuillugpyp – VLP
- 2.1.2 Riolput – RP
- 2.1.3 Gietyster – GY
- 2.1.4 Inspeksie oog – IO
- 2.1.5 Bodemdiepte – BD
- 2.1.6 Steekoog – SO
- 2.1.7 Spoelkloset – SK

(7)

2.2 NOEM DIE STANDAARDKLEURKODE VIR ELK VAN DIE VOLGENDE:

- 2.2.1 Nuwe – Bruin
- 2.2.2 Bestaande rirole – Swart
- 2.2.3 Vuilpype – Rooi

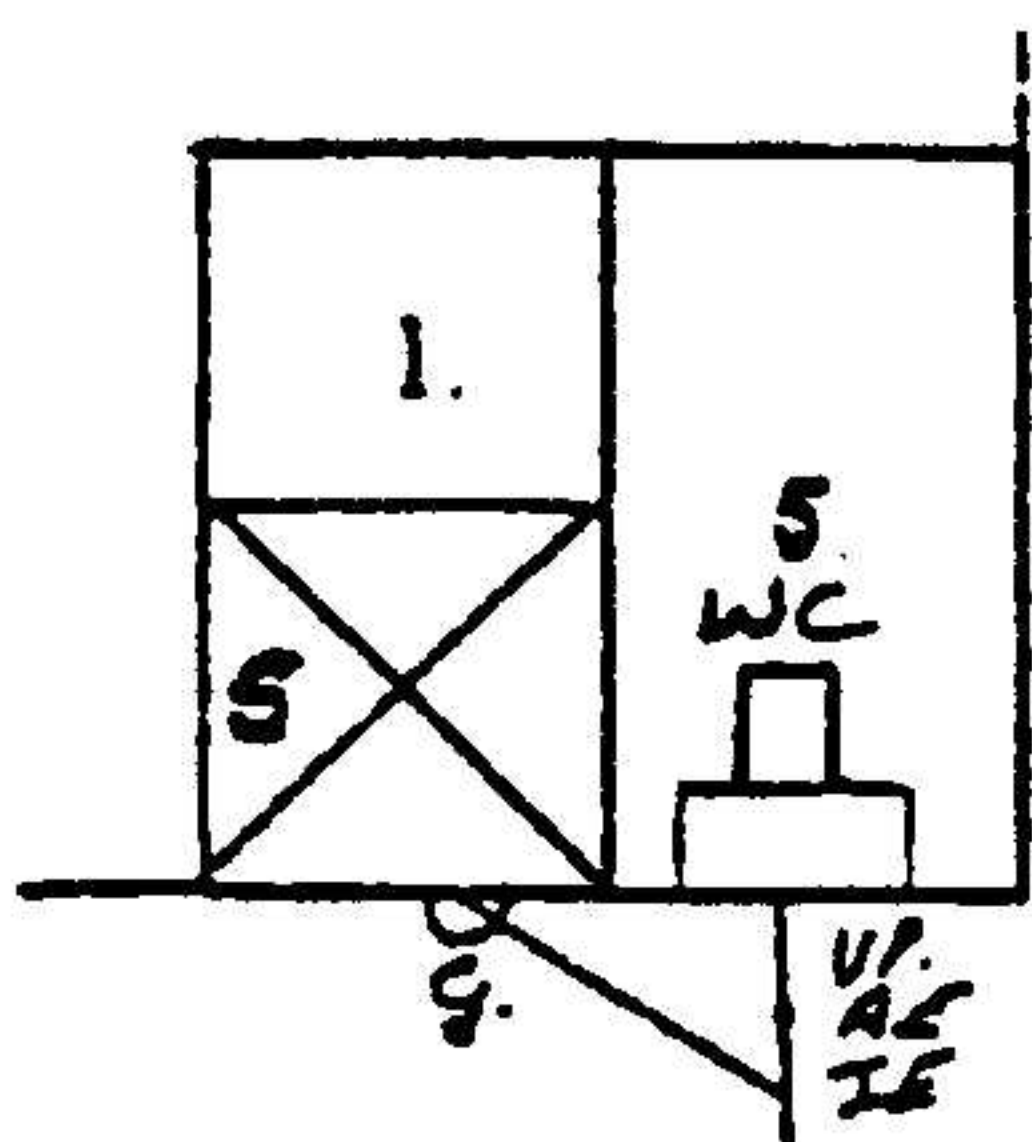
(3)

VRAAG 3 VEILIGHEIDSMATREËLS

3.1 NOEM DIE VEILIGHEIDSMATREËLS WAT JY SAL TOEPAS BY DIE GEBRUIK VAN ELK VAN DIE VOLGENDE APPARAAT:

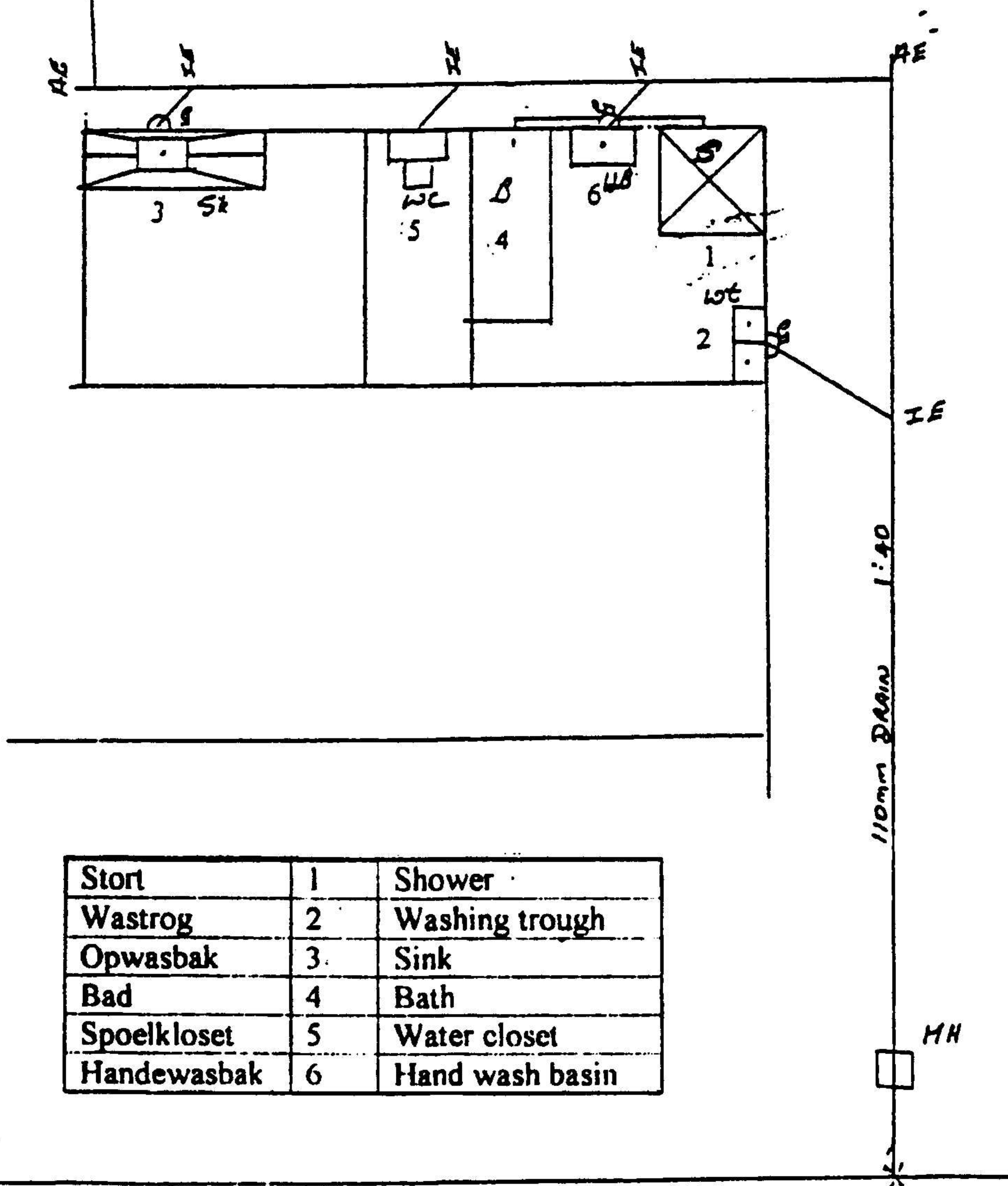
- 3.1.1 DIE AMARILSLYPWIEL
 - 3.1.1.1 Gebruik 'n doeltreffende skermbril.
 - 3.1.1.2 Geen loshangende klere, bv. dasse, moue ens.
 - 3.1.1.3 Kontroleer dat die werkstuk 3 mm van die wiel is en haaks daarmee gehou word.

**VRAAG 2
GEDEELTE VAN HUISPLAN**



- Connections/ Aansluitings (4)
- Gulley (2)
- Access/ Toegang (3)
- Abbreviations/ Afkortings (2)
- Sewerage/ Riool (2)
- Fitments/ Meublemente (2)

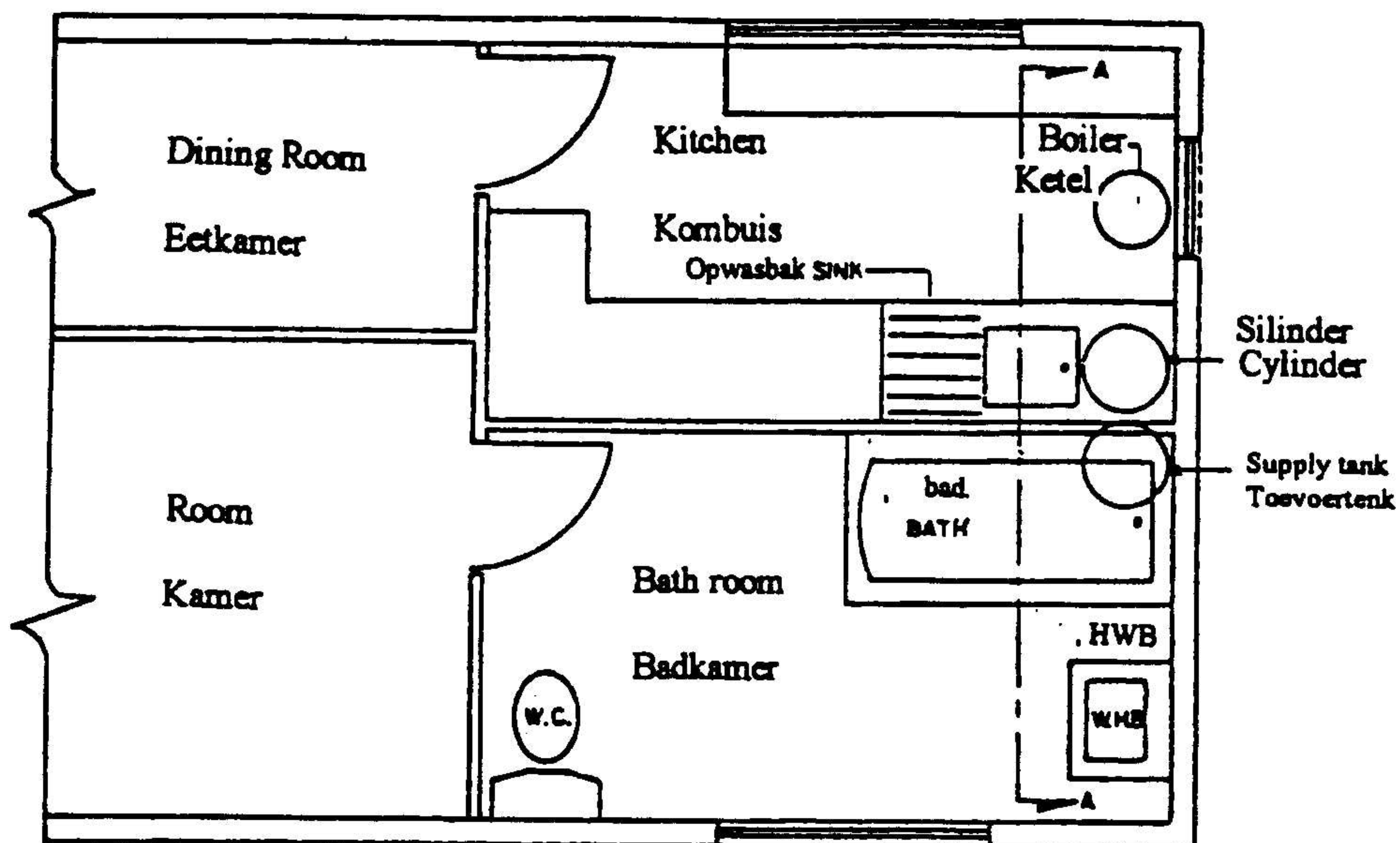
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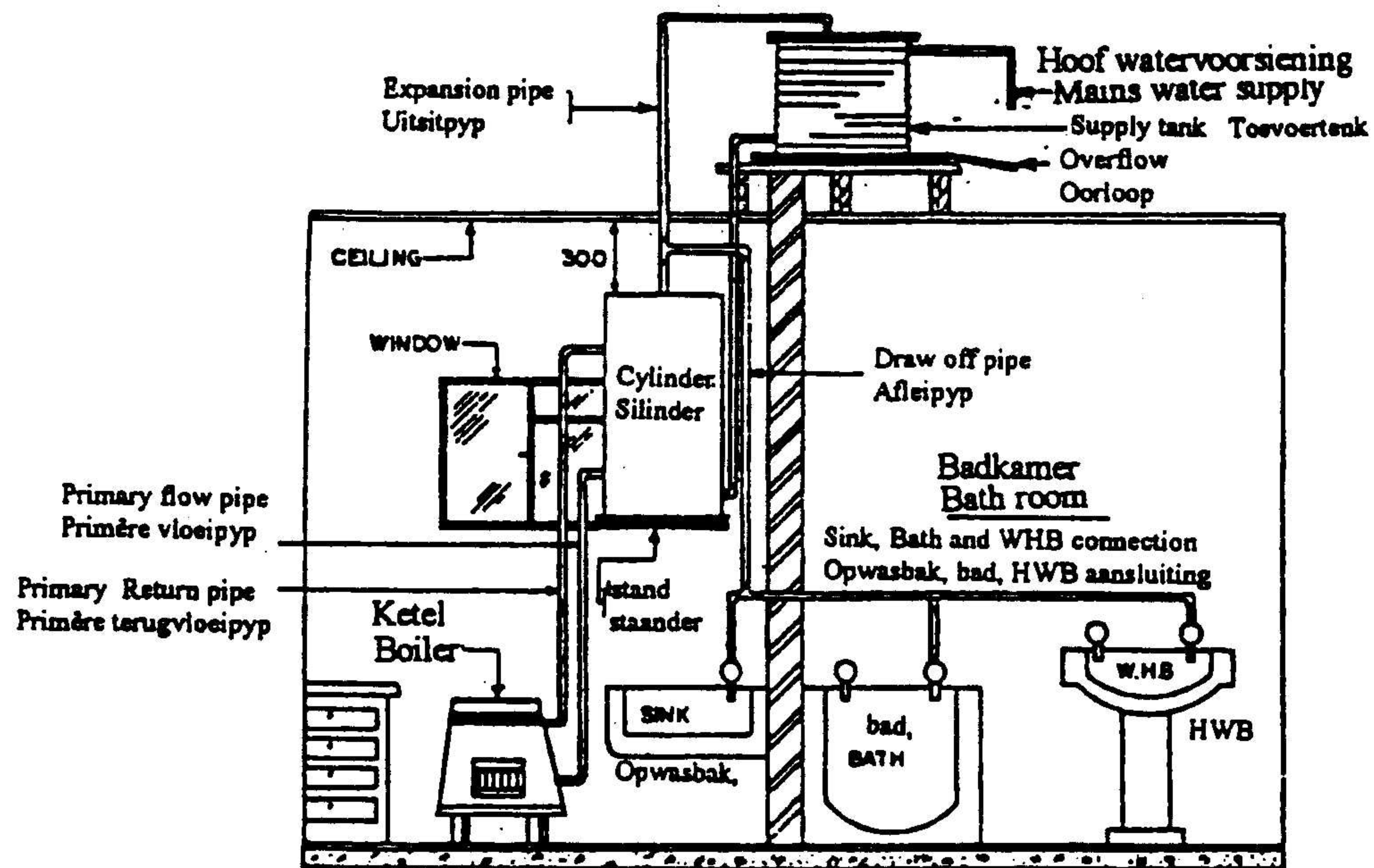
Stort	1	Shower
Wastrog	2	Washing trough
Opwasbak	3	Sink
Bad	4	Bath
Spoelkloset	5	Water closet
Handewasbak	6	Hand wash basin

MUNISIPALE HOOFRIOOLSTELSEL

FIG. 2



PLAN



Section A-A

Deursnee

- 3.1.1.4 Klein voorwerpe moet met 'n tang of 'n geskikte klamp vasgehou word.
 3.1.1.5 Swaar werkstukke moet nie teen die wiel gestamp word nie.

(Enige 4) (4)

3.1.2 DIE OKSIASETILEENSWEISTOESTEL

- 3.1.2.1 Dra 'n doeltreffende sweisbril.
 3.1.2.2 Die kleppe van die silinders moet nie vinnig oopgemaak word nie.
 3.1.2.3 Moet nie koop (of) enige vlam op persoon of silinder rig nie.
 3.1.2.4 Plaas albei silinders regop en ondersteun dit stewig.

- 3.1.2.5 Maak seker dat die pype in 'n goeie toestand is. (Enige 4) (4)
- 3.2 WATTER VEILIGHEIDSMATREËLS SAL JY VOORSKRYF OM WERKNEMERS EN LEDE VAN DIE PUBLIEK TE BESKERM, WANNEER DIEP RIOOLSLOTE GEGRAWE MOET WORD?
- 3.2.1 Kante moet doeltreffend gestut wees.
- 3.2.2 Los grond en ander materiaal moet tussen 450 mm en 600 mm van sloot se kante af gehou word.
- 3.2.3 Kinders mag onder geen omstandighede op die grond wat uitgedrawe – of in die rioolslote speel nie.
- 3.2.4 Versperrings moet om die slote aangebring word.
- 3.2.5 Tydelike oorgang oor die sloot moet stewig en veilig wees. (5)
- 3.3 NOEM VIER VOORSORGMAATREËLS WAT JY SAL TREF WANNEER 'N RIOOL ONDER 'N GEBOU DEURLOOP.
- 3.3.1 Indien erdepype gebruik word, moet die gedeelte onder die gebou met beton bekis of versterk word.
- 3.3.2 Gietysterpype moet verkieslik gebruik word.
- 3.3.3 Die pype mag nie onder die gebou van rigting verander nie.
- 3.3.4 Die stelsel mag nie onder die gebou vertak nie.
- 3.3.5 Mangate moet voorsien word waar die riool onder die gebou ingaan en waar dit weer uitkom.
- 3.3.6 Daar moet 'n vryruimte van minstens 50 mm om die rioolpyp gelaat word waar dit die fondasie binnedring. (Enige 4 – 2 punte elk) (8)
- 3.4 NOEM VIER VOORSORGMAATREËLS WAT GETREF KAN WORD OM DIE VERSPREIDING VAN CHOLERA TE VOORKOM.
- 3.4.1 Kook die water ten minste 2 minute en laat dit afkoel voordat dit gebruik word.
- 3.4.2 Voeg een teelepels bleikmiddel by 25 liter water en laat dit vir 10 minute staan voor dit gebruik word.
- 3.4.3 Moenie water uit 'n rivier of 'n dam drink sonder om die water te behandel nie.
- 3.4.4 Moenie toelaat dat kinders of volwassenes in riviere of damme swem nie. (4) [25]

VRAAG 4
'N KETELTIPE WATERVOORSIENINGSTELSEL

4.1 Materiaal benodig:

TOTAAL

4.1.1	15 mm omtrek waterpyp	ongeveer 9 meter pype	3
4.1.2	Elmboë	11	5½
4.1.3	T-stuk	3	1½
			<u>10</u>

Toevoerpyp	2
Primêre vloeiyp	2
Primêre terugvloeiyp	2
Afvoerpyp	2
Uitsitpyp	2
Pypaansluiting by sink, bad, h.w.b.	2
Oorvloeiyp	2
Netheid	<u>1</u>
	15

[25]

VRAAG 5
INTERPRETASIE VAN BASIESE BOUTEKENE DEUR GEGEWE INLIGTING TE IDENTIFISEER

5.1.1	B	5.1.2	A
5.1.3	A	5.1.4	A
5.1.5	A	5.1.6	C
5.1.7	B	5.1.8	A
5.1.9	B	5.1.10	C
5.1.11	A	5.1.12	C
5.1.13	B	5.1.14	A
5.1.15	A	5.1.16	C
5.1.17	B	5.1.18	B

IDENTIFISERING VAN GEGEWE BOUTEKENE INLIGTING

5.2.1	A	5.2.2	B
5.2.3	A	5.2.4	C
5.2.5	A	5.2.6	C
5.2.7	B		

[25]

VRAAG 6
SENTRALE VERWARMING

6.1 Noem drie beginsels van verwarming en gee 'n voorbeeld van hoe elkeen in 'n sentrale verwarmingstelsel toegepas word.

6.1.1 STRALING: (1 Punt)

- (i) Die vuur straal hitte uit na die wand van die ketel.
- (ii) Verwarmers straal hitte uit na die onmiddellike omgewing. (persone en voorwerpe)

(Enige een– 2 punte) (3)

6.1.2 GELEIDING: (1 Punt)

- (i) Hitte van die vuur word deur die metaalwand na die water gelei.
- (ii) Hitte word vanaf metaal na die water gelei.
- (iii) Hitte word van die warmwater deur die metaal van die warmer na die lug, wat daarmee in aanraking, kom gelei.

(Enige een – 2 punte) (3)

6.1.3 KONVEKSIE: (1 punt)

- (i) Water wat in die ketel verwarm word, vloei deur middel van konveksiestrome met die vloeiptype langs na die verwarmers.
 - (ii) Die water wat afgekoel het, vloei deur middel van konveksiestrome deur die terugvloeiptype terug na die ketel om meer verwarm te word.
 - (iii) Die lug wat deur geleiding verwarm word, versprei deur middel van konveksiestrome en verwarm die hele vertrek.
- (Enige een – 2 punte) (3)

6.2 VERDUIDELIK WAT MET SENTRALE VERWARMING BEDOEL WORD?

- 6.2.1 Verwarming van 'n gebou deur middel van warm water.
 - 6.2.2 Water word op 'n sentrale punt deur 'n ketel verwarm.
 - 6.2.3 Die warm water word met vloeiptype vanaf die verwarmers vervoer.
 - 6.2.4 Afgekoelde water word met terugvloeiptype na die ketel terug vervoer om weer verwarm te word.
 - 6.2.5 Die verwarmers verhit die vertrekke.
 - 6.2.6 'n Aanjaagpomp laat die warm water vinniger pomp.
- 1 Punt elk (6)

6.3 VOLGENS WATTER TWEE METODEDES WORD DIE PYPE IN 'N SENTRALE VERWARMINGSTELSEL GERANGSKIK?

- (i) Eenpypstelsel
 - (ii) Tweepypstelsel
- (2)

6.4 VERDUIDELIK DIE FUNKSIE VAN ELK VAN DIE VOLGENDE ONDERDELE VAN 'N SENTRALE VERWARMINGSTELSEL:

- (i) TERUGVLOEIPTYPE
om water wat vanaf die verwarmers gevloei en afgekoel het, terug te voer om weer verwarm te word. (2)
- (ii) LUGLAATKLEP
om lug wat in die verwarmers versamel en lugleegtes vorm deur die klep vry te laat. (2)
- (iii) AANJAAGPOMP
laat die water vinniger deur die stelsel sirkuleer. (2)

(iv) UITSITTENK

- a) Verskaf ruimte vir die water om uit te sit as dit verwarm word.
- b) Die uitlaatpyp is bo aan die tenk gekoppel en laat warm lug en stoom ontsnap.
- c) Verskaf die nodige drukking sodat die water vinniger deur die stelsel kan beweeg. (Enige een – 2 punte) (2)

VRAAG 7
VENTILASIE EN SENTRALE LUGVERSORGING

7.1 WAT IS DIE BEGINSELS VAN VENTILASIE?

Die stelling dat 'n vertrek goed geventileer is, beteken

- (i) dat die lug vars en skoon is.
- (ii) dat die atmosfeer bevorderlik is vir die gesondheid van die inwoners van die vertrek.
- (iii) dat die inwoners gerieflik daarin kan woon.

(Twee punte elk) (2)

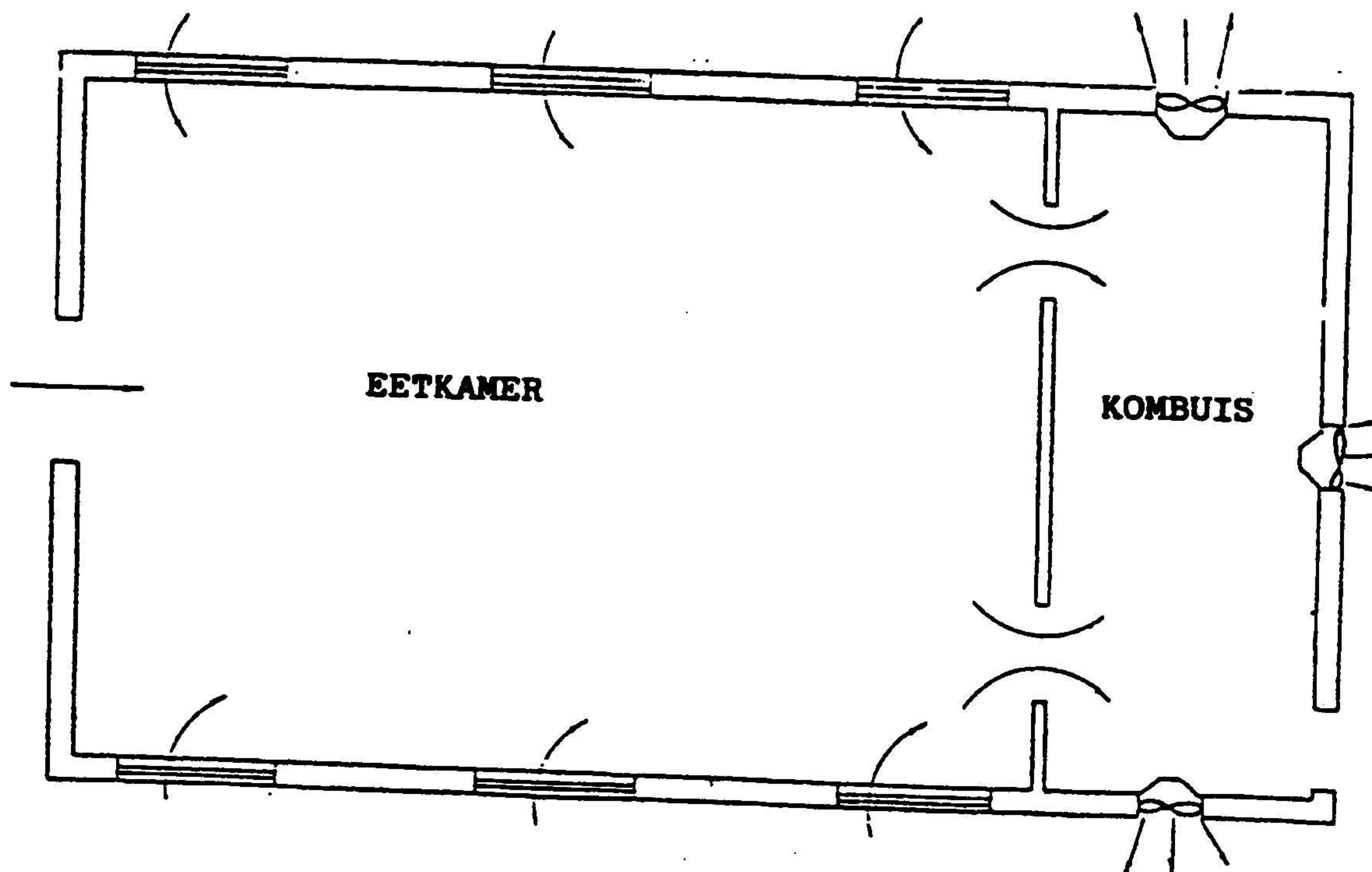
7.2 NOEM TWEE MANIER WAAROP VENTILASIE VIR GEBOU BEWERKSTELLIG KAN WORD.

- (i) Natuurlike ventilasie
- (ii) Meganiese ventilasie

(2)

7.3

Skets (ontwerp)	-	5
Uitsuigestelsel	-	4
Netheid	-	<u>2</u>
		11



7.4 NOEM, IN VOLGORDE, SES BELANGRIKE STADIUMS, IN DIE BEHANDELING VAN LUG IN 'N GROOT LUGVERSORGINGSTELSEL.

- (i) Suigwaaier
- (ii) Bevogting
- (iii) Primêre filters
- (iv) Ontvogting
- (v) Hoë doeltreffendheidsfilters
- (vi) Verwarming of verkoeling

(Een punt elk) (6) [25]

**VRAAG 8
PATROONONTWIKKELING**

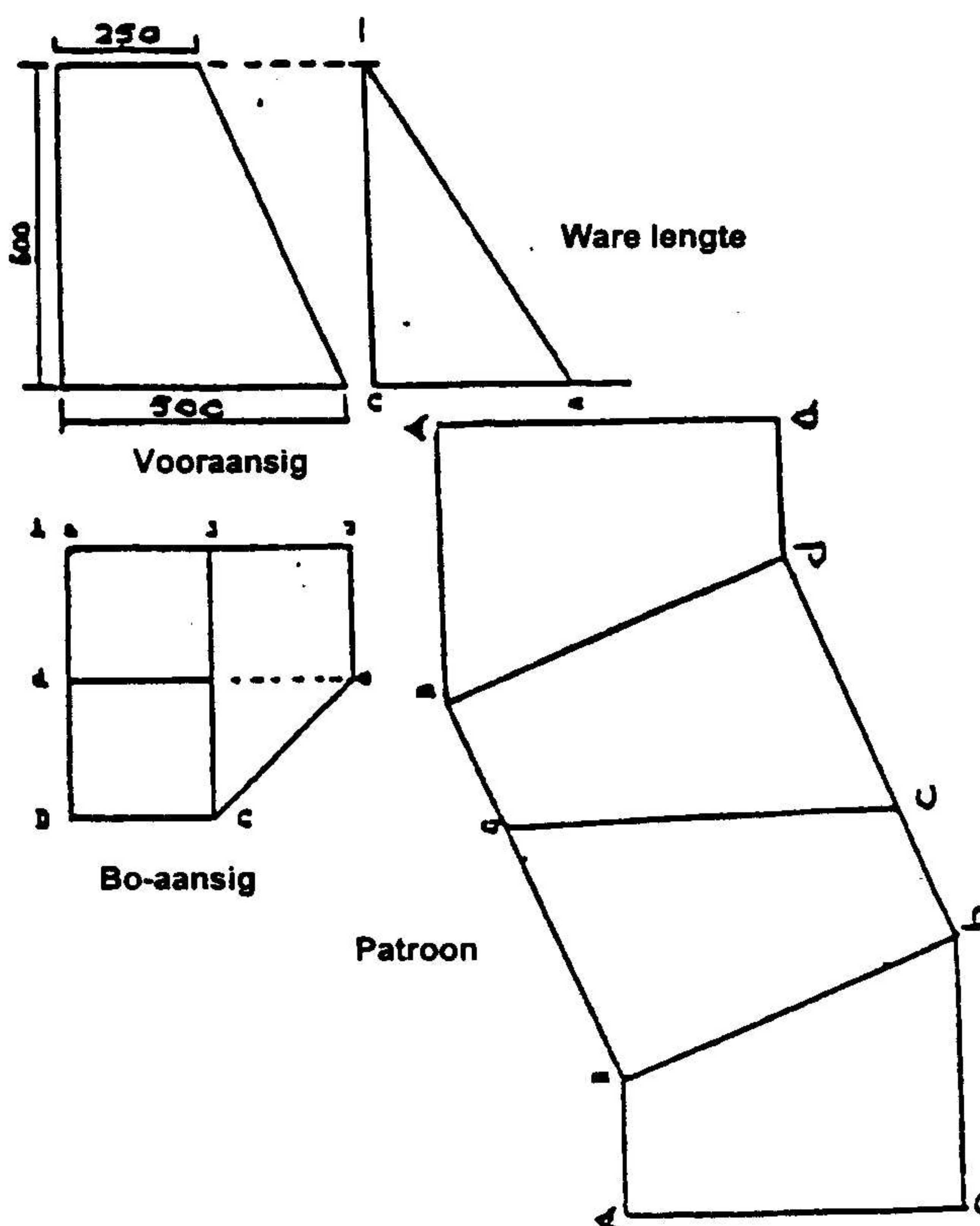
8.1 NOEM DRIE ONTWIKKELINGSMETODES WAT MET PATROON-ONTWIKKELING IN PLAATMETAALWERK TOEGEPAS WORD:

- 1. Triagulasiemetode
- 2. Straallynmetode
- 3. Parallelynmetode

(2 punte elk) (6)

8.2 DIE ONTWIKKELING VAN DIE PATROON VIR 'N REGHOEKIGE VERBINDINGSTUK WAT DEUR 90° GEDRAAI IS:

Vooraansig	2
Bo-aansig	2
Skaal	2
Netheid	1
Patroon	<u>4 X 3 = 12</u>
	<u>19</u>



TOTAAL: 200