higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

PLUMBING THEORY N2

6 AUGUST 2019

This marking guideline consists of 9 pages.

Copyright reserved

QUESTION 1: COLD-WATER SUPPLY

1.1
- Provide water to the consumers
- Ensure adequate reserve of a 2 to 3-day supply of water in case of interruption of supply from the treatment plant/control reservoir
- Provide the required pressure head to the water mains
- Conveniently placed to regulate and control the water supply and the quality thereof (3)

1.2
- Disease-producing organisms of enteric (intestinal) origin
- Toxic substances most frequently derived from industrial waste but it can also come from the careless use of insecticides
- Biocides and even lead from lead pipes and lead containers
- Algae, which release a characteristic taste and odours
- Disinfecting chlorine, which may produce an objectionable taste unless chlorination is well-managed
- Iron and manganese are taken into solution in the calcium, magnesium and lead
- Organic water that produces odours and taste such as the odour of hydrogen sulphide upon decomposition (Any 3 × 1) (3)

1.3 1.3.1 Coagulation: Addition of special chemicals✓ (coagulants) to the impure water.✓ (2)

1.3.2 Sedimentation: A stage where coagulants react with the colloidal matter✓ and cause it to bond to one another and form heavier, larger flocks that settle to the bottom of the septic tanks as a sludge.✓ (2)

1.3.3 Filtration: A water purification stage that allows the untreated water to pass through layers of material while being treated chemically to remove bacteria✓ and microscopic suspended matter from the water. ✓ (2)

1.3.4 Chlorination: During this process, harmful disease-carrying micro-organisms and pathogenic bacteria are destroyed.✓ This disinfecting and sterilisation process is archived by injecting chlorine into the water at high pressure.✓ (2)

1.4 1.4.1 CAUSES OF WATER HAMMER

- Failure to fit supply pipes properly to ceiling joists or to other fixtures that support the pipes
- Connecting primary flow pipes and primary return pipes the wrong way round
- Closing taps or valves too quickly, which produces a vibration through the pipe if the pipe is not fitted properly
- Lime deposits in the pipe system that restrict the flow of water, especially in gravity-type or combination-type hot-water systems
- Faulty washers, especially in high-pressure installations

(Any 3 × 1) (3)

1.4.2 REMEDIES OF WATER HAMMER

- Close all taps slowly and gently.
- Fit an air-release valve at the top of the water-supply system.
- Install a water hammer arrestor.
- Don't use long pipe runs to the rafters or the walls using plastic pipe clips as support. (Any 3 × 1) (3)

[20]

QUESTION 2: HOT-WATER SUPPLY

2.1

- To reduce the incoming main pressure to a pre-set pressure rating
- and to maintain this pressure when the system is not in use
- and to control this pressure when the system is not in use. (3)

2.2 2.2.1 200 kPa = black label (1)

2.2.2 400 kPa = red label (1)

2.3

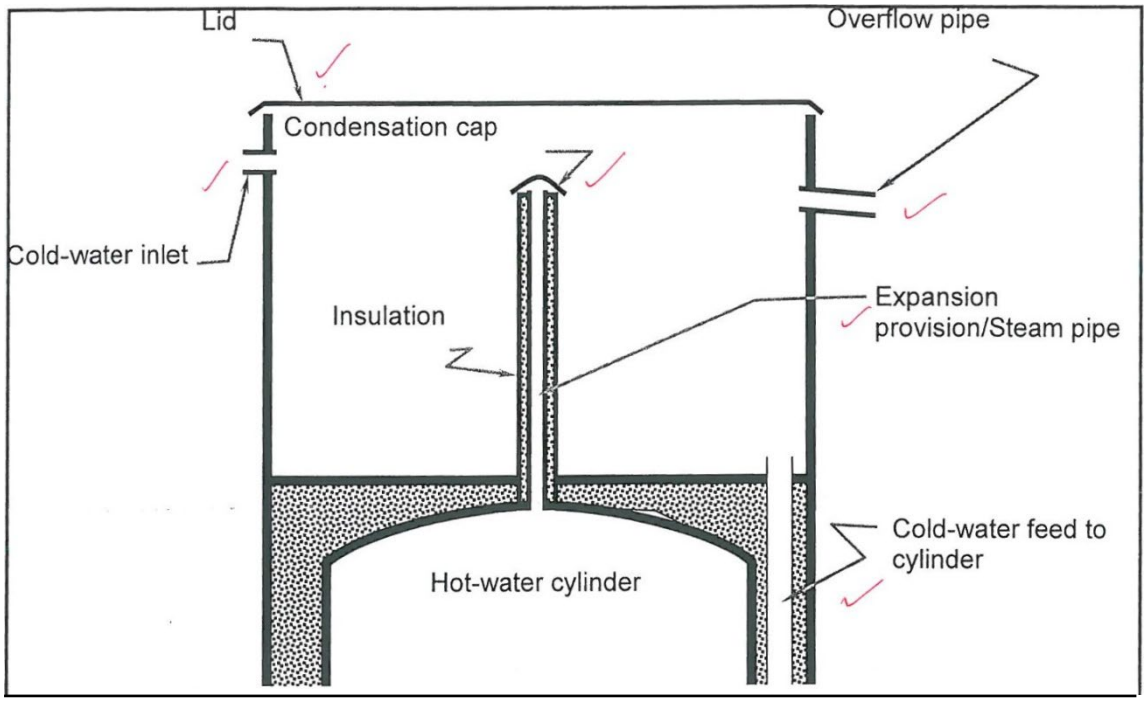
- It can be installed on the floor level as it does not depend on gravity for pressure.
- Horizontal and vertical versions are available.
- A modern mixer valve can be used with the geyser as the pressure is high enough (400–600 kPa).
- Both hot-water and cold-water supply is required to have a balanced water pressure. (Any 3 × 1) (3)

2.4

- Where a constant supply of water is demanded (hospitals, clinics, ablution facilities at hostels, factories, etc.
- When a current geyser needs to be upgraded in terms of volume (capacity) the volume could be augmented by interconnecting it with another geyser.
- When different heat sources are being considered as alternative supplies (electric + solar + solid fuel + etc.) (Any 2 × 1) (2)

Copyright reserved

2.5

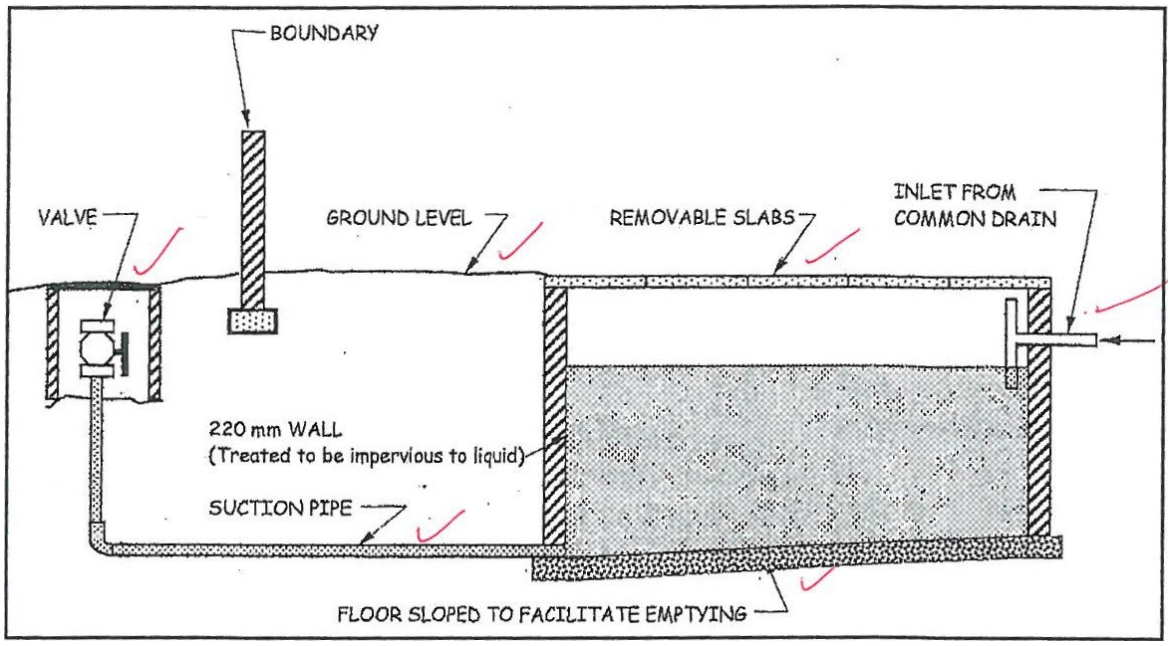


(Labelling) (8)
(Correctness) (2)
[20]

QUESTION 3: DRAINAGE

3.1 Drainage installation is an installation which is vested in the owner of the site✓ and is intended for the reception, conveyance storage or treatment of sewage✓ and may include sanitary fixtures, traps, discharge pipes, drains, ventilation pipes, septic tanks, sewage-treatment works or mechanical appliances associated therewith.✓ (3)

3.2



(Labelling) (6)
(Correct layout) (4)

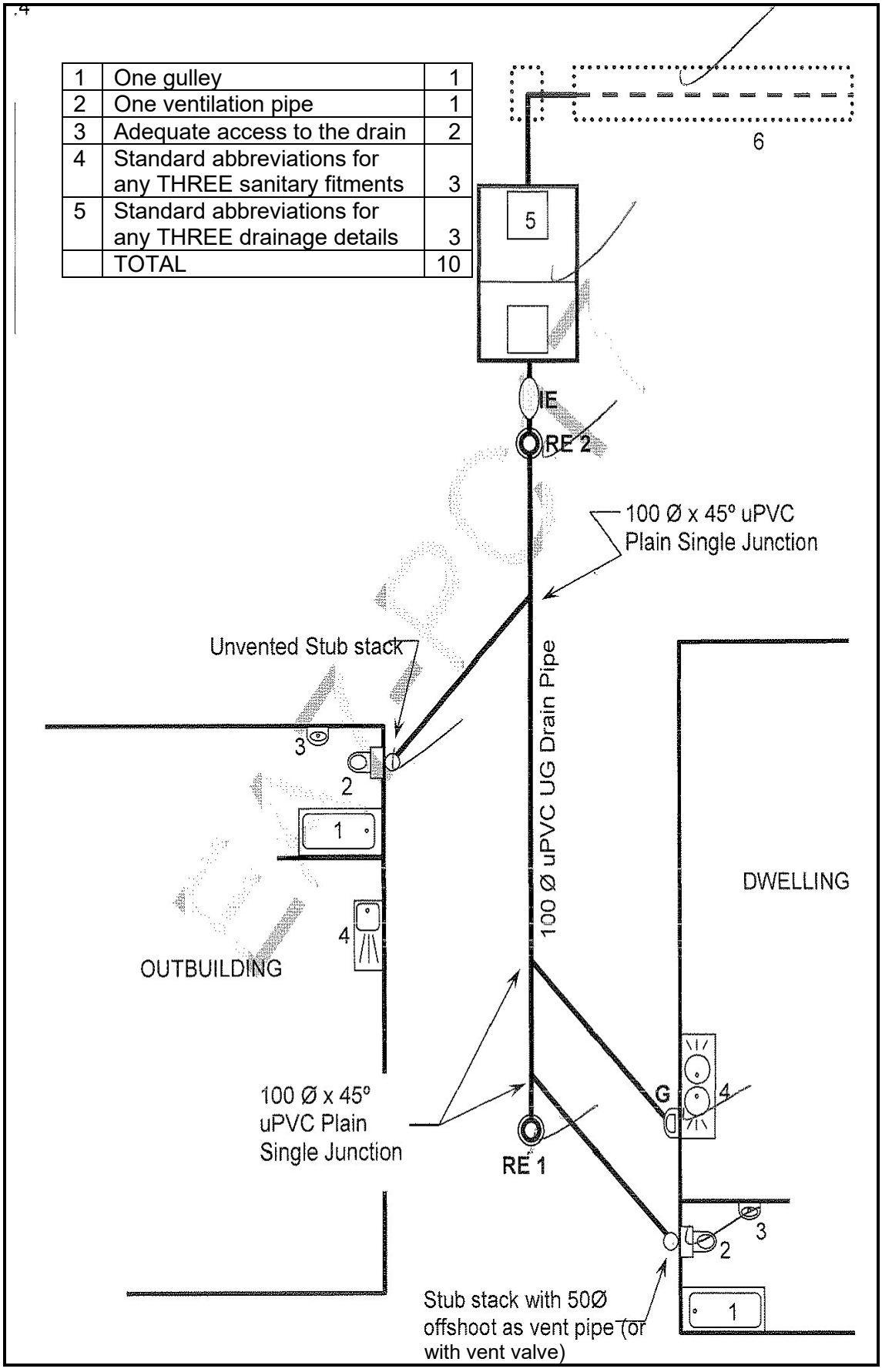
3.3 Fall over 11 m
= 11 × 1/40✓
= 0,275✓

Invert depth at next change
= 0,55 m + 0,275 m✓
= 0,825 m✓ (4)

3.4
- The shortest most practical route should be used without affecting the effectiveness of the drain.
- The number of branch pipes must be limited.
- The number of branch pipes must be as short as possible.
- Drains should only be allowed to run under buildings where no other route is available.
- Avoid excessive excavations i.e. follow natural gradient of ground and consider the installation of ramps where required.
- The underground drain should be at least 1 m from the building if the runs are parallel to the wall.
- All regulations regarding ventilations, access, gradients, invert depths, etc. should be considered and adhered to. (Any 3 × 1) (3)

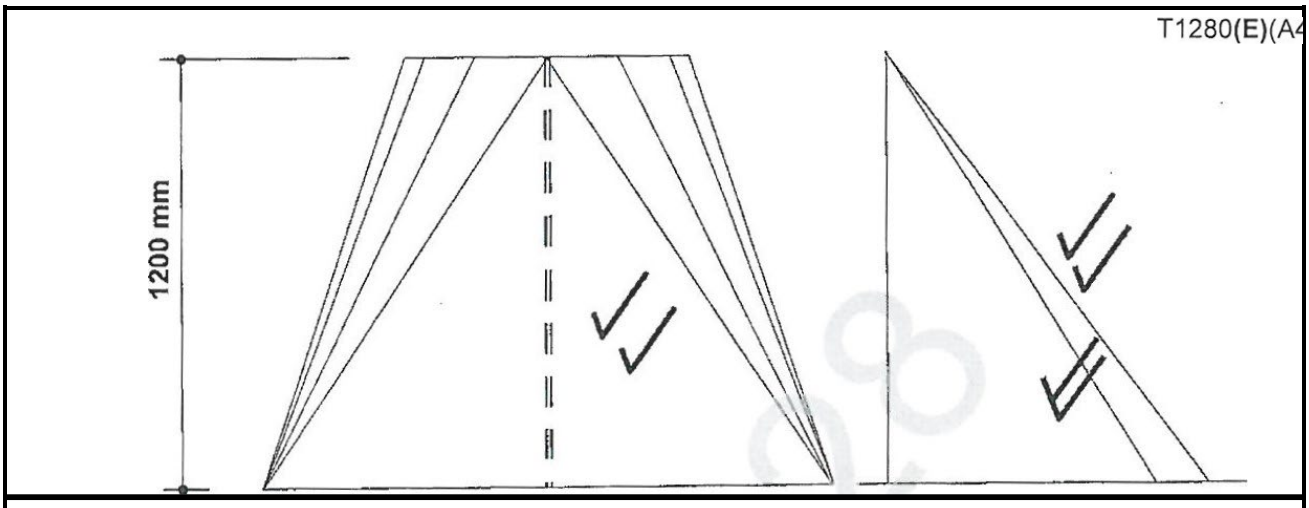
3.5

1	One gulley	1
2	One ventilation pipe	1
3	Adequate access to the drain	2
4	Standard abbreviations for any THREE sanitary fitments	3
5	Standard abbreviations for any THREE drainage details	3
	TOTAL	10



(15)
[35]

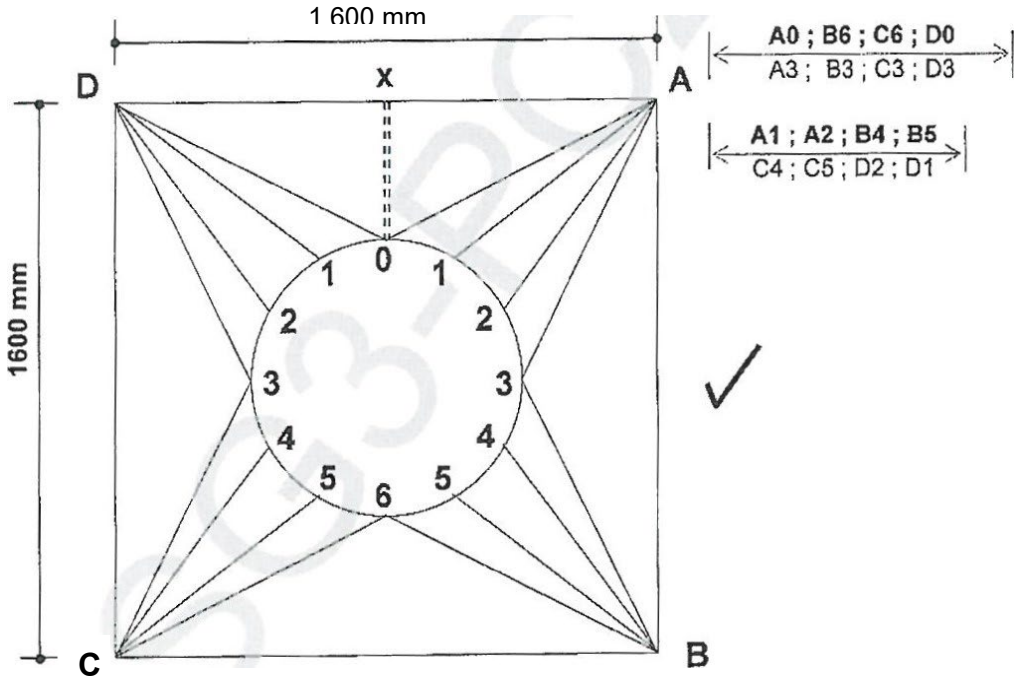
QUESTION 4: SHEET-METAL WORK AND FLASHING



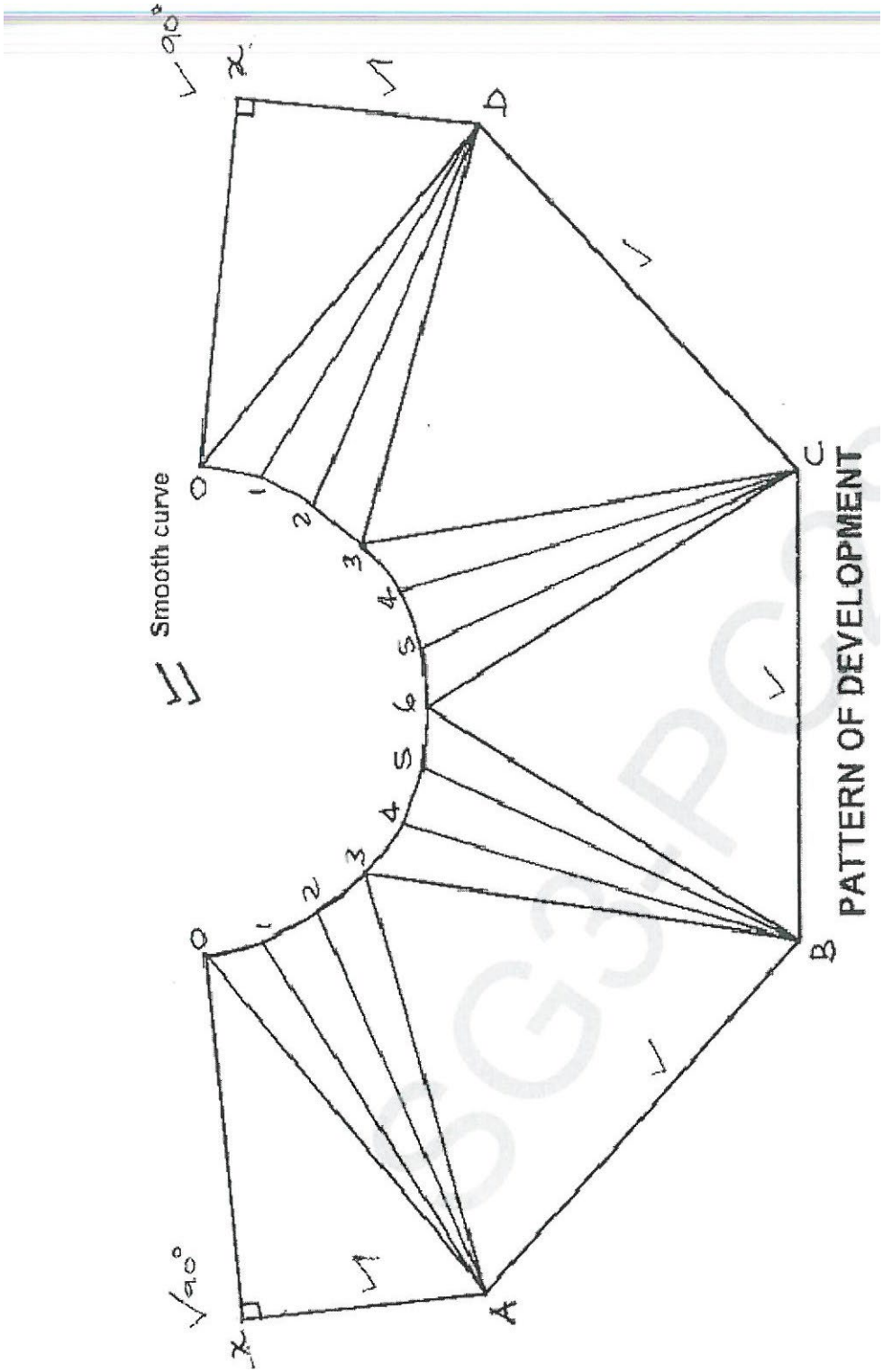
SIDE VIEW

Ø 800 mm

TOP VIEW



The dimensions for the transition must be adjusted to 600 mm for the square, 350 mm for the circle and the height to only 600 mm.



SCALE 1:10 **[15]**

Copyright reserved

QUESTION 5: CALCULATIONS

5.1 Volume = L × B × H

= 1 × 1,2 × 1,5✓

= 1,8 m^3✓

= 1 800 litres✓ (3)

5.2 Mass = Density × volume

= 1,8 m^3 × 1 000 kg/m^3✓

= 1 800 kg✓

Mass of tank + mass of water = 130 + 1 800✓

= 1 930 kg✓ (4)

5.3 Total area = Area of a base + Area of sides✓

= (1 × 1,2) + 2(1 × 1,5) + 2(1,2 × 1,5)✓

= 1,2 + 3 + 3,6✓

= 7,8 m^2 **OR** 8 m^2 (3)

[10]

TOTAL: 100

Copyright reserved