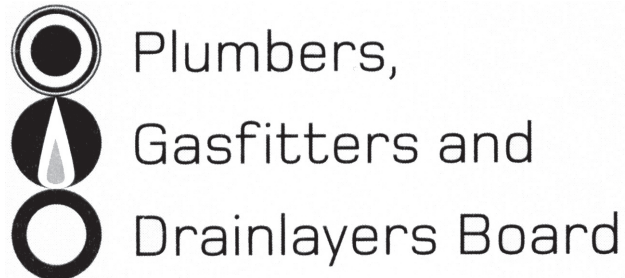


No. 9192



REGISTRATION EXAMINATION, NOVEMBER 2007
PLUMBING

ANSWER SCHEDULE

ANSWER 1

(a) Any TWO:

- 1 To prevent objects entering the pipework.
- 2 To avoid mechanical damage to the pipe ends.
- 3 To avoid damage or danger from unexpected flow within the system.

(½ mark each) (1 mark)

(b) Any FOUR:

- 1 Correctly spacing pipe supports.
- 2 Using a smooth bore pipe.
- 3 Using large radius bends.
- 4 Replacing worn valve components will reduce chattering.
- 5 Increasing pipe size (to lower velocity).
- 6 Accoustically insulate the pipework.
- 7 Use accoustically rated pipe work

(½ mark each) (2 marks)

(c)

- 1 After the T/A's toby.
- 2 Accessible for reading.
- 3 Accessible for maintenance.
- 4 Protected from damage.

(½ mark each) (2 marks)

Total 5 marks

ANSWER 2

(a) Any SEVEN:

- 1 Wear a full shield for the face with approved colored glass to protect the eyes.
- 2 Wear appropriate protective clothing such as gloves, apron, long sleeve overalls, aprons and spats.
- 3 Do not use the end of a electrode to light a cigarette or any other appliance.
- 4 Always erect shields around the welding area to protect other people's eyes.
- 5 Never strike an electrode on a gas cylinder.
- 6 Always use safety glasses when chipping slag.
- 7 Take precautions against electric shock, check primary and secondary leads and earthing.
- 8 Take precautions against inhaling toxic fumes from any welding.
- 9 Take precautions against stray sparks starting a fire, always keep an appropriate fire extinguisher handy.

(1 mark each)

(b) Any TWO:

- 1 The lead should be as short as possible as it carries the highest voltage.
- 2 At no time should primary leads be placed where trolleys or other objects can be wheeled over them or where they can be tripped over, caught or hooked up in any way whatsoever.
- 3 Leads should be regularly inspected for damage to insulation and connections.
- 4 Suitable for current loading.

(2 marks)

Total 9 marks

ANSWER 3

(a) A centrifugal pump has very little suction capability but is able to push water out of the pump chamber by means of a rotating impellor.

A reciprocating pump uses a piston moving forwards and backwards inside a suction chamber to draw water at the same time as it pushes water out of the pump.

(2 marks)

(b) Use a cylinder charged with air in conjunction with a pump. When the water is forced into the cylinder, air within the cylinder is compressed creating an artificial head.

(2 marks)

Total 4 marks

ANSWER 4

- (a) 9.81 (1 mark)
- (b) UV degradation. (1 mark)
- (c) Cohesion. (1 mark)
- (d) Malleability. (1 mark)
- (e) Sal ammoniac or Killed spirits. (1 mark)
- (f) Humidity. (1 mark)

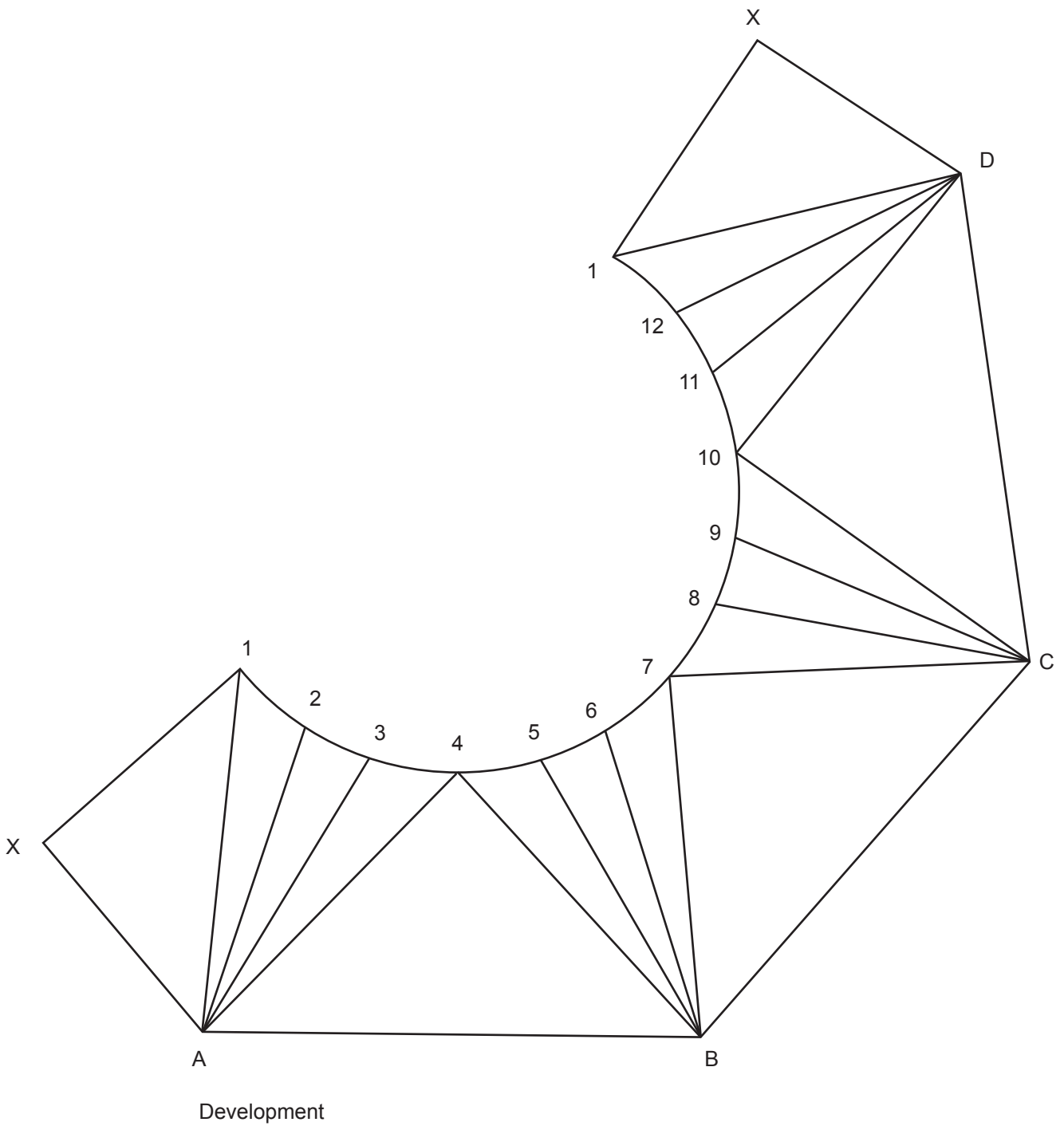
Total 6 marks

ANSWER 5

- (a)
 - 1 Chemical action of the water in the pipe.
 - 2 Chemical action of other substances on the outside of the pipe.
 - 3 Electrolytic action between the pipe and other materials in contact with the pipe.
 - 4 Stray electrical current. (2 marks)
- (b) Prevent the tank tipping or moving during an earthquake. (1 mark)

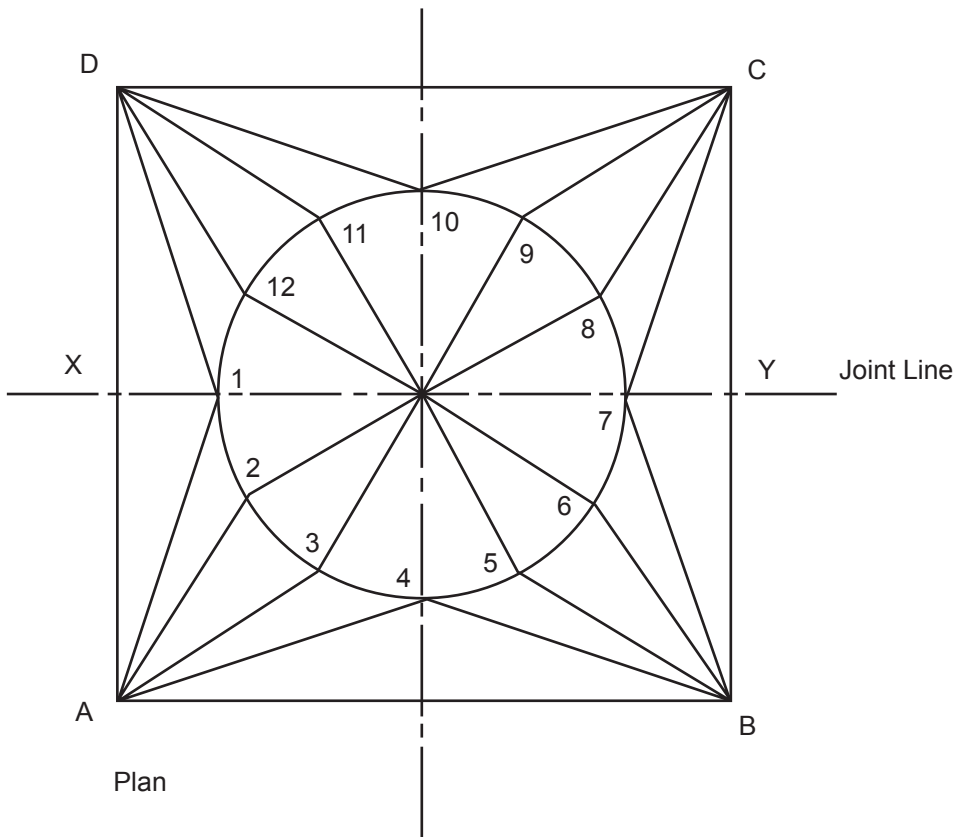
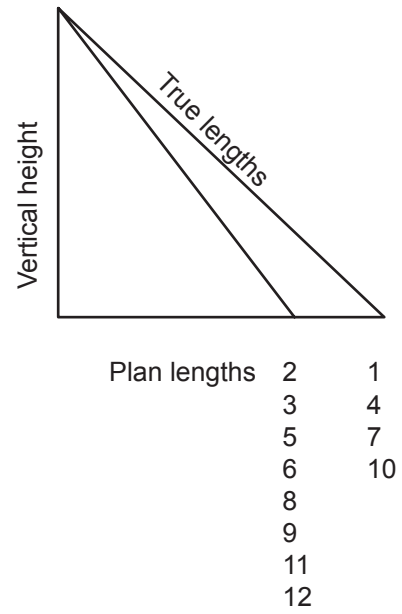
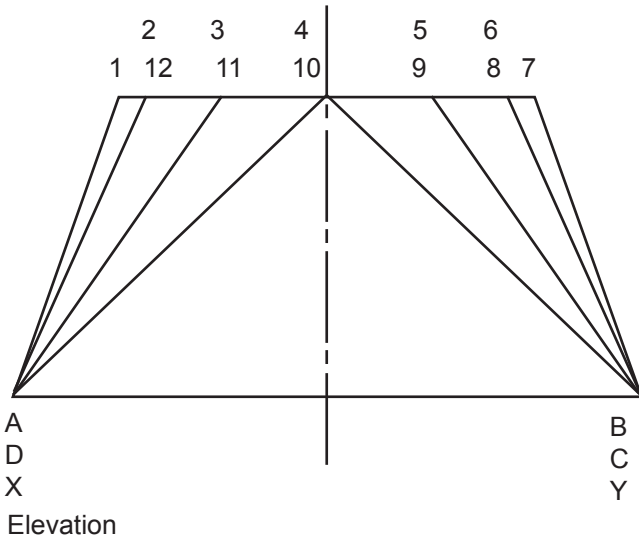
Total 3 marks

ANSWER 6



NOT TO SCALE

(3 marks for coordinates, 1 mark for the outer straight edges, 1 mark for the triangles)



NOT TO SCALE

Total 5 marks

ANSWER 7

(a)

(Working) Mass of water = 450kg
temperature diff = 75 – 15 = 60°C (1 mark)
convert kW to kJ = 4.8 x 3.6 x 1000 = 17280kJ (1 mark)

$$\text{Time} = \frac{\text{Mass of water (kg)} \times 4.2 \times \text{Temperature difference } ^\circ\text{C} \times 100}{\text{Heat energy input per hour (kJ)} \times \text{efficiency}}$$

$$\text{Time} = \frac{450 \times 4.2 \times 60}{4.8 \times 3.6 \times 1000 \times 0.95} \quad (1 \text{ mark})$$

$$= \frac{113400}{16416} = 6.9078 \quad (1 \text{ mark})$$

$$= 6.908 \text{ hours} \quad (1 \text{ mark})$$

Note: Accept working without 100.

(5 marks)

(b)

$$\text{Temperature rise cold to hot} = 65 - 15 = 50^\circ\text{C}$$

$$\text{Temperature rise cold to mixed water} = 55 - 15 = 40^\circ\text{C}$$

$$\text{Litres of water} = \frac{850 \times 40}{50} = 680 \text{ litres @ } 65^\circ\text{C}$$

(1 mark correct transposition, 1 mark correct temperature rises, 1 mark correct data entry,
1 mark correct answer)

(4 marks)

Total 9 marks

ANSWER 8

(a) Subject the system to a pressure of 1500kPa for a period not less than 15 minutes. (2 marks)

(b) Any THREE:

- 1 Carry out testing before concealing pipework behind interior linings or flooring, or within or under concrete or before back filling trenches.
 - 2 Isolate all fixtures, appliances, water tanks, storage heaters and other equipment which may be damaged during testing.
 - 3 After the expiry of the test period inspect the system to ensure there are no leaks.
 - 4 Observed by an inspector.
- (3 marks)

(c) The potable and non-potable must be clearly identified by signs and all non-potable outlets must be identified with an appropriate safety sign.

Backflow protection for the potable supply must be provided if combined system.

(2 marks)

Total 7 marks

ANSWER 9

- (a) Adjust the dampers under the outlet grills so that adjustments to the airflow at each grill can be made. (1 mark)
- (b) Ideally it should be situated on the ground floor as close as possible to the centre of the house. (1 mark)
- (c) Any TWO:
- 1 Excessive noise.
 - 2 Lack of air flow.
 - 3 Over temperature device activated (on and off cycling). (½ mark each) (1 mark)
- (d)
- 1 The main line in a single-pipe system is larger than in a two-pipe system.
 - 2 Main line acts as the flow and return on an single-pipe system.
 - 3 In a two-pipe system the flow and return lines are separate.
 - 4 In a two-pipe system the flow line decreases in size the further the distance from the heat source but the return line does the opposite.
 - 5 In a single-pipe system the flow line has the same diameter throughout.
 - 6 A two-pipe system is more efficient. (4 marks)
- (e) The radiators nearest the boiler and connected to the single main circulating pipe receive the hottest water, while after some cooling is returned to the circulating water then those radiators later in the circuit particularly those connected nearest, where it returns to the boiler receive water at a lower temperature. (2 marks)
- (f) It should always branch into the side of the main circulating pipe. (1 mark)

Total 10 marks

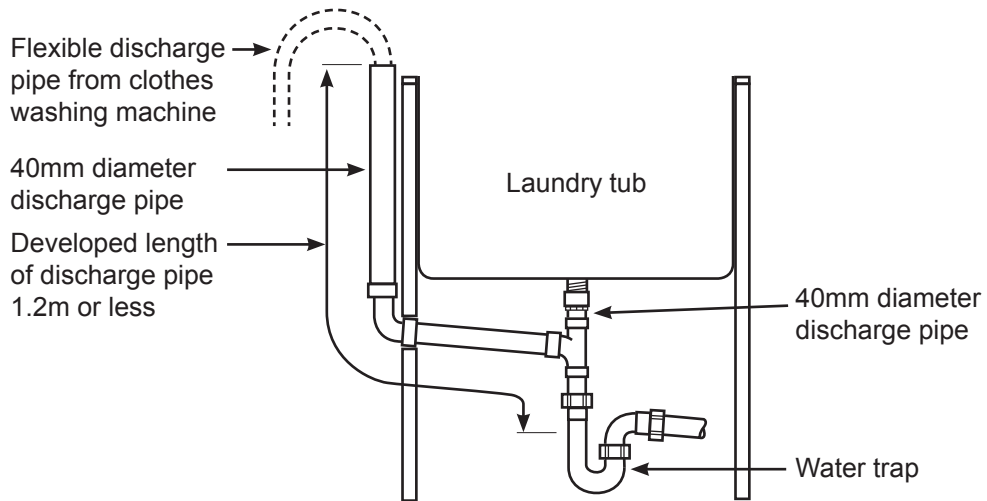
ANSWER 10

- (a) Buildings in which sanitary fixtures and sanitary appliances using waterborne waste disposal are installed, shall be provided with an adequate plumbing and drainage system to carry foul water to appropriate outfalls. (2 marks)
- (b) The plumbing system shall be constructed to:
- 1 Convey foul water from buildings to a drainage system.
 - 2 Avoid the likelihood of blockage and leakage.
 - 3 Avoid the likelihood of foul air and gases entering buildings.
 - 4 Provide reasonable access for maintenance and clearing blockages.
- (1 mark each, 4 marks)

Total 6 marks

ANSWER 11

(a)

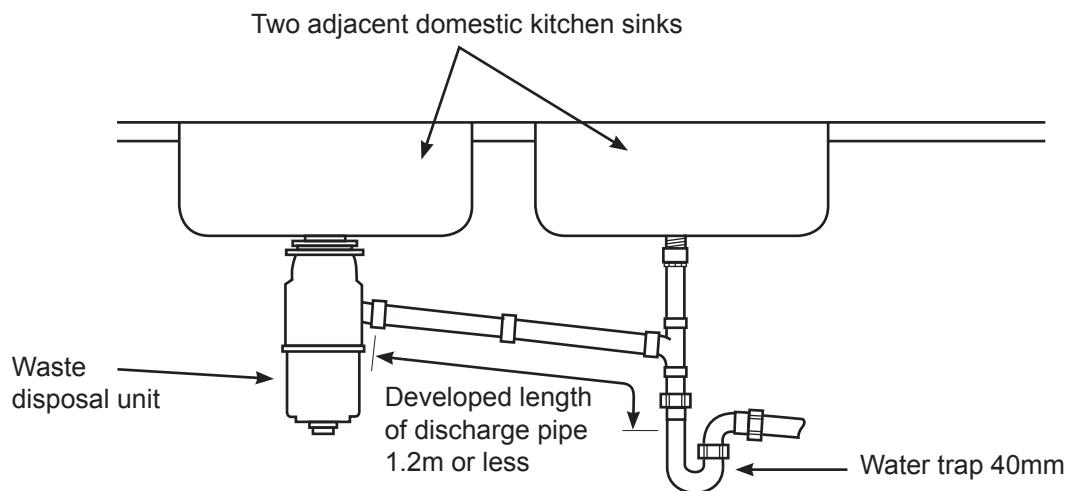


Laundry tub and discharge pipe for a clothes washing machine

(Diameter of waste pipe – 1 mark, Water trap – 1 mark, Developed length – 1 mark, Discharge pipe from the washing machine – 1 mark)

(4 marks)

(b)

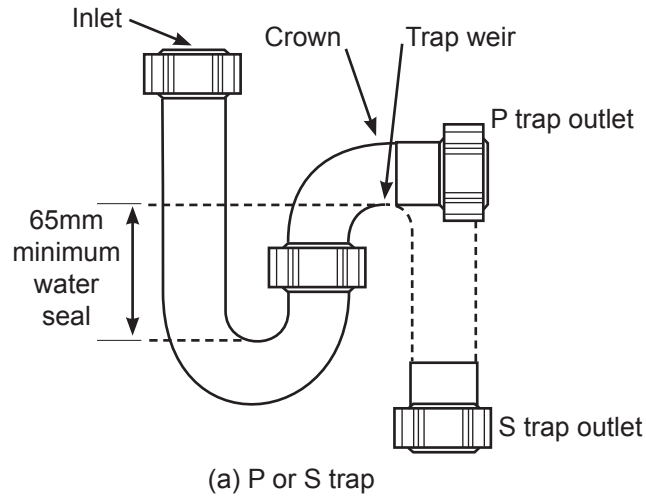


Two adjacent domestic kitchen sinks and one disposal unit

(1 mark for diameter, 1 mark for the position of the water trap, 1 mark for the maximum developed length of the waste pipe)

(3 marks)

(c)



(Diagram – 1 mark, must show access for maintenance, Trap seal and depth – 1 mark, Inlet and outlet – 1 mark, Crown – 1 mark, Weir – 1 mark)

(5 marks)

(d) The stack and discharge pipe also serve as vent pipes. (1 mark)

(e) Additional venting is provided by means of a relief vent, which is connected with the stack at intervals by cross vents.

(2 marks)

Total 15 marks

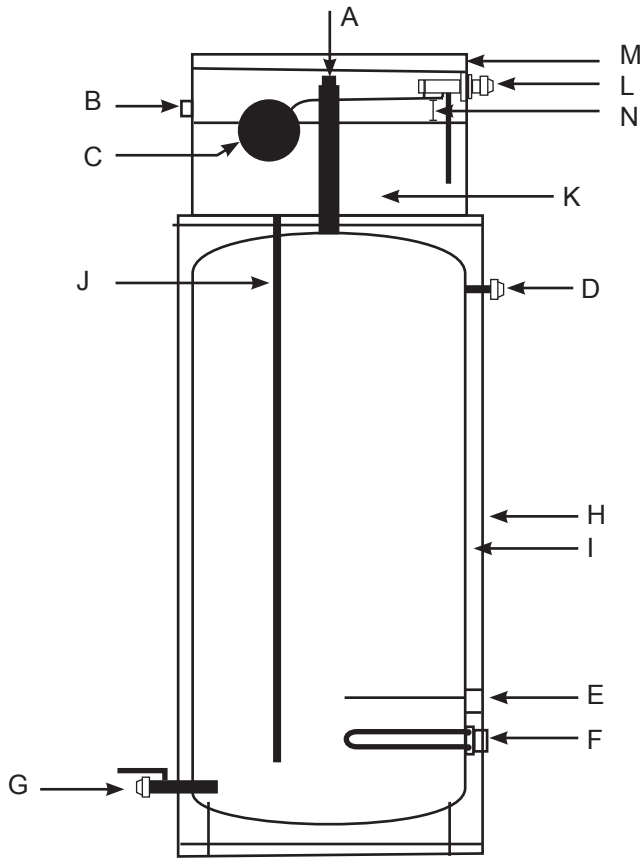
ANSWER 12

- 1 Deliver hot water to sanitary fixtures used for personal hygiene at a safe temperature.
- 2 Protect the potable water supply from the likelihood of contamination by cross connection.
- 3 Avoid the likelihood of leakage.
- 4 Provide adequate flow rates.
- 5 Allow reasonable access for maintenance.
- 6 Allow for the isolation and testing of any backflow prevention equipment and other valves attached to the system.
- 7 Allow people with disabilities to carry out normal activities.
- 8 Relieve excess pressure.
- 9 Limited temperature to avoid the likelihood of flash steam production.
- 10 Control water temperature so as to prevent the growth of legionella bacteria.

Total 10 marks

ANSWER 13

(a)



- A Vent pipe
- B Overflow
- C Heat resistant ball float
- D Hot water outlet
- E Thermostat
- F Element
- G Drain
- H Metal Casing
- I Insulation
- J Cold water supply tube
- K capacity of supply tank 1/3 of storage water heater capacity
- L Cold water inlet via equilibrium ball valve
- M Removable lid
- N Air gap to be 2x the diameter of inlet pipe or 25mm whichever is greatest.

(7 marks)

(b) It is determined by the sum of the changes in direction, plus the length of pipe in metres.
This sum must not exceed 12.

(3 marks)

(c) It must be one diameter larger than the relief discharge pipe connected to the valve.

(1 mark)

Total 11 marks

