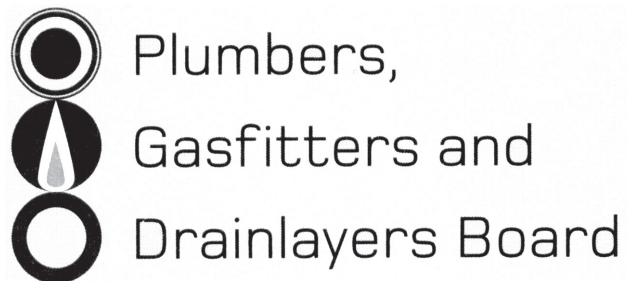


No. 9192



REGISTRATION EXAMINATION, NOVEMBER 2008
PLUMBING

ANSWER SCHEDULE

ANSWER 1

- (a) (i) Circulation of water taking advantage of the fact that its density decreases as it is heated (density difference). Hot water will thus float to the top of cooler water (displacement). The greater the difference in temperature, the greater the circulating pressure. (2 marks)
- (ii) Because water is a poor conductor of heat, water at different temperatures may be considered to be in layers, or stratified. (1 mark)
- (b) (i) Where the thermo-siphon effect cannot be used, a pump must be used to circulate hot water. OR hot water demand. (1 mark)
- The method of circulating water around a large commercial hot-water system or within a solar water-heating system. (Accept physical example eg. central heating.) (1 mark)
- (ii) The boiling point refers to the temperature at which a liquid changes to vapour (change of state by the addition of heat). As the pressure increases the boiling point increases. (1 mark each, 2 marks)
- (iii) Radiation (1 mark)

Total 8 marks

ANSWER 2

- (a) (i) Grouping draw-off points as close as possible to the cylinder. (1 mark)
- (ii) Density difference of water (temperature difference). Not accept thermo-siphon. (1 mark)
- (iii) When a boiler is required to heat the water, not only for a heating system, but also for a potable water supply.
Water quality.
Cross contamination.
Alternative heating source. (Any one, 1 mark)
- (iv) None (1 mark)
- (b) (i) Heat able to be felt-sensed by a thermometer OR heat that changes temperature without change of state. (1 mark)
- (ii) The amount of heat energy (kJ) required to raise the temperature through 1°C per unit of mass (kg) of a substance. (1 mark)
- (iii) The heat energy required to change the state of a substance without a change in temperature (solid to liquid or liquid to gas). (1 mark)
- (iv) Minus 273° Celcius or 0 kelvin. Must be a temperature. (1 mark)
-273 (½ mark)
Do not accept anything other than -273°C

- (c) Volume: Increases
 Density: Lessens
 Pressure in a closed system: Increases
 The boiling point: No change

(1 mark each, 4 marks)

Total 12 marks

ANSWER 3

- (a) (i) $h^2 = 1.2^2 + 5.66^2$
 $h^2 = 1.44 + 32.035$ (½ mark)
 $h^2 = 33.4756$ (½ mark)
 $h = 5.7858\text{m}$ (½ mark)
 $5.7858\text{m} + 0.050\text{m}$
 Answer = 5.836m (½ mark)
 (2 marks)
- (ii) length divided by effective cover.
 $12.2 \div 0.68\text{m} = 17.941$
 Answer = 18 sheets
 (1 mark)
- (iii) Sheet length \times number of full sheets \times \$8.20
 $5.836\text{m} \times 18 \times \$8.20 = \$861.40$
 (1 mark)
- (b) Volume = $D^2 \times 0.7854 \times$ Length in m
 $8.836 \text{ litres} = D^2 \times 0.7854 \times 500\text{mm}$
 $(8.836 \div 1000 = 0.008836\text{m}^3)$ (500mm = 0.5m) (½ mark)
 $D^2 = \frac{0.008836\text{m}^3}{0.7854 \times 0.5\text{m}}$ (½ mark)
 $D^2 = \frac{0.008836\text{m}^3}{0.3927}$ (½ mark)
 $D^2 = 0.0225006$ (½ mark)
 $D^2 = 0.1500\text{m}$ (½ mark)
 Answer = 150mm diameter (½ mark)
 (3 marks)

Total 7 marks

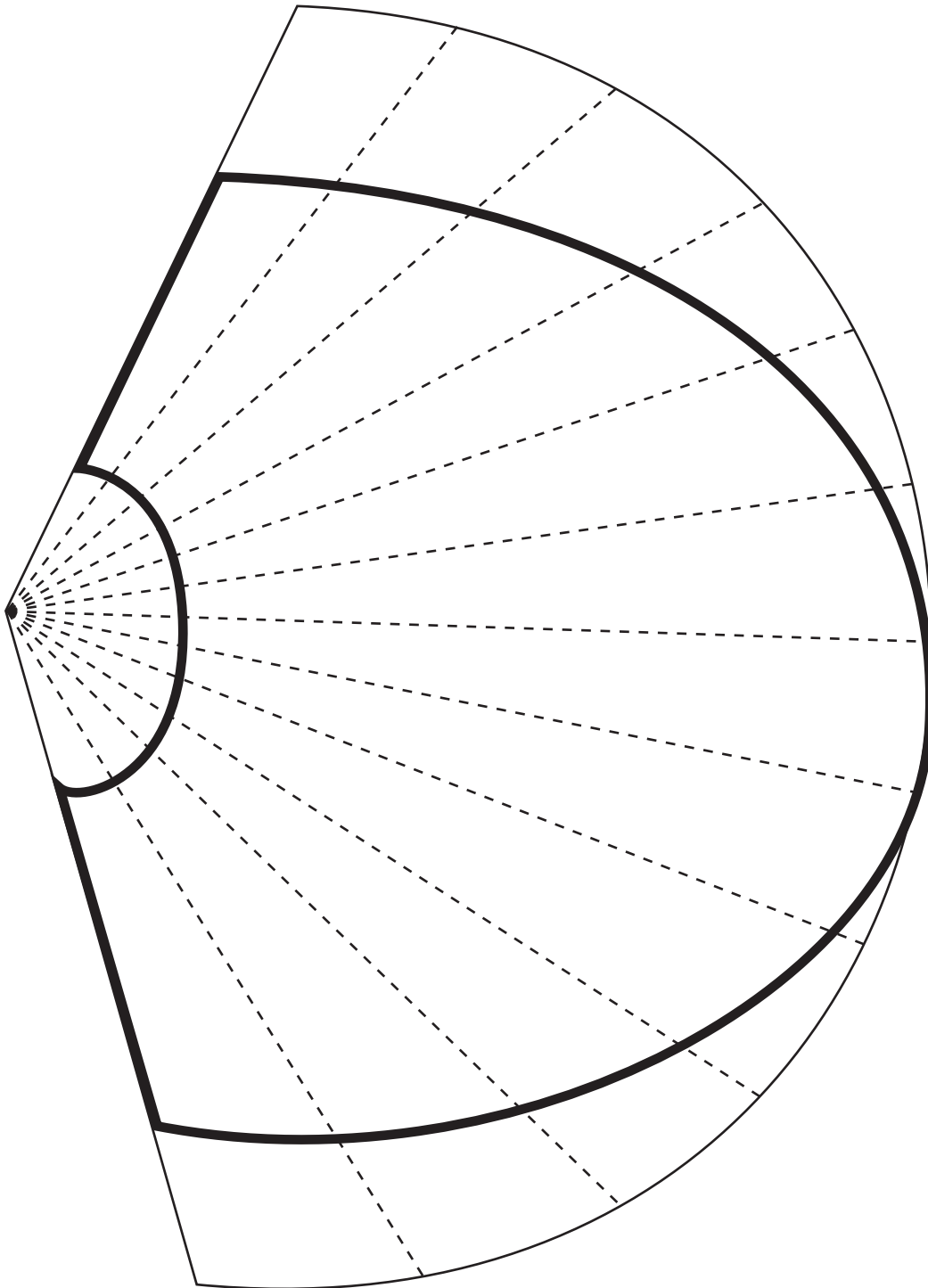
ANSWER 4

- (a) The depth of water, which can be retained in a trap OR stops foul gases.
- (b) Two adjacent waste fixtures of the same type, which have their outlets connected to the same fixture trap.
- (c) A pipe inclined at an angle of greater than 45° from the horizontal plane.
- (d) A pipe provided to limit the pressure fluctuations within the discharge pipe system or to encourage the passage of gases.
- (e) Overflow from a sewer system caused by overloading or blockage.
- (f) A pipe, which conveys the discharges from one or more soil fixtures.
- (g) A disconnector gully for installation inside a building for use with a floor grating or waste outlet fitting on a riser pipe and with provision, where required, for connection of fixture waste pipes.
- (h) A vent connected to a stack below the lowest fixture and reconnected to the stack above the top fixture or discharging to the open air. Accept answers that give the purpose. Accept all discharge pipes (eg. branch discharge pipes).
- (i) A pipe for the conveyance of sewage and waste water from any fixture, appliance or floor waste gully trap to a stack or drain.
- (j) A pipe installed at a grade of less than 45° from the horizontal plane.

(1 mark each)

Total 10 Marks

ANSWER 5



Outer shape (Curve and sides)

(1 mark)

Dividing into 12 sections

(1 mark)

Circle at top.

(1 mark)

Carry lines across to T/L side

(1 mark)

Positioning T/L lines on development

(1 mark)

Final shape

(1 mark)

Total 6 Marks

ANSWER 6

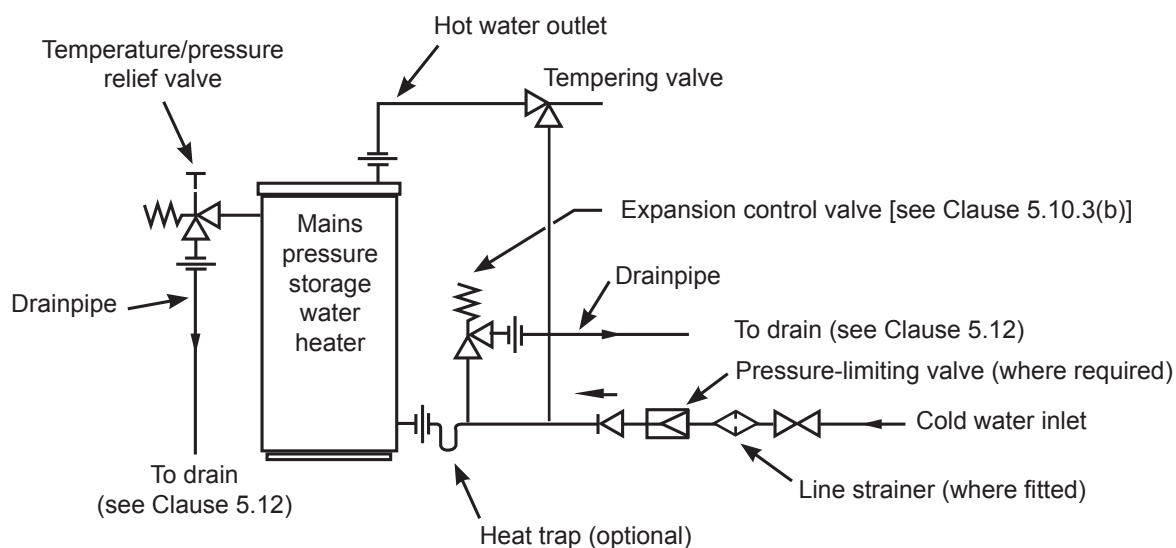
- (a) To protect the cylinder the anode is corroded in preference to the hot water cylinder.

(2 marks)

- (b) Incomplete glazing of the interior surface of the hot water cylinder.
Highly corrosive water.
Physical damage.
Corrosion due to the presence of electrolysis.
Lack of sacrificial anode.
Excessive water temperature

(Any 4, ½ mark each, 2 marks)

(c)



NOTE: Expansion control valve may be combined with the pressure-limiting valve.

Marks

Temperature/pressure relief valve.
Cold water expansion valve
Non return valve. (Must be in correct place)
Pressure limiting valve.
Line strainer. (Must be in correct place)
Isolation.
Tempering valve.
TPR drain or cylinder drain

(½ mark each, 4 marks)

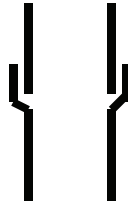
Total 8 marks

ANSWER 7

- (a)
- (1) A building consent is required from the Territorial Local Authority.
 - (2) The heater and flue is to be installed according to the manufacturer's instructions.
 - (3) The heater and flue is to comply with requirements for seismic restraint.
 - (4) The Territorial Local Authority is to be notified on completion for the Code Compliance Certificate.
 - (5) Suitable hearth

(Any three 1 mark each, 3 marks)

- (b) (i)



(1 mark)

- (ii) The socket and lapped flue sections face upwards so condensation Or liquid creosote can run down the inner wall of the flue; this helps avoid rapid deterioration of the joint.
If the joint was the other way and the condensate was trapped, the cavity would fill up with a corrosive liquid resulting in staining.

(2 marks)

Total 6 marks

ANSWER 8

- (a) (i) Fresh air
A comfortable temperature
A comfortable level of humidity
Sufficient air movements without draughts.

(½ mark each, 2 marks)

- (ii) The radial flow or centrifugal fan forces the air from the centre outwards.
The axial flow or propeller fan having blades arranged in a propeller fashion forces the air along the line of the axial.

(½ mark for fan and half for air flow, 1 mark each) (2 marks)

- (iii) Absolute humidity is the maximum amount of water vapour that air can hold at a given temperature.

(1 mark)

- (iv) It is expressed...
In grams of water vapour per kilogram of dry air
In grams of water vapour per cubic metre of air
As saturated air
As dew point
As 100% humidity

(Any one, 1 mark)

ANSWER 8 (cont'd)

- (b) The liquid refrigerant inside the evaporator absorbs heat from the surroundings. This heat causes the refrigerant to boil and to change from a liquid to a vapour. The heat laden vapour is drawn from the evaporator by a compressor and forced into a condenser. The condenser disperses the heat, and the refrigerant returns to its liquid state. The liquid is then forced back to the evaporator to begin its cooling cycle again

(½ mark for each, 4 marks)

Total 10 marks

ANSWER 9

- (a) A sanitary appliance is intended to be used for sanitation and which is not a sanitary fixture. (2 marks)

(1) Dishwashing machine (½ mark)

(2) Clothes washing machine (½ mark)

(3 marks)

- (b) Single stack system (1 mark)

- (c) A waste water fixture is any fixture or appliance for waste water that is not a soil fixture. (1 mark)

- (d) (1) Using a tempering valve located on the hot supply

(2) Thermostatic mixing valve OR blending valve

(3) Device located at the point of use

(4) Instantaneous water heater

(Any three, 1 mark each, 3 marks)

Total 8 marks

ANSWER 10

- (a) (i) A cross connection is an actual or potential connection between a potable water supply and any contaminant. (1 mark)

(ii) To protect wholesome potable drinking water from contamination. (1 mark)

(iii) Isolating valve on each side of the check valve assembly. (1 mark)

Sufficient test points to enable each check valve to be readily tested. (1 mark)

ANSWER 10 (cont'd)

- (b) (1) Friction between moving water and the surface of the pipe or fitting which may vary depending on the type of material and condition of pipe.
- (2) Disturbance in the water flow caused by sudden changes in direction (i.e. elbows, tees, etc).
- (3) Disturbance in the water caused by either sudden enlargements or contractions in the pipeline.
- (4) Valves.
- (5) Flow of water at intakes or outlets.
- (6) The pipe length.
- (7) The diameter of the pipe.

(Any five, 1 mark each, 5 marks)

Total 9 marks

ANSWER 11

- (a) Check the water temperature correct.
Check no foreign matter is in the valves.
Check cold water expansion valve.

(Any two, 1 mark each, 2 marks)

- (b) Isolating valve
Line strainer
Non return valve
Pressure reducing
Pressure limiting valve
Cold water expansion valve.
Energy control thermostat.
Relief valve.
Energy cut-out.

(Any six, ½ mark each, 3 marks)

- (c) 20mm

(½ mark)

It must be one size larger than the largest relief valve outlet.

(½ mark)

(1 mark)

Total 6 marks

ANSWER 12

- (a) You must make application and pay the prescribed fee to the Plumbers, Gasfitters, and Drainlayers Board in order to be issued with a current practising license. (2 marks)
- (b) (i) (1) Apprentice Plumber
- (2) Any non-registered person wishing to do sanitary plumbing (Journeyman ½ mark) (2 marks)
- (ii) That person must work under the direct supervision and in the presence of a Craftsman Plumber or a Registered Plumber when the holder has not held a limited certificate for a continuous period of at least two years. (3 marks)
- (iii) That person has held a limited certificate for a continuous period of 5 years. (1 mark)
- (iv) The Craftsman Plumber or Gasfitter or Registered Plumber or Gasfitter as may be appropriate for the certificate applied for and in whose employment or under whose supervision the certificate holder intends to work. (2 marks)

Total 10 marks

