No. 9192

Plumbers, Gasfitters and Drainlayers Board

REGISTRATION EXAMINATION, NOVEMBER 2009

PLUMBING

ANSWER SCHEDULE

ANSWER 1

(a) (i) He or she must be trained in the safe handling of any asbestos products
(ii) Occupational Health and Safety (OSH).

(1 mark each, 2 marks)

(iii)
- Sprayed on sound proofing or insulation to structures.
- Trowelled on acoustic plaster soundproofing.
- Insulation on pipes, ducting, boilers and hot water vessels etc.
- Decorative coatings e.g. textured ceilings.
- Flooring e.g. some vinyls and linoleum.
- Asbestos cement roofing, cladding and pipes.
- Insulation on electrical cables.

(Any 4, ½ mark each, 2 marks)

(b)
- Work where workers could fall 5m or more (Excluding work on 2 story house)
- The erection of scaffolds 5m or more above ground.
- Every excavation which is more than 1.5m deep and is deeper than it is wide at top.
- Any form of tunnel or drive where workers work underground irrespective of timbering or not.
- Excavations where the excavated face is more than 5m deep and the batter of the face is steeper than 1 horizontal to 2 vertical.
- Any constructive work where explosives are used.
- Any construction work in connection with asbestos fibres.

(Any 4, 1 mark each)

Total 8 marks

ANSWER 2

(a) (i) Liquid drawn between two close fitting surfaces.
(ii) The resistance to motion when one surface slides over another.
(iii) A metal that does not contain iron.
(iv) Water that is fit for human consumption (drinkable).
(v) A method of joining uPVC materials by applying a solvent that melts the surface enabling them to be fused together.
(vi) (Water or Fluids or liquids) at rest
(vii) (Water or fluids or Liquid) in motion

(1 mark each, 7 marks)

(b) The cross-sectional area / size / diameter of the pipe.
The pressure or head.

(½ mark each, 1 mark)

(c) (i) Yes (½ mark)
(ii) It would lower as mercury is more dense (heavier) than water. (13.6 times) (½ mark)

(d) (i) 4º C
(ii) Approx 1700 times
(iii) Pressure
(iv) As it is heated expansion is not even but is greater at the higher temperatures.

(1 mark each)

Total 13 marks

ANSWER 3

(a) A pressure reducing valve may be used in conjunction with pressure relief valves. (2 marks)

(b) Ensure the minimum water temperature in cylinder reaches 60ºC once a day. (1 mark)

(c) (i)
- Supplying water to under rim bidet.
- Supplying water to a low pressure heating system (flushing etc).
- Supplying water to an autopsy table.
- Supplying water to sluice sink. (Any 2, 1 mark each, 2 marks)

(ii) The inlet being a minimum of 25 mm above the top of the overflow outlet of the tank or twice the diameter (which ever is greater).

(2 marks)

(d)
- The back flow device must be installed as close as practicable to the potential source of contamination.
- It shall be in an accessible position to allow for regular maintenance and inspection.
- It shall be protected from freezing.
- It shall be located so that no part of the device can become submerged.
- It shall be located so that the pressure differential relief valve outlet is fully ventilated to the atmosphere and any discharge does not cause a nuisance.

(Any 4, 1 mark each, 4 marks)

Total 11 marks

ANSWER 4

(a) Roof area = 12.600m x 15.500m =195.3m² (½ mark)

V = 195.3 m² x 0.025 m
V = 4.8825 m³ /hr (½ mark)

Therefore for 15 minutes V = 4.8825 x 0.25
= 1.2206 m³ (½ mark)

Convert to litres = 1.2206 m³ x 1000
= 1220.625 litres (½ mark)

(2 marks)

(b) $D^2 = \frac{V}{0.7854 \times L}$ (½ mark)

$= \frac{0.800\ m^3}{0.7854 \times 0.45\ m}$ (½ mark)

$= \frac{0.800}{0.353}$ (½ mark)

$D^2 = 2.266$ (½ mark)

Therefore $D = \sqrt{2.266}$

Ans 1.505m (1 mark)

(3 marks)

(c) Temperature rise cold to hot = 70 – 20 = 50ºC half mark
Temperature rise cold to mixed water = 45 – 20 = 25ºC half mark

Litres of water = $\frac{620 \times 25}{50}$ = $\frac{15500}{50}$ (1 mark)

Ans 310 litres of hot water (1 mark)

(d) Formula

V = H x L x W

V = 2.4m x 3.8m x 1.2m

V = 10.944 m^3 (½ mark)

10.944 m^3 x 1000 = litres

Full tank = 10944litres (½ mark)

10944 x 60% = 6566.4 litres (½ mark)

Ans = 6566.4 litres (½ mark)

(2 marks)

Total 10 marks

ANSWER 5

(a) (i) 6m x 9.81 = 58.86kP.
(ii) 6m – (1.5 + 0.5) = 4m + 1m = 5m 5m × 9.81m = 49.05kP.
(iii) 6m – 1.5m = 4.5m 4.5 × 9.81 = 44.145kP
(iv) 0.8 x 9.81 = 7.848kP (½ mark each)

(b) All would be same level as water will find its own level independent in size.
Half mark for each level and 1 mark for explanation.

(2 marks)

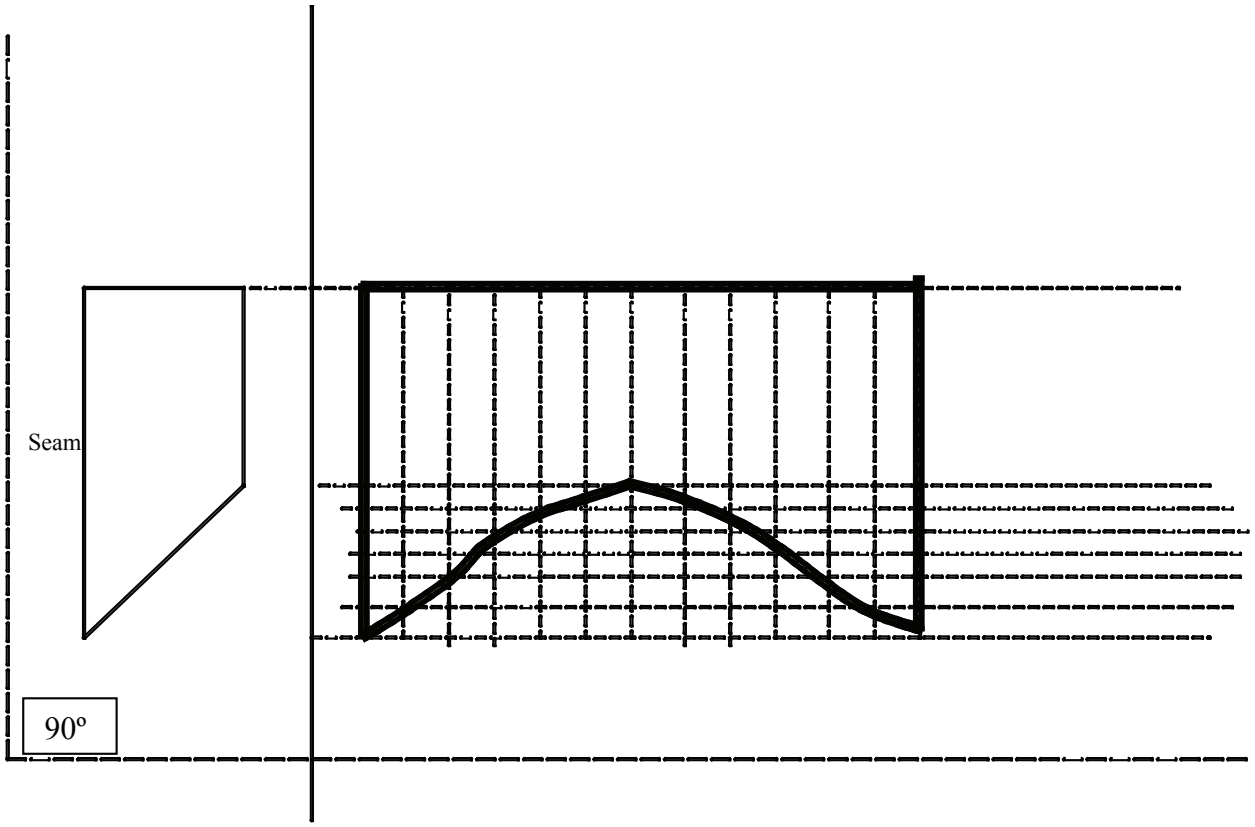
(c) Pressure at the outlet is directly proportional to the head available. The greater the head the greater the pressure

(1 mark)

Total 5 marks

ANSWER 6

This will be redrawn to fit on paper. Angle may change a little to accommodate paper.
The dotted line forming a right angle will be left so they can use it to work from.



Marking:

Sectioning	(1 mark)
Horizontal lines	(1 mark)
Vertical lines	(1 mark)
Development of the true shape	(2 mark)

Total 5 marks

ANSWER 7

(a) (i)
- Where the water contains temporary hardness or is of a kind which may produce much rust.
- Where one boiler is required to heat water for a heating system and also for hot-water supply.
- Where stand-by facilities can be provided from boilers connected to a heating system and consequently the need for a separate boiler for hot-water supply can be obviated.
- Where steam is already generated for other purposes and it is impracticable to install an additional boiler which would require separate space and firing. Exhaust steam, which might otherwise be wasted, may be used.

(Any THREE, 2 marks each, 6 marks)

(ii) Calorifier (1 mark)

(iii) Annular Cylinder
Plate heater exchanger
Pipe Coil

(Any two 1 mark each, 2 marks)

(b) (i) To wash the air
(ii) Changes the humidity
(iii) 1 Be drained off to a suitable drainage point
2 Be re-circulated.

(1 mark each, total 3 marks)

Total 12 marks

ANSWER 8

(a) (i) At least 3.000 m above ground level.
(ii) Clear of windows and other openings by 600 mm above and 3.000 m horizontally.
(iii) Be 150 mm above roofs.
(iv) Clear of any deck having pedestrian access by 3.000 m both horizontally and vertically
(v) Clear of eaves and parapets by 600 mm both horizontally and vertically above.
(vi) Clear of air intakes by 5.000 m in any direction.

(½ mark each for measurements)

(b)
- It shall have a diameter relative to the total number of discharge units served by the stack.
- Be open at its upper end to the atmosphere.
- Terminate outside the building
- At the terminal to the atmosphere incorporate a device to prevent the entry of birds and vermin.
- The protection device at the terminal shall have openings with a total area of no less than 80 percent of the cross-sectional area of the vent pipe it serves.

(Any THREE, 1 mark each)

(c) (i) The Building Act 2004
Plumbers, Gasfitters and Drainlayers Act 1976.
Health and Safety in Employment Act 1992
The Drinking Water Act

(Any two, Total 2 marks)

(ii) G12: Water Supplies.
B2: Durability.
E2: External Moisture
G1: Personal Hygiene

(½ mark each, 2 marks)

Total 10 marks

ANSWER 9

(a) (i) To prevent odours from a waste pipe or drain entering a building. (1 mark)

(ii) Under normal working conditions a minimum 25 mm depth of seal must be retained.
(1 mark)

(iii)
- Ventilate the trap by the installation of an open ventilation pipe
- Ventilate the trap by an air admittance valve.

(1 mark each, 2 marks)

(b) (i) A top access type trap (easy clean). (1 mark)

(ii) A water trap shall be located as close as possible to the sanitary fixture it serves.
(1 mark)

(iii) A single water trap may serve any one of the following outlet combinations located within the same space.

- One or two adjacent domestic kitchen sinks together with a dishwashing machine.
- One or two adjacent domestic kitchen sinks together with a waste disposal unit.
- One or two adjacent laundry tubs together with a clothes washing machine.
- Two adjacent basins, domestic kitchen sinks or laundry tubs.
- One or two adjacent domestic kitchen sinks, together with a waste disposal unit and a dishwashing machine when fitted with a 50 mm trap and discharge pipe.

Note: One trap is not permitted to serve two adjacent commercial sinks.

(Any four 1 mark each Total 4 marks.)

Total 10 marks

ANSWER 10

(a) Use of swage near end of pipe (crox fitting) (½ mark)

Copper tube slips into nipple up to swage with a sealing material between swage and nipple. Loose nut on tube tightens against back of swage holding it firmly in place
(1 mark)

Use of flaring tool (flared fitting) (½ mark)

Cut Cu tube square, flare end with special coned drift (flaring tool) to form a simple bell shape. This shape matches the face of the nipple the tube end fits forming a metal to metal joint. This is held together by a nut also shaped on inside to match the flared shape.
(1 mark)

Total 3 marks

(b) (i)
- Lack of prime
- Excessive suction lift
- Excessive head of discharge
- Clogged pump
- Leaking pipe
- Rotation of vanes in wrong direction.

(½ mark each, total 2 marks)

(ii)
- Impellers are worn
- Impellers rotating wrong way
- Speed too slow.
- Excessive head for discharge
- Pump unsuitable for task

(½ mark each Total 2 marks)

(c) (i) The foot valve prevents water from flowing back down the suction pipe when the pump is not in use.

(1 mark)

(ii) Install a check valve or a non-return valve. (1 mark)

Total 9 marks

ANSWER 11

(a) (i) Welding is a process of joining two or more materials together by the application of heat, resulting in the fusion of the components being joined.

(ii) In brazing, the components do not fuse (2 marks)

(b) (i) Oxygen cylinders are solid drawn and generally thicker than acetylene cylinders which are generally not solid drawn.

(ii) Contents are a porous mass (diatomite) and acetone. (2 marks)

(c)
- Cut square and Chamfer spigot end.
- Lightly roughen end of pipe to give solvent something to bite into.
- Measure and mark depth of socket on pipe.

(1 mark for 2 out of 3 steps)

- Clean both surfaces with appropriate cleaning fluid.
- Apply even coating of appropriate solvent to socket and then spigot.

(1 mark for both steps)

- Push spigot into full depth of socket.
- Remove excess solvent from pipe.
- Do not move for at least five minutes.

(1 mark for 2 out of 3 steps)

Total 7 marks