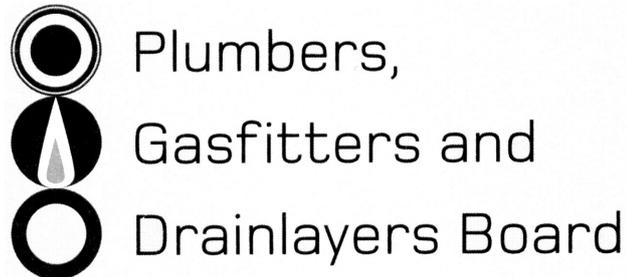


No. 9195



REGISTRATION EXAMINATION, NOVEMBER 2011
CERTIFYING PLUMBER

ANSWER SCHEDULE

ANSWER 1

- (a) To prevent vermin entering the tank.
To stop condensation damaging the building. (2 marks)
- (b) Calculate effective height of water in tank 880 mm or 0.88 m (2 marks)
Divide volume of tank by height to get area of base of tank $0.3 \div 0.8 = 0.3409 \text{ m}^2$ (1 mark)
Calculate diameter $0.3409 \div 0.7854 = 0.434$ (1 mark)
Diameter = $\sqrt{0.434} = 0.659 \text{ m} / 659 \text{ mm}$ (1 mark)
- Alternative formula
Effective height of water in tank = 880 mm or 0.88 m (2 marks)
Calculate diameter $0.3409 \div \pi = r^2$
 $0.3409 \div 3.142 = r^2$
 $0.1085 = r^2$ (1 mark)
 $\sqrt{0.1085} = \text{radius}$
329 = radius (1 mark)
- Diameter $2 \times 329 = 658$ (1 mark)
- (c) Any FOUR (1 mark each)
An overflow pipe discharging to a visible place that will not cause a nuisance.
A safe tray if leakage could cause damage to another household within the same building.
Space (350 mm) above the tank to allow access for maintenance.
Treated timber to be used for supporting structure.
Tank installed over a load bearing wall.
Tank to be seismically restrained.
Backflow protection for water supply.
Centre of tank located within 300 mm of a load bearing wall.
Clearance around inlet and outlet pipe work to allow for movement.
- (d) To control the water pressure throughout the building / can be used instead of ratio valves. (1½ marks)
- Any ONE
To provide extra water storage for the building. (½ mark)
To provide a method of backflow prevention. (½ mark)

Total 13 marks

ANSWER 2

(a) 700 (1 mark)

(b)

Camper Facilities				
	WC Pans	Urinals	Basins	Showers/baths
Female	12 - 2 marks	0	8 - 1 mark	8 - 1 mark
Male	10 - 2 marks	7 - 2 marks	8 - 1 mark	8 - 1 mark

Disabled access facilities		
WC Pans	Basins	Showers/baths
3 – 1 mark	3 – 1 mark	3 – 1 mark

(13 marks)

Total 14 marks

ANSWER 3

(a)

Location number	Hazard rating	Device type	Protection type
2	H	RPZ	C
5	H	RPZ	I
6	M	DCVA	I
9	M	DCVA	Z
14	M	DCVA	I
15	M	DCVA	I
16	H	RPZ	I

(12 marks)

(b) Install a bypass which includes a backflow preventer of the same type (rating) as the one being tested. (2 marks)

(c) Any ONE (1 mark)

To ensure the relief drain can discharge freely.

To stop contaminants entering the valve.

Any water discharge would be noticeable.

Total 15 marks

ANSWER 4

(a) (i) Parallel or Series. either one (1 mark)

(ii) Drawing to show list below to match answer in (i).

Correct location of inlet and outlet to panels.

Correct pipework linking each panel together.

Flow and return pipes labelled correctly. (3 marks)

(b) An advantage to match (a) (i).

Series:

Water must flow through all panels, therefore, when the system is working at its optimum the water will increase in temperature with each panel it travels through.

Parallel:

Panels are less likely to over heat.

Additional panels can be joined to the system more easily. (2 marks)

Total 6 marks

ANSWER 5

(a) Drawing to show

Points A and B connected to a heat exchanger coil/loop.

Heat exchanger to be located inside a storage cylinder.

Circuit of pipe work from storage cylinder to radiators and returning back to cylinder.

Pump located on return line from radiators.

Water supply and vent for secondary circuit. (5 marks)

(b) Any ONE (1 mark)

If indirect an anti-corrosion or similar additive can be used in the radiator circuit without contaminating supply to the hot water outlets.

The secondary circuit can be shut down separately or controlled by a timer.

Total 6 marks

ANSWER 6

(a)

Fixture	Number permitted per floor
Basins	5
Cleaner's sinks	1
Kitchen sinks	1
Wall hung urinals	5
WC pans	5
Showers	2

(3 marks)

(b)

Sanitary Fixture	Quantity	Total discharge units
Basin	5 (½ mark)	5 (1 mark)
Drinking fountain	1 (½ mark)	1 (1 mark)
Cleaners sink	1 (½ mark)	1 (1 mark)
Shower	2 (½ mark)	4 (1 mark)

(6 marks)

- (c) The basin must be highest fixture on stack.
Discharge pipe must be within the prescribed length for the system being installed.

(1 mark)

Total 10 marks

ANSWER 7

(a) Start with 10

Item	Minus
Basin to FWG incorrect size - 40mm	1
Basin to toilet branch incorrect size - 65mm	1
Basin to ORG - 32mm	0
Basin to ORG - 40 mm	0.5
Basin to ORG - 50+	1
Sink to drain incorrect size - 65 mm	1
Sink to FWG	3
Tub to FWG incorrect size - 50 mm	1
Shower to FWG incorrect size - 40 mm	1
Toilets - 80 mm	0
Toilets - 100 mm	0.5
HWC not charging FWG	1
FWG not correct size 65 mm	1
TV incorrect place or size - 50 mm	1
Main drain not 100 mm	1
Main drain doesn't reduce when possible - 65 mm	0.5
Un-economical design	3
Drains outside boundary on right of drawing	9
Gully dish or cleaning eye outside of boundary at head of drain	2
Gradient table completed incorrectly	1

(b) Correct gradients for pipework used in (a)

Diameter	Gradient
32	1:40 or 2.50%
40	1:40 or 2.50%
50	1:40 or 2.50%
65	1:40 or 2.50%
80	1:60 or 1.65%
100	1:60 or 1.65%

Total 10 marks

ANSWER 8

Hydraulic jump at base of stack

- (a) (i) The waste flows in a vortex (around the outside) of a vertical common discharge pipe.
The vertical pipe changes to horizontal.
The waste changes to a full bore flow in the horizontal pipe. (2 marks)
- (ii) The change in flow pattern creates a positive pressure zone at the change of direction.
This positive pressure can cause air/gas to blow through the water seals of traps on branches connected to the vertical pipe. (2 marks)
- (b) Any TWO (1 mark)
A vent pipe installed near the base of the vertical pipe.
A restricted area at the change of direction where no branches should be installed.
Use of a reduced velocity aerator stack.
Sweeping bends at base of stack.
Increase pipe diameter. (2 marks)

Hydraulic jump in fixture discharge pipe

- (a) (i) Water being discharged from fixture runs at full bore of the discharge pipe. (2 marks)
- (ii) The full bore flow creates a vacuum (reduced pressure) which siphons water from the fixture trap. (2 marks)
- (b) Any TWO (1 mark each)
Install a vent near the trap.
Install discharge pipe at the correct gradient.
Increase the diameter of the discharge pipe.
Use a resealing trap. (2 marks)

Total 6 marks

SECTION B

- 1 B 60 mm.
- 2 B 200 mm.
- 3 C 250 mm.
- 4 E 45°
- 5 D 15 years.
- 6 E 50 years.
- 7 D 15 years.
- 8 B 40 mm.
- 9 B 1.2 m
- 10 B 3
- 11 A In the event of a waste pipe blockage, dirty water from one sink could contaminate clean water in the other.
- 12 C To keep an effective water seal in the trap.
- 13 E 350 litres.
- 14 A To prevent the system from overheating.
- 15 E They are both uncontrolled heat sources.
- 16 A 4
- 17 D An Electric element connected to a solar water heating system.
- 18 D 32 mm.
- 19 C In the middle third.
- 20 E 600 mm.

Total 20 marks

