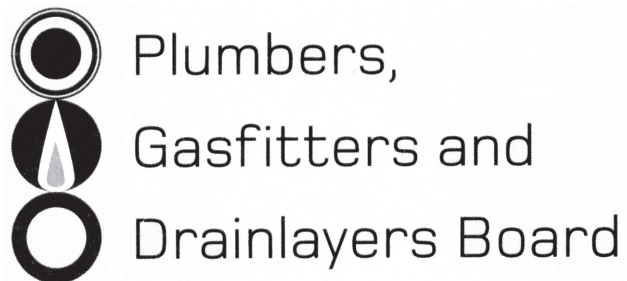


No. 9192



REGISTRATION EXAMINATION, JUNE 2008  
**PLUMBING**

**ANSWER SCHEDULE**



## ANSWER 1

- 1 Ensure all efforts have been made to locate any possible existing underground services so precautions can be taken to avoid them.
- 2 The proposed excavation does not effect the stability of neighbouring buildings or property.
- 3 Excavated materials or spoil should not be stacked near the edge of the excavation if there is any likelihood of the spoil falling back into the excavation or causing any side to collapse to be a potential hazard to any person working in or near the excavation.
- 4 Suitable barriers are erected and warning signs placed as appropriate to stop any person falling into the excavation.
- 5 Precautions should be taken to minimise the risk of the excavation flooding.
- 6 The sides of the excavation are sloped back sufficient to avoid collapse.
- 7 There is safe access to the excavation.
- 8 The excavation is inspected daily to ensure it remains safe against possible collapse.
- 9 The excavation is appropriately illuminated during hours of darkness.
- 10 The excavation is properly secured to avoid collapse caused by vehicles working in close proximity.

(½ mark each)

**Total 5 marks**

## ANSWER 2

- (a) (i) Upright and secured. (1 mark)
- (ii) If stored or used in a horizontal position, priming could occur which means the acetone could run to the cylinder outlet and be discharged to the atmosphere, which would allow the acetylene to collect within the cylinder to a dangerous proportion. Also, acetone if discharged during welding can have a deleterious effect on the weld. (2 marks)
- (b) Acetone. (1 mark)

**Total 4 marks**

### ANSWER 3

- (a) An acceptable test method to meet the minimum requirements of G12 ASI (NZ Building Code) is to:
- 1 carry out testing before concealing pipework behind interior linings, flooring, under or within concrete and before backfilling trenches
  - 2 isolate all fixtures, appliances, water tanks and other equipment which may be damaged during testing
  - 3 subject the pipework or system to a minimum test pressure of 1500 kPa for a period of not less than 15 minutes
  - 4 inspect the system to ensure there are no leaks.
- (b) (i) 450 mm
- (ii) 600 mm

(4 marks)

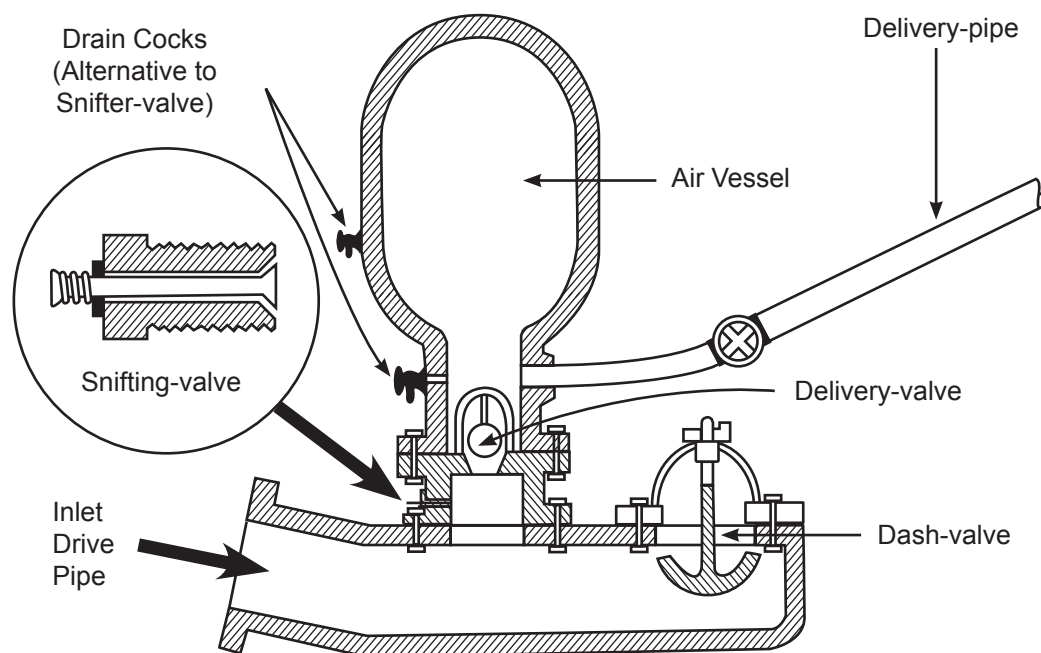
(2 marks)

**Total 6 marks**

### ANSWER 4

- (a) 1 The ram is only suitable in situations where an unlimited supply of water is available.
- 2 The ram must be situated below the water supply because the water is supplied to the ram via the drive pipe by gravity. (Head)

(1 mark each)  
(2 marks)



(b) Any FIVE:

- 1 Water flows from the reservoir or sources down the drive pipe, then it escapes through the dash valve which is held open by a weight attached to its stem.
- 2 The velocity of water increases producing enough pressure to force the dash valve closed against its seat.
- 3 The sudden stoppage of flow produces a shock wave within the ram. This is sufficient to open the delivery valve and allow water into the air chamber.
- 4 This halting of the water column in the drive pipe is so sudden and violent that the recoil moves against the water coming in from the supply source. In doing so it relieves the ram of all pressure allowing the dash valve to drop and the delivery valve to close.
- 5 The cycle is repeated as water begins to move down the drive pipe again.
- 6 As water continues to enter the air chamber it compresses the air. This in turn forces the water into the delivery pipe in a steady stream.
- 7 Air within the chamber will gradually be absorbed by the water. So to recharge the air automatically a one way snuffle valve that is located below the delivery valve allows air into the drive pipe when the pressure drops on each recoil. This is forced into the air chamber on the next charge of water entering it.

(½ mark each) (7 marks)

(c) Any FOUR:

- 1 The drive pipe must fall of at least 1m, but not exceed 6m.
- 2 The drive pipe should be large enough in diameter to obtain an adequate flow for quick and positive closure of the dash valve. In most instances the drive pipe is twice the diameter of the delivery pipe.
- 3 The drive pipe should be straight and have a uniform gradient.
- 4 The strainer at the inlet to the drive pipe should be at least 300mm below the lowest possible surface of the supply source to prevent air being drawn into the drive pipe. The drive pipe must remain below the surface of the water supply
- 5 The height to which the water is to be delivered should not, in general, be more than 6 to 8 times the available fall (h).

(4 marks)

**Total 13 marks**

## ANSWER 5

(a) Any ONE:

- 1 The galvanised pipe should be wrapped in a waterproof material (denso tape), with plastic tape encasing the waterproof material
- 2 Use a sacrificial anode
- 3 Sleeve the pipe

(1 mark)

(b) Any FIVE:

- 1 Use of suitable pipe material.
- 2 Use of suitable strong pipe supports or holders
- 3 Use of condensation trap/water filters on outlets to protect equipment
- 4 Fall on pipe runs to allow for the collection of condensation
- 5 Code identification
- 6 The noise from compressor

(5 marks)

**Total 6 marks**

## ANSWER 6

(a)

Radius	=	$0.550 \times 2 = \text{diameter} = 1.100$
Volume	=	$0.7854 \times d^2 \times H$
	=	$0.7854 \times 1.100^2 \times 1.500$
	=	$0.7854 \times 1.21 \times 1.500$
	=	1.4255
	=	1.426 m <sup>3</sup> correct to 3 decimal places

(3 marks)

(b)

V	=	$3.600 \times 1.400 \times 2.500$
	=	12.6m <sup>3</sup>
Capacity	=	$12.6 \times 1000 = 12600 \text{ litres}$
60% capacity	=	$12600 \times 0.6 = 7560 \text{ litres}$

(1 mark)

(1 mark)

(1 mark)

(3 marks)

**Total 6 marks**

## ANSWER 7

(a)  $12.200 \times 3.660 \times 2$  (1 mark)

=  $89.304\text{m}^2$  (1 mark)

(b)  $12.200 \times 2$

=  $24.400 \div 0.762$  (1 mark)

=  $32.021$  (accept 33) (1 mark)

(c)  $A^2 + B^2 = C^2$

$3.660^2 + 3.050^2 = \text{ridge length}^2$  (1 mark)

$13.395 + 9.302 = 22.697$

=  $4.764\text{m}$  (1 mark)

Total length of ridge

$6.1 + (4.764 \times 4)$

$6.1 + 19.056$

=  $25.156$  (1 mark)

$7.5\% = 1.887$  ( $\frac{1}{2}$  mark)

$25.156 + 1.887$

=  $27.043\text{m}$  ( $\frac{1}{2}$  mark)

(d)	Roofing	$32 \times 3.66 \times 9.2$	=	1077.50	OR	$33 \times 3.66 \times 9.2$	=	1111.17	(1 mark)
-----	---------	-----------------------------	---	---------	----	-----------------------------	---	---------	----------

	Ridging	$27.043 \times 13.3$	=	359.67		$27.043 \times 13.3$	=	359.67	(1 mark)
--	---------	----------------------	---	--------	--	----------------------	---	--------	----------

	Sub Total			1437.17			=	1470.85	
--	-----------	--	--	---------	--	--	---	---------	--

	22%		=	316.18			=	323.58	( $\frac{1}{2}$ mark)
--	-----	--	---	--------	--	--	---	--------	-----------------------

	Total		=	1753.35			=	1794.43	( $\frac{1}{2}$ mark)
--	-------	--	---	---------	--	--	---	---------	-----------------------

ANS		<u>\$1753.35</u>				<u>\$1794.43</u>		(1 mark)
-----	--	------------------	--	--	--	------------------	--	----------

**Total 12 marks**

## ANSWER 8

- (a) A heat pump extracts heat from the air, water or ground, and transfers that heat via a heat exchanger to the medium to be heated. (2 marks)
- (b)
- 1 The evaporator. Absorbs heat from a medium and converts the liquid refrigerant into a gas.
  - 2 The condenser. Causes the gaseous refrigerant to give up its heat and revert to a liquid.
  - 3 The compressor. Compresses and pressurises the refrigerant gas, thus raising its temperature.
  - 4 The reversing valve. Can reverse the refrigerant flow direction for winter or summer setting.
  - 5 The capillary tube. Reduces the high compressor-condenser pressure to the pressure required by the evaporator.
- (1 mark each) (5 marks)

**Total 7 marks**

## ANSWER 9

- (a) Damper: A device for manually controlling draught by altering the size of either the flue passage or the combustion air intake opening.
- (b) Flue Gases: The discharged products of combustion that develop when ever fuel is burnt.
- (c) Appliance Collar: The projection or spigot on an appliance to which the flue pipe is attached.
- (d) Flue Pipe: A sheet metal, or other approved pipe discharging products of combustion.
- (1 mark each) (4 marks)

**Total 4 marks**

## ANSWER 10

Any FOUR

- 1 Waste pipes discharging to a gully trap must be arranged so as to provide easy access for cleaning the gully trap.
- 2 Waste pipes must discharge over the gully trap.
- 3 Waste pipe outlets must terminate at least 20 mm below the grating of the gully trap.
- 4 Waste pipe outlets must terminate at least 20 mm above the water seal level of the gully trap.
- 5 Waste pipes must be sealed when passing through a gully dish.

**Total 4 marks**



## ANSWER 11

- (a) Where water could penetrate another house hold unit in the same building. (1 mark)
- (b) A drain point is required on every storage water heater of more than 45 litres capacity. (1 mark)
- (c) The drain point must incorporate an accessible control valve and terminate with a cap within the confines of the building envelope or cap only if exterior to the building. (1 mark)
- (d) 1 The non-return valves are required to prevent hot water back-flowing into the potable cold supply.
- 2 The non-return valve prevents the storage cylinder from accidentally emptying. (2 marks)

**Total 5 marks**

## ANSWER 12

- 1 Pressure limiting or pressure reducing valve

The pressure of the cold water supply is usually controlled by a pressure limiting or pressure reducing valve so the pressure limitations of the storage cylinders are not exceeded.

- 2 Filter

A line strainer to filter the supply and minimise the ingress of foreign particles, grit, etc to protect valving in the system.

- 3 Thermostat

The thermostat maintains the normal operating temperature of the water. The function is to turn the energy supply off and on.

- 4 Energy cut out device

The energy cut out device is a safety override cutting off the energy should the thermostat fail. This must be manually reset alerting the user to the fact that something is wrong.

- 5 Cold water expansion valve

An expansion valve is fitted at the cold water inlet at the bottom of the water heater to relieve water pressure ensuring that the pressure does not exceed the allowable limit discharging excess cold water rather than hot. Thus minimising dezincification of the hot water pressure relief. This is also the purpose of the pressure relief function of the temperature and pressure relief valve which is fitted to the top of the water heater.

- 6 Temperature relief and pressure relief valve

The temperature relief function of this valve is the vital safety control of the system relieving before the temperature reaches the danger point of 100°C. Relieves over pressure.

(1 mark purpose, 1 mark function)

**Total 12 marks**

### ANSWER 13

- (a) Total working head is the total suction lift plus the total delivery head plus the velocity head (frictional loss). This is the amount of head the pump must overcome before water will flow out of the delivery pipe. (2 marks)
- (b) Friction head is the head necessary to overcome resistance to the motion of fluids in pipes and fittings. (2 marks)
- (c) Static suction head is the vertical distance from the liquid that is to be pumped to the centre of the pump. (2 marks)
- (d) Total delivery head is the static delivery head plus the friction head in the delivery pipe system. (2 marks)

**Total 8 marks**

### ANSWER 14

- 1 Order the name of the registered person to be removed from the appropriate register. (1 mark)
- 2 Order that the registered person's registration be suspended for a period not exceeding 12 months. (1 mark)
- 3 Impose a fine on the registered person not exceeding \$10,000.00 (1 mark)
- 4 Order that the registered person be censured. (1 mark)
- 5 Order the person to pay the whole or any part of the costs and expenses of and incidental to the enquiry by the Board and the preceding investigation by an investigator. (1 mark)

**Total 5 marks**

### ANSWER 15

- (a) Every person must hold a current licence or a limited certificate which must indicate the classification applying to the licence or limited certificate. (1 mark)
- (b) (i) 24 hours
- (ii) 24 hours (2 mark)

**Total 3 marks**



