

Affix label with Candidate Code
Number here.
If no label, enter candidate
Number if known

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No. 9192



Plumbers,
Gasfitters and
Drainlayers Board

REGISTRATION EXAMINATION, JUNE 2009

PLUMBING

QUESTION AND ANSWER BOOKLET

Time allowed THREE hours

INSTRUCTIONS

Check that the Candidate Code Number on your admission slip is the same as the number on the label at the top of this page.

Do not start writing until you are told to do so by the Supervisor.

Total marks for this examination: 100.

The pass mark for this examination is 60 marks.

Write your answers and draw your sketches in this booklet. If you need more paper, use the blank pages at the back of this booklet. Clearly write the question number if any of these pages are used.

All working in calculations must be shown.

Candidates are permitted to use the following in this examination:

Drawing instruments, approved calculators

The following are NOT permitted in the examination room:

Any publications, Acts, Regulations, Codes of Practice, or Standards

Check that this booklet has all of 25 pages in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION

QUESTION 1

- (a) State where an isolating transformer or residual current device (RCD) should be connected in order to provide electrical safety protection.

(1 mark)

- (b) A trench is to be dug 1.700m deep.

State SIX safety measures, excluding personal protection equipment (PPE), that could be taken to protect workers when working in the trench.

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

(6 marks)

- (c) The New Zealand Building Code G12/AS1 gives maximum temperatures at which hot water may be discharged when serving sanitary fixtures used for personal hygiene.

State this temperature for:

- (i) schools, old people's homes and early childhood centres

- (ii) domestic dwellings.

(1 mark)

Total 8 marks

QUESTION 2

(a) The temperature and pressure relief valve on a domestic hot-water cylinder is releasing steam.

(i) State what action should be taken immediately.

(ii) Give a possible cause of this condition.

(2 marks)

(b) A water heating system is required to heat water for both a radiator heating system and a potable hot water supply.

State the type of system that must be used.

(1 mark)

(c) Explain the following terms in relation to a hot water system that uses a plate heat exchanger.

(i) Primary flow:

(ii) Secondary flow:

(2 marks)

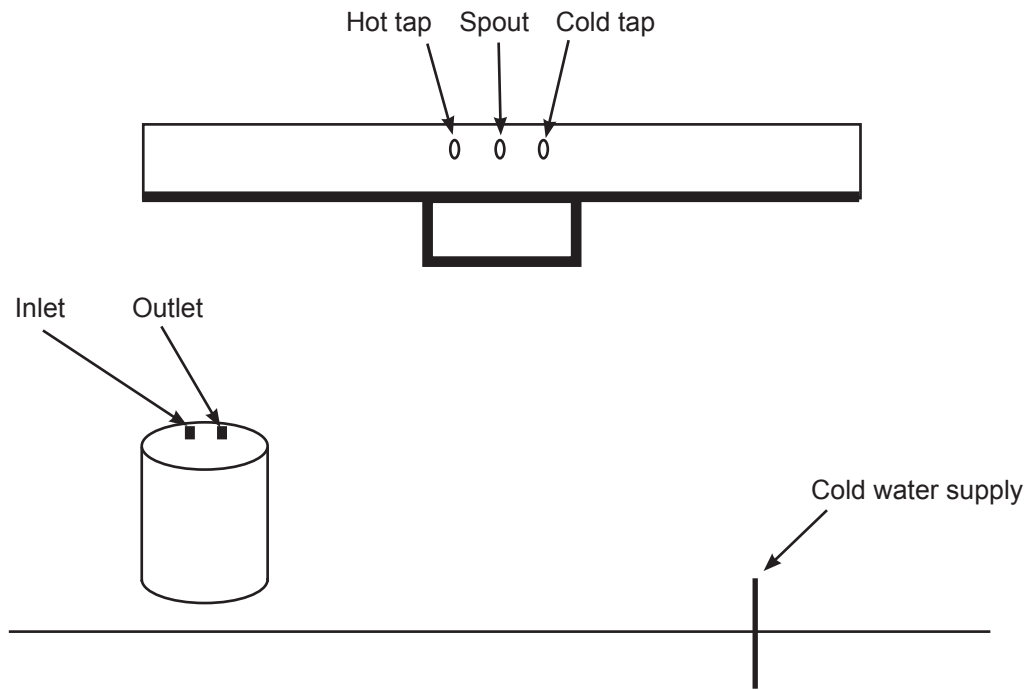
QUESTION 2 (cont'd)

(d) The starter drawing below is of a free outlet (push through) hot water service supplying hot and cold water to a sink.

The capacity of the hot water cylinder is 10 litres.

Both hot and cold water are to discharge through the centre spout over the sink bowl.

Complete the hot and cold water service and label all relevant points.



(3 marks)

Total 8 marks

QUESTION 3

- (a) State the THREE requirements a person must meet to become registered with the Plumbers, Gasfitters and Drainlayers Board as a registered plumber.

1 _____

2 _____

3 _____

(3 marks)

- (b) Give TWO occasions when a plumber must give 24 hours notice to any Territorial Authority regarding plumbing installations.

1 _____

2 _____

(2 marks)

QUESTION 3 (cont'd)

(c) A solid fuel space heater is to be installed.

State FOUR New Zealand Building Code requirements that must be met regarding the installation.

1 _____

2 _____

3 _____

4 _____

(4 marks)

(d) State when it is necessary to provide overflow outlets to roof gutters.

(1 mark)

(e) Complete the following Functional Requirement as stated in the New Zealand Building Code Clause G13 Foul Water.

Functional Requirement

Buildings in which sanitary fixtures and sanitary appliances using waterborne waste disposal are installed must be provided with an adequate plumbing and drainage system to...

(1 mark)

Total 11 marks

QUESTION 4

(a) A pump is to be installed in the basement of a two-storey dwelling.

The pump is to supply water to the upper floor of the dwelling from a water supply below the level of the pump.

Give FOUR items of information required when selecting the pump.

- 1 _____
- 2 _____
- 3 _____
- 4 _____

(4 marks)

(b) A hydro-pneumatic pressure system installed in a domestic situation has a waterlogged pressure vessel.

(i) State the probable effect this will have on the system.

(ii) State what action is required to remedy the situation.

(2 marks)

(c) A new 100mm potable water main has been installed.

List TWO procedures that must be carried out on the water main before the supply is put into service.

- 1 _____
- 2 _____

(2 marks)

QUESTION 4 (cont'd)

- (d) A plumber has arrived at an occupied apartment block to carry out repairs to the metallic water main.

It is necessary for the plumber to cut through a section of the main.

After having exposed the main, list FOUR steps the plumber should carry out before cutting the pipe.

- 1 _____
- 2 _____
- 3 _____
- 4 _____

(2 marks)

- (e) An open-vented low pressure water system is being installed.

State TWO ways in which the performance of the system will be affected if it does not have the correct hydraulic gradient.

- 1 _____
- 2 _____

(2 marks)

- (f) A well is one form of water supply.

Give the essential feature of the following wells.

- (i) Deep well

- (ii) Shallow well

(2 marks)

Total 14 marks

QUESTION 5

(a) (i) Explain how electrolysis occurs.

(ii) State an effect of electrolysis.

(3 marks)

(b) Describe the following physical properties of plumbing materials.

(i) Ductility: _____

(ii) Conductivity: _____

(iii) Malleability: _____

(iv) Tenacity: _____

(v) Fusibility: _____

(5 marks)

(c) Explain what is meant by the term ambient temperature.

(1 mark)

Total 9 marks

QUESTION 6 (cont'd)

(b) A cylindrical tube is to be constructed from a flat sheet.

The tube is to be 400mm in diameter and 1.200m in length.

A 20mm allowance is to be made for the seam.

Calculate the area of sheet metal required.

Show all working to three decimal places.

Formula:

$$C = \pi \times D$$

where

C = Circumference

D = Diameter

(2 marks)

QUESTION 6 (cont'd)

(c) A hydraulic ram is supplied with 320 litres of water per hour.

The head of water on the inlet side of the ram is 3.500m.

The ram must lift the water 6.000m to fill the tank.

The efficiency of the ram is 55%.

Calculate the quantity of water per hour delivered by the ram.

Show all working to three decimal places.

Formula:

$$q = \frac{Q \times h \times e}{100 \times H}$$

where

q = number of litres of water delivered per hour

Q = number of litres of water flowing to the ram per hour

h = head on inlet side of ram in metres

e = efficiency of ram (%)

H = height to which water is raised in metres

(2 marks)

Total 7 marks

QUESTION 7

Name the THREE types of view of a building that may be shown on a set of building plans.

- 1 _____
- 2 _____
- 3 _____

Total 3 marks

QUESTION 8

(a) A heating and ventilation system is to be installed in a building.

List FOUR factors used to determine the number of air changes per hour that are required.

- 1 _____
- 2 _____
- 3 _____
- 4 _____

(4 marks)

(b) A reliable supply of dust-free air is not available for a ducted supply-air ventilating system.

State what should be done to rectify the situation.

- _____
- _____

(2 marks)

(c) State TWO advantages of a mechanical inlet and natural return air supply system.

- 1 _____
- _____
- 2 _____
- _____

(2 marks)

(d) State the effect of a clogged air filter on a ventilation system.

- _____

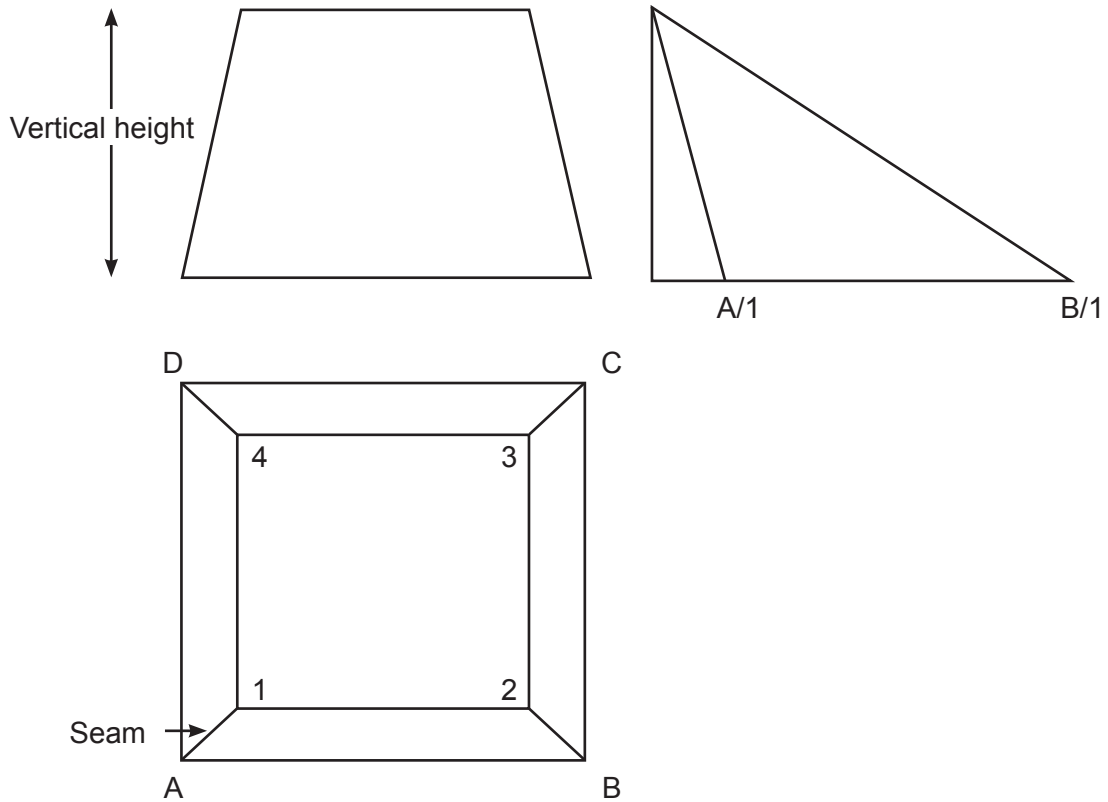
(1 marks)

Total 9 marks

QUESTION 9

The drawings below show a square to square transition.

On the page opposite, develop the pattern from the information provided by using the triangulation method. Use the line AB drawn to start the development.



Total 5 marks



QUESTION 10

(a) A valve train is fitted to the supply line for a mains pressure hot water cylinder.

A cold water expansion (relief) valve is to be fitted in the valve train.

State TWO requirements that must be met when determining the pressure rating for the valve.

1 _____

2 _____

(2 marks)

(b) State the purpose of a pressure limiting valve in the cold water supply line to a mains pressure hot water cylinder.

(1 mark)

(c) Give TWO reasons for fitting a cold water relief valve to a mains pressure hot water cylinder.

1 _____

2 _____

(2 marks)

QUESTION 10 (cont'd)

(d) State TWO installation factors that must be considered when installing cold water expansion valves and temperature-pressure relief valves.

1 _____

2 _____

(2 marks)

(e) Name TWO types of valve that can be used to control the cold water supply pressure to a hot water cylinder.

1 _____
2 _____

(1 mark)

(f) Multiple water heaters are to be installed in parallel.

State TWO requirements the pipework must meet in relation to water flow.

1 _____

2 _____

(2 marks)

Total 10 marks

QUESTION 11

(a) Water seal loss in a sanitary fixture trap may be caused by momentum.

Explain how this occurs.

(2 marks)

(b) Water seal loss in a sanitary fixture trap may be caused by oscillation.

Explain how this occurs.

(2 marks)

(c) State the minimum performance requirement of any urinal flushing apparatus.

(1 mark)

Total 5 marks

QUESTION 12

- (a) Explain the term break tank in relation to plumbing.

(1 mark)

- (b) Draw the side elevation of an above ground water meter installation and name all the components. Indicate the direction of flow and ground level.

(4 marks)

QUESTION 12 (cont'd)

- (c) Using drawing equipment, draw a schematic diagram of a testable double check valve backflow prevention device.

Show all test points to enable full testing of the device.

Clearly label all components.

(3 marks)

- (d) Using drawing equipment, draw a line drawing of a vacuum column suitable for back flow protection. Show the relevant measurement.

(1 mark)

QUESTION 12 (cont'd)

(e) State TWO methods of preventing backflow from a sanitary fixture in a domestic dwelling.

1 _____

2 _____

(2 marks)

Total 11 marks

For Examiner's use only

| Question number | Marks | Marks |
|-----------------|-------|-------|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |
| 10 | | |
| 11 | | |
| 12 | | |
| Total | | |