

Affix label with Candidate Code
Number here.
If no label, enter candidate
Number if known, or name here.
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(Supervisor's Code only)

No. 9195



Plumbers,
Gasfitters and
Drainlayers Board

In cooperation with
New Zealand Qualifications Authority

CRAFTSMAN EXAMINATION, 2005 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.

The pass mark for this examination is 60 marks.

Write your answers and draw your sketches in this booklet. If you need more paper, ask the Supervisor for extra sheets. Write your Candidate Code Number and the number 9195 on any extra sheets used, and attach them to this booklet. **NO SEPARATE ANSWER BOOKLET IS TO BE USED.** Write the number of extra sheets used in the box on the last page of this booklet. Write **NIL** if you have not used any.

All working in calculations must be shown.

Candidates are permitted to use the following in this examination:

Drawing instruments, approved calculator

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 16 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

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QUESTION 1

- (a)** Explain what the Health and Safety in Employment Act 1992 requires, in relation to the provision of backflow prevention.

(2 marks)

- (b)** State THREE requirements of the New Zealand Building Code for the testing of backflow prevention devices.

1

2

3

(3 marks)

- (c)** Explain a building owner's responsibility regarding the continued effectiveness of backflow prevention.

(3 marks)

Total 8 marks

QUESTION 2

(a) When installing pumps for supplying water, list SIX general rules that should be considered to ensure trouble-free operation. Assume the pump is the correct one for the job and there is an adequate supply of clean water.

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

(6 marks)

(b) List FIVE separate systems that may be required in the design of a water system for a multi-storey building.

1 _____

2 _____

3 _____

4 _____

5 _____

(5 marks)

(c) List THREE advantages of the **direct system** of cold water supply within a multi-storey building.

1 _____

2 _____

3 _____

(3 marks)

QUESTION 2 (contd)

(d) List FIVE advantages of the **indirect system** of cold water supply within a multi-storey building.

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

(5 marks)

(e) State EIGHT requirements for the installation of a **storage tank** supplying water for flushing WC pans.

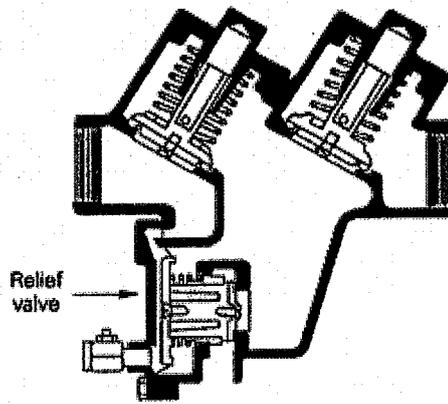
- 1 _____
- 2 _____
- 3 _____
- 4 _____
- 5 _____
- 6 _____
- 7 _____
- 8 _____

(4 marks)

Total 23 marks

QUESTION 3

Name the device shown in the illustration provided, and explain how it operates under the conditions stated in (b) to (c).



(a) **Name of device:** _____ (1 mark)

(b) **Normal Operation**

(2 marks)

(c) **No flow**

(2 marks)

QUESTION 3 (contd)

(d) Back-siphonage protection

(2 marks)

(e) Backpressure protection

(2 marks)

QUESTION 3 (contd)

(f) The valve shown is to be installed inside a building.
State SIX factors that must be considered in deciding on the location of the valve.

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

(3 marks)

(g) Name TWO acceptable backflow prevention devices that can be used in the installation of any medical, dental, mortuary, or veterinary equipment that requires connection to a potable water supply system.

1 _____

2 _____

(2 marks)

Total 14 marks

QUESTION 4

Complete the diagram below by

drawing in all the **pipework** and **valves** necessary for the design of an **indirect, combined flow and return, potable hot-water supply and heating system.**

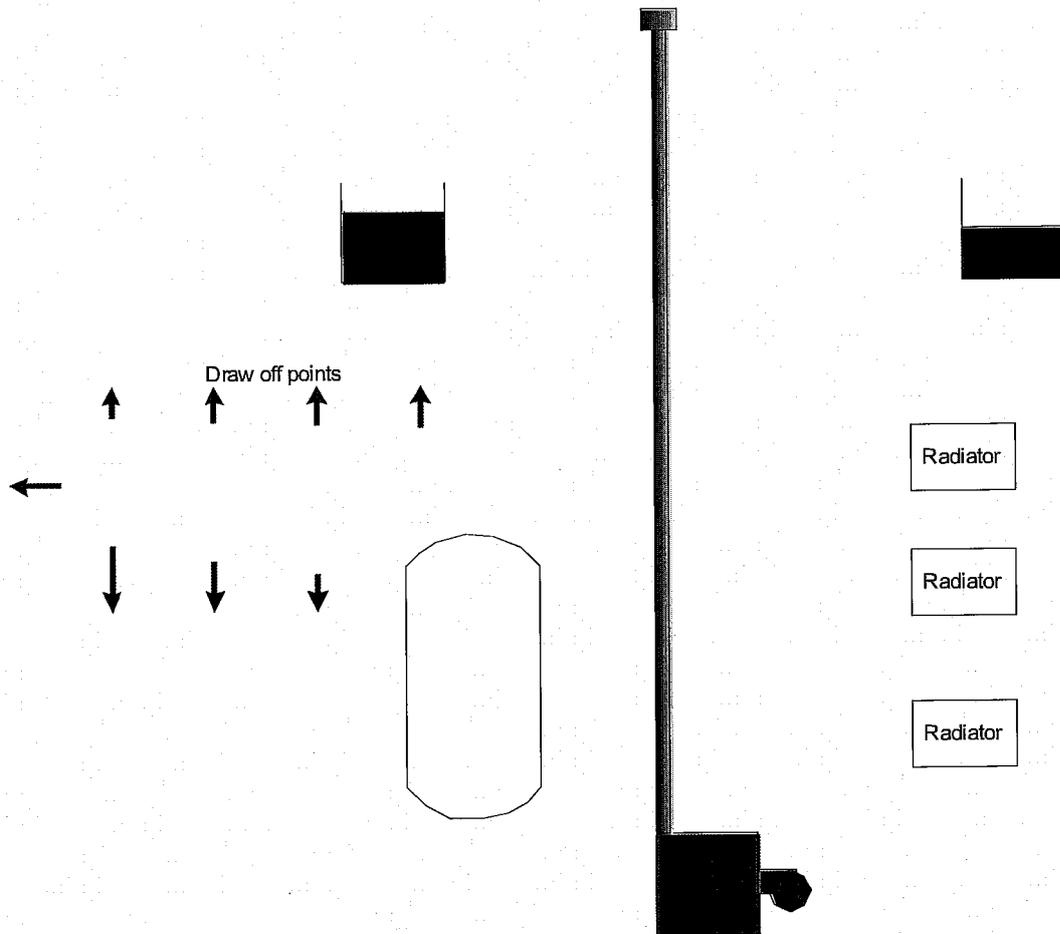
- Label all the **pipework,**
- **radiators,**
 - **valves,**
 - **drain points.**

Show the position of the **circulating pumps** on the secondary hot water supply circuit and the heating circuit.

For reasons of clarity, tempering and radiator/lockshield valves should be omitted.

Note: 2 marks for clarity

Total 16 marks



QUESTION 5

All working must be shown for each question.

Your answers are to be correct to **three decimal places**.

- (a) A cylindrical water supply tank has a **radius** of 250 mm and stands 1200 mm high. Calculate its **capacity in litres** when it is **80%** full.

Formula: $V = 0.7854 \times D^2 \times H$

Where: $V =$ Volume in cubic metres (m^3)

$D =$ Diameter of tank in metres (m)

$H =$ Tank height in metres (m)

(3 marks)

QUESTION 5 (contd)

- (b) Calculate the **number of litres** of hot water at 70 °C required to produce 1000 litres of **warm water** at 44 °C when mixed with **cold** at 15 °C.

Formula: Litres of hot water required = $\frac{\text{Litres of warm water required} \times \text{Temperature rise from cold to mixed}}{\text{Temperature rise from cold to hot}}$

(2 marks)

QUESTION 5 (contd)

- (c) Calculate the heat input, expressed as **kW/h**, required to heat 180 litres of water from 10 °C to 65 °C.

The specific heat capacity of water is: the heat in **kilojoules (kJ)** required to raise the temperature of 1 kg of water by 1 °C = 4.18 **kJ**.
and

3.6 MJ = 1 kW/h

Formula: Heat Input = Temperature difference × Mass × Specific heat capacity

(3 marks)

Total 8 marks

QUESTION 6

In foul water systems, trap seals can be lost due to air pressure fluctuations. Name FIVE causes of trap seal loss and provide a brief explanation for EACH.

(1) Cause: _____

Explanation: _____

(2) Cause: _____

Explanation: _____

(3) Cause: _____

Explanation: _____

(4) Cause: _____

Explanation: _____

(5) Cause: _____

Explanation: _____

(Causes 1 mark each, explanations 1 mark each)

Total 10 marks

QUESTION 7

In the space provided and using your knowledge of AS/NZS 3500.2:2003, neatly and accurately, using a ruler, draw a **floor waste gully** with two waste pipes connected to it indicating:

- The two angle options for the entry of the waste pipes to the floor waste gully (2 marks)
 - The maximum length of a trapped waste pipe (1 mark)
 - The maximum length of an untrapped waste pipe (1 mark)
 - The maximum depth of the floor waste gully - indicate measuring points (1 mark)
 - The minimum depth of the floor waste gully. Indicate measuring points (1 mark)
 - The grating requirement (1 mark)
 - The minimum diameter of the riser for the floor waste gully intended usage (1 mark)
- Note: Neatness and accuracy. (1 mark)

Total 9 marks

QUESTION 8

(a) State TWO advantages that a single-stack modified system has over a single-stack system.

- 1 _____
- 2 _____ (2 marks)

(b) Describe how the advantages identified in part (a) are achieved.

- 1 _____
- 2 _____ (2 marks)

(c) You are designing foul water disposal systems to comply with the acceptable solutions of the New Zealand Building Code.

Identify TWO reference documents you could use for establishing unit discharge loadings.

- 1 _____
- 2 _____ (2 marks)

Total 6 marks

QUESTION 9

State SIX ways to reduce the risk of corrosion in the design and fixing of exterior metal flashings.

- 1 _____

- 2 _____

- 3 _____

- 4 _____

- 5 _____

- 6 _____

(6 marks)

Total 6 marks

For Candidate's use

Number of EXTRA sheets used (write NIL if none have been used).	
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For Examiner's use only

Questions Answered	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
Total	