

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, NOVEMBER 2008

# 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

With regard to hot water services, fully describe the following.

(a) (i) Thermo siphon circulation.

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(2 marks)

(ii) Stratification.

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(1 mark)

(b) (i) Explain what is meant by pumped circulation and give an example of where it would be used.

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(2 marks)

**QUESTION 1 (cont'd)**

- (ii) Explain what is meant by the term boiling point and describe the effect that increasing pressure will have on it.

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(2 marks)

- (iii) Name the method by which energy is transferred from the sun to a solar panel.

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(1 mark)

**Total 8 marks**

## QUESTION 2

- (a) (i) Insulation is one method to minimise heat loss from pipe work in a domestic hot-water system. Give another method of how to minimise heat loss and assist the efficiency of the system at the same time.

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(1 mark)

- (ii) State the principle that the convective movement in a hot-water cylinder relies on.

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(1 mark)

- (iii) State when an indirect calorifier system would be required for hot water heating.

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(1 mark)

- (iv) State how many isolating valves may be installed on the flow or return pipes from a wet back to hot water storage cylinder.

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(1 mark)

**QUESTION 2 (cont'd)**

(b) Give the meaning of the following terms.

(i) Sensible heat.

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(1 mark)

(ii) Specific heat.

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(1 mark)

(iii) Latent heat.

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(1 mark)

(iv) Absolute zero as a temperature.

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(1 mark)

**QUESTION 2 (cont'd)**

(c) If the temperature of water is increased state the effect on the following.

(i) Volume of the water.

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(1 mark)

(ii) Density of the water.

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(1 mark)

(iii) Pressure of the water if it completely fills a closed vessel.

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(1 mark)

(iv) The boiling point of the water.

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(1 mark)

**Total 12 marks**

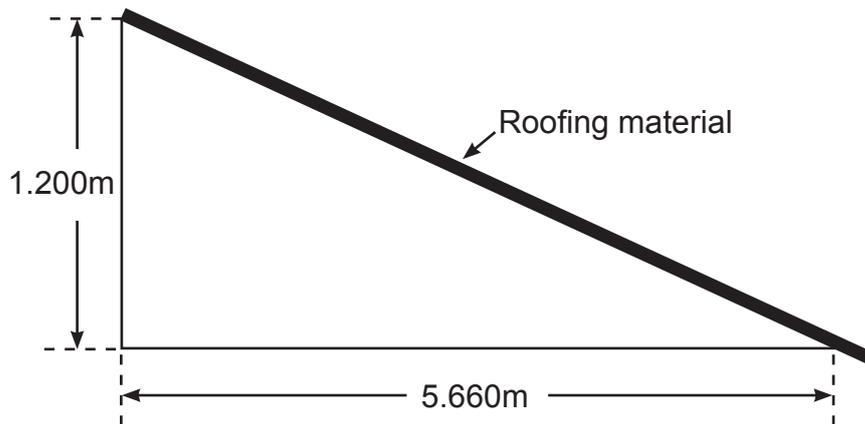
### QUESTION 3

- (a) The drawing below shows the end elevation of a corrugated profile roof. The roofing material extends 50mm into the gutter.

The fascia length (gutter length) is 12.200m and the effective cover of each corrugated roofing sheet is 680mm.

Corrugated roofing cost is \$8.20 per lineal metre,

Formula:  $\text{hypotenuse}^2 = \text{vertical height}^2 + \text{base}^2$



- (i) Calculate the total length of each corrugated roofing sheet.

Show all working to three decimal places.

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(2 marks)

**QUESTION 3 (cont'd)**

(ii) Calculate the number of full sheets of corrugated roofing required.

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(1 mark)

(iii) Calculate the total cost of corrugated roofing.

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(1 mark)

(b) A metallic water pipe 500mm in length contains 8.836 litres of water.  
Calculate the internal diameter of this pipe in mm.  
Show all working.

Formula:  $V = D^2 \times 0.7854 \times L$   
where  $V =$  volume in cubic metres  
 $D =$  diameter in metres  
 $L =$  length in metres.

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(3 marks)

**Total 7 marks**

#### QUESTION 4

In relation to sanitary plumbing explain the meaning of the following terms.

(a) Water seal

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(b) Fixture pair

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(c) Vertical pipe

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(d) Ventilating pipe

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(e) Surcharge

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(f) Soil pipe

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(g) Floor waste gully trap

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**QUESTION 4 (cont'd)**

(h) Relief vent

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(i) Discharge pipe

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(j) Graded pipe

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**Total 10 marks**



**Total 6 marks**

**QUESTION 6**

(a) State the purpose of the sacrificial anode in a mains pressure hot water cylinder, and explain how it achieves this.

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(2 marks)

(b) State FOUR conditions which can lead to accelerated corrosion of the interior of a mains pressure hot water cylinder.

1 \_\_\_\_\_

2 \_\_\_\_\_

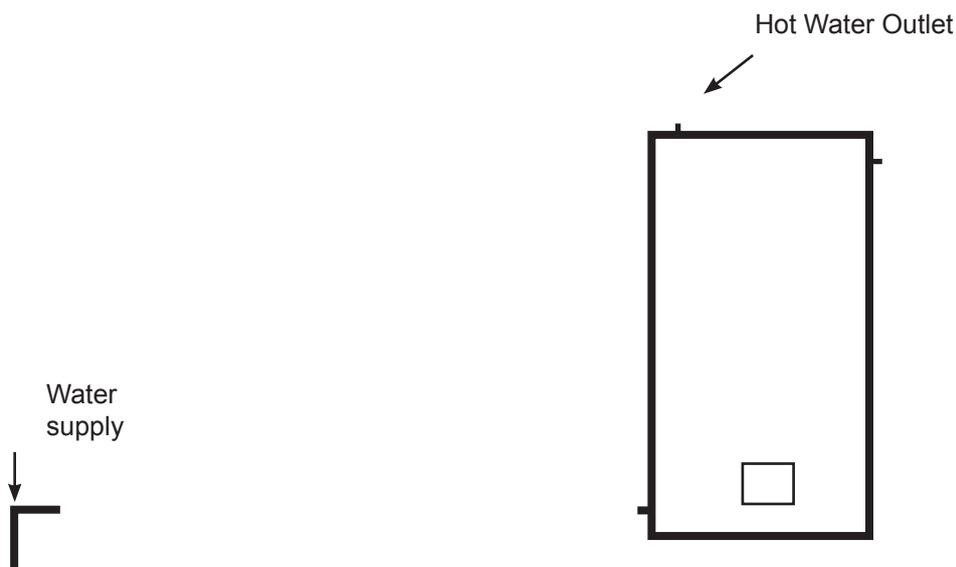
3 \_\_\_\_\_

4 \_\_\_\_\_

(2 marks)

(c) The starter drawing below shows a mains pressure valve vented hot water storage cylinder for personal hygiene.

Complete the drawing to show all valves, and label all parts, so that the system complies with the New Zealand Building Code. Show all valves individually.



(4 marks)

**Total 8 marks**

**QUESTION 7**

(a) State THREE New Zealand Building Code requirements which must be met when installing a solid fuel space heater.

1 \_\_\_\_\_  
\_\_\_\_\_  
2 \_\_\_\_\_  
\_\_\_\_\_  
3 \_\_\_\_\_  
\_\_\_\_\_

(3 marks)

(b) When installing the flue of a solid fuel heater, certain criteria must be met.

(i) Draw a sketch to demonstrate which way the socket end of a solid fuel heater flue should be installed (up or down).

(1 mark)

(ii) Give the reason why the socket in (i) should be installed as shown, and state the consequences if the socket is incorrectly installed.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(2 marks)

**Total 6 marks**

**QUESTION 8**

(a) (i) List the FOUR main aspects of an air conditioning and ventilation system that affect the comfort of users of the system.

1 \_\_\_\_\_  
2 \_\_\_\_\_  
3 \_\_\_\_\_  
4 \_\_\_\_\_

(2 marks)

(ii) Name the TWO types of fans most commonly used in air conditioning systems, and describe the pattern of air flow for each.

Fan: \_\_\_\_\_

Air flow: \_\_\_\_\_  
\_\_\_\_\_

Fan: \_\_\_\_\_

Air flow: \_\_\_\_\_  
\_\_\_\_\_

(2 marks)

(iii) Explain the meaning of the term absolute humidity.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(1 mark)

**QUESTION 8 (cont'd)**

(iv) State how absolute humidity is expressed.

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(1 mark)

(b) Explain fully how a basic refrigeration circuit produces a cooling effect.

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(4 marks)

**Total 10 marks**

**QUESTION 9**

- (a) Explain the meaning of the term sanitary appliance, and give TWO examples of sanitary appliances.

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(3 marks)

- (b) State the name of the sanitary plumbing system in which the stack and discharge pipes also serve as vent pipes.

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(1 mark)

- (c) New Zealand Building Code Clause G13 Foul Water gives a definition of a waste water fixture. Using your knowledge of this code, state what a waste water fixture is NOT.

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(1 mark)

- (d) State THREE methods of automatically achieving a safe water temperature for sanitary fixtures used for personal hygiene.

1 

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2 

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3 

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(3 marks)

**Total 8 marks**

## QUESTION 10

(a) Using your knowledge of the New Zealand Building Code, answer the following questions in regard to water supply.

(i) Explain the meaning of the term cross connection.

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(1 mark)

(ii) State the principal purpose of a back-flow preventer.

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(1 mark)

(iii) Depending on the hazard rating, a double-check valve device may be used to prevent back flow. List the components that must be incorporated in the valve train and device to allow for testing.

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(2 marks)

**QUESTION 10 (cont'd)**

(b) Give FIVE causes of resistance to flow in piped water supply systems.

1 \_\_\_\_\_  
\_\_\_\_\_

2 \_\_\_\_\_  
\_\_\_\_\_

3 \_\_\_\_\_  
\_\_\_\_\_

4 \_\_\_\_\_  
\_\_\_\_\_

5 \_\_\_\_\_  
\_\_\_\_\_

(5 marks)

**Total 9 marks**

**QUESTION 11**

(a) Describe TWO checks that should be carried out if the overflow from the temperature and pressure relief valve on a mains pressure storage hot water cylinder runs continuously or runs for long periods of time.

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(2 marks)

(b) The installation of a low pressure valve vented storage hot water heater requires several controls or valves. List SIX of these.

1 

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2 

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3 

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4 

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5 

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6 

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(3 marks)

(c) Using your knowledge of the New Zealand Building Code Clause G12/AS1.

(i) state the minimum diameter of a relief drain serving combined relief valve drains.

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(ii) state the drain size in relation to the largest relief valve outlet.

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(1 mark)

**Total 6 marks**

**QUESTION 12**

- (a) Having applied to the Plumbers, Gasfitters, and Drainlayers Board for registration and your first practising licence, state what is then required of you on an annual basis under the Plumbers, Gasfitters and Drainlayers Act.

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(2 marks)

- (b) With regard to the Plumbers, Gasfitters, and Drainlayers Act, answer the following.

- (i) Name TWO groups of people who are required to hold a limited certificate to do sanitary plumbing.

1 \_\_\_\_\_

2 \_\_\_\_\_

(2 marks)

- (ii) State what restriction is initially placed on a person not in a formal training agreement who has been granted a limited certificate, and for how long the restriction applies.

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(3 marks)

- (iii) State the minimum continuous period that a person (other than a person who is in a formal training agreement) who wishes to sit the examination for registration as a plumber and/or gasfitter is required to have held a limited certificate.

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(1 mark)

**QUESTION 12 (cont'd)**

(iv) State who is required to countersign every application for a limited certificate.

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(2 marks)

**Total 10 marks**









For Examiner's use only

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