

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

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No. 9193



Plumbers,  
Gasfitters and  
Drainlayers Board

## REGISTRATION EXAMINATION, NOVEMBER 2008

# GASFITTING

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 21 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) When investigating the suitability of a cupboard for the installation of a gas fired storage water heater, several factors should be considered. List SIX of these.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

4 \_\_\_\_\_

5 \_\_\_\_\_

6 \_\_\_\_\_

(3 marks)

- (b) Using your knowledge of NZS 5261, list FIVE checks a gasfitter should carry out prior to commencing a new gas installation.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

4 \_\_\_\_\_

5 \_\_\_\_\_

(5 marks)

- (c) Having checked that the gas rate is correct, the gasfitter notices that flames are emerging from the top of the radiant of a flued gas space heater. List FOUR likely causes of this.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

4 \_\_\_\_\_

(4 marks)

**Total 12 marks**

## QUESTION 2

- (a) (i) State the reason for odorising natural gas and liquefied petroleum gas.

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(1 mark)

- (ii) Explain why low level ventilation must be installed in a locker where an LPG cylinder is located, and state where that ventilation must terminate.

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(2 marks)

- (b) Gases have different properties and behave in different ways. From the list provided, complete the following table for the two gases shown.

**List**

2.4% to 9.5%

10 to 1 approximately

0.65

102 MJ/m<sup>3</sup>

25 to 1 approximately

5% to 14%

40 MJ/m<sup>3</sup>

1.55

	<b>LPG</b>	<b>Natural gas</b>
Main constituent gases	Propane / Butane	Methane
Air / gas mixture ratio		
Heat (calorific) value		
Flammability range		
Relative density		

(2 marks)

**QUESTION 2 (cont'd)**

(c) Explain the purpose of each of the following thermostats.

(i) Direct acting thermostat.

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(2 marks)

(ii) Indirect acting thermostat.

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(2 marks)

(iii) Modulating thermostat.

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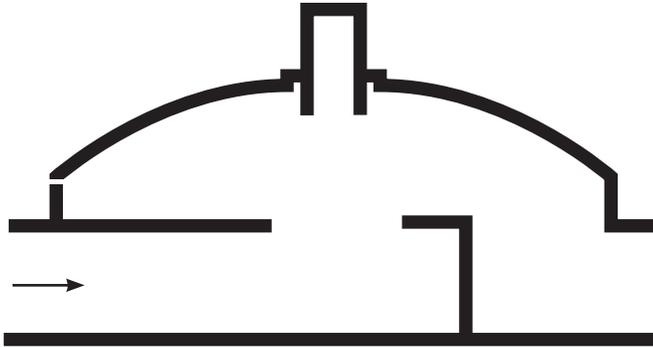
(2 marks)

**Total 11 marks**

### QUESTION 3

- (a) The starter drawing below shows a cut away section of a spring loaded constant pressure appliance regulator.

Complete the drawing to show all component parts. Label all parts of the regulator.



(2 marks)

- (b) (i) The primary air to a gas flame is closed off. Describe the appearance of the gas flame now, and state what may be deposited.

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(2 marks)

- (ii) If the temperature of liquified petroleum gas (LPG) is decreased to minus 45°C (-45°C), state the effect on the following.

Volume: \_\_\_\_\_

Density: \_\_\_\_\_

Pressure in a closed system: \_\_\_\_\_

State: \_\_\_\_\_

(2 marks)

**QUESTION 3 (cont'd)**

(iii) In relation to gases, state Charles's Law.

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(2 marks)

(iv) In relation to gases, state Boyle's Law.

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(2 marks)

**Total 10 marks**

**QUESTION 4**

(a) A room has the following dimensions.

Length: 4.000m  
Width: 3.800m  
Height: 2.700m

A gas heater is to be installed in the room.

Calculate the input rating of the heater. Show all working.

Assume a heat rate input requirement of 0.36 MJ/m<sup>3</sup>

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(2 marks)

(b) A liquefied petroleum gas (LPG) appliance has an energy input of 4.5kW. Calculate the gas rate in m<sup>3</sup>/hr for the appliance.

The heating value of LPG is given as 90 MJ/m<sup>3</sup>.

1 kW = 3.6 MJ.

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(2 marks)

**QUESTION 4 (cont'd)**

(c) The pipe work for a gas installation consists of:

- 12.5m of 40mm diameter pipe
- 28m of 20mm diameter pipe
- 10m of 10mm diameter pipe.

Calculate the total volume of gas contained in the pipe work, and calculate how many MJ of heat will be given off assuming the gas was completely burnt. Show all working to 3 decimal places.

The heat value of the gas is given as 40MJ/m<sup>3</sup>.

Formula: Volume = Diameter<sup>2</sup> x 0.7854 x length

(4 marks)

**Total 8 marks**

## QUESTION 5

Using your knowledge of NZS 5261, answer the following questions.

- (a) (i) NZS 5261 states that gas quick connect device sockets must be positioned to avoid traffic across the hose. State ONE other minimum location requirement for the installation of these sockets.

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(1 mark)

- (ii) List FOUR types of rooms in which quick connection device sockets and connection points for hose assemblies must not be located.

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(2 marks)

- (iii) State the temperature and pressure that are constant in relation to the gasfitting term standard conditions.

Temperature: \_\_\_\_\_

Pressure: \_\_\_\_\_

(2 marks)

**QUESTION 5 (cont'd)**

(b) State how pipes must be jointed to comply with NZS 5261 for the following.

(i) Welded joints.

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(1 mark)

(ii) Capillary joints in copper pipe.

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(1 mark)

(iii) Compression fittings and flare fittings.

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(1 mark)

(iv) Screwed fittings and unions.

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(1 mark)

**QUESTION 5 (cont'd)**

(c) Based on your knowledge of materials used in the gasfitting industry, and in compliance with NZS 5261, answer the following questions.

(i) In relation to storage and handling of pipe, state the manner in which the following pipes must be stored and handled.

Metallic pipes.

Stored: \_\_\_\_\_

\_\_\_\_\_

Handled: \_\_\_\_\_

\_\_\_\_\_

(1 mark)

Polyethylene pipes.

Stored: \_\_\_\_\_

\_\_\_\_\_

Handled: \_\_\_\_\_

\_\_\_\_\_

(1 mark)

(ii) A gas pipe is to be laid in a trench. State how the base of the trench must be prepared.

\_\_\_\_\_

\_\_\_\_\_

(1 mark)

**Total 12 marks**

**QUESTION 6**

(a) List FOUR factors that determine the number of air changes per hour required in a heating and ventilation system.

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

(4 marks)

(b) List SIX factors that should be considered when selecting the position for the installation of a gas fired storage water heater.

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_
- 5 \_\_\_\_\_
- 6 \_\_\_\_\_

(3 marks)

(c) Having commissioned a new gas fired water storage heater that is situated in a cupboard, list FIVE points that should be identified to the consumer relating to safety.

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_
- 5 \_\_\_\_\_

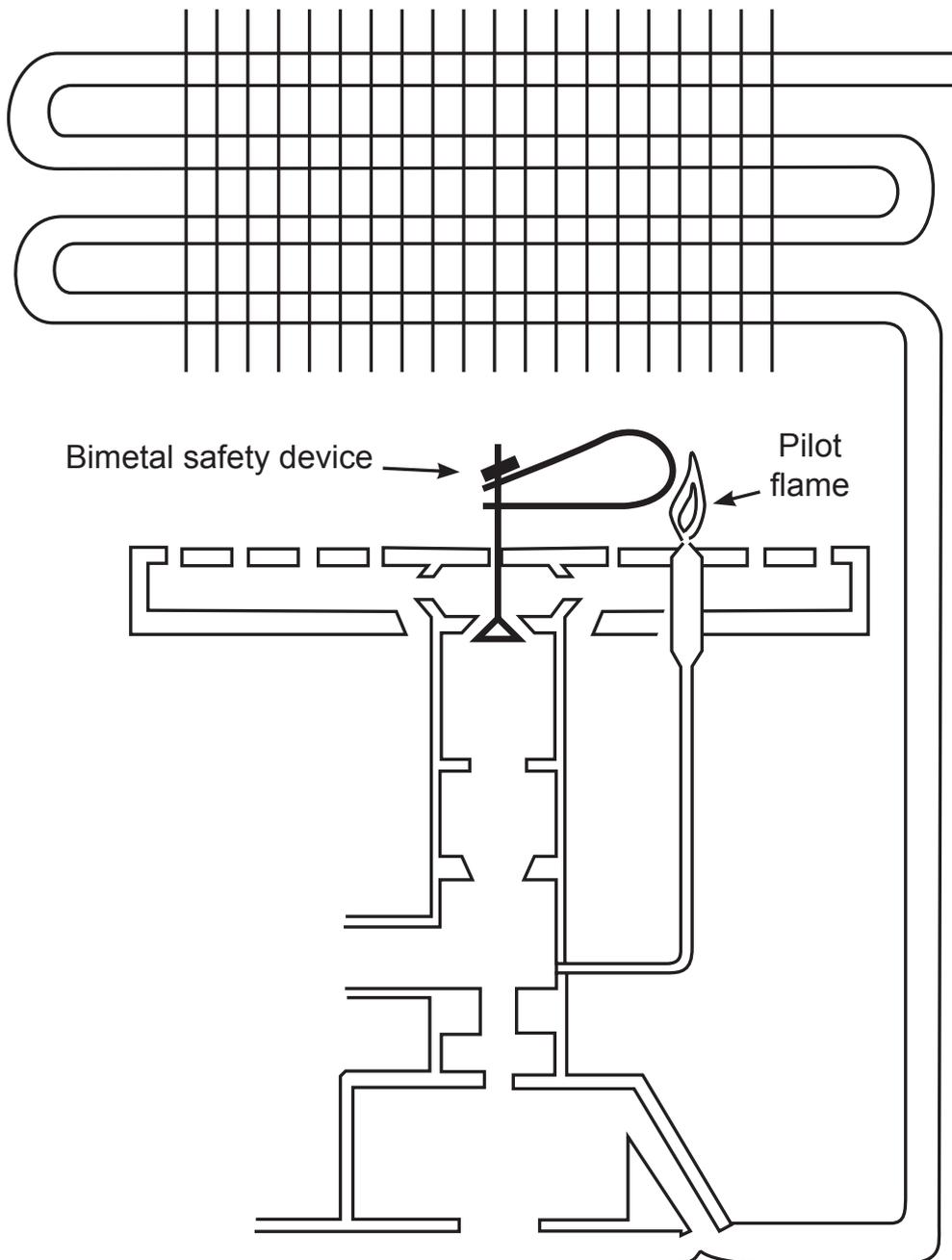
(5 marks)

**Total 12 marks**

### QUESTION 7

(a) The starter drawing below shows a sectional view of a water operated gas valve.

Complete the drawing to show the component parts when the valve is working and supplying hot water to the outlet. Label all parts and show the water and gas inlets.



(5 marks)

**QUESTION 7 (cont'd)**

(b) (i) Complete combustion is a result of a gas appliance working correctly. State the TWO main flue gases produced under this situation.

1 \_\_\_\_\_

2 \_\_\_\_\_

(2 marks)

(ii) Propane and butane are the two major gases forming liquified petroleum gas (LPG). The density of butane is greater than the density of air. State if the density of propane is greater than or less than the density of air.

\_\_\_\_\_

(1 mark)

(iii) There are different types of domestic hot water systems. State the distinguishing characteristics of the following TWO types.

Instantaneous.

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

Indirect.

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

(4 marks)

**Total 12 marks**

**QUESTION 8**

(a) State FIVE functions of the Plumbers, Gasfitters, and Drainlayers Board as prescribed in the Plumbers, Gasfitters, and Drainlayers Act.

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

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

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

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

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

(5 marks)

(b) (i) State another requirement, in addition to gasfitting registration and holding a current licence, that a gasfitter must meet to be able to work on the water connections of gas fired water heater.

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

(1 mark)

**QUESTION 8 (cont'd)**

- (ii) State the condition under which a registered gasfitter is permitted to test gas installation work.

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(1 mark)

- (iii) The NZ Building Code clause G4 Ventilation gives requirements for ventilation when gas appliances are installed. State TWO of these requirements.

1 

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2 

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(2 marks)

- (iv) State who, in addition to the gas supplier, must have copies of a Gas Certification Certificate.

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(1 mark)

**Total 10 marks**

**QUESTION 9**

(a) State THREE characteristics of each of the following in relation to a gas space heater.

Balanced flue.

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Open flue.

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Flueless.

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(9 marks)

(b) Carbon monoxide (CO) is a by-product of incomplete combustion. List FOUR circumstances in relation to gas appliances that can lead to the production of carbon monoxide.

1 

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2 

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3 

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4 

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(4 marks)

**Total 13 marks**











For Examiner's use only

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