

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

.....

No. 9193



Plumbers,  
Gasfitters and  
Drainlayers Board

## REGISTRATION EXAMINATION, JUNE 2009

# 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 17 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 the TWO requirements of an underground gas service pipe that particularly relate to the crossing of any other service.

1 \_\_\_\_\_

2 \_\_\_\_\_

(2 marks)

(b) State TWO effects if the air supply to a gas fired water heater is restricted.

1 \_\_\_\_\_

2 \_\_\_\_\_

(2 marks)

(c) State TWO effects if an over-sized injector is fitted in a gas burner.

1 \_\_\_\_\_

2 \_\_\_\_\_

(2 marks)

(d) State TWO requirements that must be met when selecting the position of the terminal for an open-vented flue.

1 \_\_\_\_\_

2 \_\_\_\_\_

(2 marks)

**Total 8 marks**

**QUESTION 2**

(a) State the minimum permitted gradient for a lateral run of natural draught flue pipe connected to a gas appliance.

---

---

(1 mark)

(b) Briefly explain how an open-flued space heater should be checked for spillage.

---

---

---

---

(2 marks)

(c) A open flued gas fired space heater is installed to heat a room.

Identify FOUR conditions that contribute to the overall effectiveness of this installation.

1 

---

2 

---

3 

---

4 

---

(4 marks)

(d) A gas flame appears yellow and floppy.

Give TWO reasons for this.

1 

---

2 

---

(2 marks)

**Total 9 marks**

### QUESTION 3

A balanced flue instantaneous gas-fired water heater is to be installed externally on a building.

State SIX general requirements relating to mounting and clearances that must be met.

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

Total 3 marks

**QUESTION 4**

(a) A 15-storey office block has a gas boiler installed at level 15.

(i) State whether atmospheric pressure at level 15 will be higher or lower than atmospheric pressure at ground level.

---

(1 mark)

(ii) State whether the natural gas gauge pressure at level 15 in (i) will be higher or lower than the gauge pressure at ground level.

---

(1 mark)

(iii) If liquefied petroleum gas (LPG) replaced natural gas in (ii), state the effect on the gauge pressure and give the reason for this.

Effect: \_\_\_\_\_

---

Reason: \_\_\_\_\_

---

(2 marks)

(b) Give FOUR reasons why gas pressure in an installation may be insufficient at times of high consumption.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

4 \_\_\_\_\_

(4 marks)

**Total 8 marks**

## QUESTION 5

(a) Several materials used for gas pipework require protection to prevent corrosion.

Name THREE distinct methods of protection, and for each method identify the material(s) it is suitable to protect.

Method 1: \_\_\_\_\_

Material(s) protected: \_\_\_\_\_

\_\_\_\_\_

Method 2: \_\_\_\_\_

Material(s) protected: \_\_\_\_\_

\_\_\_\_\_

Method 3: \_\_\_\_\_

Material(s) protected: \_\_\_\_\_

\_\_\_\_\_

(6 marks)

(b) Identify the following symbols used on a diagram of a gas valve train.

(a)  \_\_\_\_\_

(b)  \_\_\_\_\_

(c)  \_\_\_\_\_

(d)  \_\_\_\_\_

(4 marks)

**Total 10 marks**

## QUESTION 6

- (a) A gas installation comprises the following pipework:  
15m of nominal bore 32mm steel – internal diameter 36mm.  
40m of nominal bore 20mm copper – internal diameter 19mm.

- (i) Calculate the total pipework capacity in litres.

Formula:

$$V = 0.7854 \times D^2 \times L$$

where

V = Volume

D = Diameter

L = Length

---

---

---

---

---

(3 marks)

- (ii) State whether or not a specific written pressure test procedure should be developed or the pressure testing can be in accordance with Appendix D of NZS 5261. Give a reason for your answer.

---

---

(1 mark)



**QUESTION 6 (cont'd)**

(b) A flue pipe is to be made from stainless steel sheet.

The flue is to be 12m long and to have a diameter of 150mm.

The stainless steel sheet weighs 25 kg/m<sup>2</sup>.

Calculate the weight of the flue.

Formula:

$$C = \pi \times D$$

where

C = Circumference

D = Diameter

---

---

---

---

---

(3 marks)

**Total 7 marks**

**QUESTION 7**

(a) A natural gas appliance has an efficiency of 70%.

The test dial on the gas meter connected to this appliance completes 1 revolution in 5 minutes.

The test dial on the meter is marked 0.05 m<sup>3</sup> per revolution.

The heating value (HV) of natural gas is 40 MJ/m<sup>3</sup>.

1 kW is equivalent to 3.6 MJ/hr.

Calculate, in kW, the energy output from the appliance.

Formula:

$$\text{Gas rate in MJ/hr} = \frac{\text{m}^3 \times \text{HV} \times 3600}{\text{time taken in seconds}}$$

---

---

---

---

---

---

---

---

---

---

(5 marks)

(b) State how the amount of energy passed during 1 revolution of the test dial would change if the meter used in (a) was measuring LPG.

---

---

(1 mark)

**Total 6 marks**

**QUESTION 8**

(a) Give THREE reasons why a space containing a gas appliance must be ventilated in order to comply with NZS 5261.

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

(3 marks)

(b) Fan forced indirect gas fired air heaters are to be installed to heat a supermarket.

(i) Draw and label a line diagram to show the operation of this type of heater.

(5 marks)

(ii) Four heaters are needed to heat the supermarket shop area.

Describe the best position for the heaters and their flues.

---

---

---

---

(2 marks)

**Total 10 marks**

## QUESTION 9

(a) State the type and purpose of each of the following controls on a domestic gas fired storage water heater.

(i) Overheat shut-off

Type: \_\_\_\_\_

Purpose: \_\_\_\_\_

(2 marks)

(ii) Thermostat

Type: \_\_\_\_\_

Purpose: \_\_\_\_\_

(2 marks)

(iii) Flame Failure

Type: \_\_\_\_\_

Purpose: \_\_\_\_\_

(2 marks)

(b) Identify TWO purposes for each of the following on a fired gas package burner fitted to an industrial boiler.

(i) Air proving system

Purpose 1: \_\_\_\_\_

Purpose 2: \_\_\_\_\_

(2 marks)

(ii) Separate main burner and pilot burner regulators

Purpose 1: \_\_\_\_\_

Purpose 2: \_\_\_\_\_

(2 marks)

**QUESTION 9 (cont'd)**

(c) An existing chimney has been used for a fuel other than gas.

Specify FIVE checks that are necessary if the chimney is now to be used as a flue for a gas appliance.

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

(5 marks)

**Total 15 marks**

## QUESTION 10

A flueless gas space heater is installed in a room.

- (a) Explain what can cause condensation to form on windows when the heater is in use.

---

---

---

---

---

---

---

(3 marks)

- (b) State what can be done to reduce the amount of condensation while the heater is in use.

---

---

(1 mark)

**Total 4 marks**

### QUESTION 11

(a) Give a reason why natural gas and LPG are non-toxic.

---

---

(1 mark)

(b) Despite being non-toxic, escaping fuel gas is dangerous.

Give TWO reasons for this.

1 \_\_\_\_\_

2 \_\_\_\_\_

(2 marks)

(c) Complete the table below for either natural gas or LPG:

Type of gas	
Main constituent(s)	
Relative density compared with air	
Heating (calorific) value (MJ/m <sup>3</sup> )	
Volume of air required for combustion of 1 cubic metre of gas	
Lower explosive limit (% gas in air)	
Upper explosive limit (% gas in air)	

(6 marks)

**Total 9 marks**

**QUESTION 12**

(a) Identify FIVE markings that must be on the data plate for a free-standing gas cooker for it to comply with NZS 5262.

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

(5 marks)

(b) NZS 5261 identifies the three types of pressure test listed below.

State the specific purpose of each test.

(i) Pipework test

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

(ii) Installation test

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

(iii) Leakage test

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

(6 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		