

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 2010

# LICENSED GASFITTER

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 pages 21–25 at the back of this booklet. Clearly write the question number(s) 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, document(s) provided.

Publications, Acts, Regulations, Codes of Practice, or Standards other than the ones provided are NOT permitted in the examination room.

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**

Candidates that sat this examination in November 2010 were provided with the following documents:

- NZS 5261 Gas installation
- NZS 5428 LPG installations for non-propulsive purposes in caravans and boats

**SECTION A**

**QUESTION 1**

(a) State the purpose of an excess flow valve.

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(2 marks)

(b) Explain how an excess flow valve operates in an LPG pigtail.

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(1 mark)

(c) Give an example of when an excess flow situation could occur.

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(1 mark)

**Total 4 marks**

## QUESTION 2

All gas appliances that are intended for installation in New Zealand must meet certain requirements.

Compliance information is available so installers can ensure that the appliances that they are installing meet these requirements.

- (a) Name the government agency responsible for managing the database that contains this information.

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(1 mark)

- (b) State where the compliance declarations for appliances can be found.

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(1 mark)

**Total 2 marks**

## QUESTION 3

List FOUR types of flame failure devices found in domestic or commercial gas appliances.

1 

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2 

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3 

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4 

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**Total 2 marks**

**QUESTION 4**

An annual service check is to be carried out on an internal gas storage water heater.

No fault has been detected by the customer.

Give TEN steps that should be included in carrying out the service check.

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_
- 5 \_\_\_\_\_
- 6 \_\_\_\_\_
- 7 \_\_\_\_\_
- 8 \_\_\_\_\_
- 9 \_\_\_\_\_
- 10 \_\_\_\_\_

**Total 5 marks**

**QUESTION 5**

A customer has an external electronic gas-fired continuous flow water heater.

The customer reports that the appliance is not heating the hot water.

The other gas appliances in the property are still operating.

Give FOUR initial checks that should be included in the servicing.

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

**Total 4 marks**

**QUESTION 6**

Describe the operation of each of the following types of burner.

(a) Atmospheric burner

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

(1 mark)

(b) Forced Draught Burner

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

(1 mark)

(c) Induced Draught Burner

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

(1 mark)

**Total 3 marks**

## QUESTION 7

The breather hole on an appliance regulator is a specific size so that it can perform a particular function.

(a) Explain why the breather hole has this specific size.

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(2 marks)

(b) State what would occur if the breather hole was:

(i) blocked.

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(1 mark)

(ii) enlarged.

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(1 mark)

**Total 4 marks**

## QUESTION 8

Eight gas items are listed in the left-hand column of the table below.

In the right-hand column, give the key feature(s) of each item.

Item	Key feature(s)
Balanced flue	
Common flue	
Natural draught flue	
Open flue	
Power flue	
Room-sealed gas appliance	
Portable gas appliance	
Mobile gas appliance	

Total 8 marks

### QUESTION 9

Different types of gas appliance use different systems of temperature control.

Various thermostat types are listed in the left hand column of the table below.

Complete the table.

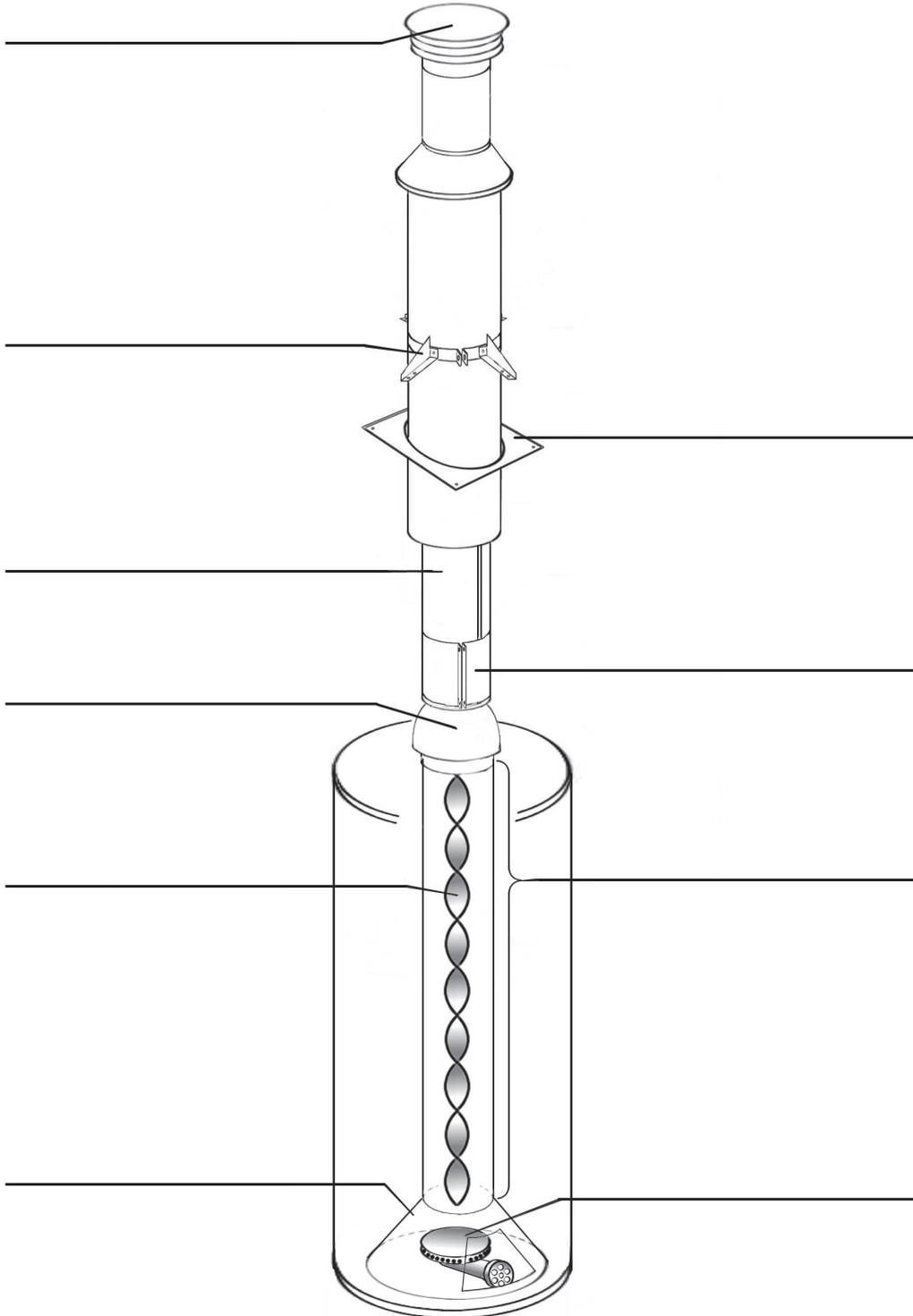
Thermostat Type	How the thermostat operates	Appliance commonly used in
Thermistor		
Liquid expansion (vapour filled)		
Coil		
Rod and tube		

Total 12 marks

**QUESTION 10**

The diagram below shows an appliance and flue.

Name each component. Write each answer on the appropriate line.



**Total 5 marks**

## QUESTION 11

Give FOUR circumstances in relation to gas appliances that can lead to the production of carbon monoxide.

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

Total 4 marks

**QUESTION 12**

(a) Describe how the maximum allowable length of a lateral flue run is calculated.

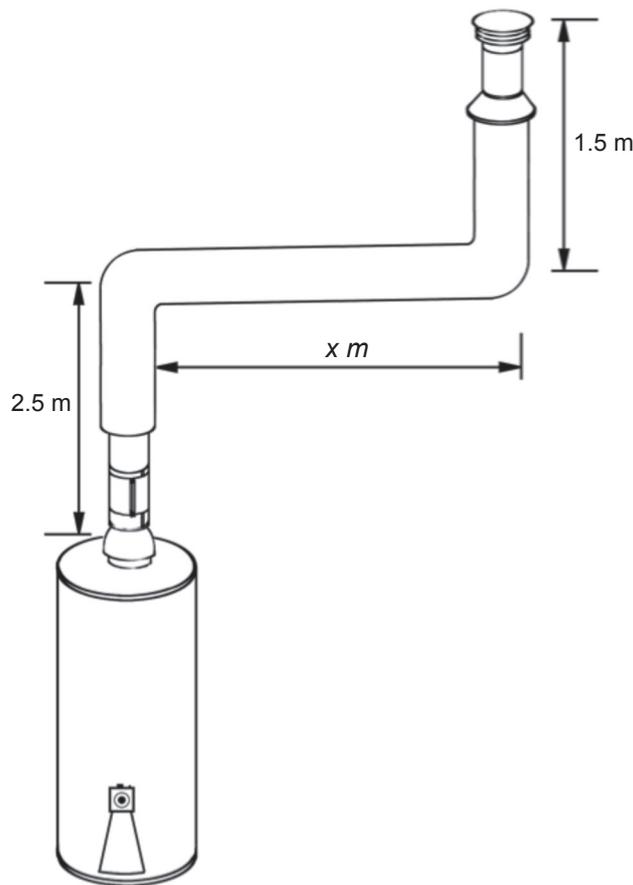
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(2 marks)

(b) Give the maximum length of the lateral section shown as  $x$  in the drawing below.

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(1 mark)

**Total 3 marks**

**QUESTION 13**

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

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

**Total 4 marks**

**QUESTION 14**

(a) Give TWO locations where a return air intake for a warm air gas furnace should be located.

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

(2 marks)

(b) Give FOUR reasons for the answer to (a).

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

(2 marks)

**Total 4 marks**

**QUESTION 15**

Calculate the volume of oxygen used per hour by a 45 MJ space heater. Show your working.

LPG has a Heating Value of 95 MJ/m<sup>3</sup>.

The air to gas ratio for LPG is 25 : 1.

20% of air is oxygen.

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**Total 3 marks**

**QUESTION 16**

Draw a Bunsen burner for use within a laboratory environment, and label its main parts.

In your drawing, include a well adjusted pre-aerated burner flame, and label its parts.

**Total 6 marks**

**QUESTION 17**

While performing a leakage test on an existing gas installation with several appliances, a leak is detected.

The owner is advised, and requests that the leak be located and repaired.

Describe the procedure that should be followed to locate the leak.

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**Total 2 marks**

**QUESTION 18**

List EIGHT steps that should be followed when measuring the working pressure of a gas installation with several appliances.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

4 \_\_\_\_\_

5 \_\_\_\_\_

6 \_\_\_\_\_

7 \_\_\_\_\_

8 \_\_\_\_\_

**Total 4 marks**

## SECTION B

Answer the following multiple-choice questions by writing your answer (A, B, C, D or E) in the box provided after each one of the questions.

Each correct answer in this section of the examination is worth 1 mark.

Note that should your choice of answer be unclear in this section of the examination no marks will be awarded for that question.

1. GMS is an abbreviation for which of the following as it applies to gasfitting?

- A Gas Maintenance Systems.
- B General Material Supplied.
- C Gas Main Service.
- D Gas Measurement System.
- E General Maintenance Servicing.

2. When a cooking appliance is being installed in a campervan or caravan, a permanent legible warning label is required.

Which of the following is the correct wording for the label?

- A WARNING. Hot Surface
- B WARNING. Provide ventilation when cooker is in use. Do not use for space heating.
- C WARNING. Sleeping is prohibited while cooking appliance is in use.
- D WARNING. Gas detector must be operating while this appliance is in use.
- E WARNING. Use of aerosols is not permitted while this appliance is in operation.

3. Which of the following requirements must the text of the warning label in Question 2 meet?

- A It must be of Arial font size 10, bold.
- B It must be easily read from a standing position from above the appliance.
- C It must be of adequate size to be read from 2 m away.
- D It must have a minimum character height of 4 mm.
- E It must be black text on a yellow background.

4. A Location Test Certificate is needed if which of the following amounts of LPG are being used and/or stored in one place for more than 18 hours?
- A 90 kilograms.
  - B 100 kilograms.
  - C 120 kilograms.
  - D Two 90 kilogram cylinders.
  - E 200 kilograms.
- 

5. Which of the following does AS NZS 1596 relate to?
- A Storage and Handling of LP Gas.
  - B Gas Appliance Safety.
  - C Underground Marking Tape.
  - D Gas Detection and Odourisation.
  - E Gas when used as a propellant.
- 

6. Which of the following does NZS 5262 cover?
- A Storage and Handling of LP Gas.
  - B Gas Appliance Safety.
  - C Underground Marking Tape.
  - D Gas Detection and Odourisation.
  - E Gas when used as a propellant.
-

7. A thermocouple produces an electrical current.

Which reading would you expect to read on a multi-meter when testing a working thermocouple?

- A Between 20 and 35 Watts.
- B Between 20 and 35 Amps.
- C Between 20 and 35 Volts.
- D Between 20 and 35 mA.
- E Between 20 and 35 mV.

8. A motor home gas cylinder storage locker contains two cylinders.

The locker is only accessible from within the vehicle.

What is the maximum allowable capacity of the cylinders?

- A 15 kg maximum each cylinder.
- B 45 kilograms total.
- C Not more than 40 kg total.
- D 18 kg maximum each cylinder.
- E Two cylinders each not exceeding 10 kg.

9. It is recommended that a gas detector be fitted when installing appliances in a caravan or motor home.

What is the recommended level of LPG the gas detector should be able to register?

- A At 10% of the LEL.
- B At 10% of the UEL.
- C At 15% of the LEL.
- D At 15% of the UEL.
- E At 20% of the LEL.

10. When a gas detector is installed in a caravan or motor home, where should it be located?

- A At the exit point of the caravan.
- B At low level above the floor.
- C As close to the largest appliance as possible.
- D At high level next to the ceiling.
- E 1500 mm from the floor.

11. Which statement describes Boyle's Law?

- A The calorific value of a gas is proportional to the volume multiplied by the factor of pressure at a constant temperature.
- B At constant pressure the volume of a gas increases or decreases by the same factor as its temperature increases or decreases.
- C A gas to be classed as inert only if it cannot react within an oxygen/nitrogen environment.
- D Atmospheric pressure to be 101.3 kPa at sea level if the water temperature is 15°C.
- E For a fixed amount of gas kept at a fixed temperature, pressure and volume are inversely proportional.

12. Which statement describes Charles's Law?

- A The calorific value of a gas is proportional to the volume multiplied by the factor of pressure at a constant temperature.
- B At constant pressure the volume of a gas increases or decreases by the same factor as its temperature increases or decreases.
- C A gas to be classed as inert only if it cannot react within an oxygen/nitrogen environment.
- D Atmospheric pressure to be 101.3 kPa at sea level if the water temperature is 15°C.
- E For a fixed amount of gas kept at a fixed temperature, pressure and volume are inversely proportional.

13. Gases are classified in families. What does it mean if two gases are in the same family?
- A The gases require similar pressures to change state from gas into liquid.
  - B The vapourisation points of the gases are within 25°C of each other ensuring even dilution of molecules once in a gas state.
  - C The gases were separated after being extracted from the same well source.
  - D There is the possibility to interchange between the gases without the need to change the injector size.
  - E There is not more than 1 kg/m<sup>3</sup> difference in density between the gases.

14. What can occur within an appliance that has an efficiency exceeding 85%?
- A Flame cooling.
  - B Vitiation due to low flue temperatures.
  - C Condensation.
  - D Excessive CO<sub>2</sub> creation.
  - E Excessive flame noise and lift.

15. Which formula is used to calculate the meter correction factor?
- A  $(101.3 + \text{supply pressure}) \div 101.3$
  - B  $(101.3 \times \text{burner pressure}) \div 101.3$
  - C  $101.3 + 2.5 \div 101.3$
  - D  $9.81 + \text{atmospheric pressure} \div 101.3$
  - E  $(\text{atmospheric pressure} + \text{heating value}) \div 101.3$

16. Where can the ventilation grill on a motor home NOT be located?

- A On the rear wall of the motor home.
- B Within 200 mm of a ventilator or hatch.
- C In the floor of the motor home.
- D Within 1500 mm of a fuel tank vent.
- E In the driving cabin of the motor home.

17. Which of the following is NOT required on an appliance data plate?

- A Burner injector sizes.
- B Gas type.
- C Gas consumption.
- D Supplier name.
- E Operating pressure.

18. Flues can sometimes be joined together – for example so as to have fewer penetrations through the roof of the building.

Under what circumstances is this NOT permitted?

- A Appliances that are likely to discharge a combustible mixture.
- B Appliance which run at different burner operating pressures.
- C Appliances with an hourly consumption in excess of 90 MJ.
- D Appliances for use in school or early child care facilities.
- E Appliances for use with propane gas.

19. What does the abbreviation ECO stand for as it applies to gasfitting?

- A Electronic Controlled Odouriser.
- B Electrical Circuit Overheat.
- C Energy Cut Out.
- D Exemption Certification Organisation.
- E Electrical Certifying Officer.

20. On what principle does flame rectification rely?

- A A direct current passes through a gas flame and completes the circuit back to the control board.
- B An electrical current is partially rectified as it passes through a flame, then travels back to the control board.
- C An alternating current travels through a flame once the electrode is heated, and then travels through earth to the control board.
- D An electrical current is generated by the gas flame, and this current passes through earth back to the control board.
- E A probe expands as it is heated, pushing open a gas valve allowing the burner to ignite.

21. What is the lower explosive limit of natural gas?

- A 2%
- B 5%
- C 15%
- D 19%
- E 25%

**Total 21 marks**

For Examiner's use only

Question number	Marks	Marks
1		
2		
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Section B		
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