

### **QUESTION 1**

If an open flued gas appliance is to be installed in front of an existing fireplace (console model) with a brick chimney, give FOUR steps necessary to ensure that the products of combustion are disposed of correctly.

1 \_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

\_\_\_\_\_

3 \_\_\_\_\_

\_\_\_\_\_

4 \_\_\_\_\_

\_\_\_\_\_

(4 marks)

**Total 4 marks**

## QUESTION 2

(a) List FOUR items that are normally fitted to a secondary metering installation.

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

(2 marks)

(b) Explain the significance, when dealing with an LPG leak, of LPG having a density greater than air.

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(2 marks)

(c) Give the likely effects if an over-sized injector is fitted in a gas burner.

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(2 marks)

(d) Define the term **vitiating** and state what it causes in relation to a gas appliance.

**Vitiating** \_\_\_\_\_  
\_\_\_\_\_

**Causing** \_\_\_\_\_  
\_\_\_\_\_

(4 marks)

**QUESTION 2** (contd)

**(e)** Describe the operation of a Bourdon gauge.

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(2 marks)

**Total 12 marks**

**QUESTION 3**

**(a)** Name TWO types of positive displacement gas meters.

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(2 marks)

**(b)** State TWO effects if the diaphragm of a gas regulator is punctured.

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(2 marks)

**(c)** Why is the bypass of a meter normally locked in the closed position?

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(2 marks)

**Total 6 marks**

#### QUESTION 4

- (a) Calculate the gas rate for a space heater based on the information set out below:

Use the formula: Gas rate =  $\frac{(\text{room size} \times \text{heat input} \div \text{efficiency})}{\text{heat value}}$

Room size = 80 m<sup>3</sup>  
Heat input to room = 0.36 MJ/m<sup>3</sup>/hr  
Appliance efficiency = 70%  
Heating value of gas = 95 MJ/m<sup>3</sup>

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(3 marks)

- (b) List FIVE steps to gas rate a domestic gas appliance. All five steps must be correct to obtain marks.

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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(3 marks)

- (c) State TWO likely causes if a domestic gas space heater ignites explosively.

1 

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2 

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(2 marks)

**Total 8 marks**

### QUESTION 5

**(a)** Describe the purpose of a flue damper.

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(1 mark)

**(b)** Name FOUR types of flue systems.

1 

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2 

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3 

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4 

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(2 marks)

**(c)** State TWO methods to protect the combustible material surrounding a flue where it enters the ceiling space.

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(2 marks)

**(d)** What fixing considerations are required by the New Zealand Building Code for a free-standing gas-fired or solid-fuel space heater installation?

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(2 marks)

**Total 7 marks**

### QUESTION 6

- (a)** List FOUR control devices that are normally fitted on a new gas radiant panel heater.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

4 \_\_\_\_\_

(2 marks)

- (b)** A low pressure gas-fired open flued storage water heater is to be installed in a cupboard to replace an existing electric heater. Name FOUR modifications that are necessary to comply with the Gas Installation Standard requirements.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

4 \_\_\_\_\_

(4 marks)

- (c)** State FOUR operational advantages of installing an instantaneous gas-fired water heater compared to a gas-fired storage water heater.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

4 \_\_\_\_\_

(4 marks)

**QUESTION 6** (contd)

- (d)** State FOUR markings that must be provided on the data plate of a domestic gas-fired water heater.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

4 \_\_\_\_\_

(2 marks)

- (e)** State SIX general requirements that relate to the mounting and clearances for a balanced flue, instantaneous, gas-fired water heater that is fitted externally to the building.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

4 \_\_\_\_\_

5 \_\_\_\_\_

6 \_\_\_\_\_

(3 marks)

- (f)** State THREE requirements for the ventilation arrangements of a gas-fired storage water heater situated in a cupboard.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

(3 marks)



**QUESTION 6** (contd)

**(g)** 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)

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

1 \_\_\_\_\_

2 \_\_\_\_\_

(2 marks)

**Total 26 marks**

### QUESTION 7

- (a) You have replaced a faulty 50 mm gas regulator from an industrial gas installation. The inlet gas valve is turned off. State the 13 steps necessary to commission the new regulator.

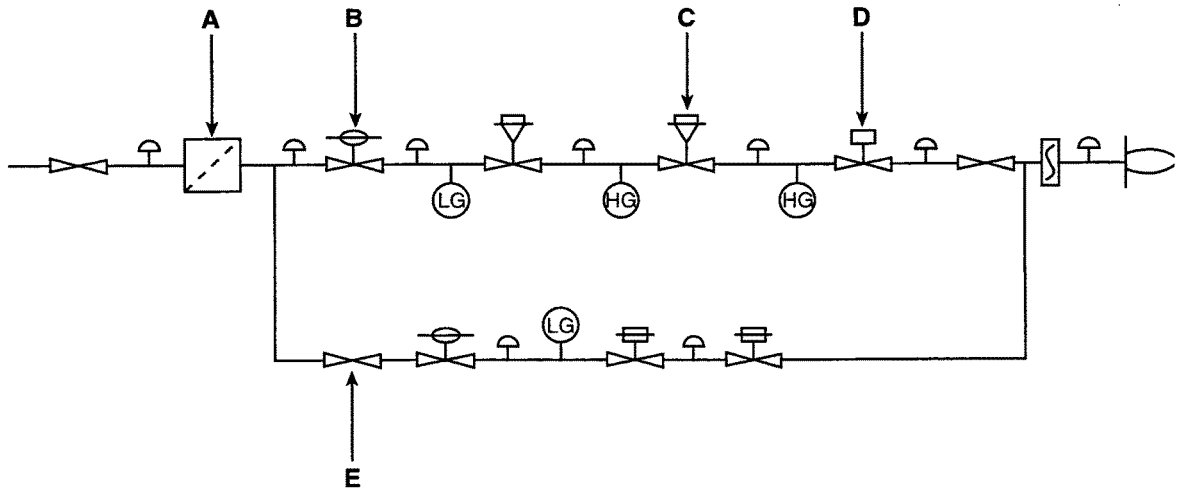
(N.B. Failure to observe correct safety procedure will result in the deduction of 3 marks)

1	_____
2	_____
3	_____
4	_____
5	_____
6	_____
7	_____
8	_____
9	_____
10	_____
11	_____
12	_____
13	_____

(6 marks)

**QUESTION 7** (contd)

- (b) Identify the items marked A to E on the diagrammatic layout of an industrial gas burner shown in Fig. 1.



**Fig. 1**

A = \_\_\_\_\_

B = \_\_\_\_\_

C = \_\_\_\_\_

D = \_\_\_\_\_

E = \_\_\_\_\_

(5 marks)

**Total 11 marks**

### QUESTION 8

- (a)** Who can certify an LPG installation which is supplied from two 45 kg cylinders? Give TWO answers.

1 \_\_\_\_\_  
2 \_\_\_\_\_ (2 marks)

- (b)** Identify the TWO main constituents of LPG.

1 \_\_\_\_\_  
2 \_\_\_\_\_ (1 mark)

- (c)** State the air/gas ratios for

(i) Propane \_\_\_\_\_  
(ii) Natural gas \_\_\_\_\_ (2 marks)

- (d)** Name TWO inert gases present in New Zealand natural gas.

1 \_\_\_\_\_  
2 \_\_\_\_\_ (1 mark)

- (e)** State the flammability limits for LPG.

\_\_\_\_\_  
\_\_\_\_\_  
(2 marks)

**QUESTION 8** (contd)

- (f)** (i) Why do flueless gas space heaters sometimes cause condensation?

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- (ii) What can be done to minimise this problem?

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(2 marks)

**Total 10 marks**

### QUESTION 9

- (a)** Describe the operation of a PIEZO spark ignition system that is suitable for a domestic gas appliance.

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(5 marks)

- (b)** Describe the operation of a thermo-electric flame failure device used on a gas appliance.

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(5 marks)

**(Total 10 marks)**

### QUESTION 10

- (a)** Describe TWO tests that can be used to determine how well a natural draught flue is working.

(1) \_\_\_\_\_

(2) \_\_\_\_\_

(2 marks)

- (b)** State FOUR factors to be considered in selecting the position for an open flue terminal.

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(2 marks)

- (c)** What are TWO of the possible dangers if the heat exchanger of a domestic warm air heating unit has a hole in it.

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(2 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	
10	
Total	