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, JUNE 2014

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 19–21 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 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

Candidates that sat this examination in June 2014 were provided with the following documents:

- AS/NZS 5601.2010 Part 1: General installations
- AS/NZS 5601.2010 Part 2: LP Gas installations in caravans and boats for non-propulsive purposes

USEFUL FORMULAE

Circumference of circle = $2 \times \pi \times R$ or Circumference of circle = $\pi \times D$

Area of circle = $\pi \times R^2$ or Area of circle = $0.7854 \times D^2$

Volume of cylinder = $\pi \times R^2 \times H$ or Volume of cylinder = $0.7854 \times D^2 \times H$

$$\text{Heating time} = \frac{\text{mass of water (kg)} \times 4.2 \times \text{temp diff (°C)} \times 100}{\text{heat energy input per hour in kJ} \times \text{efficiency (\%)}}$$

$$\text{Correction factor} = \frac{\text{atmospheric pressure + supply pressure}}{\text{atmospheric pressure}}$$

$$\text{Gas rate (m}^3\text{)} = \frac{\text{volume (m}^3\text{)} \times 3600}{\text{time (seconds)}}$$

SECTION A

QUESTION 1

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

(4 marks)

(b) List FOUR items of information that must be provided on the data plate of a domestic freestanding gas cooker.

1 _____

2 _____

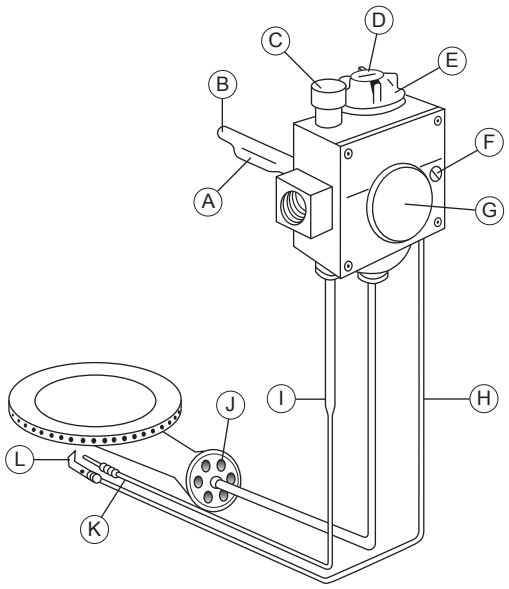
3 _____

4 _____

(2 marks)

Total 6 marks

QUESTION 2



(a) Complete the table below matching the components listed with the labels in the diagram above.

Description	Label	Description	Label
Aeration adjustment		Pilot adjustment	
Thermocouple		Burner regulator adjustment	
Pilot head		Thermostat control	
Pilot Tube		Energy cut out	
Thermal fuse		Thermostat probe	
TEFFD button		Gas valve	

(6 marks)

(b) A faulty control valve on a gas storage water heater has been replaced with a new one.

List FIVE safety checks/tests that must be carried out to the repaired appliance.

1 _____

2 _____

3 _____

4 _____

5 _____

(5 marks)

QUESTION 2 (cont'd)

(c) An existing gas-fired storage water heater has become inefficient and expensive to operate.

Give SEVEN likely causes for this.

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

7 _____

(7 marks)

Total 18 marks

QUESTION 3

Calculate the volume of oxygen used per hour by a 24 MJ LPG space heater.

- LPG has a heating value of 95 MJ/m^3
- Air to gas ratio for LPG is 25:1
- 20% of air is oxygen

Total 3 marks

QUESTION 4

(a) Give FOUR important installation points to ensure when running a condensate drain from a high efficiency appliance.

1 _____

2 _____

3 _____

4 _____

(4 marks)

(b) Some appliance flues encourage rain water to enter the flue terminal.

State the purpose for this.

_____

_____

(2 marks)

Total 6 marks

QUESTION 5

(a) List THREE safety systems that are designed to protect a person who falls while working at a height.

1 _____

2 _____

3 _____

(3 marks)

(b) List, in order, the THREE main points used in the hierarchy of controls for managing hazards.

1 _____

2 _____

3 _____

(1 mark)

(c) Name TWO common harness systems used to protect people from harm while working at heights.

1 _____

2 _____

(2 marks)

Total 6 marks

QUESTION 6

Give the meaning of the following in relation to the appendices of AS/NZS 5601 Part 1.

(a) Normative

_____

(1 mark)

(b) Informative

_____

(1 mark)

Total 2 marks

QUESTION 7

Describe the operation of each of the following thermostat types used in gas appliances.

(a) Thermistor

(3 marks)

(b) Vapour/liquid expansion thermostat

(3 marks)

(c) Rod and tube thermostat

(3 marks)

Total 9 marks

QUESTION 8

(a) A new appliance are to be added to an existing installation.

The installation has an operating pressure of 3.0 kPa.

State the types of pressure tests and testing pressures required to be performed throughout the course of the installation.

The completed installation is to comply with AS/NZS 5601 Part 1.

(8 marks)

(b) A new installation is to have an operating pressure of 5.0 kPa.

State the minimum pressure to which the new pipework for the installation must be tested.

(1 mark)

(c) The gas installation operating pressure for an existing installation is to be increased from 1.8 kPA to 3.5 kPa.

List the required checks or tests that should be carried out during the process of changing the pressure.

(3 marks)

Total 12 marks

QUESTION 9

(a) According to AS/NZS 5601 Part 2, describe what is required when LPG cylinders are located in an external compartment which is also used for general storage.

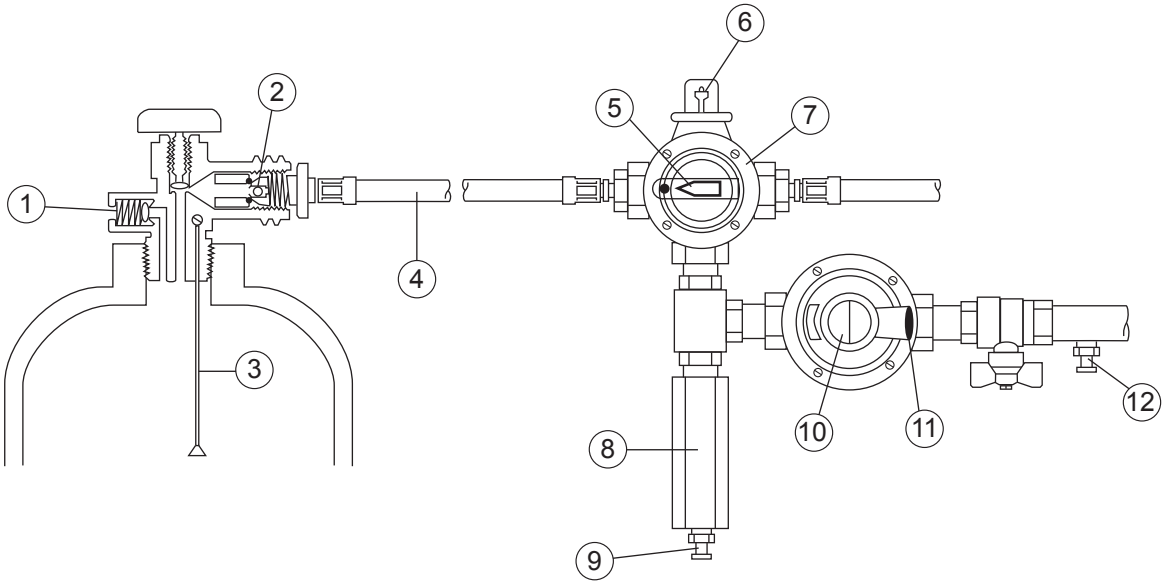
(2 marks)

(b) According to AS/NZS 5601 Part 2, state the purpose of the label shown below.

(1 mark)

Total 3 marks

QUESTION 10



(a) Complete the table below matching the components listed to the diagram above.

Description	No.	Description	No.
Installation pressure test point		Drip leg	
Ullage tube		Excess flow device	
Cylinder change-over lever		Cylinder relief	
Installation pressure adjustment		Indicator	
Drain point		Installation overpressure relief	
Pigtail		First stage regulator	

(6 marks)

(b) Give the names of THREE different LPG cylinder connection types.

1 _____

2 _____

3 _____

(3 marks)

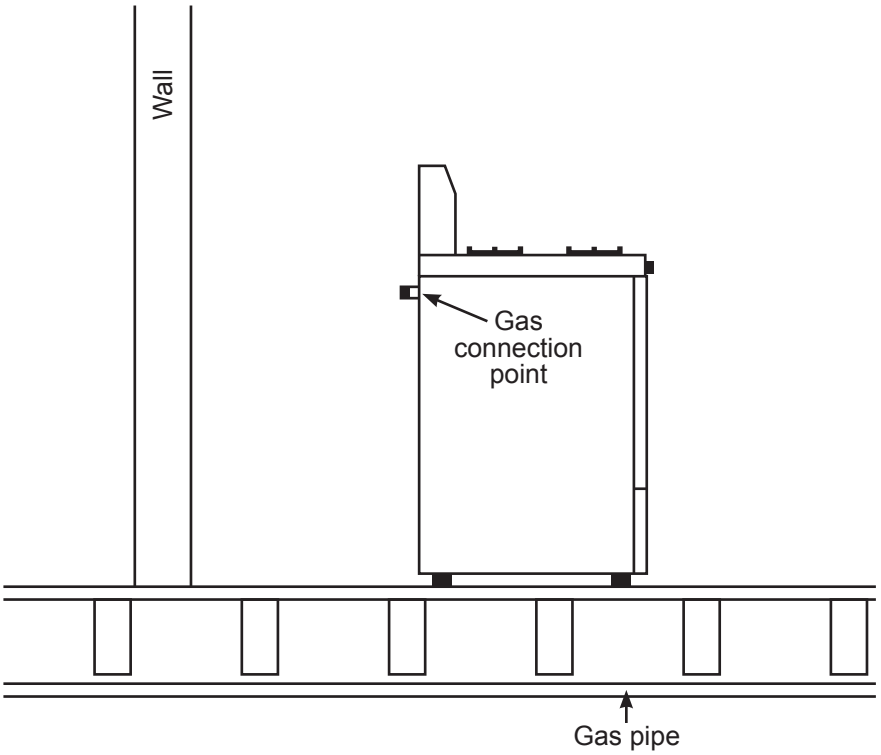
Total 9 marks

QUESTION 11

A free standing gas cooker is to be installed backing directly onto a wall as shown in the diagram below, using a flexible hose and bayonet fitting.

Complete the drawing and label the gas piping and associated equipment to connect the gas pipe to the cooker. Include relevant measurements.

The completed installation is to comply with AS/NZS 5601 Part 1.

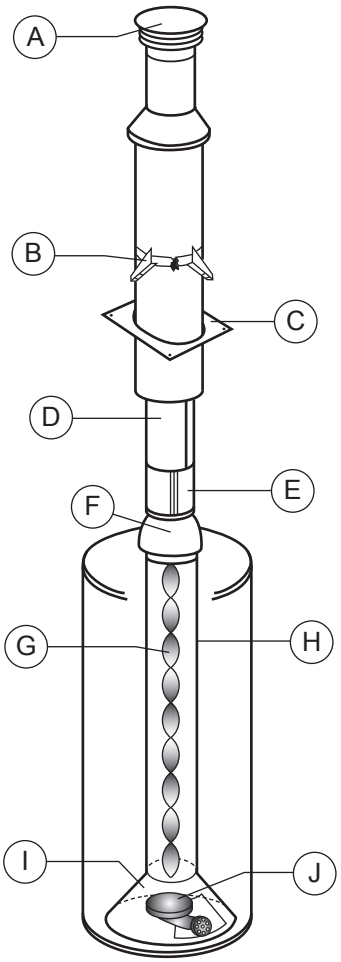


Total 6 marks

QUESTION 12

Complete the table below by naming the components of the water heater drawn on the right.

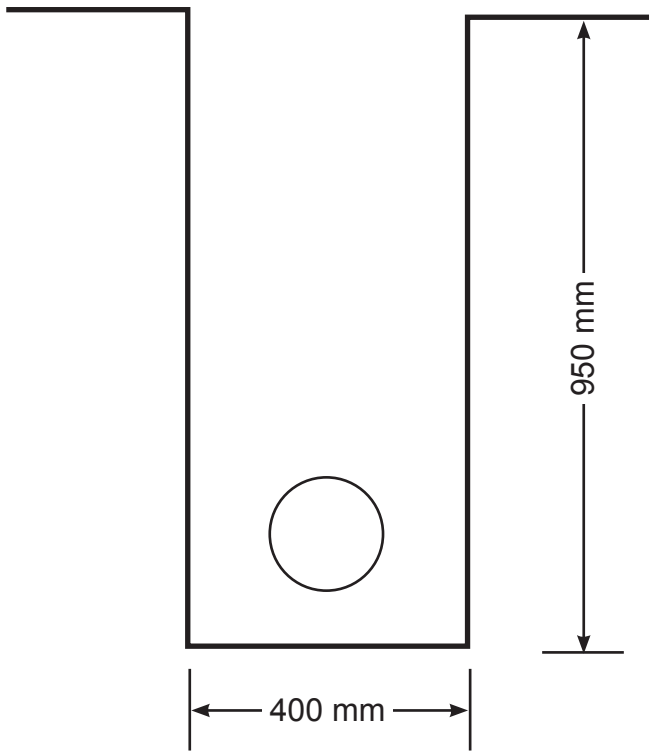
Item	Name
A	
B	
C	
D	
E	
F	
G	
H	
I	
J	



Total 5 marks

QUESTION 13

The plan below shows the front elevation of a trench. The trench is 15 m long.



Calculate the volume of material required to fill the trench.

- Allow 20% for compaction.
- No allowance is required for the pipe volume.

Total 2 marks

QUESTION 14

When installing a cooking appliance in a campervan or caravan, a permanent warning label is required.

State the requirements of the label and indicate where it must be fixed.

Total 3 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. Safety control systems are required when a person could face a fall of what height (or higher)?

   A 2.0 m.

   B 2.4 m.

   C 3.0 m.

   D 5.0 m.

   E Any height.

   ☐

2. A thermocouple produces electrical current.

   Which reading would be expected to see 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.

   ☐

3. The burner on a newly installed LPG hob burns nicely on high but keeps going out when it is turned down to low.

   What is the most likely reason for this to occur?

   A The wrong size injectors have been used.

   B The hob is a natural gas appliance.

   C The aeration has been set incorrectly.

   D The low flame has not been set correctly.

   E The wrong knobs are fitted to the appliance.

   ☐

4. Which of the following can be confirmed by gas rating an appliance?

A The burner injector size is correct.

B The appliance efficiency.

C Correct air to gas ratio.

D The operation of the appliance safety devices.

E Correct operation of the appliance flue.

☐

5. Which of the following safety devices will shut off gas supply in the event of mechanical ventilation failing to operate?

A Flame rectification.

B Fire damper.

C Carbon monoxide detector.

D Fan interlock.

E Oxygen depletion device.

☐

6. What TWO main elements occur in both natural gas and LPG?

A Hydrogen and nitrogen.

B Carbon and hydrogen.

C Propane and butane.

D Nitrogen and oxygen.

E Hydrogen and oxygen.

☐

7. Which of the following is the government agency responsible for managing the database that contains the compliance declarations for gas appliances?

A Plumbers Gasfitters and Drainlayers Board.

B Environmental Protection Agency.

C WorkSafe New Zealand.

D Housing New Zealand.

E Gas Association of New Zealand.

☐

8. According to AS/NZS 5601 Part 1, in what situation should cross-linked polyethylene/ aluminium/polyethylene multilayer gas pipe not be used?

A Where operating temperatures exceed 40°C.

B Underground.

C Under a building.

D Inside a building framework.

E Where it is exposed to sunlight.

☐

9. According to AS/NZS 5601 Part 1, what is the minimum permitted thickness of a concrete precast chimney used for flue gases not exceeding 300°C?

A 50 mm.

B 60 mm.

C 80 mm.

D 100 mm.

E 120 mm.

☐

10. According to AS/NZS 5601 Part 1, what is required when a flanged joint is to be re-made?

A The gasket should be checked for defects before re-using it.

B Sealant should be applied to both sides of the gasket before refitting it.

C The gasket should be replaced.

D The gasket should be lightly sanded before re-fitting.

E The gasket should be soaked in jointing compound before re-fitting.

☐

Total 10 marks ☐

For Examiner's use only

Question number	Marks	Marks
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
Section B		
Total		