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

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No. 9196

Plumbers, Gasfitters and Drainlayers Board

REGISTRATION EXAMINATION, NOVEMBER 2017

CERTIFYING 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 17-21 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 November 2017 were provided with the following documents:

- AS/NZS 5601 Part 1: General installations
- AS/NZS 5601 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 = $0.7854 \times D^2 \times H$

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

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

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

SECTION A

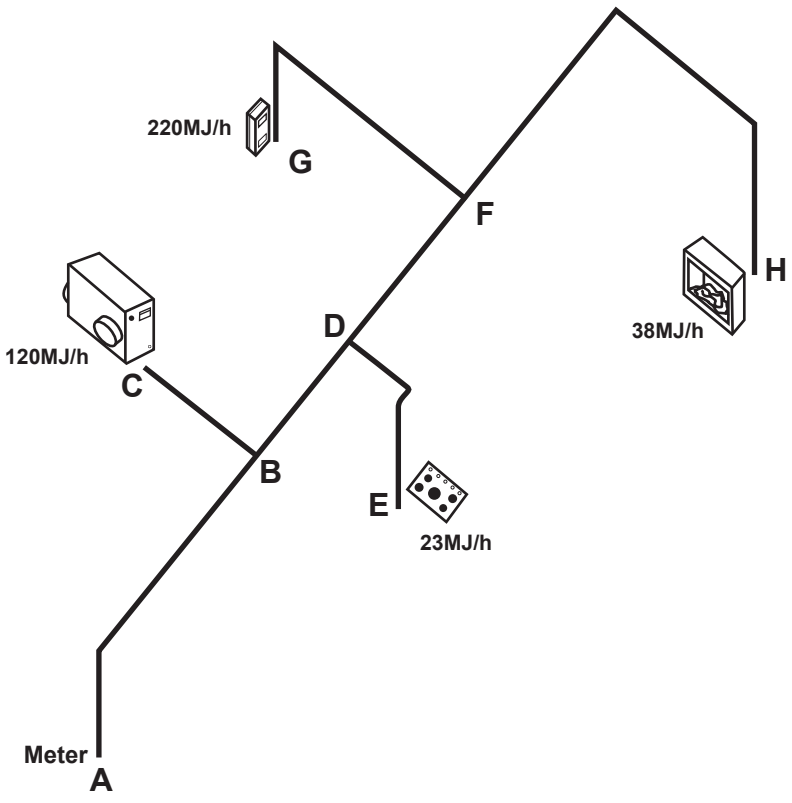
QUESTION 1

The diagram below shows the pipework and appliances for a gas installation in a house.

The installation specifications include the following:
- Natural gas
- Copper pipe (NZS 3501)
- The installation supply pressure is 2.75 kPa.

Use the Pipe Sizing Tables (not the graphs) from AS/NZS 5601 Part 1 to complete the table below.

Pipe section	Length (m)	Main run (m)	Gas flow (MJ/h)	Nominal size
A - B	4.5			
B – C	2.3			
B – D	3.7			
D – E	4.4			
D – F	2.2			
F – G	4.5			
F – H	5.6			



Total 11 marks

QUESTION 2

(a) Give the meaning of each of the following in relation to the New Zealand Building Code, and give an example of each.

(i) Acceptable solution

Meaning: _____

_____

Example: _____

(ii) Alternative solution

Meaning: _____

_____

Example: _____

(iii) Compliance documents

Meaning: _____

_____

Example: _____

(iv) Cited standards

Meaning: _____

_____

Example: _____

(8 marks)

(b) Give the meaning of the term verification method in relation to the New Zealand Building Code.

_____

(1 mark)

Total 9 marks

QUESTION 3

(a) Give the full name of each document relating to gasfitting listed below, and state when each is to be issued.

(i) CoC

Name: _____

When issued: _____

(2 marks)

(ii) GSC

Name: _____

When issued: _____

(2 marks)

(iii) CoV

Name: _____

When issued: _____

(2 marks)

(b) Name the category of gasfitting work that requires details of the installation to be entered into an on-line data base.

_____

(1 mark)

(c) Name the government agency that manages the on-line data base in (b).

_____

(1 mark)

Total 8 marks

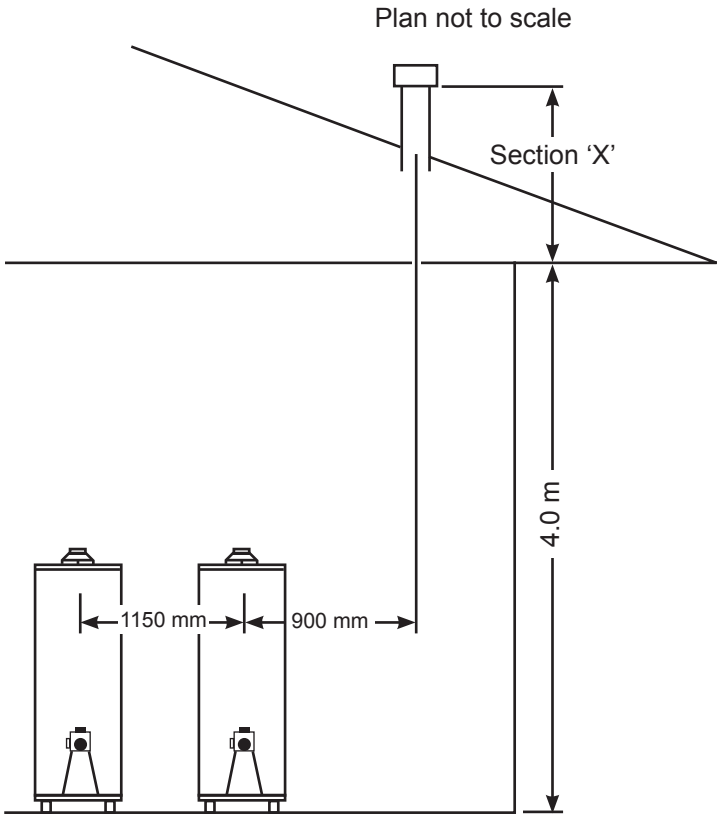
QUESTION 4

(a) Two 55 MJ/h water heaters require a combined flue to be designed with a manifold at the base, as shown in AS/NZS 5601 Part 1 Figure H4.

The water heaters are each 1.6 m high with 100 mm diameter flue spigots.

On the starter drawing below, draw the flue between the appliances and the roof termination.

On the drawing, show
- the minimum length of section X
- the minimum sizes of each section of the flue
- the minimum rise of the lateral flue connector.



(7 marks)

(b) State the TWO effects of excessive heat loss on the operation of a natural draught gas flue.

1 _____

2 _____

(2 marks)

QUESTION 4 (cont'd)

(c) Give TWO factors that affect heat loss of a gas flue.

1 _____

2 _____

(2 marks)

(d) Give FOUR factors other than heat loss that determine the diameter of a gas flue.

1 _____

2 _____

3 _____

4 _____

(2 marks)

Total 13 marks

QUESTION 5

(a) A building may have active and passive fire protection in place.

Give TWO examples, other than fire collars, of passive fire protection.

1 _____

2 _____

(2 marks)

(b) Draw and label a cross-sectional view of a pipe penetration through a hollow construction wall fitted with fire collars. The wall is to have a 60/60/60 fire rating.

(4 marks)

(c) Describe what intumescent material does.

_____

(1 mark)

Total 7 marks

QUESTION 6

(a) AS/NZS 5601 Part 2 gives the purpose of ventilation of compartments where gas appliances are installed.

Give TWO conditions the ventilation is designed to prevent.

1 _____

2 _____

(1 mark)

(b) Two 6 kW gas cookers are to be installed in a boat which is designed for the occupancy of five people.

Using AS/NZS 5601 Part 2, calculate the minimum free area of the ventilation required for the area.

_____

_____

_____

_____

(4 marks)

(c) According to AS/NZS 5601 Part 2, high and low ventilation is required in compartments of a boat where gas appliances are installed.

Give TWO systems/devices that may be used to assist the ventilation of the compartments.

1 _____

2 _____

(1 mark)

Total 6 marks

QUESTION 7

A commercial property is fuelled by LPG, with a maximum total gas consumption of 1095 MJ/h. The average lowest temperature at the property's location is 4ºC.

(a) Using AS/NZS 5601 Part 1 as a guide, calculate the number of 90 kg LPG exchange cylinders needed to provide an adequate gas supply when all appliances are operating at once.

(2 marks)

(b) State how many cylinders should be kept in reserve for use when the primary cylinders have been emptied.

(1 mark)

(c) State when a site location certificate (location test certificate) may be required for an LPG installation.

(2 marks)

Total 5 marks

QUESTION 8

A gas burner has been operated on full, and 4.7 m^3/h of LPG was being consumed.

The installation supply pressure is 14 kPa.

(a) Calculate the corrected gas consumption in MJ/h.

(4 marks)

(b) State THREE factors that determine the size of a rotary gas meter for an industrial boiler.

1

2

3

(3 marks)

(c) Give TWO advantages of using a rotary gas meter instead of a diaphragm gas meter.

1

2

(2 marks)

Total 9 marks

QUESTION 9

Name the TWO different types of safety system that are designed to prevent harm to persons working at height, and explain how each system achieves its purpose.

1 _____

_____

2 _____

_____

Total 4 marks

QUESTION 10

(a) Give a situation that would make working in a confined space particular hazardous work (notifiable work).

_____

(1 mark)

(b) Give FOUR items in addition to standard personal protection equipment that should be supplied to the person monitoring people working within a confined space.

1 _____

2 _____

3 _____

4 _____

(4 marks)

Total 5 marks

QUESTION 11

A notifiable incident is an unplanned or uncontrolled incident in the workplace that seriously endangers or threatens the health and safety of workers or others.

(a) Give FOUR examples of occurrences that would be classed as notifiable incidents.

1 _____

2 _____

3 _____

4 _____

(4 marks) ☐

(b) List THREE actions which must be taken immediately after a notifiable incident has occurred.

1 _____

2 _____

3 _____

(3 marks) ☐

(c) A notifiable incident is classed as a notifiable event.

Give the other TWO occurrences that are classed as notifiable events.

1 _____

2 _____

(2 marks) ☐

Total 9 marks ☐

QUESTION 12

Name FOUR licensing categories for which workers must be supervised and have their work verified by a certifying gasfitter.

1 _____

2 _____

3 _____

4 _____

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.

Should your choice of answer be unclear no mark will be awarded.

1. Which of the following best describes how an energy cut-off (ECO) device on a gas storage water heater operates?

   A A predetermined volume of gas is permitted to pass through the control valve, and if this is exceeded the valve will shut off the gas supply.

   B The ECO monitors the flame to ensure that there is sufficient oxygen for complete combustion, and it will shut off the gas supply in the event that the excess carbon monoxide is present.

   C If the pressure within the vessel exceeds a predetermined level, the gas supply is shut off.

   D The ECO ensures that the thermostat on the water heater cannot be turned below the temperature that will enable the growth of legionella bacteria.

   E Over temperature situations will allow the device to interrupt the flame failure circuit, shutting off the gas supply.

   ☐

2. A gas installation has been disconnected from the gas supply.

   What is the minimum period of time after which a certificate of verification is required for reconnection?

   A 3 months.

   B 6 months.

   C 12 months.

   D 24 months.

   E 36 months.

   ☐

3. Which of the following New Zealand Building Code clauses provides an acceptable solution for designing and installing soaker flashings?

   A B2

   B E1

   C E2

   D G1

   E G12

   ☐

4. According to AS/NZS 5601 Part 1, a manometer (water gauge) is only suitable for testing up to what pressure?

   A 3 kPa.

   B 5 kPa.

   C 7 kPa.

   D 10 kPa.

   E 30 kPa.

   ☐

5. Which of the following is NOT particular hazardous work?

   A Work where workers could fall 5 m or more, excluding work on a two-storeyed house, or work on a power or telephone line, or work carried out from a ladder only, or maintenance or repair work of a minor or routine nature.

   B Work such as diving, where construction workers breathe air or any other gas that has been compressed or is under pressure.

   C Those excavations where the excavated face is steeper than 1 horizontal to 2 vertical.

   D Any construction work where explosives are used or stored.

   E The erection or dismantling of scaffolds from which a person could fall 3 m or more.

   ☐

6. Which organisation must an employer contact when intending to perform particular hazardous work?

   A WorkSafe.

   B Plumbers, Gasfitters and Drainlayers Board.

   C Territorial Authority.

   D Building Consent Authority.

   E Ministry of Business, Innovation and Employment.

   ☐

7. What is the maximum amount of non-friable asbestos permitted to be removed before a licence is required?

   A 1 m^2

   B 5 m^2

   C 10 m^2

   D 15 m^2

   E 20 m^2

   ☐

8. According to AS/NZS 5601 Part 1, what length of piping is to be exceeded before the installation of reversion fittings is required on proprietary multilayer systems installed in detached dwellings?

A 5 m

B 7 m

C 10 m

D 15 m

E 20 m

9. Which of the following pressures is equivalent to six inches water gauge?

A. 0.6 kPa

B 1.2 kPa

C 1.5 kPa

D 3.0 kPa

E 6.0 kPa

10. According to AS/NZS 5601 Part 2, where low-level ventilation is required in a caravan, what is the maximum allowable distance between the ventilation provided and the floor?

A 25 mm.

B 50 mm.

C 100 mm.

D 150 mm.

E 200 mm.

Total 10 marks

For Examiner's use only

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