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 2020

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.

This exam booklet consists of 2 sections

Section A – Question 1 to 10

Section B – Question 1 to 11

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 25-27 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 28 pages in the correct order.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION

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 = $0.7854 \times D^2 \times H$

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

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

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

SECTION A

QUESTION 1

After an addition to an existing gas installation has been completed, a CoC (Certificate of Compliance) is required to be generated by a suitable person.

(a) State the class of licence required to be able to issue a CoC.

_____

(1 mark) ☐

(b) List SIX items of information that a CoC must state.

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

(3 marks) ☐

(c) Other than creating a COC, list TWO further documents or forms that must be completed after work has been finished.

1 _____

2 _____

(2 marks) ☐

Total 6 marks ☐

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QUESTION 2

Complete the table below by calculating in m^3 the daily consumption of gas required to supply energy requirement of each listed appliance.

- Heating value of natural gas = 40 MJ/m^3
- Heating value of LPG = 90 MJ/m^3

Appliance	Daily operating time	Total daily consumption (m^3)
Natural gas, package burner 95 kW	8 hours	
LPG, cooker 140 MJ/hr	3 hours	
Natural gas, furnace 113,750 BTU	5 hours	
Natural gas, space heater 35 MJ/hr	4 hours	

Total 8 marks

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QUESTION 3

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

The installation has an operating pressure of 5.0 kPa.

State the types of pressure tests required to be performed throughout the course of the installation, and give the required pressure for each test.

(8 marks)

(b) 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 must be carried out during the process of changing the pressure.

(3 marks)

Total 11 marks

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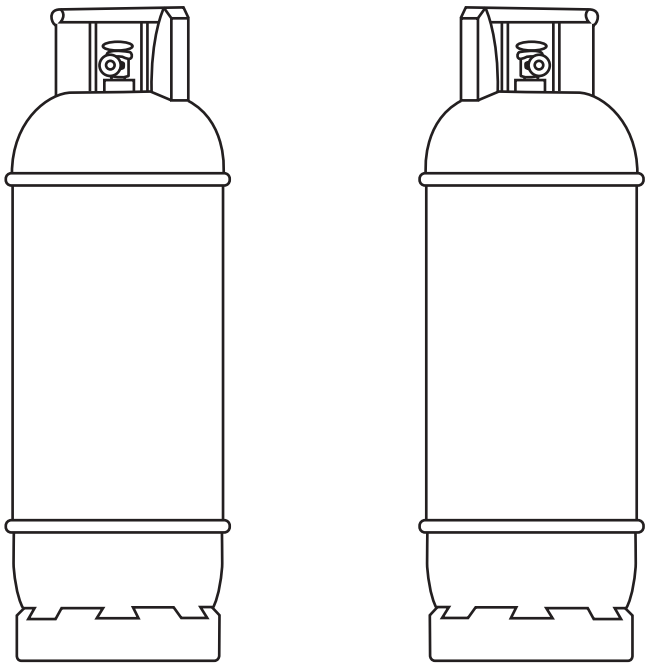
QUESTION 4

The diagram below shows two LPG cylinders.

Complete the diagram to include an auto changeover two stage regulator station with separate second stage regulator.

Do not include clearances, restraint chains or firm base.



Total 7 marks

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QUESTION 5

A plant room is fitted with mechanical supply ventilation and natural exhaust ventilation directly to outside. The plant room houses a 450 MJ induced draft boiler and two 30 MJ storage hot water cylinders with atmospheric burners.

(a) Calculate in m^3 per hour the minimum volume of air the ventilation system must be able to supply.

(5 marks)

(b) Calculate the minimum size required if a natural high level exhaust opening is used.

(2 marks)

(c) Calculate in m^3 per hour the minimum volume if a mechanical high level exhaust is used.

(1 mark)

(d) State the additional safety requirement that must be met according to AS/NZS 5601 with regard to the operation of the gas appliances with a mechanical ventilation system.

(1 mark)

Total 9 marks

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QUESTION 6

(a) According to AS/NZS 5601 Part 1, list FOUR aspects of an installation that must be taken into account before suitability of a proprietary piping system can be confirmed.

1 _____

2 _____

3 _____

4 _____

(2 marks)

(b) State FIVE factors that need to be specified when selecting a regulator for a gas installation.

1 _____

2 _____

3 _____

4 _____

5 _____

(5 marks)

Total 7 marks

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QUESTION 7

Answer the following question in accordance with New Zealand Building Code Acceptable Solution E2/AS1 External Moisture.

A corrugated iron roof has a pitch of 20°. The maximum wind speed expected for the location is 35 m/s per second.

A 300 mm diameter gas appliance flue has been installed, penetrating 600 mm below the ridge.

Sketch a diagram showing the support and flashing requirements for the installation. Show all measurements.

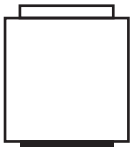
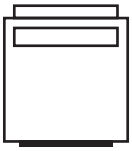
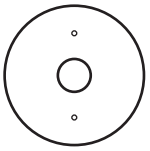
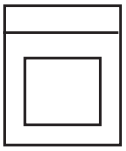
Total 8 marks

QUESTION 8

The diagram on the page opposite shows the pipework and appliances for a gas installation in a commercial laundry.

Installation details are as follows:

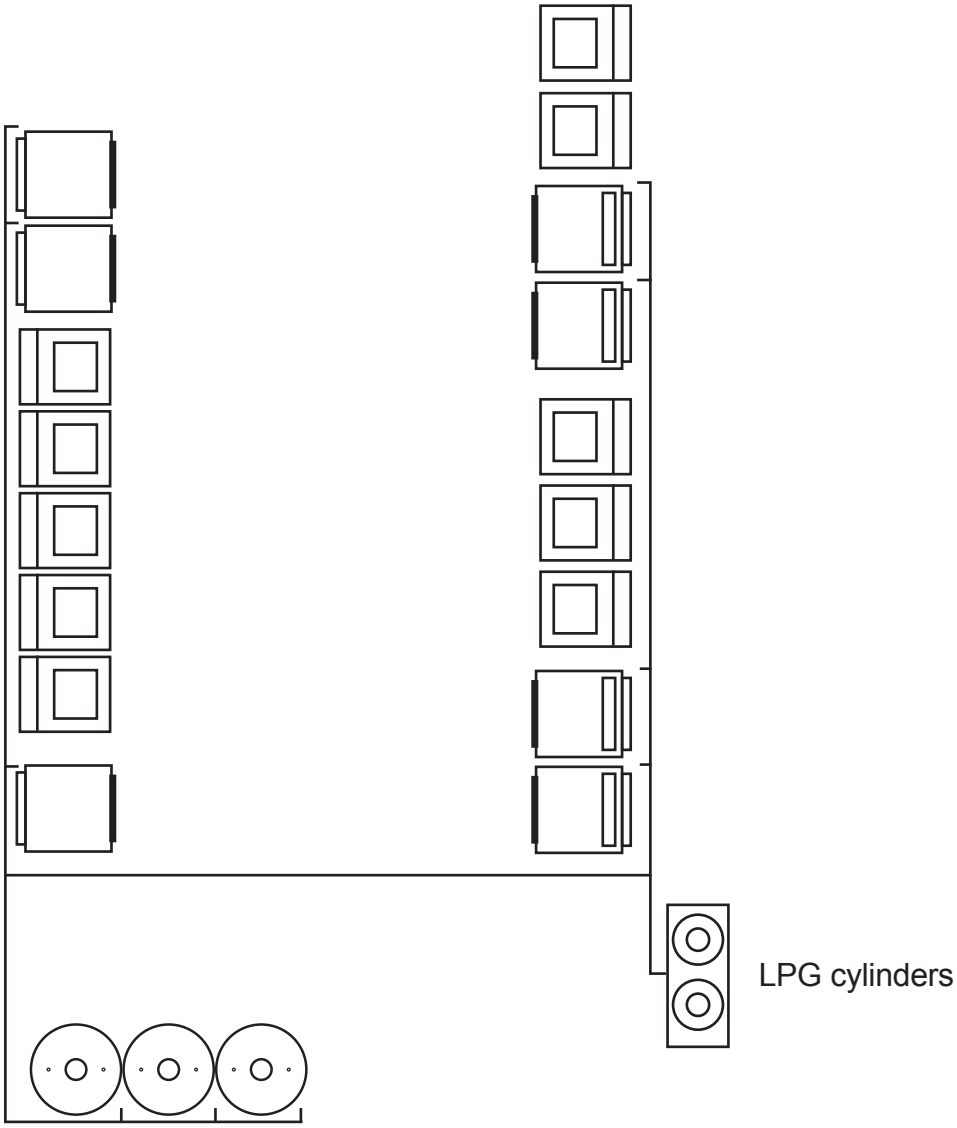
- LPG
- Copper pipe (NZS 3501)
- The installation supply pressure is 2.9 kPa.

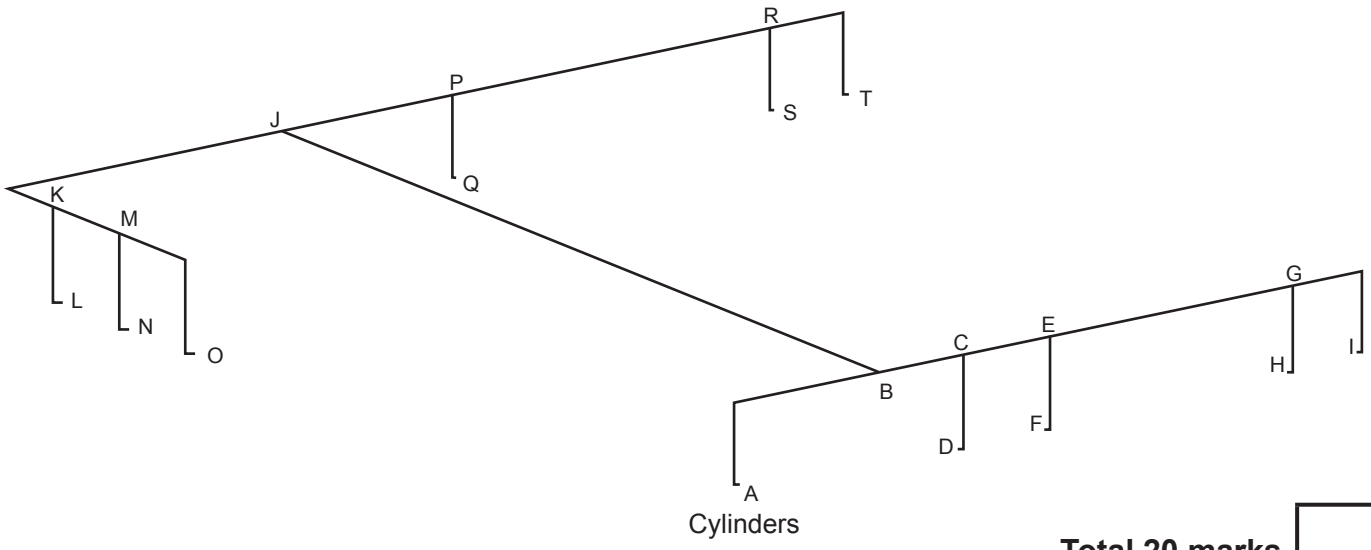
			
Gas clothes dryer 360 MJ/h	Gas clothes dryer 220 MJ/h	Gas water heater 45 MJ/h	Electric washing machine 1.5 KW

Use the Pipe Sizing Tables from AS/NZS 5601 Part 1 to complete the tables below. Use the sizing tables and not the sizing graphs to answer this question.

Pipe Section	Length (m)	Main run (m)	Gas flow (MJ/h)	Nominal size
A - B	3.5			
B - C	1.5			
C - D	1.8			
C - E	1			
E - F	1.8			
E - G	4			
G - H	1.8			
G - I	3			
B - J	5.7			
J - K	4			
K - L	2			
K - M	1			
M - N	2			
M - O	3			
J - P	1.5			
P - Q	1.7			
P - R	5			
R - S	1.7			
R - T	2.7			

QUESTION 8 (cont'd)





Total 20 marks

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QUESTION 9

(a) Complete the table below by indicating which of the situations listed require particular hazardous work notification and which do not.

Description of work	Y/N
Working in an area where the temperature exceeds 45ºC	
Working in a confined space	
Working on a scaffold that is over 5 metres high	
A trench that is 2 metres deep and 4 metres wide at the top	
Work on the roof of a 2 storey residential building that is 6 metres high	
Work in which a person wears a face mask with filter canisters	
Using a 3.5 meter high mobile scaffold on a commercial site	
Working on a residential property that is known to contain asbestos containing materials	

(4 marks)

(b) Give THREE characteristics of a work site that determine that the site will be classed as a confined space.

1 _____

2 _____

3 _____

(3 marks)

Total 7 marks

INTENTIONALLY BLANK

QUESTION 10

(a) A natural gas appliance has an efficiency of 90%.

The test dial on the gas meter connected to this appliance completes 1 revolution in 1 minute 35 seconds.

The test dial on the meter is marked 0.05 m^3 per revolution.

The heating value (HV) of natural gas is 42 MJ/m^3.

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

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

(4 marks)

(b) The operating pressure of an installation is 10 kPa.

Calculate the corrected volume of gas that is flowing through a meter that is reading 4.52 m^3.

(2 marks)

Total 6 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. What is the minimum length of time that an exempted person under supervision must work in the presence of their supervisor or a nominated person?

   A. 6 months.
   B. 12 months.
   C. 18 months.
   D. 24 months.
   E. 36 months.

   ☐

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. According to AS/NZS 5601 Part 2, what is the minimum possible permitted free area of the total permanent ventilation for any space in a caravan that contains a gas appliance?

   A. 1000 mm^2.
   B. 2000 mm^2.
   C. 3000 mm^2.
   D. 4000 mm^2.
   E. 5000 mm^2.

   ☐

4. The alarm and solenoid used on a gas detection system installed in a boat must activate when the concentration of LPG in air exceeds what percentage of the lower explosive limit?

   A. 2%

   B. 5%

   C. 11%

   D. 15%

   E. 25%

   ☐

5. 5 mm ceramic tiles are to be used with fibre cement backing for the protection of combustible surfaces adjacent to a cooking appliance.

   What is the minimum thickness of the fibre cement board required for compliance with AS/NZS 5601 Part 1?

   A. 4 mm.

   B. 6 mm.

   C. 10 mm.

   D. 12 mm.

   E. 16 mm.

   ☐

6. According to AS/NZS 5601 Part 2, what is the maximum distance that a pipe support can be from an elbow?

   A. 25 mm.

   B. 50 mm.

   C. 100 mm.

   D. 150 mm.

   E. 250 mm.

   ☐

7. A vent line is required to be installed for a vented safety shut off system. The vent valve is 6 mm and the vent line is 65 m long.

According to AS/NZS 5601 Part 1, what is the minimum allowable diameter of the vent line?

A. 8 mm.

B. 10 mm.

C. 12 mm.

D. 15 mm.

E. 20 mm.

☐

8. Outdoor, overhead radiant heaters must be installed a minimum of which height above floor level?

A. 1.0 m.

B. 1.2 m.

C. 1.5 m.

D. 1.8 m.

E. 2.0 m.

☐

9. Where a 9 kg LPG cylinder is to be used indoors, the compartment in which the cylinder is located must have a low level vent of what minimum size?

A. 300 mm^2.

B. 600 mm^2.

C. 750 mm^2.

D. 800 mm^2.

E. 1000 mm^2.

☐

10. According to AS/NZS 5601 Part 1, what is the minimum distance a gas bayonet socket can be located from a doorway?

A. 0.6 m.

B. 0.8 m.

C. 1.0 m.

D. 1.2 m.

E. 1.5 m.

☐

11. According to AS/NZS 5601 Part 2, what is the maximum amount of gas an LPG locker with internal access on a boat is permitted to contain?

A. One 9 kg cylinder.

B. Two 9 kg cylinders.

C. One 15 kg cylinder.

D. Two 15 kg cylinders.

E. One 45 kg cylinder.

☐

Total 11 marks ☐

This page is available for additional working or answers

Question number _____

This page is available for additional working or answers

Question number _____

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Question number _____

For Examiner's use only

Question number	Marks	Marks
1		
2		
3		
4		
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10		
Section B		
Total		