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

.....

No. 9196

Plumbers, Gasfitters and Drainlayers Board

REGISTRATION EXAMINATION, JUNE 2014

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 June 2014 were provided with the following documents:

- AS/NZS 5601.2010 Part 1: General installations
- LPGA COP No 2 (Installation and maintenance of twin 45kg LPG cylinder systems)

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

List THREE Acts of Parliament that have specific references to the plumbing and gasfitting industry.

1 _____

2 _____

3 _____

Total 3 marks

QUESTION 2

Use AS/NZS 5601 Part 1 to complete the table below to show the maximum outlet operating pressure a consumer piping gas regulator is permitted to provide before a permanent and durable notice displaying the pressure is required.

Maximum outlet operating pressure LPG	
Maximum outlet operating pressure natural gas	

Total 2 marks

QUESTION 3

(a) A natural gas appliance is set on to full so it can be gas rated.

The test dial on the gas meter connected to the appliance completes one revolution in 42 seconds.

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

The working pressure of the installation is 11 kPa.

The calorific value (HV) of natural gas is 40 MJ/m^3.

Calculate in MJ the corrected energy input of this appliance.

(5 marks)

(b) The gas appliance in (a) has an efficiency of 85%.

Calculate the output of the appliance in kW.

(2 marks)

Total 7 marks

QUESTION 4

(a) Four 45 kg LPG cylinders are to be housed in a recessed sheet metal enclosure.

Openings for ventilation are required in the enclosure door, which is 1.6 m wide.

Using AS/NZS 5601 Part 1, calculate in mm the minimum height for any ventilation opening required, and state where it is to be located in the door.

(4 marks)

(b) When a domestic LPG cylinder is filled with liquid LPG, it is permitted to be filled to 85% only.

Give TWO reasons for this.

1

2

(2 marks)

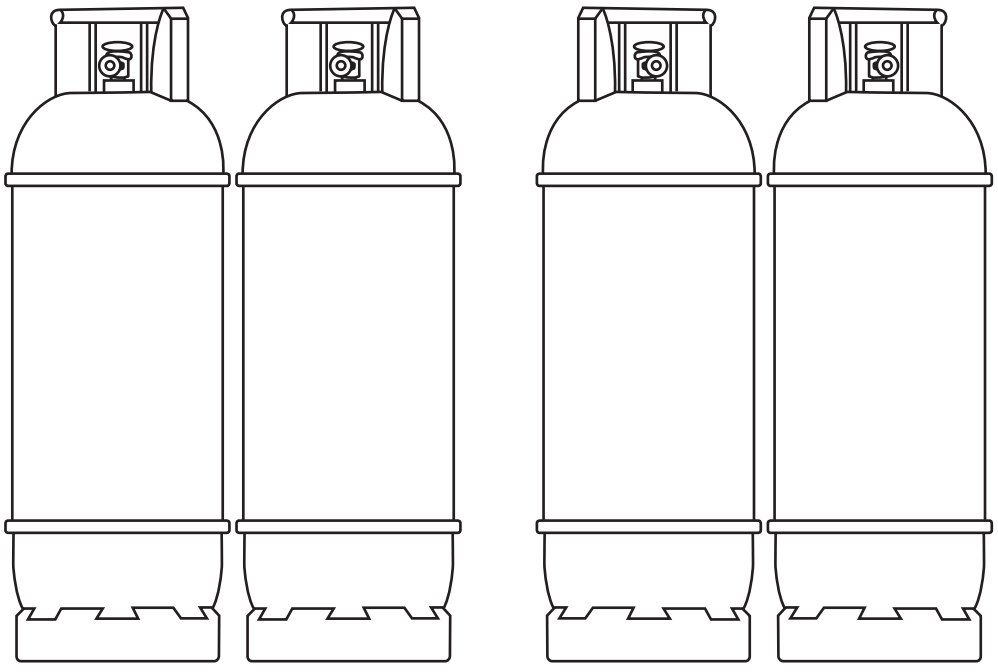
QUESTION 4 (cont'd)

(c) Complete the starter drawing below to show an LPG auto changeover two stage regulator station to suit the cylinders shown.

Indicate all main components of the flexible cylinder connections with an auto changeover first stage regulator with separate second stage regulator.

Do not include clearances.

The installation is to follow the guidelines of the LPGA Code of Practice.



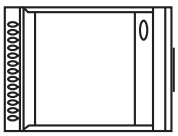
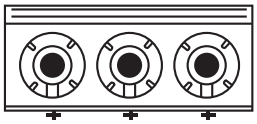
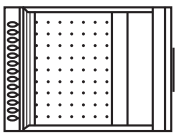
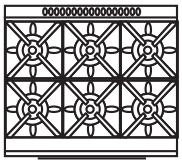
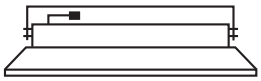
(7 marks)

Total 13 marks

QUESTION 5

The diagram on the page opposite shows the pipework and appliances for a gas installation. Installation Details are as follows:

- Natural Gas
- Copper pipe (NZS 3501)
- The installation supply pressure is 2.75 kPa

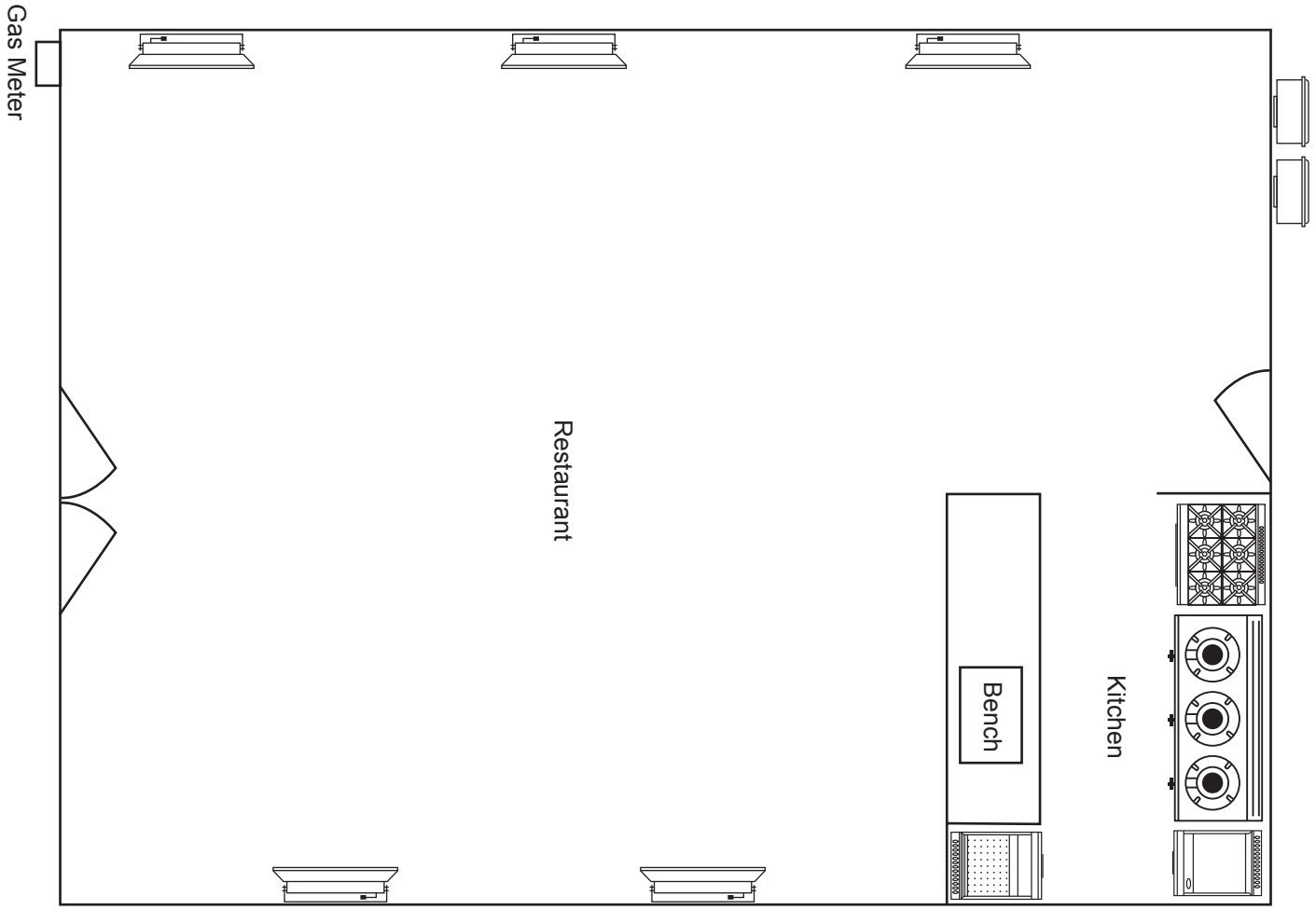
		
Griddle	Wok Bench	Deep Fryer
62 MJ/h	360 MJ/h	160 MJ/h
		
Oven	Space Heater	Water Heater
204 MJ/h	24 MJ/h	220 MJ/h

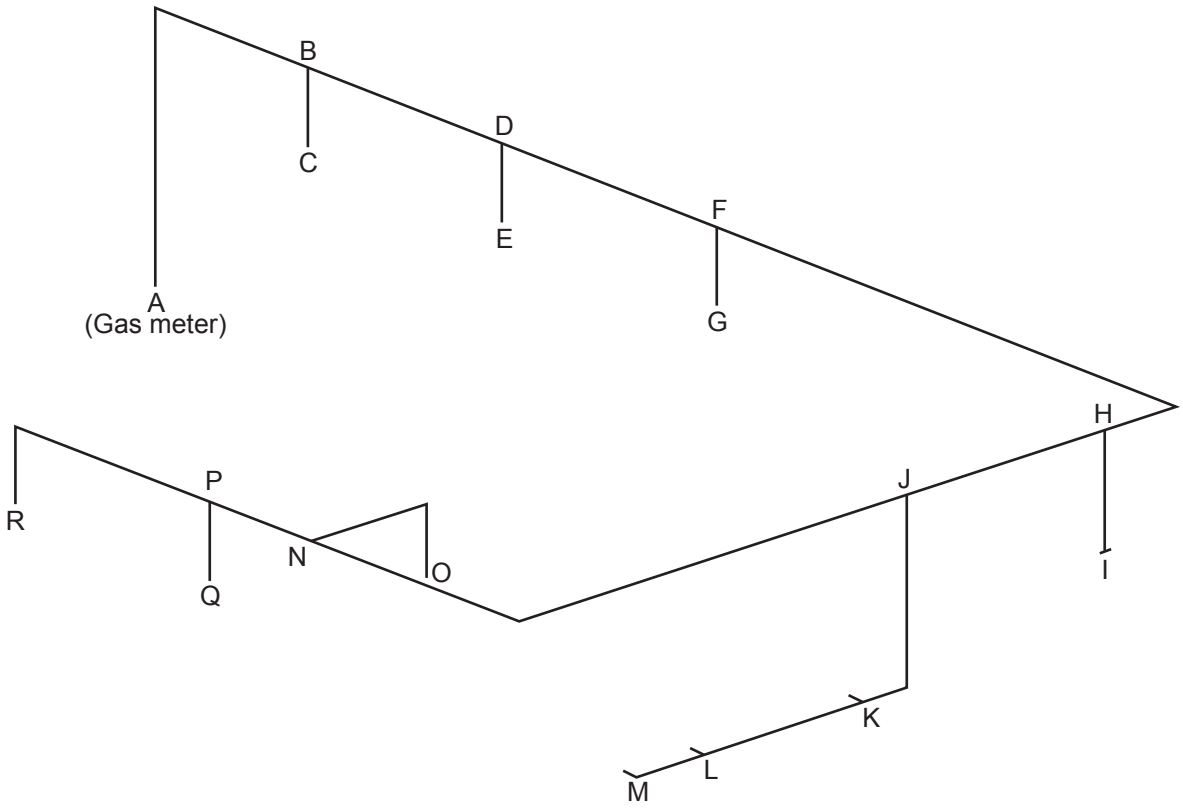
Use the Pipe Sizing Tables (not the graphs) from AS/NZS 5601 Part 1 Appendix F, Page 140, to complete the tables below.

Pipe Section	Length (m)	Main Run (m)	Gas Flow (MJ/h)	Nominal Size
A – B	5			
B – C	1.5			
B – D	3.5			
D – E	1.5			
D – F	3.7			
F – G	1.5			
F – H	5.3			
H – I	2			
H – J	3			
J – K	3			
K – L	2			
L – M	1			
J – N	5			
N – O	4			
N – P	2.5			
P – Q	1.5			
P – R	3.8			

Total 26 marks

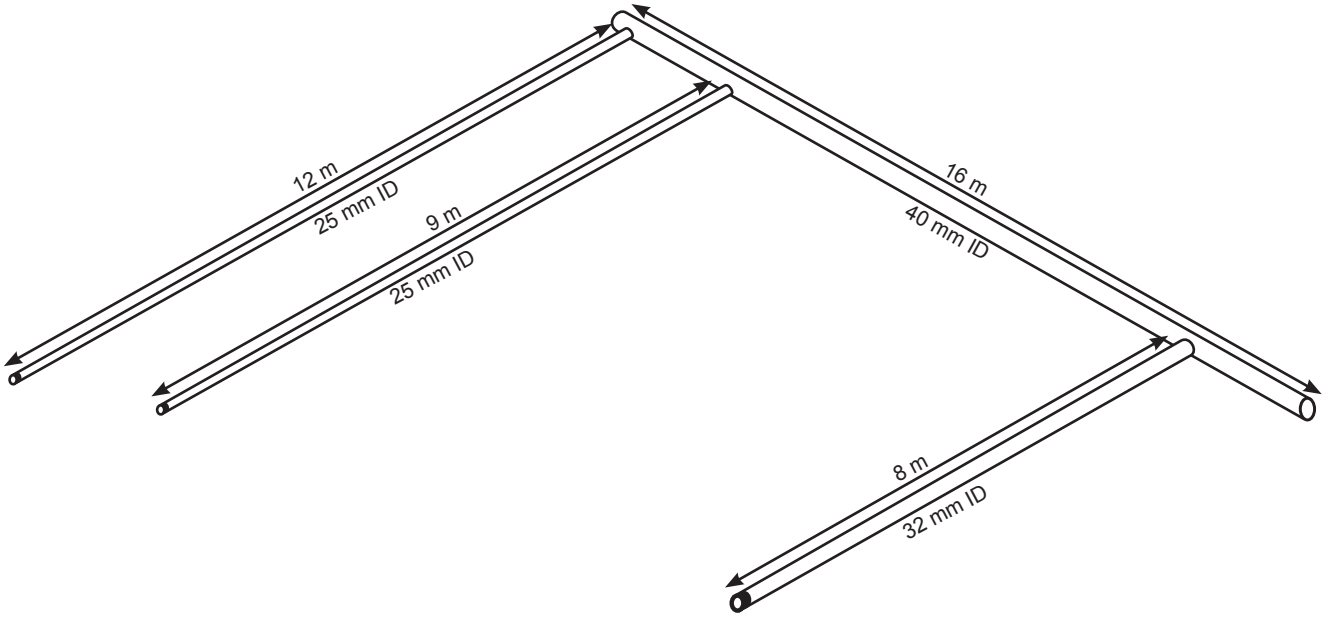
QUESTION 5 (cont'd)





QUESTION 6

The drawing below shows copper pipework NZS 3501 for a commercial gas installation.



(a) Calculate the total volume of the pipework.

(4 marks)

(b) State how the pipe volume will determine the purging procedure according to AS/NZS 5601 Part 1.

(2 marks)

Total 6 marks

QUESTION 7

(a) Complete the table below to show the ventilation requirements for a plant room to comply with AS/NZS 5601 Part 1.

Plant room Appliances	Minimum supply airflow Mechanical L/s	Location of supply opening	Minimum size of natural exhaust opening mm^3 (directly to outside)	Location of exhaust opening
Ducted furnace 220 MJ (Forced draught)				
Natural draft Heating unit 150 MJ (atmospheric)				

(6 marks)

(b) The air from a plant room is removed via mechanical ventilation.

State TWO adverse situations that AS/NZS 5601 Part 1 requires that the system be tested for.

_____

_____

_____

(1 mark)

Total 7 marks

QUESTION 8

Where the potential of a fall exists, the hazard needs to be managed.

(a) Give ONE example of how the hazard of working at height can be eliminated.

1 _____

(1 mark) ☐

(b) Give TWO examples of how the hazard of working at height can be isolated.

1 _____

2 _____

(2 marks) ☐

(c) Give THREE examples of how the hazard of working at height can be minimised.

1 _____

2 _____

3 _____

(3 marks) ☐

(d) Give FOUR factors that contribute to injuries sustained from working at heights.

1 _____

2 _____

3 _____

4 _____

(4 marks) ☐

Total 10 marks ☐

QUESTION 9

(a) Systems to manage working at height hazards can be categorised as group control measures or personal control measures.

(i) Describe the difference between group control measures and personal control measures.

(2 marks)

(ii) Give TWO examples of group control measures.

1 _____

2 _____

(2 marks)

(iii) Give TWO examples of personal control measures.

1 _____

2 _____

(2 marks)

(b) List FOUR safety guidelines that should be followed when a mobile scaffold is being used.

1 _____

2 _____

3 _____

4 _____

(4 marks)

Total 10 marks

QUESTION 10

(a) Give TWO requirements that must be met when an underground service is being installed to cross over another underground service.

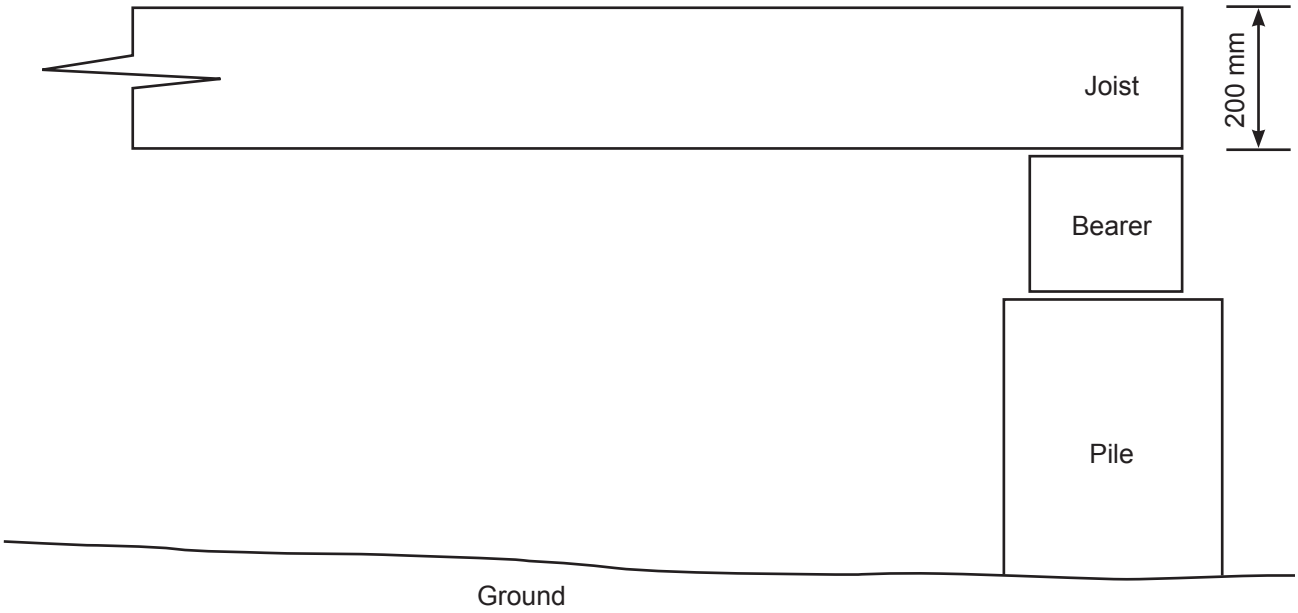
1 _____

2 _____

(2 marks)

(b) The diagram below shows part of the underfloor timber structure of a building.

On the drawing show where holes are permitted to be drilled in the joist to accommodate pipework. Include the maximum size hole permitted to be drilled in the joist.



(3 marks)

Total 5 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. When an appliance with a fan assisted flue that is designed for outdoor installation is to be installed in a covered area with only one side open, what is the maximum distance the flue is permitted to be from the opening?

   A 100 mm.

   B 250 mm.

   C 500 mm.

   D 600 mm.

   E 1200 mm.

   ☐

2. 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 to comply with AS/NZS 5601 Part 1?

   A 4 mm.

   B 6 mm.

   C 10 mm.

   D 12 mm.

   E 16 mm.

   ☐

3. What is the maximum length permitted for a flexible hose between a cylinder and the regulator it supplies?

   A 400 mm.

   B 600 mm.

   C 800 mm.

   D 1000 mm.

   E 1200 mm.

   ☐

4. Why are heat exchangers used in high efficiency gas appliances often constructed from stainless steel?

A Stainless steel is a good heat conductor.

B Stainless steel is less likely to facture from expansion due to temperature fluctuations.

C The appliance can produce higher temperatures without damaging the heat exchanger.

D The heat exchanger can be thin, making the appliance lighter.

E Because of the corrosive nature of condensate.

☐

5. Why are mercury vapour devices not suitable flame failure systems for package burners?

A The burner flame is too hot for the mercury probe.

B The valve will not operate quickly enough in the event of flame loss.

C The flame does not sit close enough to the face of the burner to pass a current.

D The valve required is too large to be operated by the bellows.

E The capillary tube cannot extend the required length, from the valve to the burner port.

☐

6. Which situation is most likely to activate the thermal fuse within the thermocouple on a gas fired storage water heater?

A The temperature pressure relief valve has seized shut.

B The ECO has activated due to the water reaching a higher than allowed temperature.

C The pilot flame has been incorrectly set and overheats the thermocouple probe.

D The thermostat fails allowing water to heat beyond the set temperature.

E The baffle collapses into the burner chamber blocking the primary flue.

☐

7. A 9 kg LPG cylinder is permitted to be used indoors with which type of fitting?

   A Companion/Camping.

   B POL.

   C CGA555.

   D QCC.

   E Primus.

   ☐

8. When a gas appliance is to be installed in a garage, what is the minimum height above the garage floor that the burners and combustion air intake should be situated?

   A 100 mm.

   B 250 mm.

   C 300 mm.

   D 450 mm.

   E 600 mm.

   ☐

9. Which of the following is the definition of an alternative solution in relation to the New Zealand Building Code?

   A A performance based standard that states how completed work and its parts must perform.

   B A custom designed method that is not included in the building code but will fulfil the requirements of the code.

   C A pre-approved method of compliance that is included in the building code.

   D A design solution, calculation or test procedure that has been approved and if used will guarantee an installation will comply with the building code.

   E A statement supplied by or on behalf of any applicant for a Building Consent.

   ☐

10. The LPGA Code of Practice for the installation and maintenance of 45 kg LPG cylinder systems states that a 10 mm condensate trap tube fitted to a bank of eight 45 kg LPG cylinders is to be what length?

A 250 mm.

B 280 mm.

C 350 mm.

D 370 mm.

E 560 mm.

☐

11. According to AS/NZS 5601 Part 1, what is the maximum gas supply pressure permitted to a push-on connector feeding a laboratory Bunsen burner?

A 1.0 kPa

B 1.5 kPa

C 2.0 kPa

D 3.0 kPa

E 7.0 kPa

☐

Total 11 marks ☐

For Examiner's use only

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