No. 9196

Plumbers,
Gasfitters and
Drainlayers Board

REGISTRATION EXAMINATION, NOVEMBER 2018
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 2018 were provided with the following documents:

• AS/NZS 5601 Part 1: General installations

USEFUL FORMULAE

Circumference of circle = 2 × π × R   or   Circumference of circle = π × D

Area of circle = π × R^2 or   Area of circle = 0.7854 × D^2

Volume of cylinder = π × R^2 × H   or   Volume of cylinder = 0.7854 × D^2 × H

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

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

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

SECTION A

QUESTION 1

(a)   Often when a gas storage water heater is first started the sound of water dripping onto the burner is heard.

     (i)   Explain how this water is produced.

                                                          (2 marks)

     (ii)   Explain why the dripping occurs more at different times.

                                                          (2 marks)

(b)   A gas-fired storage hot water cylinder is to be installed.

     Give FIVE factors that may impact on the efficiency of the system.

     1

     2

     3

     4

     5

                                                          (5 marks)

Total 9 marks

QUESTION 2

A boiler fitted with a package burner operates on natural gas.

(a)   State THREE conditions that must be met in order to perform an accurate flue gas analysis.

1   _____

2   _____

3   _____

(3 marks) ☐

(b)   Give THREE flue gas measurements that are needed to calculate the boiler efficiency (flue gas analysis).

1   _____

2   _____

3   _____

(3 marks) ☐

Total 6 marks ☐

QUESTION 3

(a) List SIX items of information that a gas CoC (Certificate of Compliance) must contain.

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

(6 marks) ☐

(b) Other than creating a gas CoC, list TWO actions that must be completed after the work has been finished.

1 _____

2 _____

(2 marks) ☐

(c) The following situations relate to installations supplied by single 9 kg LPG cylinders.

Choose the correct risk category for each situation.

Situation	Category
Installing a gas hob installation in a new house.	
Replacing a gas hob by another one of the same model.	
Adding a gas hob to an existing installation in a house.	
Replacing a gas valve on a gas hob.	

(4 marks) ☐

Total 12 marks ☐

QUESTION 4

Complete the table below by calculating the daily consumption of gas in m³ required to supply the energy input for each appliance listed.

Heating value of natural gas = 40 MJ/m³
Heating value of LPG = 90 MJ/m³.

Appliance	Daily operating time	Daily gas consumption (m³)
LPG space heater 24,000 BTU/h	11 hours	
Natural gas water heater 220 MJ/h	4 hours	
LPG gas furnace 38 kW/h	15 hours	
Natural gas commercial cooker 104 MJ/h	8 hours	

Total 8 marks

QUESTION 5

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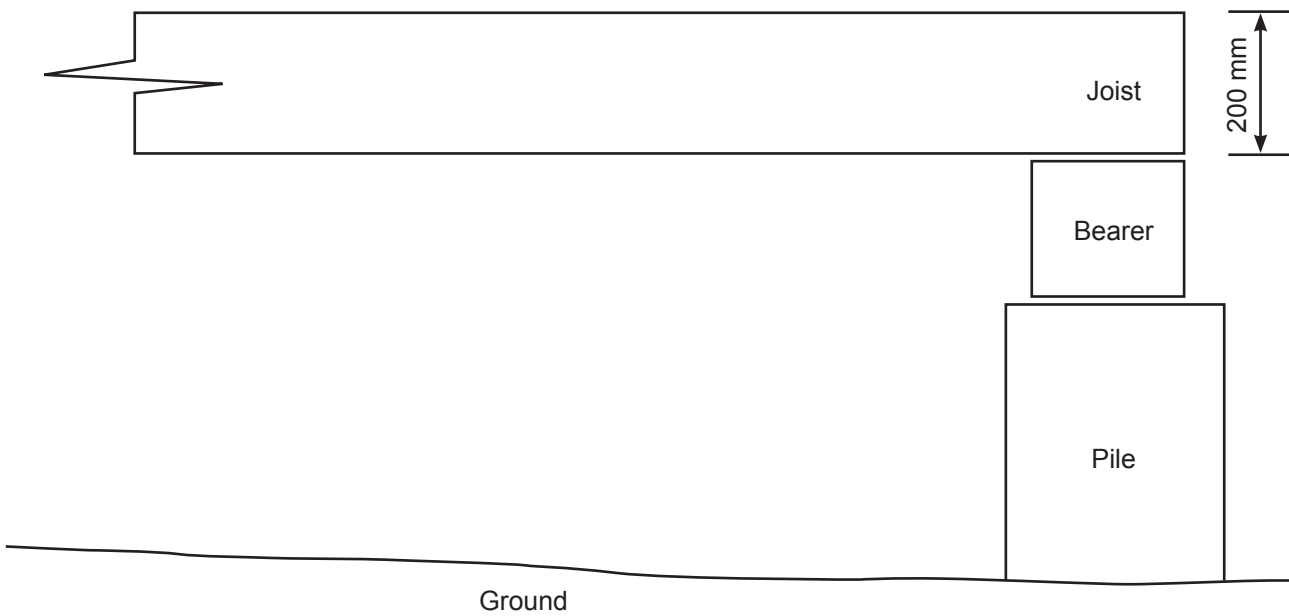
1 _____

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 ☐

QUESTION 6

The diagram on the page opposite shows the pipework and appliances for a gas installation in a dwelling.
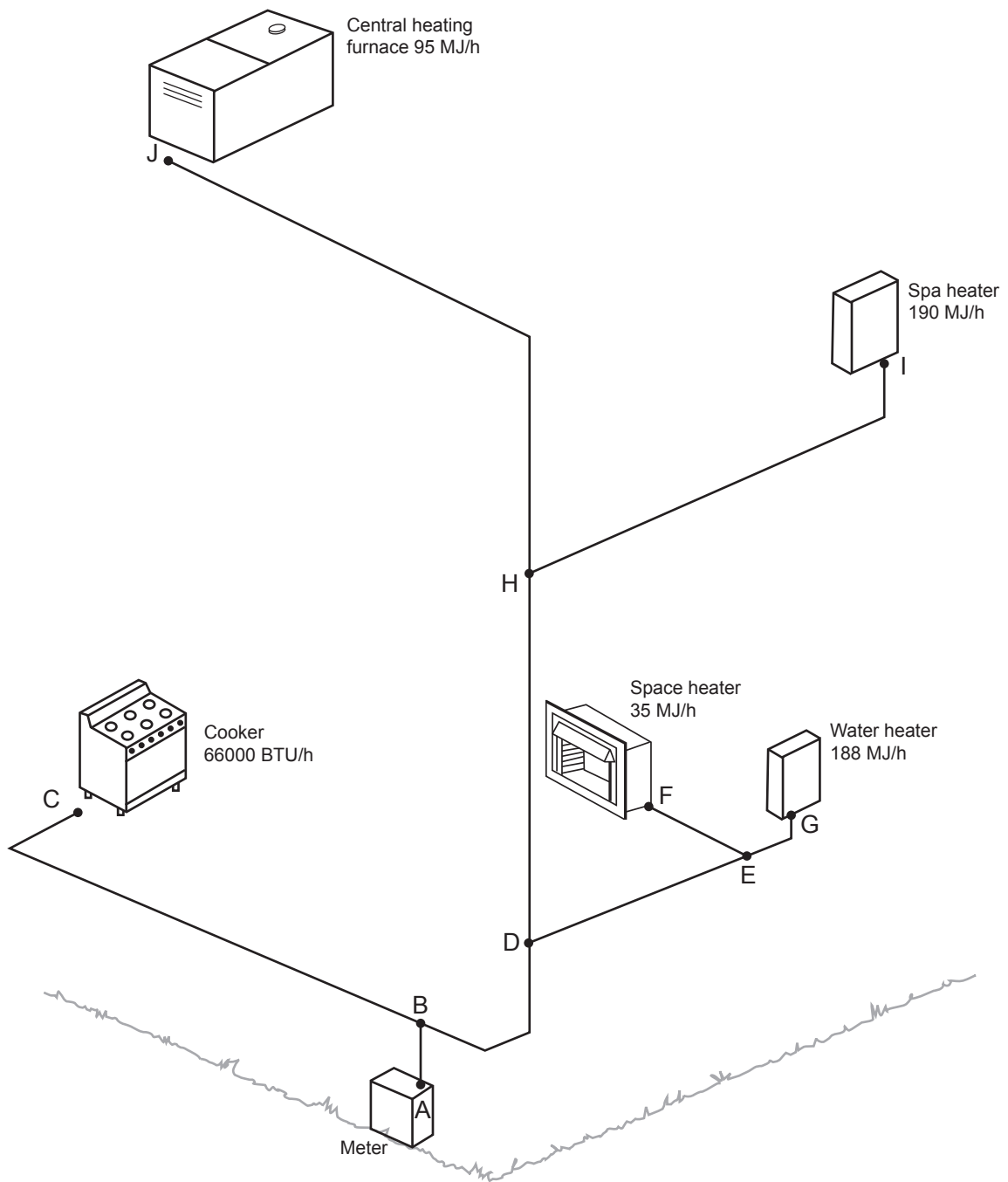
Installation details are as follows:
• Natural gas
• Copper pipe (NZS 3501)
• The installation supply pressure is 3 kPa.

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

Pipe Section	Length (m)	Main run (m)	Gas flow (MJ/h)	Nominal size (mm)
A - B	1.5			
B – C	6			
B – D	2.5			
D – E	3			
E – F	2.4			
E – G	2.5			
D – H	3.2			
H – I	4			
H – J	4.6			

Total 14 marks

Central heating furnace 95 MJ/h

Spa heater 190 MJ/h

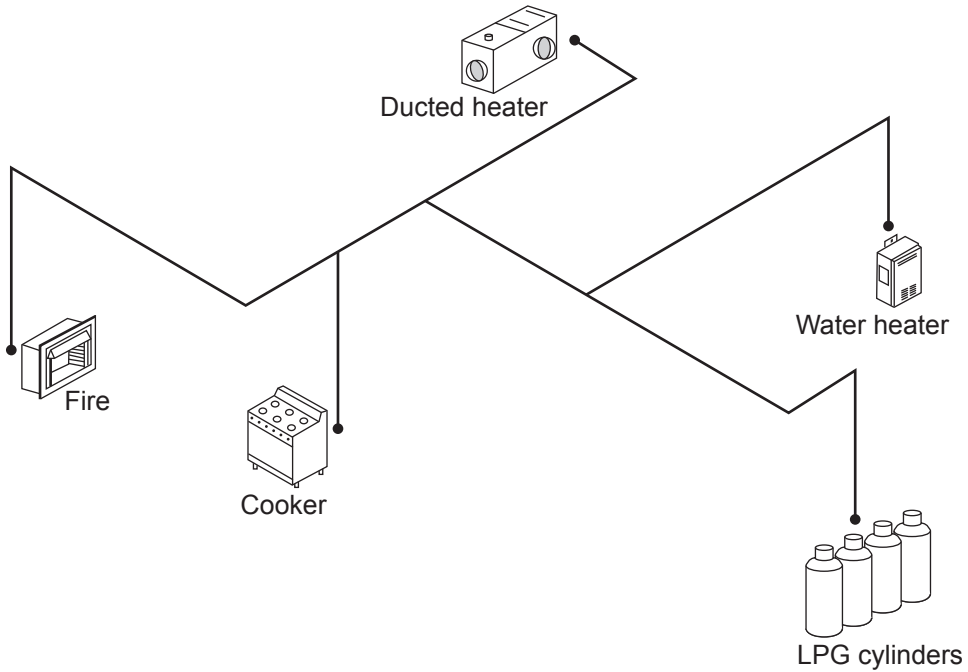Cooker 66000 BTU/h

Space heater 35 MJ/h

Water heater 188 MJ/h

Meter

QUESTION 7

(a)   The diagram below shows the layout of a single residential gas installation.

On the diagram, show where pressure test points and isolating valves are required to enable the system to comply with the minimum requirements of AS/NZS 5601 Part 1.

(3 marks) ☐

(b)   List FOUR requirements that must be met when an LPG cylinder inside a house supplying a cooktop is being installed so that the installation will comply with AS/NZS 5601 Part 1.

1 _____

2 _____

3 _____

4 _____

(4 marks) ☐

Total 7 marks ☐

QUESTION 8

The diagram below shows a plan of copper pipework to be installed in a commercial building. Munson rings with wall brackets using rod hangers are to be used to support the pipework.

- Support is to be provided 100 mm from the end of each pipe.
- Three clips are to be included for each tee, each located 100 mm from the tee.
- Two clips are to be included for each bend, each located 100 mm from the bend.
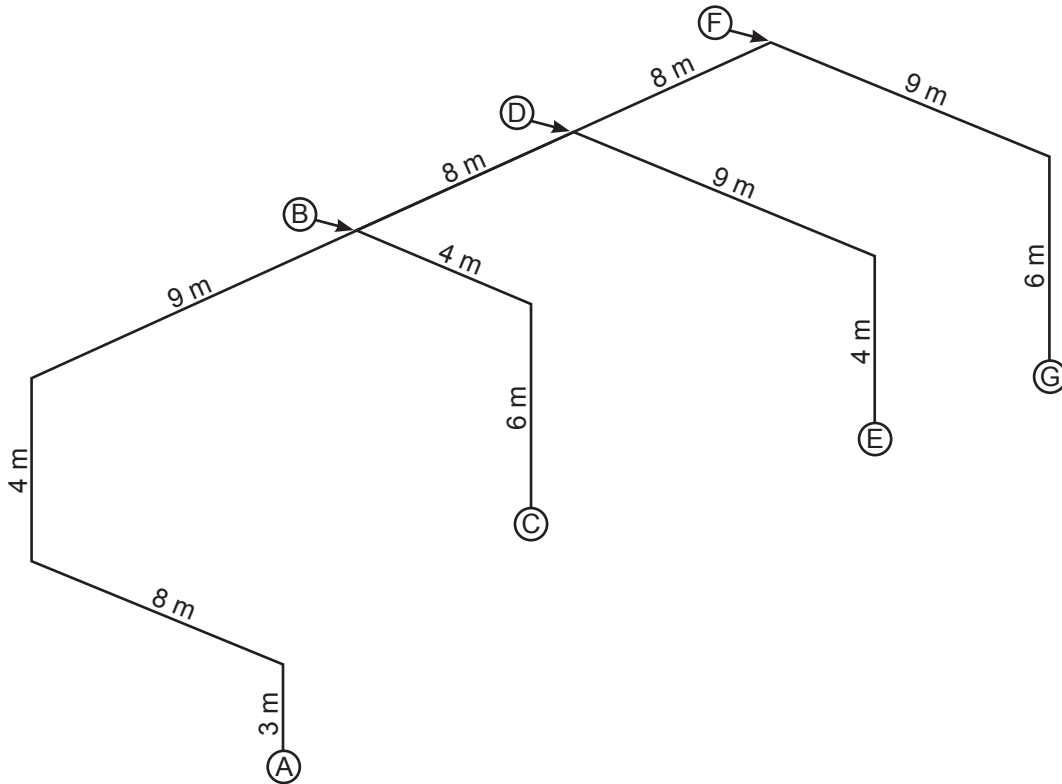
Complete the following table to show the number of clips and the rod hanger sizes required for the pipework. The clips are to be installed to comply with the minimum requirements of AS/NZS 5601 Part 1.

Pipe section	Number of clips	Rod hanger size (mm)
A – B 150 mm diameter pipe		
B – C 50 mm diameter pipe		
B – D 65 mm diameter pipe		
D – E 40 mm diameter pipe		
D – F 32 mm diameter pipe		
F – G 25 mm diameter pipe		

Total 9 marks

QUESTION 9

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

Give TWO examples, other than fire wraps, 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 wraps and a fire band.

(4 marks) ⬜

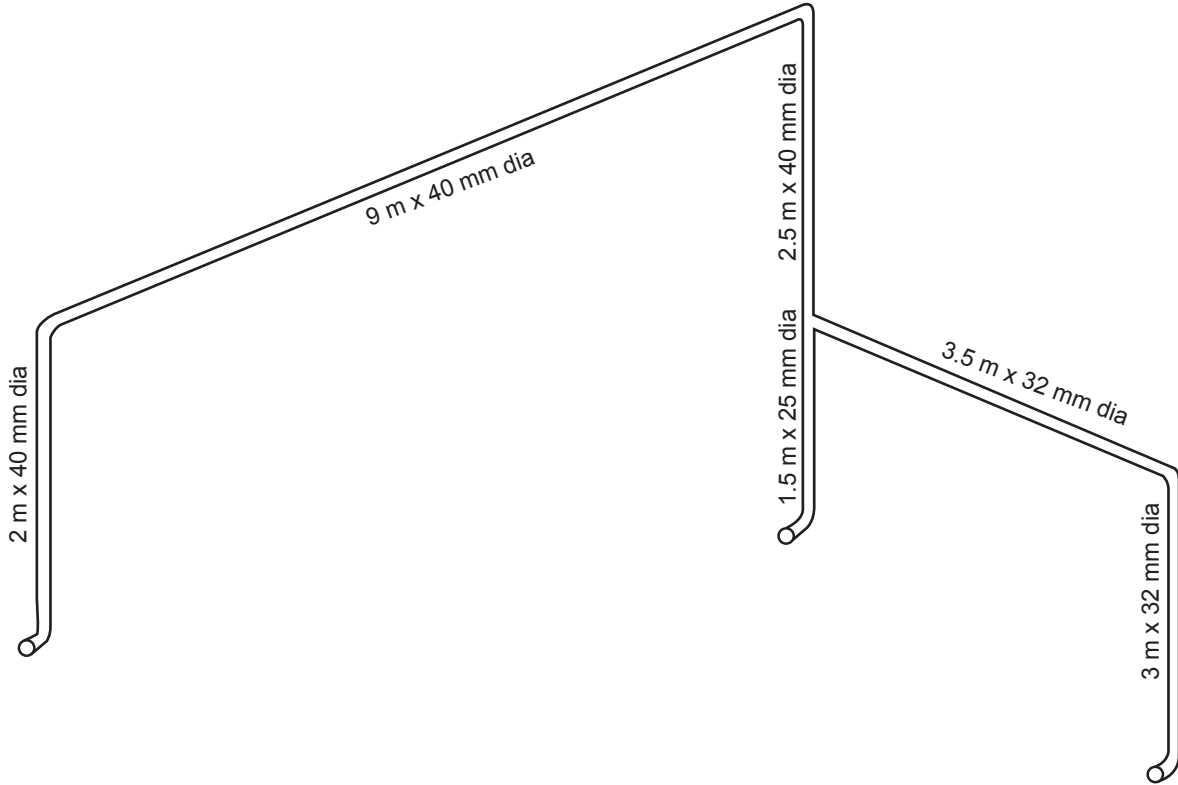(c) Describe what intumescent material does, and how it slows the spread of fire.

_____

_____

(1 mark) ⬜

Total 7 marks ⬜

QUESTION 10

(a) The diagram below shows a schematic of existing gas copper pipework (NZS 3501) in a building.

Find in litres the total volume of the pipework.

_____

_____

_____

_____

(4 marks) ☐

(b) State the maximum acceptable pressure drop permitted according to AS/NZS 5601 Part 1 when a leakage test of the installation in (a) is being undertaken.

_____

(1 mark) ☐

Total 5 marks ☐

QUESTION 11

(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.

        _____

        _____

        (1 mark) ☐

    (ii) Give an example of a group control measure.

        _____

        (1 mark) ☐

    (iii) Give an example of a personal control measure.

        _____

        (1 mark) ☐

(b) State the maximum height a scaffolding can be erected or altered without a relevant qualification.

    _____

    (1 mark) ☐

(c) State where the measurement in (b) is taken from on the scaffolding.

    _____

    (1 mark) ☐

Total 5 marks ☐

QUESTION 12

Particular hazardous work is to be carried out.

(a)   Name the agency that must be notified of this.

_____

(1 mark)

(b)   State how long before work commences a notification form must be received by the organisation in (a).

_____

(1 mark)

(c)   Give a situation where particular hazardous work may be performed prior to sending the notification form.

_____

(1 mark)

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.

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

1. According to AS/NZS 5601 Part 1, what must the minimum height of a natural draught flue be if it is not specified in the manufacturer's instructions?

    A 0.6 m.

    B 1.2 m.

    C 1.8 m.

    D 2.4 m.

    E 3.0 m.

2. Which of the following pressures is equivalent to eight inches water gauge?

    A 0.8 kPa.

    B 1.0 kPa.

    C 1.6 kPa.

    D 2.0 kPa.

    E 2.4 kPa.

3. What is the minimum length of time that a limited certified trainee must work in the presence of his or her supervisor?

    A 6 months.

    B 12 months.

    C 18 months.

    D 24 months.

    E 36 months.

4. A consumer piping gas regulator used on a LPG installation will require the outlet pressure setting to be displayed on the regulator where the outlet operating pressure setting exceeds what pressure?

A   3.5 kPa.

B   4.0 kPa.

C   4.5 kPa.

D   5.0 kPa.

E   5.5 kPa.

☐

5. Which of the following specifies the minimum permitted gradient on a lateral run of flue?

A   10 mm per m.

B   15 mm per m.

C   20 mm per m.

D   25 mm per m.

E   30 mm per m.

☐

6. AS/NZS 5601 Part 1 specifies the total input rating that must not be exceeded when a flueless space heater is to be installed in a habitable space.

Which of the following is the maximum total input for a thermostatically controlled flueless space heater that is installed in a lobby?

A   0.02 MJ/h/m^3.

B   0.2 MJ/h/m^3.

C   0.4 MJ/h/m^3.

D   2.0 MJ/h/m^3.

E   4.0 MJ/h/m^3.

☐

7. What is the minimum permissible vertical dimension of a free ventilation opening used for air supply to a gas appliance?

   A   3 mm.

   B   4 mm.

   C   5 mm.

   D   6 mm.

   E   8 mm.

   ☐

8. Which of the following statements best describes Meter Factor?

   A   The factor caused by the pressure loss across the gas meter.

   B   A factor of inaccuracy that is common in domestic gas meters.

   C   As gas passes through the meter, the energy is lost operating the dials.

   D   The allowance for a gas taking up less volume while under pressure.

   E   An allowance that is factored into a gas volume to adjust for the calorific value of the gas.

   ☐

9. According to AS/NZS 5601 Part 1, what is the largest volume of pipework a manometer (water gauge) can be used to complete a gas tightness test?

   A 0.3 m^3.

   B 0.6 m^3.

   C 3.0 m^3.

   D 10 m^3.

   E 30 m^3.

   ☐

10. 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.

   ☐

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		