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, NOVEMBER 2012

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 20–21 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 2012 were provided with the following documents:

- AS/NZS 5601 Part 1: General installations

SECTION A

QUESTION 1

(a) State atmospheric pressure at standard reference conditions.

_____

(1 mark) ☐

(b) Give the TWO standard reference conditions used when establishing atmospheric pressure.

1 _____

2 _____

(2 marks) ☐

(c) Describe what the term atmospheric pressure refers to.

_____

_____

(1 mark) ☐

(d) Give THREE factors that can affect atmospheric pressure.

1 _____

2 _____

3 _____

(3 marks) ☐

(e) State what absolute pressure measures.

_____

(1 mark) ☐

Total 8 marks ☐

QUESTION 2

(a) Describe a situation which would cause the thermal fuse built into the thermocouple on a gas-fired storage water heater to shut the appliance down.

(2 marks)

(b) Besides the thermal fuse, state what other safety device is often linked into the thermo-electric flame failure circuit on a gas-fired storage water heater.

(1 mark)

(c) Describe why linen and towels should not be stored on top of an indoor gas-fired storage water heater.

(2 marks)

(d) Describe the effect on a thermo electric flame failure device in each of the following situations.

Pilot flame too small

Pilot flame too large

(2 marks)

QUESTION 2 (cont'd)

(e) Describe the operation of a thermo-electric flame failure device on a gas-fired storage water heater.

(4 marks)

Total 11 marks

QUESTION 3

(a) Pipework with volume of 18 litres has been installed in a building and requires testing before the walls are lined.

The installation has been designed to operate at 5 kPa.

Complete the table below showing the successful completed test results.

Stabilisation Time	Test Time	Test Pressure	Pressure Loss

(3 marks)

(b) Give THREE factors that could compromise the accuracy of the test.

1 _____

2 _____

3 _____

(3 marks)

(c) List, in order, the FOUR tests which must be completed when carrying out additions or alterations to an existing installation.

1 _____

2 _____

3 _____

4 _____

(4 marks)

Total 10 marks

QUESTION 4

Explain why options for the placement of LPG cylinders on boats are limited.

Total 2 marks

QUESTION 5

(a) Describe the following ventilation types.

Adventitious

Natural

Mechanical

(3 marks)

(b) Give TWO effects of air contaminated with hair spray passing through a gas burner in a hair salon.

1

2

(2 marks)

Total 5 marks

QUESTION 6

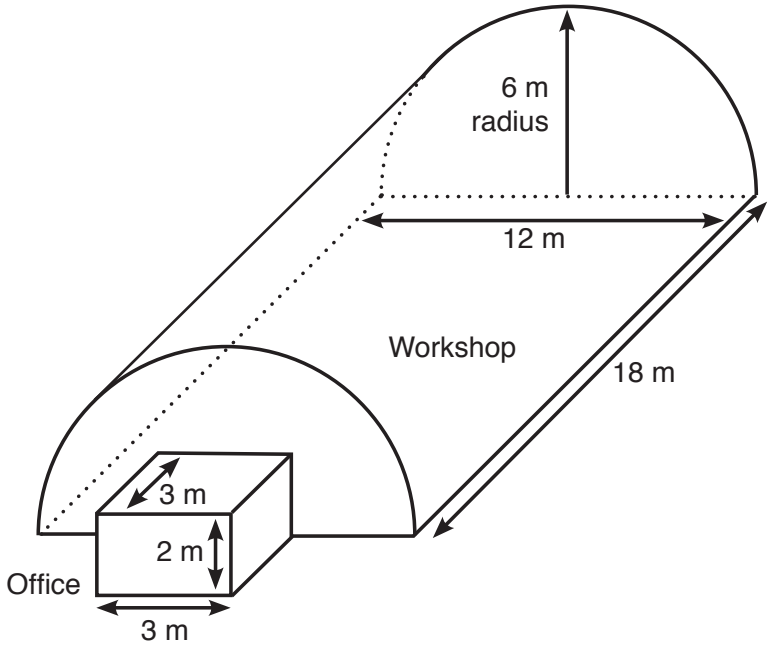
Complete the following table by naming THREE materials suitable for gas installation pipework and giving a limitation for each.

Material	Limitation

Total 6 marks

QUESTION 7

The diagram below shows a workshop and office.



The heat input rate recommended for the workshop and office is 0.36 MJ/h/m^3.

Calculate the total MJ/h required to heat the workshop and office.

Use the formula below to calculate the workshop volume.

$$V = \frac{\pi R^2 L}{2}$$

Total 6 marks

QUESTION 8

(a) Give TWO advantages flexible ducting has when compared with sheet metal ducting.

1 _____

2 _____

(2 marks)

(b) Give TWO advantages sheet metal ducting has when compared with flexible ducting.

1 _____

2 _____

(2 marks)

Total 4 marks

QUESTION 9

(a) Give FOUR reasons why gas appliances should always be commissioned.

1 _____

_____

2 _____

_____

3 _____

_____

4 _____

_____

(4 marks) ☐

(b) State TWO effects of an incorrectly sized injector fitted in a gas burner.

1 _____

_____

2 _____

_____

(2 marks) ☐

Total 6 marks ☐

QUESTION 10

Draw a cross-sectional view of an internal balanced flue space heater installed with the flue penetrating on an external wall.

Indicate all major components and the path of combustion air and flue gas products through the heater and flue.

Total 6 marks

QUESTION 11

(a) Complete the table below by giving the units used to for each item listed. An example is given for you.

Items of information	Unit
Example: *Speed*	Example: *km/hr*
Gas appliance energy consumption	
Heating value of a gas	
Gas appliance efficiency	
Carbon monoxide in a room	
Thermal expansion	
Flame speed	

(6 marks)

(b) An imported appliance has been installed.

(i) The data plate on the appliance states that the hourly gas consumption of the appliance is 28,000 BTU/hr.

Using Appendix A from AS/NZS 5601 Part 1, convert the hourly gas consumption to MJ/hr.

(1 mark)

(ii) The data plate on the appliance states that the operating pressure of the appliance is 5 inches water gauge.

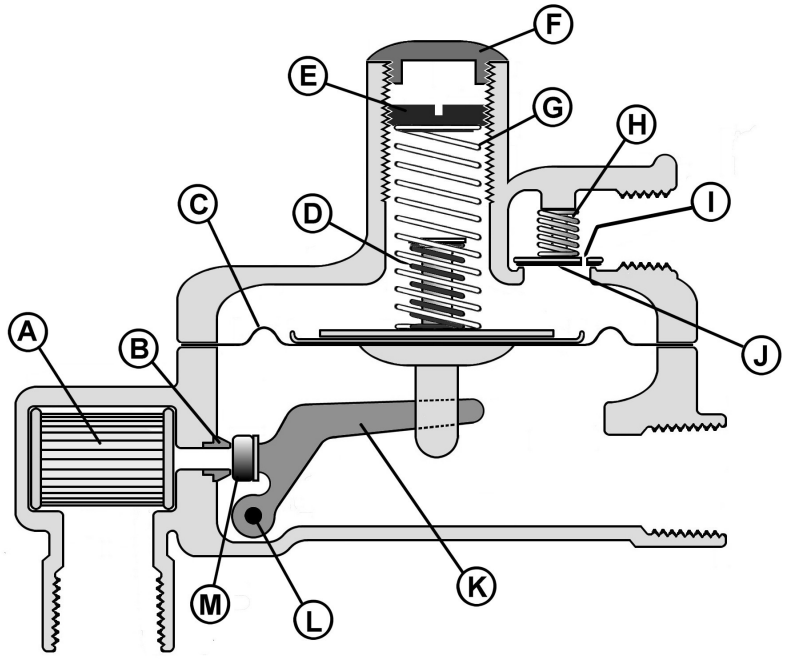
Using Appendix A from AS/NZS 5601 Part 1, convert the operating pressure to kPa.

(1 mark)

Total 8 marks

QUESTION 12

The diagram below shows a service regulator.



Complete the table below identifying the listed components.

Fulcrum		Regulator loading spring	
Orifice		Pressure relief spring	
Filter		Breather	
Diaphragm		Regulator adjustment screw	
Relief vent valve		Regulator valve	

Total 5 marks

QUESTION 13

(a) An LPG appliance has an energy input of 15 kW.

The heating value of LPG is 90 MJ/m³.

Calculate the gas rate in m³/hr for the appliance.

(2 marks)

(b) The appliance in (a) is 82% efficient.

Calculate the heat output of the appliance in kW.

(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.

Note that should your choice of answer be unclear in this section of the examination no marks will be awarded for that question.

1. An appliance has been gas rated and the consumption is much higher than it should be.

   What could this indicate?

   A The appliance is not running on high.

   B The gas pressure is set too low.

   C The flue is not long enough.

   D The gas meter is the wrong size.

   E The injectors are the wrong size.

   ☐

2. What could occur if an installation which includes appliances without flame failure devices is not purged correctly?

   A A burner could extinguish and unburnt gas could enter the room unchecked.

   B A burner flame on the appliance could become unstable and shut down the appliance.

   C An appliance could go to lock out and require manual resetting.

   D Appliance burner flames could burn yellow and floppy causing soot to appear.

   E The thermal fuse on the appliances could activate.

   ☐

3. What could occur if there were an air/gas mixture contained within consumer pipework?

   A The installation operating pressure can go out of adjustment.

   B An oily liquid can condense within the pipework.

   C The regulator diaphragms can break down.

   D An explosion could occur within the pipework.

   E The gas can oxidise and corrode the pipe.

   ☐

4. The standard for LPG installations in caravans and boats for non-propulsive purposes has been replaced.

   Which of the following is the new standard?

   A NZS 5261.

   B NZS 5262.

   C NZS 5428.

   D AS/NZS 5601 Part 1.

   E AS/NZS 5601 Part 2.

   ☐

5. Which of the following is a gas odourant?

   A Ethanol.

   B Mercaptan.

   C Benzene.

   D Hypochloride.

   E Methanol

   ☐

6. Which of the following is the lower explosive limit of LPG?

   A 2%

   B 5%

   C 10%

   D 12%

   E 15%

   ☐

7. According to AS/NZS 5601 Part 1, what is simulated natural gas (SNG) a mixture of?

   A Acetylene and LPG.

   B Methane and ethane.

   C LPG and natural gas.

   D LPG and air.

   E Carbon dioxide and methane.

   ☐

8. Biogas consists mainly of which two gases?

A Methane and hydrogen.

B Hydrogen and ethane.

C Methane and ethane.

D Butane and carbon dioxide.

E Carbon dioxide and methane.

☐

9. According to AS/NZS 5601 Part 1, except in single occupancy residential premises, above-ground consumer piping must be identified when the operating pressure exceeds what pressure?

A 7 kPa.

B 10 kPa.

C 14 kPa.

D 100 kPa.

E 200 kPa.

☐

10. According to AS/NZS 5601 Part 1, what is the minimum separation distance between consumer gas pipe and any above-ground electrical cable not in a conduit?

A 20 mm.

B 25 mm.

C 30 mm.

D 50 mm.

E 100 mm.

☐

11. According to AS/NZS 5601 Part 1, what is the minimum clearance from finished ground level of above-ground consumer piping?

A 15 mm.

B 20 mm.

C 30 mm.

D 40 mm.

E 50 mm.

☐

12. According to AS/NZS 5601 Part 1, what is the maximum diameter hole permitted to be drilled in a joist, unless otherwise specified by the manufacturer?

A 25 mm.

B 32 mm.

C 40 mm.

D 45 mm.

E 50 mm.

☐

13. According to AS/NZS 5601 Part 1, what should the depth of cover for consumer piping in the ground never be less than?

A 150 mm.

B 300 mm.

C 450 mm.

D 500 mm.

E 600 mm.

☐

14. According to AS/NZS 5601 Part 1, what is the minimum allowable separation between underground consumer piping and a communication cable?

A 25 mm.

B 40 mm.

C 50 mm.

D 75 mm.

E 100 mm.

☐

15. According to AS/NZS 5601 Part 1, which of the following words is defined as a recommendation?

A Should.

B May.

C Shall.

D Can.

E Will.

☐

16. According to AS/NZS 5601 Part 1, accessible provision for dust clearing is required for consumer piping supplied from an underground pipe which has a riser in excess of what height?

A 5 m.

B 8 m.

C 10 m.

D 12 m.

E 15 m.

☐

17. According to AS/NZS 5601 Part 1, consumer piping gas regulators can be installed in which of the following locations?

A A ceiling space.

B A lift motor room.

C A fire separated stairway.

D A hose reel cabinet.

E A sprinkler room.

☐

18. According to AS/NZS 5601 Part 1, a regulator relief vent terminal must be at least what distance from a mechanical air inlet?

A 0.6 m.

B 1 m.

C 1.2 m.

D 1.5 m.

E 3 m.

☐

19. According to AS/NZS 5601 Part 1, what is the minimum the clearance between the highest part of a gas hob of a cooking appliance and a range hood?

A 400 mm.

B 450 mm.

C 500 mm.

D 600 mm.

E 750 mm.

☐

20. Which of the following statements best describes flame rectification?

A An electrical current is generated by the gas flame, and then this current travels through earth back to the PCB.

B A direct current passes through a gas flame and completes the circuit back to the PCB.

C An alternating current travels through a flame once the electrode is heated, and then it travels through earth to the controller.

D An AC electrical current is partially rectified to DC as it passes through a flame, and then it travels back to the PCB.

E A alternating current is created when heat is applied to the flame rod, and as long as heat is being sensed the PCB keeps the gas valve open.

☐

Total 20 marks ☐

For Examiner's use only

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