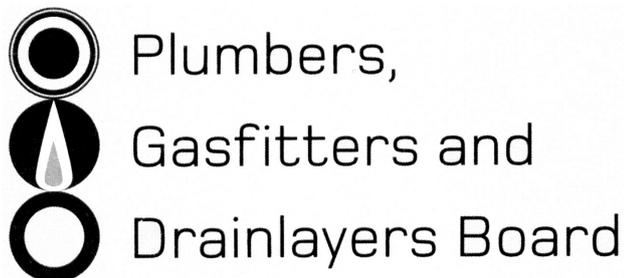


Affix label with Candidate Code
Number here.
If no label, enter candidate
Number if known

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No. 9196



REGISTRATION EXAMINATION, JUNE 2011

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 17–19 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 19 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 2011 were provided with the following document:

- NZS 5261 Gas installation

SECTION A

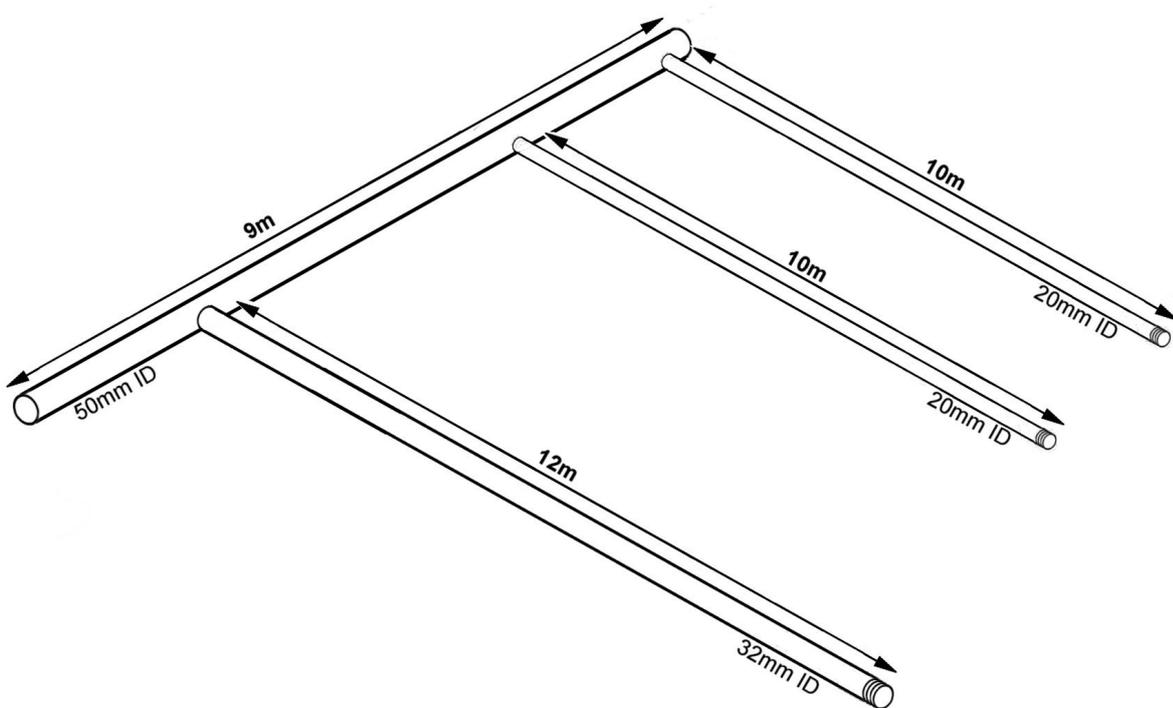
QUESTION 1

- (a) 5 m of 150 mm ID consumer piping is opened for repair.

State what is recommended according to NZS 5261 Gas Installation.

(2 marks)

- (b) The drawing below shows pipework for a new commercial gas installation.



- (i) Calculate the total volume of the pipework.

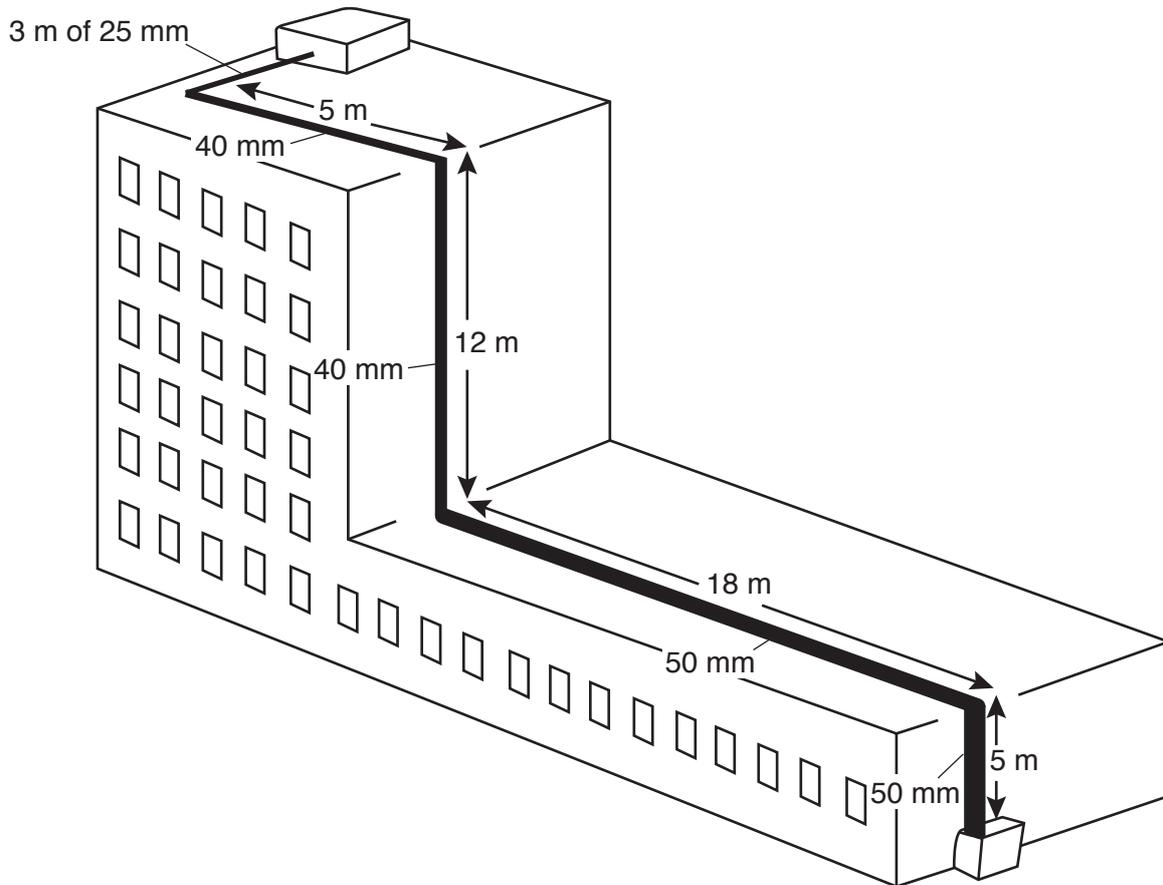
- (ii) State the size of the installation with regard to purging.

(6 marks)

Total 8 marks

QUESTION 2

(a) The following diagram shows copper pipework on a building.



Using NZS 5261 Gas Installation, complete the following table to show the minimum number of pipe supports required for the pipework. Allow for support within 500 mm of each straight section.

Size	Quantity
25 mm	
40 mm	
50 mm	

(3 marks)

(b) Give TWO methods of allowing for thermal expansion of the pipework shown in Question 2 (a).

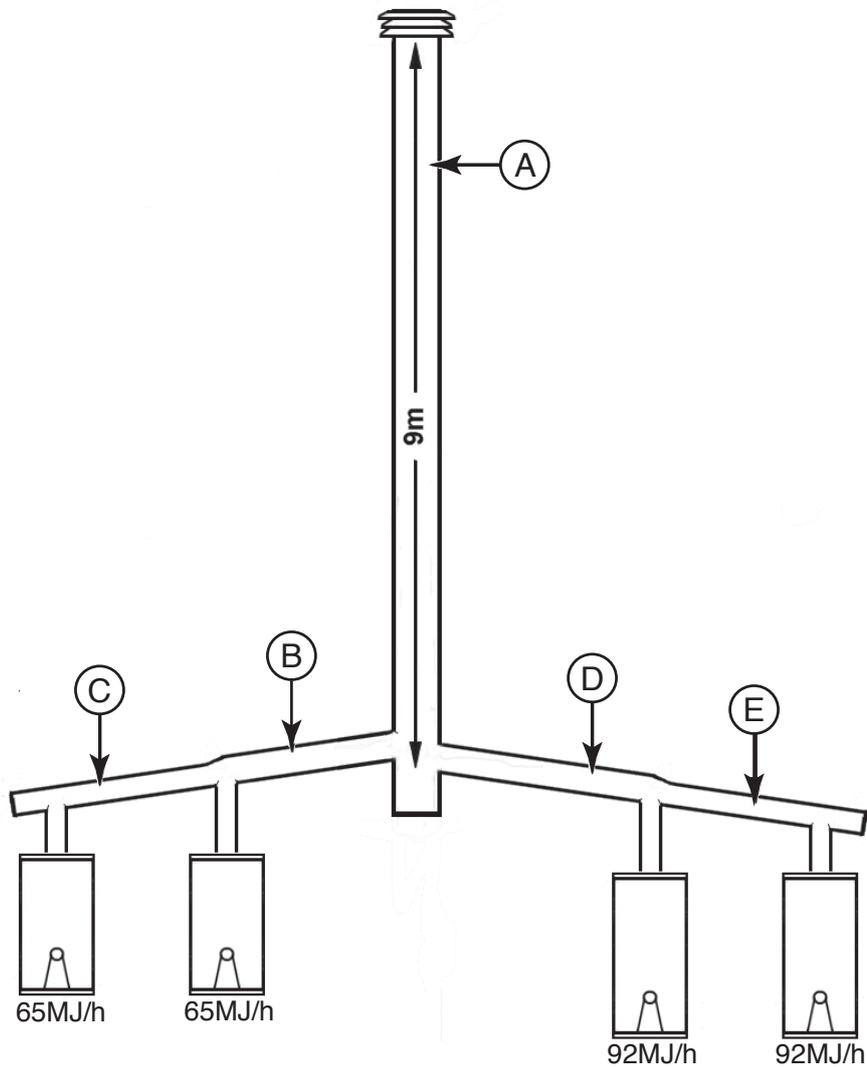
- 1 _____
- 2 _____

(2 marks)

Total 5 marks

QUESTION 3

The diagram below shows a gas installation.



Complete the following table to show the diameter of each flue section labelled A – E.
 For A, use the Flue Design Chart Figure 1 from NZS 5261 Gas Installation.
 For B – E, use the Flue Sizes Table F1 from NZS 5261 Gas Installation.

Flue Section	Size
A	
B	
C	
D	
E	

Total 6 marks

QUESTION 4

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

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

- 1 _____
- 2 _____
- 3 _____

(3 marks)

(b) Give THREE conditions that must be met before an accurate flue gas analysis can take place.

- 1 _____
- 2 _____
- 3 _____

(3 marks)

(c) Explain the effects of the following.

(i) Excessive flue draught.

- _____
- _____

(1 mark)

(ii) Insufficient flue draught.

- _____
- _____

(1 mark)

Total 8 marks

QUESTION 5

- (a) A gas boiler has been gas rated and the gas meter shows that 16.85 m³/h of gas was being consumed. The working pressure of the installation is 6.5 kPa.

Calculate the corrected volume of gas consumed per hour.

Formulae:

$$\frac{A + P}{A} = F$$

$$V \times F = C$$

where

A = atmospheric pressure

P = working pressure

F = correction factor

V = volume of gas

C = corrected volume

(3 marks)

- (b) Give 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 8 marks

QUESTION 6

(a) A natural gas appliance is to be converted to operate on LPG.

List SIX items that must be checked and may need changing in the conversion.

- 1 _____
- 2 _____
- 3 _____
- 4 _____
- 5 _____
- 6 _____

(6 marks)

(b) If the conversion in (a) was from LPG to natural gas, give TWO factors relating to the installation pipework that must be checked and may need changing.

- 1 _____
- 2 _____

(2 marks)

Total 8 marks

QUESTION 7

State the maximum gas rating of a gas appliance using a smooth-walled square chimney measuring 125 mm × 125 mm, according to NZS 5261 Gas Installation.

Total 2 marks

QUESTION 8

List, in order, TEN steps in the operational sequence of a gas-fired electronic continuous flow water heater.

- 1 _____
- 2 _____
- 3 _____
- 4 _____
- 5 _____
- 6 _____
- 7 _____
- 8 _____
- 9 _____
- 10 _____

Total 10 marks

QUESTION 9

According to the Gas (Safety and Measurement) Regulations 2010, give THREE reasons why an installation would be deemed to be unsafe.

- 1 _____
- 2 _____
- 3 _____

Total 3 marks

QUESTION 10

The diagram on the opposite page shows the floor plan of a house. A gas system is to be installed in the house according to the information in the following table.

Installation Details	
Pipe Material	Copper
Gas Type	LPG
Installation Working Pressure	2.75 kPa
The pipework is located in the ceiling and all droppers will be 2 m	

- (a) Using NZS 5261 Gas Installation, and the Installation Details above, complete the following tables to pipe size the gas installation.

Installation Pressure Drop/m	
Length of Longest Run	

Pipe Section	MJ	Section Length	Diameter
A - B			
B - C			
B - D			
D - E			
D - F			
F - G			
F - H			

(16 marks)

- (b) The cylinders supplying the installation in (a) are located in an enclosure separate from the house.

An underground steel pipe is used to carry the gas 30 meters from the enclosure to the inlet point at the house.

The pressure of the gas in the underground pipe is 7 kPa.

Using NZS 5261 Gas Installation, state the minimum diameter of the pipe.

(3 marks)

Total 19 marks

QUESTION 11

(a) Give THREE advantages a condensing gas-fired appliance has over a natural draught gas-fired appliance.

- 1 _____
- 2 _____
- 3 _____

(1½ marks)

(b) Give THREE disadvantages a condensing gas-fired appliance may have compared with a natural draught gas-fired appliance.

- 1 _____
- 2 _____
- 3 _____

(1½ marks)

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. Which of the following is not a type of flame failure system?

- A Flame rectification.
- B Mercury vapour valve.
- C Oxygen depletion pilot.
- D Ultra violet.
- E Thermoelectric.

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

- A The burner flame is too hot for the mercury probe.
- B The valve will not operate fast enough in event of flame loss.
- C The flame does not sit close enough to the surface 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 to reach the burner port from the valve.

3. In what way does a quick recovery gas storage water heater differ from a standard model?

- A The quick recovery water heater has a higher MJ rating.
- B The quick recovery water heater has an additional burner.
- C The quick recovery water heater is smaller in size so it can heat quicker.
- D The burner on a quick recovery water heater is located nearer to the top of the cylinder.
- E The quick recovery water heater allows for increased pressures which enables faster heating.

4. What is the common reason why domestic gas-fired electronic continuous flow water heaters are not suitable for use as spa pool heaters?
- A The water flow is insufficient to activate the appliance.
 - B The appliance will heat the water too slowly.
 - C The appliance will deliver water at too high a temperature.
 - D The chemicals circulating in the pool can damage the water heater.
 - E Spa pool heaters are designed to turn on and off much quicker than regular water heaters.

5. Which of the following best describes how an ECO device on a gas storage water heater operates?
- A A predetermined volume of gas is permitted to pass through the control valve, but if this is exceeded the valve will shut off the gas supply.
 - B Over temperature situations will allow the device to interrupt the flame failure circuit, shutting off the gas supply.
 - 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 which will allow the growth of legionella bacteria.
 - E The ECO monitors the flame to ensure there is sufficient oxygen for complete combustion, and will shut off the gas supply in the event that excess carbon monoxide is present.

6. Which situation is most likely to activate the thermal fuse within the thermocouple on a gas storage water heater?
- A. The hot water supply pipe-work is not adequately insulated and loses heat too fast.
 - B The temperature pressure relief valve is faulty and has seized shut.
 - C The pilot flame has been incorrectly set and overheats the thermocouple probe.
 - D The thermostat fails allowing the water to heat beyond the set temperature.
 - E The baffle collapses into the burner chamber blocking the primary flue.

7. What is an acceptable purge volume for a sub-meter?
- A The capacity of the meter multiplied by the meter factor.
 - B The test dial must rotate one whole revolution.
 - C Five times the volume held by the meter.
 - D The volume must be no less than the capacity of the meter.
 - E Twice the volume of the meter.

8. How is the volume of a sub-meter found?
- A One whole revolution of the test dial is the capacity of the meter.
 - B The test dial is used to check the volume of the meter.
 - C The capacity of the meter multiplied by the meter factor.
 - D The gas supplier must be contacted to ascertain meter volumes.
 - E The volume is indicated on the meter badge.

9. Which of the following statements best describes Meter Factor?
- A An allowance which is factored into a gas volume to adjust for the calorific value of the gas.
 - B A factor of inaccuracy which is common in domestic gas meters.
 - C As gas passes through the meter some gas is lost due to the energy needed to operate the dials.
 - D The allowance for a gas taking up less volume while under pressure.
 - E The factor created by the pressure loss across the gas meter.

10. According to NZS 5261 Gas Installation, what minimum clearance is required between a down draft diverter opening and any wall surface?
- A 75 mm.
 - B 100 mm.
 - C 150 mm.
 - D 200 mm.
 - E 300 mm.

11. When an LPG cylinder is filled, what percentage space is made available to allow vaporisation and expansion due to increases in temperature?

- A 5%
- B 10%
- C 15%
- D 20%
- E 25%

12. C_4H_{10} is the chemical formula for what gas?

- A Propane.
- B Methane.
- C Ethane.
- D Pentane.
- E Butane.

13. What is the largest volume a manometer (water gauge) can be used to test?

- A 0.3 m³.
- B 0.6 m³.
- C 3.0 m³.
- D 10 m³.
- E 30 m³.

14. Open-flued gas storage water heaters located in hair dressing salons often have a shorter life than normal.

What commonly causes the shortened life of the appliance?

- A The air is contaminated by hair sprays which pass through the burner.
- B Hair dressing salons use excessive amounts of hot water.
- C Hair dressing salons require water at higher than normal temperatures.
- D Chemicals used in hair colouring can backflow into the water system.
- E Dust from hair restricts ventilation openings around the appliance.

15. Gas appliances must be installed with specified clearances from combustible materials. What is the maximum allowable temperature rise, above ambient temperature, of adjacent combustible materials?

- A 20°C.
- B 25°C.
- C 55°C.
- D 65°C.
- E 75°C.

16. Which of the following does NZS 5261 Gas Installation state as the smallest diameter for a circular flue pipe connected to a natural draught appliance?

- A 40 mm.
- B 50 mm.
- C 65 mm.
- D 75 mm.
- E 100 mm.

17. According to NZS 5261 Gas Installation when uPVC is being used for a flue what temperature should the flue gases not be permitted to exceed?

- A 60°C.
- B 65°C.
- C 75°C.
- D 90°C.
- E 100°C.

18. According to NZS 5261 Gas Installation, what is the minimum allowable thickness of a 150 mm diameter mild steel flue?

- A 0.5 mm.
- B 0.6 mm.
- C 0.8 mm.
- D 1 mm.
- E 1.5 mm.

19. A pipe is to be run through a duct having a cross-sectional area of 8.2 m².
What is the minimum free ventilation area required at both ends of the duct?

- A 0.0492 m².
- B 0.0822 m².
- C 0.0062 m².
- D 1.453 m².
- E 1.553 m².

20. A 25 mm diameter vent valve for a vented safety shut-off system requires a vent line 35 m long.

What is the minimum diameter of the vent line?

- A 25 mm.
- B 32 mm.
- C 40 mm.
- D 50 mm.
- E 80 mm.

Total 20 marks

For Examiner's use only

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