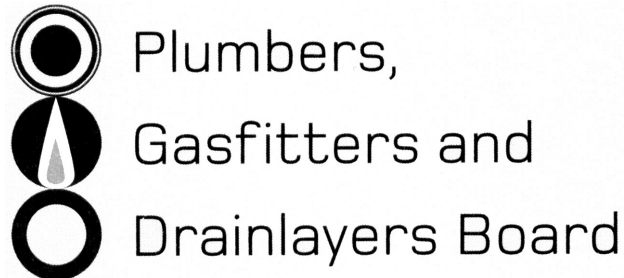


Affix label with Candidate Code
Number here.
If no label, enter candidate
Number if known

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No. 9192



REGISTRATION EXAMINATION, JUNE 2013

LICENSED PLUMBER

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 24–25 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 25 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 2013 were provided with the following documents:

- New Zealand Building Code Clause G13 Foul Water

SECTION A

QUESTION 1

Discharge pipes have been installed in readiness for pouring the concrete slab for the floor of a dwelling.

Give THREE methods of protecting the discharge pipes where they will penetrate the concrete.

1 _____

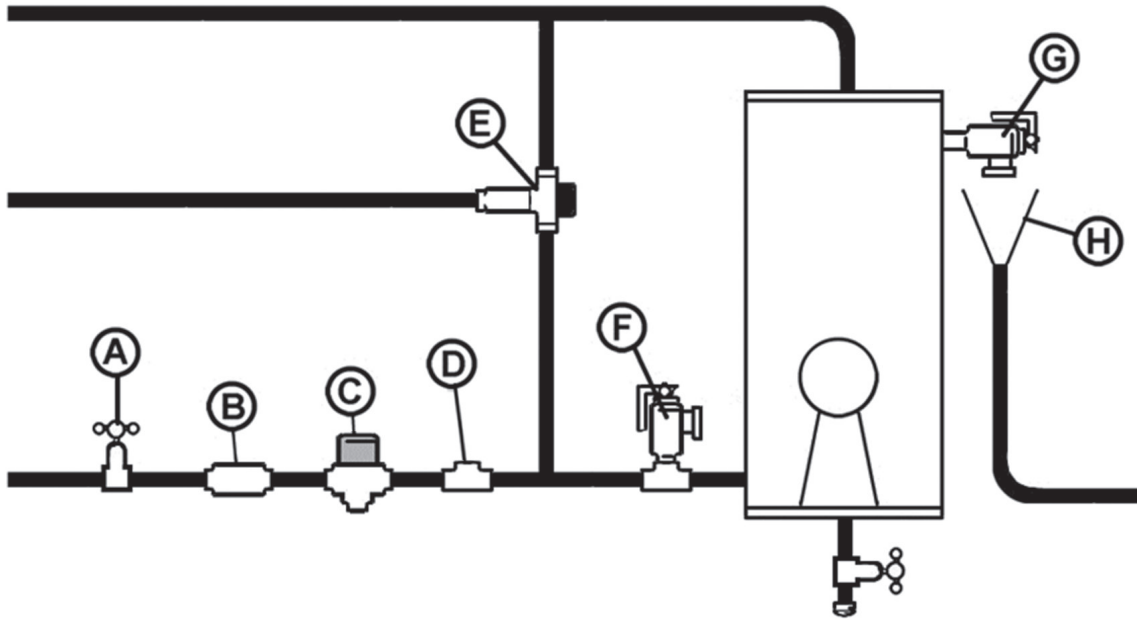
2 _____

3 _____

Total 3 marks

QUESTION 2

The diagram below shows a domestic hot water system.



(a) Describe the type of system shown.

(1 mark)

(b) Name and give the function of each component labelled A – H. Write each name in full.

A Name: _____

Function: _____

B Name: _____

Function: _____

QUESTION 2 (cont'd)

C Name: _____

Function: _____

D Name: _____

Function: _____

E Name: _____

Function: _____

F Name: _____

Function: _____

G Name: _____

Function: _____

H Name: _____

Function: _____

(12 marks)

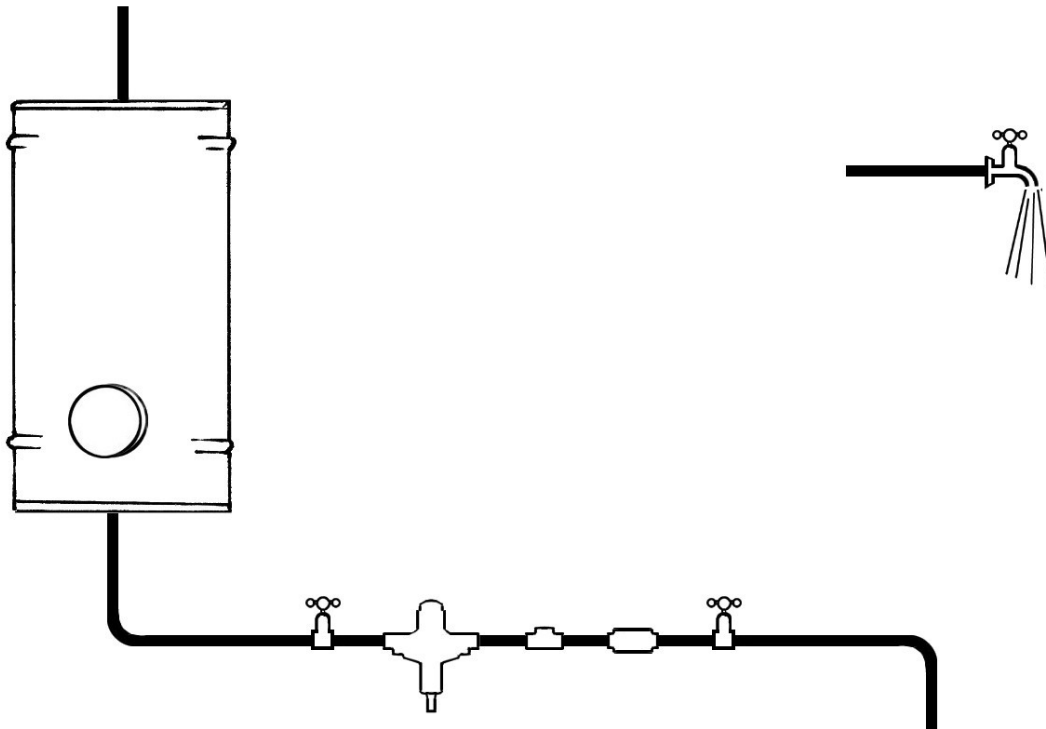
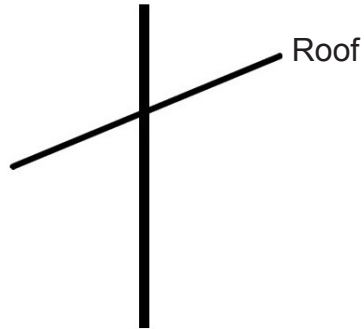
Total 13 marks

QUESTION 3

The starter drawing below shows parts of a low pressure, open vented, hot water storage system.

The system is to provide tempered water to the outlet shown.

Complete the diagram to show the correct installation of the tempering valve.



Total 4 marks

QUESTION 4

(a) With the exception of cost, state EIGHT factors that may need to be considered when choosing pipe material for a hot water system.

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

(4 marks)

(b) Equipotential bonding is used in some installations.

(i) Describe a situation where equipotential bonding may be used.

(1 mark)

(ii) Explain how equipotential bonding is achieved.

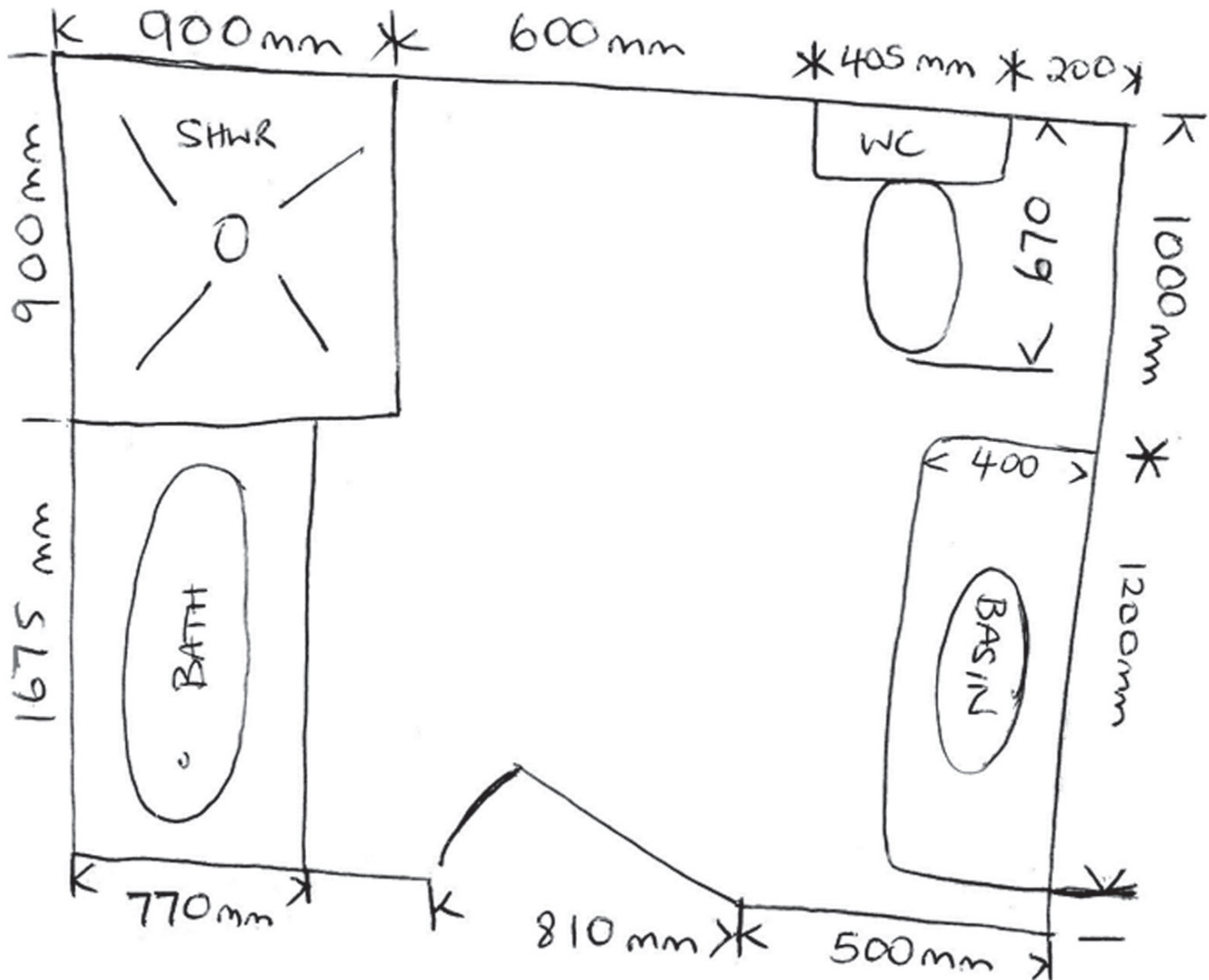
(1 mark)

Total 6 marks

QUESTION 5

A customer has supplied the drawing below for the proposed layout of sanitary fixtures in a bathroom.

On the opposite page, draw a 1:20 scale plan of the bathroom and fixtures.



Total 5 marks

QUESTION 5 (cont'd)

QUESTION 6

- (a) Mobile scaffolding has been erected by a qualified scaffolding contractor, and has been tagged as safe to use.

Give FIVE checks that should be carried out at the beginning of each day to ensure the scaffolding is still safe to use.

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

(5 marks)

- (b) A trench is to be excavated

- (i) State THREE environmental factors that increase the risk of a trench collapsing.

- 1 _____
- 2 _____
- 3 _____

(3 marks)

- (ii) Give FOUR practices that can be used to protect workers from trench collapse.

- 1 _____
- 2 _____
- 3 _____
- 4 _____

(2 marks)

QUESTION 6 (cont'd)

(iii) State FOUR precautions that should be taken to ensure members of the public do not fall into an excavated trench at night.

- 1 _____
- 2 _____
- 3 _____
- 4 _____

(2 marks)

Total 12 marks

QUESTION 7

Five causes of trap seal loss in foul water systems are given below.

Briefly describe how each situation arises.

(a) Self siphonage

(2 marks)

(b) Induced siphonage

(2 marks)

(c) Compression

(2 marks)

QUESTION 7 (cont'd)

(d) Momentum

(2 marks)

(e) Oscillation

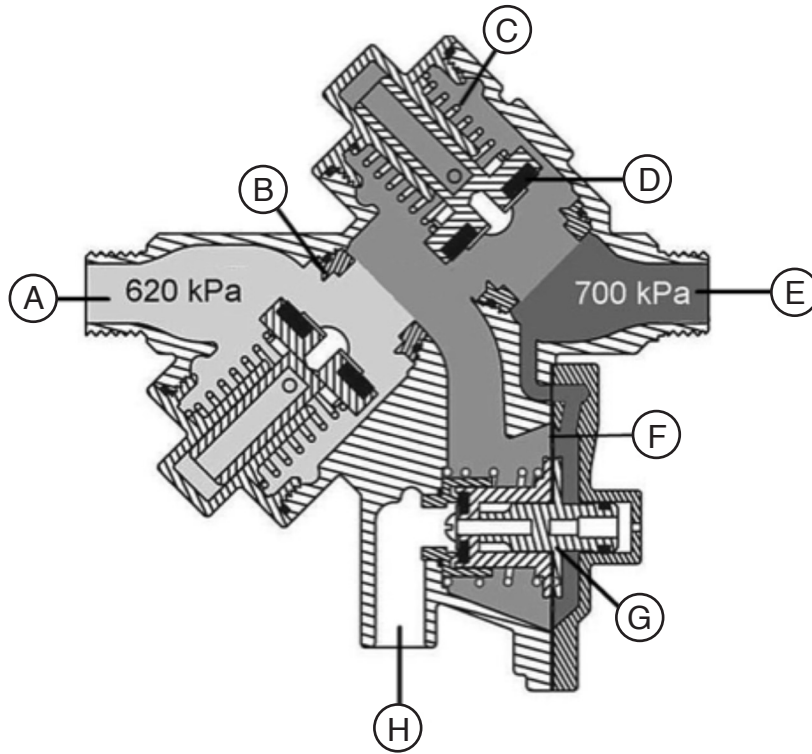
(2 marks)

Total 10 marks

QUESTION 8

(a) Name the type of backflow device shown below. Write the name in full.

(1 mark)



(b) Complete the table below by writing the letter of each component indicated in the drawing above.

Name	Position
Inlet	
Outlet	
Relief valve	
Diaphragm	
Relief port	
Check valve seat	
Washer	
Spring	

(4 marks)

QUESTION 8 (cont'd)

(c) Give THREE situations that would require the installation of the device in (a) on the water supply.

1 _____

2 _____

3 _____

(3 marks)

Total 8 marks

QUESTION 9

(a) A water tank has a diameter of 2.6 metres and a height of 2.1 metres.

The outlet is 100 mm above the base of the tank.

The overflow level is 300 mm below the top of the tank.

Calculate the litres of useable water the tank is able to store.

Formula:

Volume = $\pi \times r^2 \times H$ OR Volume = $0.7854 \times D^2 \times H$

(4 marks)

(b) State the circumstances which require a safe tray to be installed under a water supply tank.

(1 mark)

Total 5 marks

QUESTION 10

(a) List THREE different materials that are used to thermally insulate water supply pipework.

- 1 _____
- 2 _____
- 3 _____

(3 marks)

(b) Give TWO instances where insulation must be installed on pipework to comply with the New Zealand Building Code Clause G12/AS1 Water Supplies.

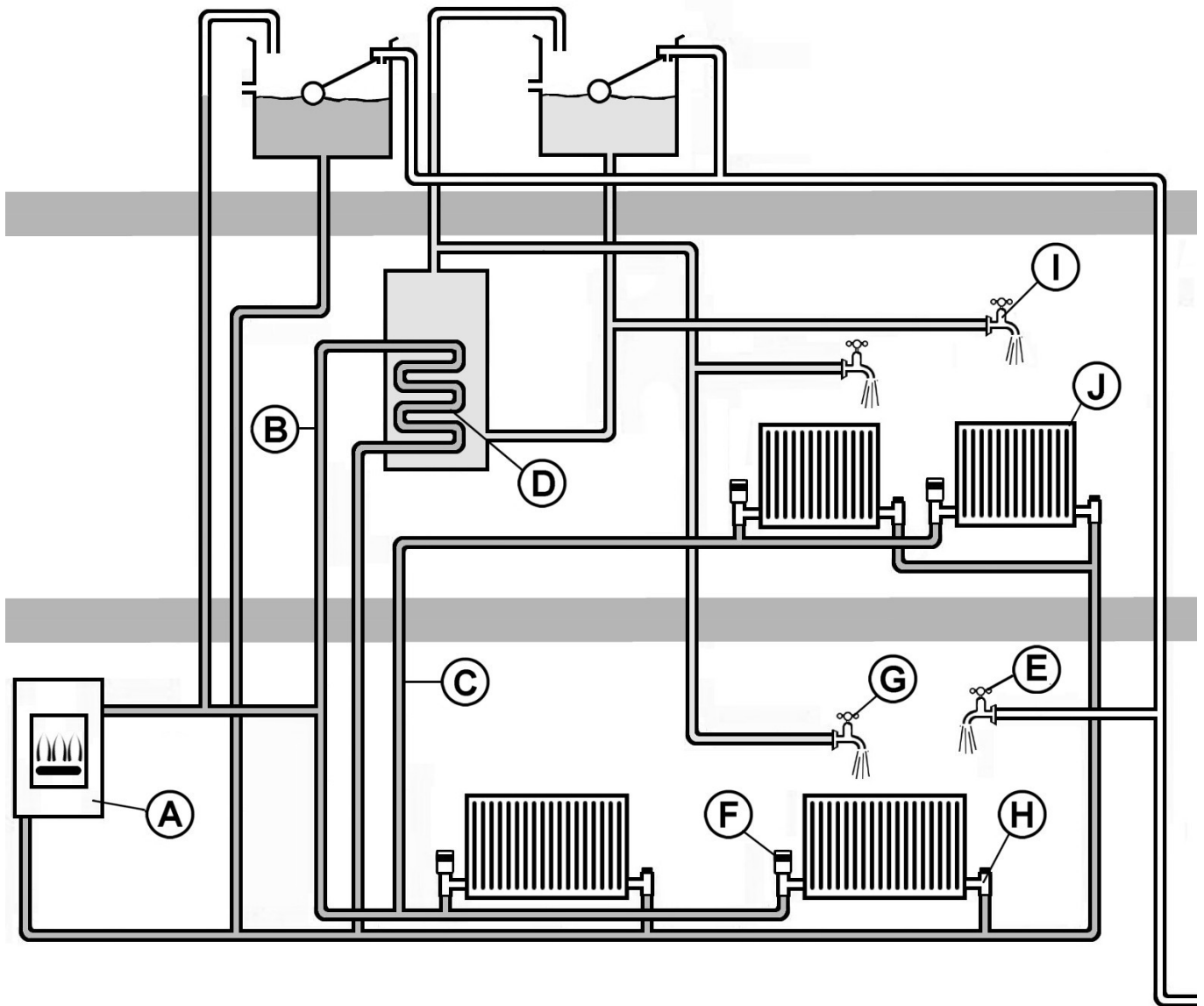
- 1 _____
- 2 _____

(2 marks)

Total 5 marks

QUESTION 11

The diagram below shows a plumbing and heating system for a dwelling.



QUESTION 11 (cont'd)

- (a) Complete the table below by writing the letter for each component in the system shown on the opposite page.

Name	Position
Potable hot outlet	
Low pressure cold outlet	
Radiator thermostat	
Radiator bleed valve	
Indirect heat exchanger	
Primary flow pipe	
Primary return pipe	
High pressure cold outlet	
Radiator	
Boiler	

(5 marks)

- (b) State how prevention against the risk of backflow has been provided for in this installation.

(1 mark)

Total 6 marks

QUESTION 12

A high impact uPVC water supply is to be installed and will include a straight run of pipe 30 metres long.

The water temperature is expected to range from 4° C to 20° C.

Using the information in the table below, calculate in millimetres how much space for expansion would need to be allowed for the installation.

Formula:

Expansion = Length × Coeff. Lin. Exp. × temperature difference

Coefficient of linear expansion

Material	Coefficient of linear expansion per degree K Note: One degree K = 1°c
Polyethylene— low density high density	0.00028 or 280×10^{-6} 0.00011 to 0.00013 or 110×10^{-6} to 130×10^{-6}
Polyvinyl chloride (uPVC)— normal impact high impact	0.00005 or 50×10^{-6} 0.000081 or 81×10^{-6}
Acrylonitrile butadiene styrene (ABS)	0.000083 to 0.000095 or 83×10^{-6} to 95×10^{-6}
Polypropylene Acrylics	0.00011 or 110×10^{-6} 0.00005 to 0.00009 or 50×10^{-6} to 90×10^{-6}
Nylon	0.00007 to 0.00001 or 70×10^{-6} to 100×10^{-6}
Lead	0.000029 or 29×10^{-6}
Zinc	0.000035 or 35×10^{-6}
Aluminium	0.000025 or 25×10^{-6}
Brass	0.000018 or 18×10^{-6}
Copper	0.0000166 or 16.6×10^{-6}
Steel	0.0000133 or 13.3×10^{-6}
Cast iron	0.0000106 or 10.6×10^{-6}
Tin	0.000020 or 20×10^{-6}

Total 4 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 no marks will be awarded for that question.

1. Which of the following items of information are required to determine the minimum allowable gradient for a discharge pipe?

- A The diameter and the length of the pipe.
- B The diameter of the pipe and the total discharge loading.
- C The length of the pipe and the total discharge loading.
- D The material the pipe is constructed from and the length of the pipe.
- E The total discharge loading and the amount of fall available.

2. What is the minimum trap and discharge pipe diameter for a single trap receiving the discharge from two sink bowls, a dishwasher and a waste disposal unit?

- A 32 mm.
- B 40 mm.
- C 50 mm.
- D 65 mm.
- E 80 mm.

3. What is the maximum allowable length of an unvented discharge pipe discharging into a gully trap installed to comply with the New Zealand Building Code Clause G13 Water Supplies?

- A 3.5 m.
- B 3.8 m.
- C 4.2 m.
- D 4.5 m.
- E 5.0 m.

4. A 50 mm urinal discharge pipe requires venting.
What is the minimum allowable diameter for the vent pipe?

- A 20 mm.
- B 25 mm.
- C 32 mm.
- D 40 mm.
- E 50 mm.

5. What is the minimum allowable gradient for an 80 mm discharge pipe?

- A 1:20
- B 1:25
- C 1:30
- D 1:40
- E 1:60

6. What is the minimum allowable diameter for the discharge stack vent when the discharge stack is receiving 72 discharge units?

- A 40 mm.
- B 50 mm.
- C 65 mm.
- D 80 mm.
- E 100 mm.

7. If a vent pipe terminates above a window, what is the minimum distance above the window at which it must terminate?

- A 400 mm.
- B 500 mm.
- C 600 mm.
- D 800 mm.
- E 1000 mm.

8. What is the minimum height above the weir of the trap that an air admittance valve is permitted to be installed?

- A 25 mm.
- B 50 mm.
- C 75 mm.
- D 100 mm.
- E 150 mm.

9. What is the maximum permitted separation distance between supports fitted to graded 80 mm uPVC discharge pipe?

- A 0.5 m.
- B 1.0 m.
- C 1.2 m.
- D 1.5 m.
- E 1.8 m.

10. A main drain vent is to be used as the fixture vent for a WC with an 80 mm discharge pipe. What is the maximum allowable length for the WC discharge pipe?

- A 1.0 m.
- B 1.2 m.
- C 1.5 m.
- D 1.8 m.
- E 2.0 m.

11. What does the term positive displacement mean in relation to pumps?

- A The pump moves a measured portion of liquid by a plunger or gear.
- B The pump will grind any solids and discharge them with the liquid.
- C The pump can be fitted below the supply water level.
- D The pump can be fitted above the supply water level.
- E The pump is capable of providing a flow rate above 50 litres/minute.

12. Which of the following pumps is a non-displacement type pump?

- A Hydraulic ram.
- B Gear pump.
- C Rotary pump.
- D Reciprocating pump.
- E Centrifugal pump.

13. What is the maximum theoretical height that a pump is able to lift water when installed at sea level?

- A 3.6 m.
- B 7.854 m.
- C 9.81 m.
- D 10.3 m.
- E 101.3 m.

14. What is the purpose of a foot valve on a suction line of a water pump?

- A To keep the pump level and reduce noise.
- B To set the desired flow rate output of the pump.
- C To manually fill the suction line of the pump.
- D To filter any debris in the water supply.
- E To ensure the pump remains primed.

15. Which of the following may occur if a water pipe rises above the hydraulic gradient in a low pressure hot water system?

- A The water pressure can increase.
- B Back siphonage can occur.
- C Air can enter the water supply.
- D An air lock can occur.
- E The installation can become noisy (water hammer).

16. What is the purpose of a thrust block installed on the water supply pipework?

- A To stop an underground pipe from moving.
- B To increase the velocity of the water in the pipe.
- C To increase the pressure of the water in the pipe.
- D To ensure the pipe is laid at the correct gradient.
- E To assist in locating the position of the pipe.

17. How is the discharge unit loading of a soil stack determined?

- A The diameter of the discharge stack.
- B The total discharge units from the highest floor level served by the stack.
- C The number of soil fixtures discharging into the stack.
- D The gradient of the drain the stack discharges into.
- E The total discharge units from all fixtures discharging to the stack.

18. Which of the following could result in electrolysis?

- A Using brass and galvanised steel pipework for a water supply.
- B Operating a power tool without using a residual current device.
- C Installing an electric storage hot water cylinder on a site with a bore water supply.
- D Excessive vibration caused by a pump.
- E A water supply being installed within the minimum separation distance of an electrical supply cable.

19. Which of the following is a form of cathodic corrosion protection?

- A Petrolatum tape (Denzo).
- B A sacrificial anode.
- C A sleeve or lagging.
- D A plastic insulator between different metals.
- E A neutral cure silicon sealant.

Total 19 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		