No. 9195

**Plumbers,
Gasfitters and
Drainlayers Board**

REGISTRATION EXAMINATION, NOVEMBER 2018
CERTIFYING 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 21-25 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
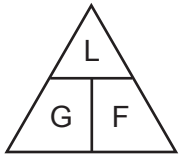
Candidates that sat this examination in November 2018 were provided with the following documents:

- AS/NZS 3500 Part 1: Water supplies

- AS/NZS 3500 Part 2: Sanitary plumbing and drainage
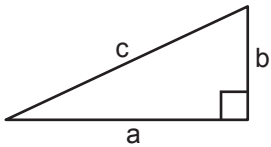
USEFUL FORMULAE

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 = $0.7854 \times D^2$

length = L
gradient = 1:G
fall = F

Volume of cylinder = $\pi \times R^2 \times H$ or   Volume of cylinder = $0.7854 \times D^2 \times H$

$a^2 + b^2 = c^2$

Heat energy = mass × specific heat × temp diff

Litres of hot water × temp diff cold to hot = litres of mixed water × temp diff cold to mixed

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

Box's formula: $q = \sqrt{\dfrac{H \times D^5}{25 \times L \times 10^5}}$

where   q = quantity discharged in litres per second
           H = head in metres
           D = diameter of pipe in mm
           L = length of pipe in metres

SECTION A

QUESTION 1

Hot water cylinder installations are to be designed to comply with New Zealand Building Code clause G12/AS1 Water Supplies.

(a)   Complete the table to show the acceptable hot water temperature for each situation given.

Situation	Temperature
Supply to a wash hand basin at a preschool.	
Supply to a wash hand basin in a commercial building.	
Supply to a bath in a dwelling.	
Internal hot water cylinder temperature to prevent the growth of legionella bacteria.	

(2 marks)

(b)   (i)   State the capacity at which a third seismic restraint stap becomes required on a hot water storage cylinder.

_____

(1 mark)

(ii)   Explain where on the cylinder the three staps must be located.

_____

_____

(1 mark)

Total 4 marks

QUESTION 2

(a) (i) Name FOUR group control methods for protecting people working at heights.

1 _____

2 _____

3 _____

4 _____

(4 marks)

(ii) State the situation in which working at heights may become particular hazardous work.

_____

(1 mark)

(b) (i) Give THREE characteristics of a work site that determine that the site will be considered to be a confined space.

1 _____

2 _____

3 _____

(3 marks)

(ii) State who is responsible for ensuring that all workers entering a confined space are suitably trained.

_____

(1 mark)

(iii) Give an example of a situation in which working in a confined space may become particular hazardous work.

_____

(1 mark)

QUESTION 2 (cont'd)

(c)   Name the agency that must be contacted if a task is considered to be particular hazardous work.

_____

(1 mark) ☐

Total 11 marks ☐

QUESTION 3

An open-vented hot water cylinder is connected to a wetback.

The cylinder is to be replaced.

(a) Give a situation in which a building consent would NOT be required.

_____

(1 mark) ☐

(b) Give a situation in which a building consent WILL be required.

_____

(1 mark) ☐

(c) State the period of time a building consent remains current if the project for which it was issued has not been started.

_____

(1 mark) ☐

Total 3 marks ☐

QUESTION 4

A tank is to be installed to supply 4 metres head to an ablution block.

20 mm diameter pipe will be used to convey the water from the tank to the outlets.

The pipe is 12 m long.

Calculate, in litres per second, the expected flow rate at the outlet of the pipe.

_____

_____

_____

_____

_____

_____

Total 5 marks

QUESTION 5

(a) A rural home has been supplied by bore water. The bore supply is no longer suitable. The owner has decided to install a tank to collect rain water from the roof to supply the house.

Give SIX factors regarding the catchment area that need to be checked to prevent contamination of the rain water.

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

(3 marks)

(b) Give TWO different components that could be included in the installation to help maintain the water quality before the water enters the tank.

1 _____

2 _____

(2 marks)

Total 5 marks

QUESTION 6

The diagram below shows part of a foul water installation consisting of four discharge stacks.

Each stack is to have a relief vent fitted. All the relief vents are to connect to a header vent.

The header vent is to connect to the stack vent from the 100 mm foul water stack.

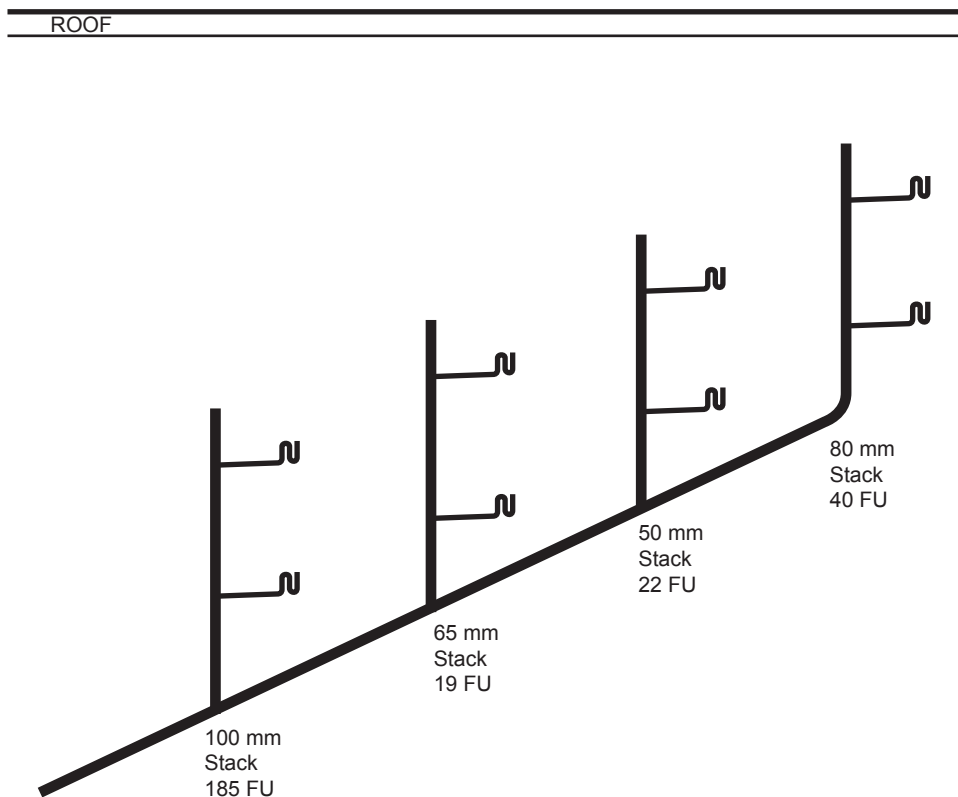The developed length of each relief vent is 16 metres.

The completed system is to comply with the minimum requirements of AS/NZS 3500 Part 2: Sanitary plumbing and drainage.

(a)   Complete the drawing to show the relief vents, header vents and stack vent.

(4 marks)

(b)   Using the stack diameters and fixture unit ratings (FU) shown on the diagram, size each vent. Write your answers on the diagram.

(7 marks)

ROOF

80 mm
Stack
40 FU

50 mm
Stack
22 FU

65 mm
Stack
19 FU

100 mm
Stack
185 FU

Total 11 marks

QUESTION 7

The plan on the page opposite shows the layout of sanitary fixtures for a proposed dwelling.

The diagram is drawn to a scale of 1:100

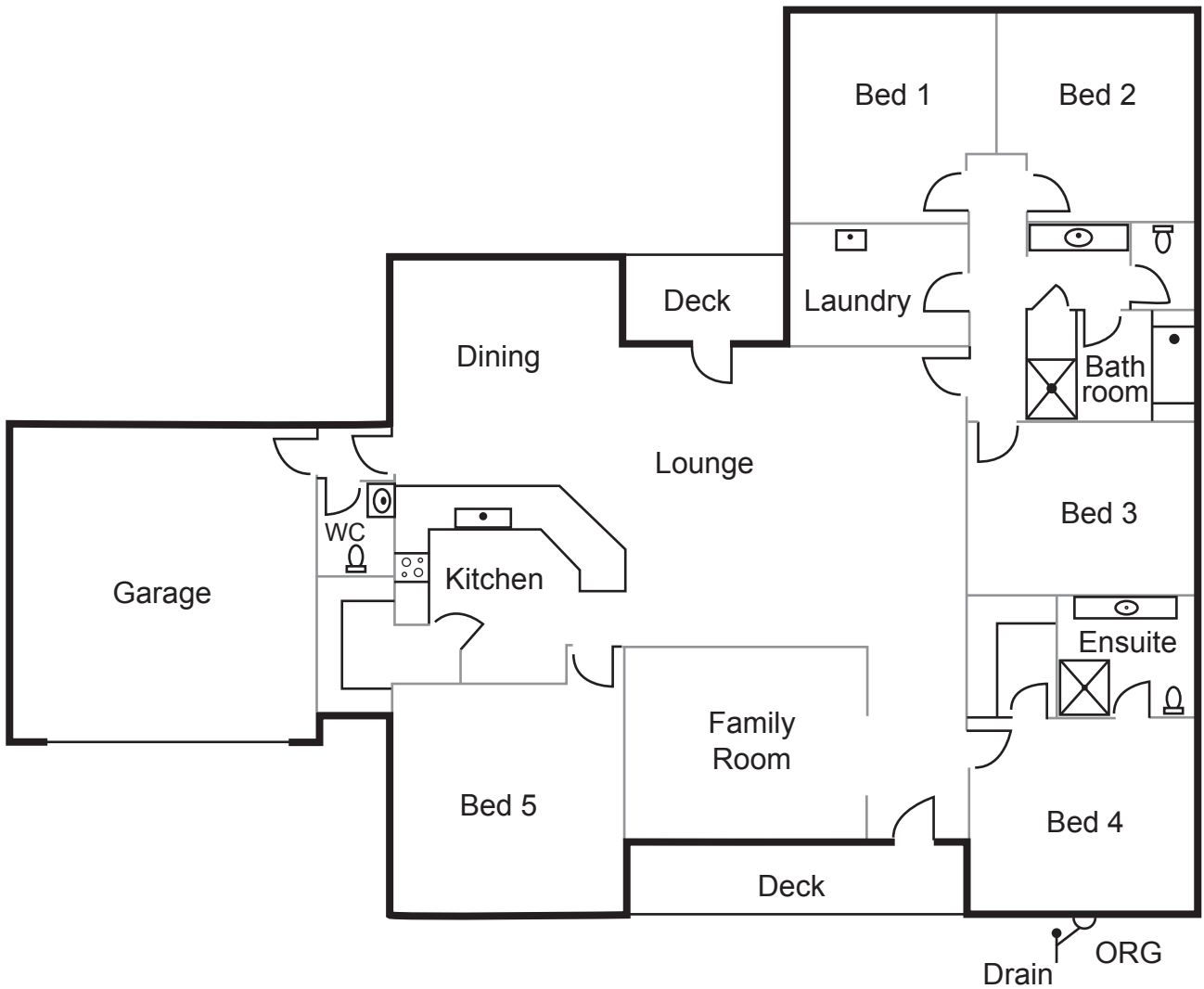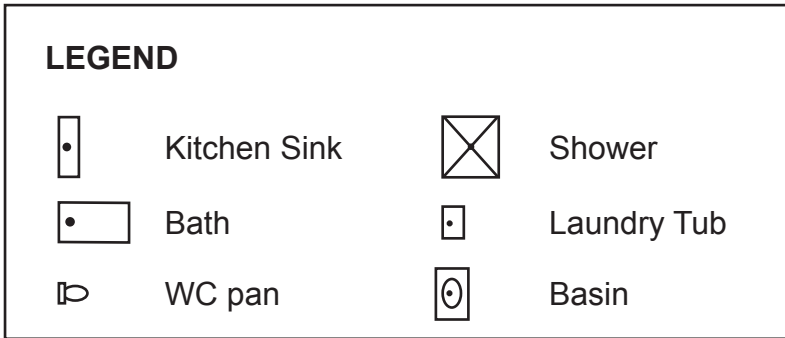The dwelling is to be built on a concrete pad foundation.

The drainage design for the dwelling has been completed, and the connection point for the sanitary plumbing is shown on the plan.

The sanitary plumbing system is to comply with the minimum requirements of AS/NZS 3500 Part 2: Sanitary plumbing and drainage.

(a)   On the plan, draw all discharge pipes and show vent connections that will be required to be installed before the concrete floor is poured.

(b)   On the plan, show the minimum allowable diameter for each section of discharge and vent pipework.

Total 9 marks

LEGEND

	Kitchen Sink		Shower
	Bath		Laundry Tub
	WC pan		Basin

Bed 1

Bed 2

Deck

Laundry

Bath room

Bed 3

Dining

Lounge

WC

Kitchen

Garage

Ensuite

Family Room

Bed 5

Bed 4

Deck

Drain

ORG

QUESTION 8

(a) State THREE specific requirements or conditions of the Building Act that apply to an Independently Qualified Person (IQP) involved with backflow prevention.

1 _____

_____

2 _____

_____

3 _____

_____

(3 marks)

(b) (i) Give THREE times when a backflow prevention device needs to be tested.
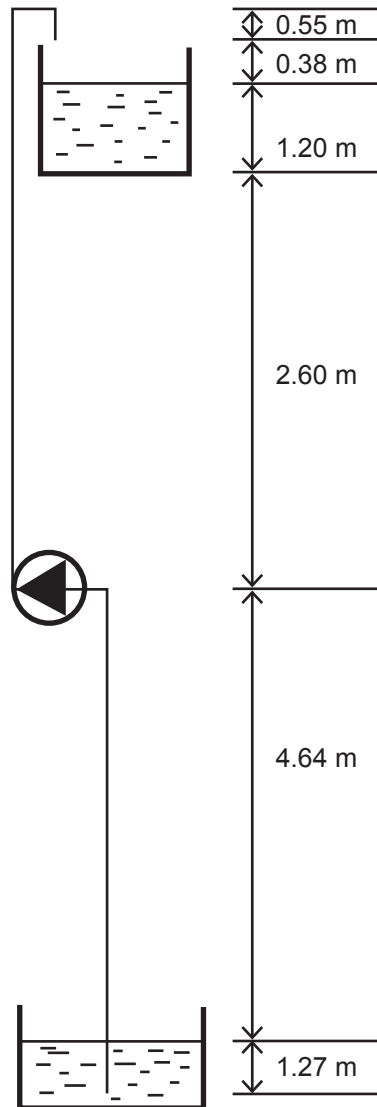
1 _____

2 _____

3 _____

(3 marks)

(ii) State who is required to arrange for the testing.

_____

(1 mark)

Total 7 marks

QUESTION 9

The diagram above shows a pump installation.

Using the information on the diagram, give the total measurements for each of the following.

(a) Static suction lift _____

(b) Total static head _____

(c) Total delivery head _____

(d) Static delivery head _____

(e) Total pump head _____

Total 5 marks

QUESTION 10

A plan view of a single level domestic dwelling, drawn to a scale of 1:100, is shown on the opposite page.

The plan shows the proposed layout for the cold water pipework for the dwelling.

The water main supply can provide 500 kPa water pressure, and is situated 15 lineal metres away from the entry point to the dwelling.

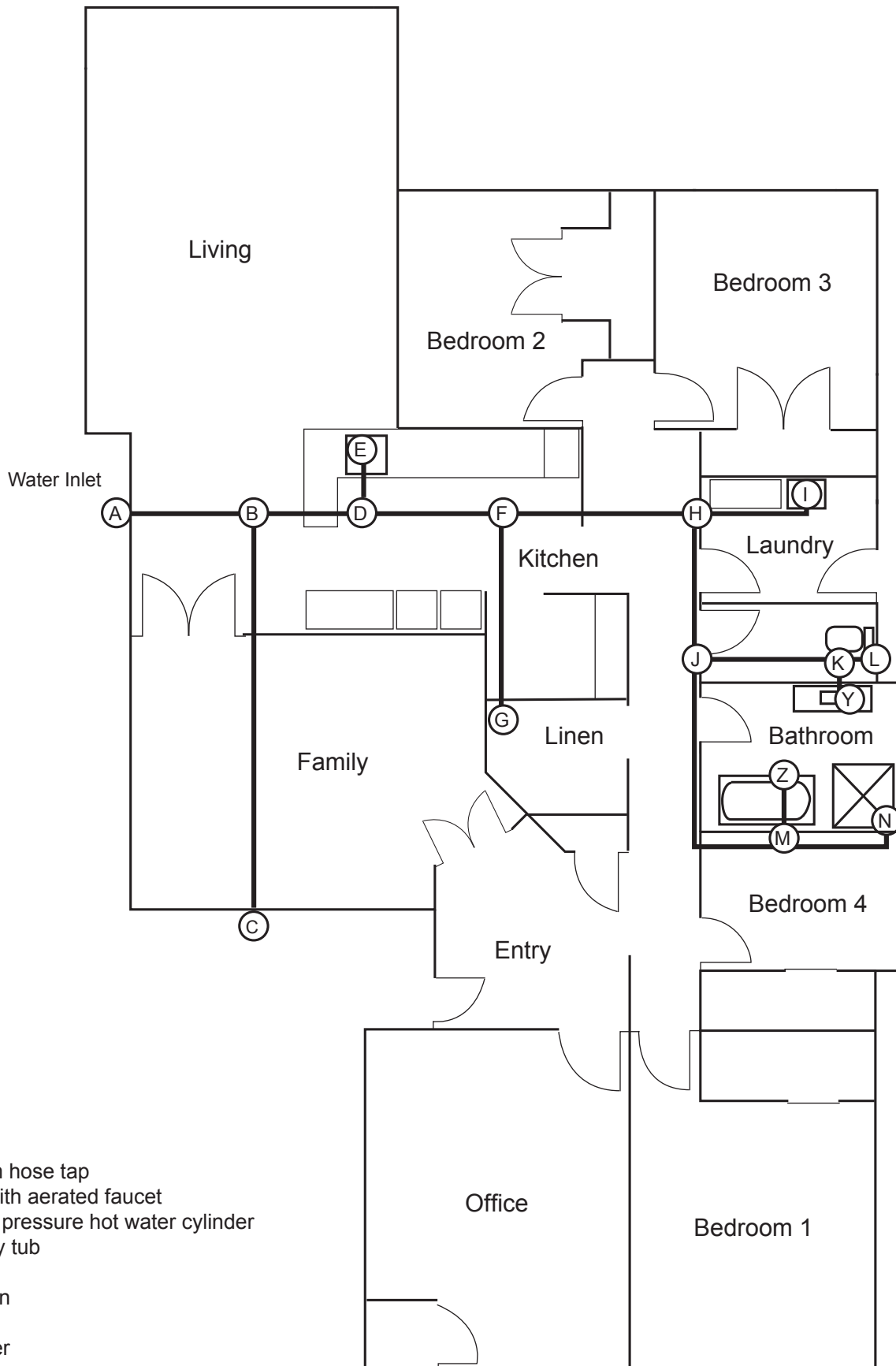The shower is the highest outlet, and is 3 vertical metres above the water main.

Using the procedure given in AS/NZS 3500 Part 1 Water services Appendix E, complete the tables below.

Index length	Pressure drop

Pipe Section	Total Loading Units	Probable Simultaneous Flow Rate (L/s)	Pipe size DN
A-B			
B-C			
B-D			
D-E			
D-F			
F-G			
F-H			
H-I			
H-J			
J-K			
K-L			
J-M			
M-N			

Total 18 marks

Living

Bedroom 2

Bedroom 3

Water Inlet

Ⓐ —— Ⓑ —— Ⓓ —— Ⓕ —— Ⓗ

Ⓔ

Ⓘ

Laundry

Kitchen

Family

Ⓖ

Linen

Ⓙ —— Ⓚ Ⓛ

Ⓨ

Bathroom

Ⓩ

Ⓜ Ⓝ

Ⓒ

Bedroom 4

Entry

Office

Bedroom 1

Legend

C = 15 mm hose tap
E = Sink with aerated faucet
G = Mains pressure hot water cylinder
I = Laundry tub
Y = Vanity
L = WC pan
Z = Bath
N = Shower

QUESTION 11

A water supply pipe is to be installed to comply with AS/NZS 3500 Part 1: Water services.

(a)   The diagram below shows potable and non-potable water supply pipes laid in a trench with a drain.
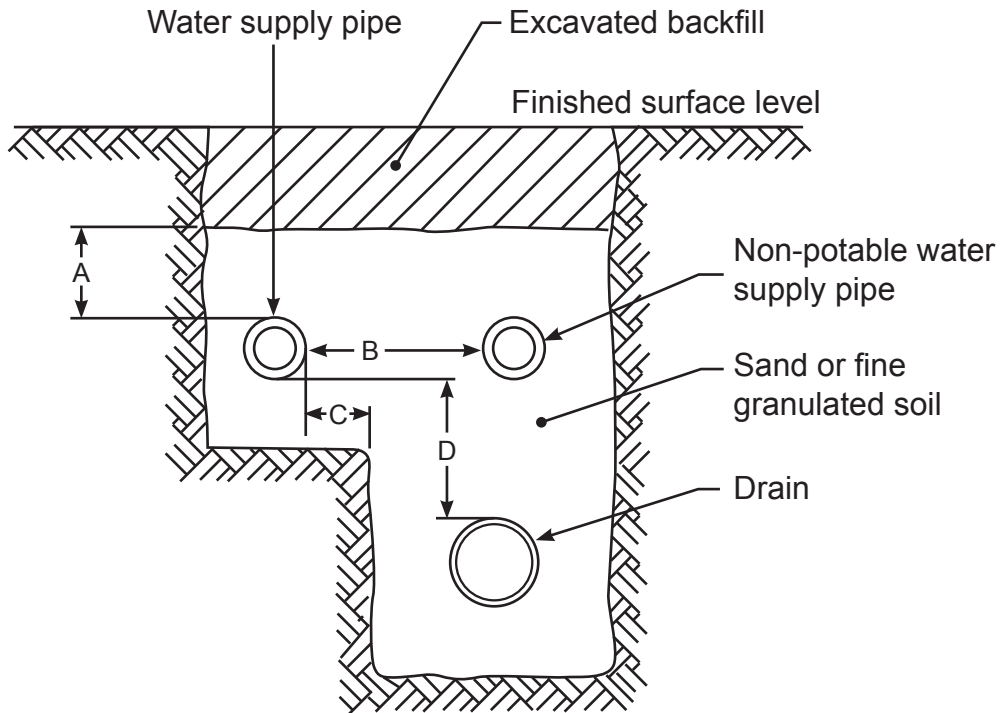
(i)   Give the minimum measurement required for each of the distances marked A, B, C and D.

A   _____

B   _____

C   _____

D   _____

(4 marks)

(ii)   Before entering the building, the potable water supply pipe must cross over a telecommunications cable.

Give TWO requirements in addition to the minimum allowable separation distance that must be met in relation to the cross over.

1   _____

2   _____

(2 marks)

QUESTION 11 (cont'd)

(b)   The potable water supply pipe will exit the ground near the electrical earthing electrode for the building. The electricity supply is less than 1000 V.

State the minimum allowable distance between the pipe and the electrode.

_____

(1 mark) ☐

Total 7 marks ☐

QUESTION 12

(a) State the length of time within which a plumber is required to notify the Plumbers, Gasfitters and Drainlayers Board of a change of address.

_____

(1 mark) ☐

(b) State the penalty that may be imposed if the requirement in (a) is not met.

_____

(1 mark) ☐

Total 2 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. Which of the following can be discharged into a copper waste pipe without risk of affecting the system?

   A   Slop hoppers.

   B   Photographic equipment.

   C   Cooling towers.

   D   Undiluted urinal waste.

   E   Grease arrestors.

   ☐

2. Why is a restricted entry zone required at the base of a discharge stack?

   A   To prevent blockages occurring.

   B   To stop oscillation within the discharge stack.

   C   To stop the pipe running full bore.

   D   To prevent trap seal loss.

   E   To increase the number of discharge units the stack can convey.

   ☐

3. What is the fixture unit rating for a double sink with waste disposal installation?

   A   2

   B   3

   C   4

   D   5

   E   6

   ☐

4. Which of the following is a fixture pair?

A   A washing machine discharging into a laundry tub.

B   A double-bowl kitchen sink unit where each bowl has its own trap and the discharge pipes are combined.

C   A double-bowl vanity where the two bowls share one trap.

D   A dishwasher connected to a supplementary trap on a sink.

E   A WC pan and basin installed in the same room.

☐

5. What is the minimum length of time pipework concealed behind wall linings must last in order to meet the durability requirements of the New Zealand Building Code?

A   1 year.

B   2 years.

C   5 years.

D   15 years.

E   50 years.

☐

6. What is the minimum length of time a hot water cylinder relief drain installed under a concrete slab must last in order to meet the durability requirements of the New Zealand Building Code?

A   1 year.

B   2 years.

C   5 years.

D   15 years.

E   50 years.

☐

7. Within what distance from the top and from the bottom of a hot water storage cylinder must a seismic restraint be fitted?

A   50 mm.

B   75 mm.

C   100 mm.

D   150 mm.

E   200 mm.

☐

8. A third seismic restraint is required to be fitted to a hot water storage cylinder exceeding what capacity?

   A   150 litres.

   B   200 litres.

   C   250 litres.

   D   300 litres.

   E   350 litres.

9. Which of the following is NOT an acceptable reason to disturb the scene of an accident that has resulted in serious harm?

   A   To recover plant and equipment from the site.

   B   To provide help to an injured person.

   C   To remove a deceased person.

   D   When directed by a police officer.

   E   To make the site safe.

10. Which of the following is the best method of controlling hazards in the workplace and to comply with the Health and Safety in Employment Act?

    A   Isolate employees from the hazard.

    B   Minimise the hazard to the employees.

    C   Eliminate the hazard from the employee's workplace.

    D   Provide all necessary personal protection equipment to employees.

    E   Monitor the employees' health and exposure to the hazard.

11. Plumber A has requested the assistance of a tradesman plumber employed by Plumber B.

    Who is responsible for ensuring that the tradesman plumber is capable of completing the proposed work safely?

    A   Plumber A.

    B   Plumber B.

    C   The tradesman plumber.

    D   The Plumbers, Gasfitters and Drainlayers Board.

    E   WorkSafe.

12. A 4 metre length of pipe has been installed at a gradient of 1:80 (1.25%).

What is the pipe fall?

A   4 mm.

B   5 mm.

C   40 mm.

D   50 mm.

E   500 mm.

13. A pipe is to be laid at a gradient of 2.5%. The fall is 1350 mm.

What is the length of the pipe?

A   5.4 m.

B   11.4 m.

C   14 m.

D   54 m.

E   140 m.

Total 13 marks