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

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No. 9195

Plumbers, Gasfitters and Drainlayers Board

REGISTRATION EXAMINATION, JUNE 2017

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 19-21 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

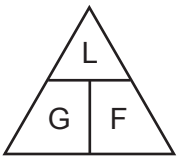
Candidates that sat this examination in June 2017 were provided with the following documents:

- New Zealand Building Code Clause G1 – Personal Hygiene
- AS/NZS 3500 Part 2: Sanitary plumbing and drainage

USEFUL FORMULAE

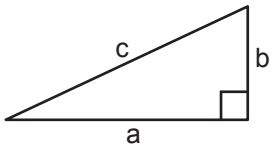
Circumference of circle = $2 \times \pi \times R$ or Circumference of circle = $\pi \times D$

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

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

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

The plan below shows the layout of sanitary fixtures for a proposed dwelling.

The plan is drawn to a scale of 1:100

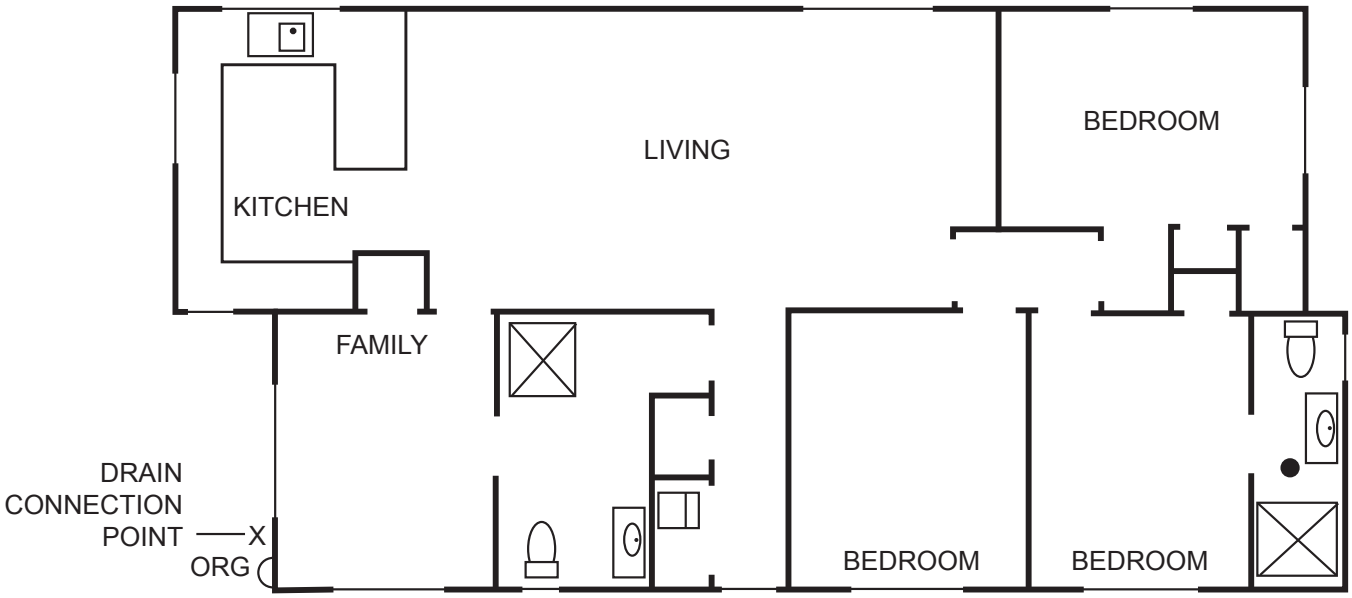
The dwelling is to be built on a concrete pad foundation.

The drainage design for the dwelling has been completed, and the connection point for the sanitary plumbing is as 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 the location of any required vent(s).

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



Total 9 marks

QUESTION 2

(a) Explain why vented testable backflow prevention devices cannot be installed in pits.

_____

_____

(1 mark)

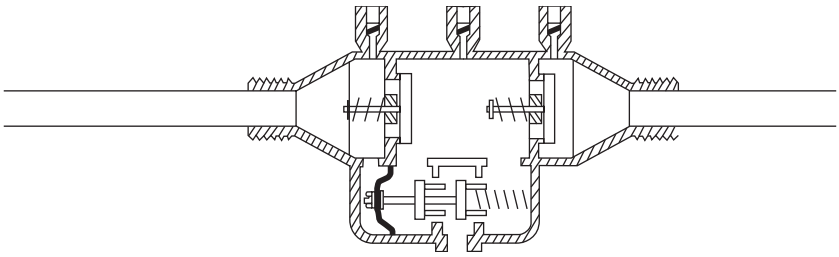
(b) The diagram below shows the installation of a reduced pressure zone (RPZ) backflow prevention device.

(i) State the minimum distance above ground level the device is permitted to be installed.

_____

(1 mark)

(ii) On the drawing below, show the two points between which the measurement in (i) is taken.



Ground level

(1 mark)

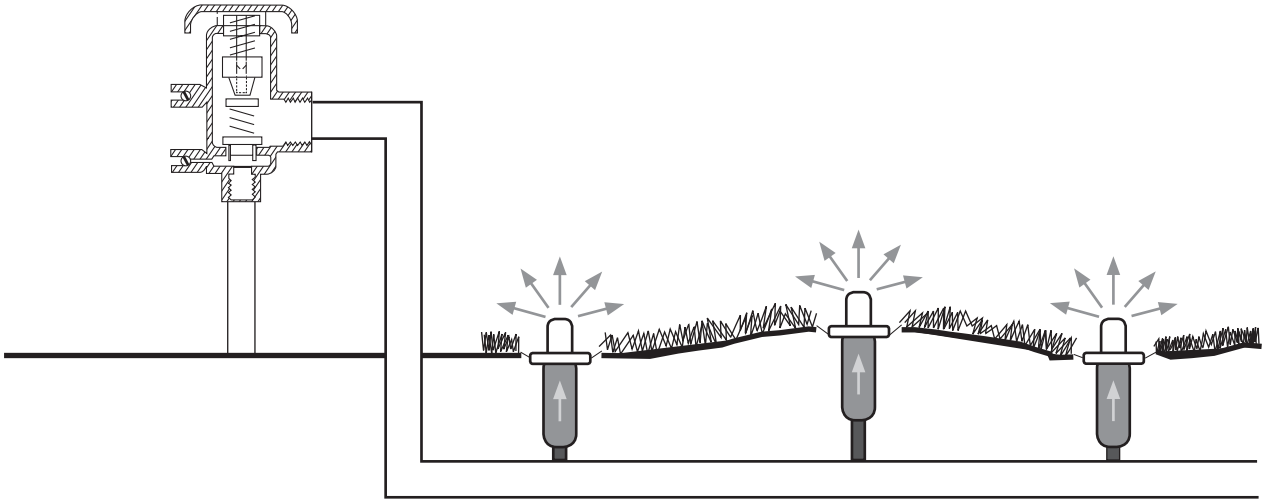
QUESTION 2 (cont'd)

(c) The diagram below shows the installation of a pressure vacuum breaker (PVB) backflow prevention device on a lawn sprinkler system.

(i) State the minimum height at which the device is permitted to be installed.

(1 mark)

(ii) On the diagram, show the two points between which the measurement in (i) is taken.



(1 mark)

(d) Complete the table below to show which of the backflow devices listed are permitted to be used for protection against back pressure in a high hazard situation and which are permitted to be used for protection against back siphonage in a high hazard situation in order to comply with New Zealand Building Code clause G12/AS1 Water Supplies.

Type of backflow protection	High hazard rating	
	Back-pressure	Back-siphonage
Air gap		
Atmospheric vacuum breaker		
Double check valve		
Pressure type vacuum breaker		
Reduced pressure zone device		

(5 marks)

Total 10 marks

QUESTION 3

The plan on the opposite page shows the discharge pipework for a concrete floored single storey dwelling.

The plan has been drawn to a scale of 1:100

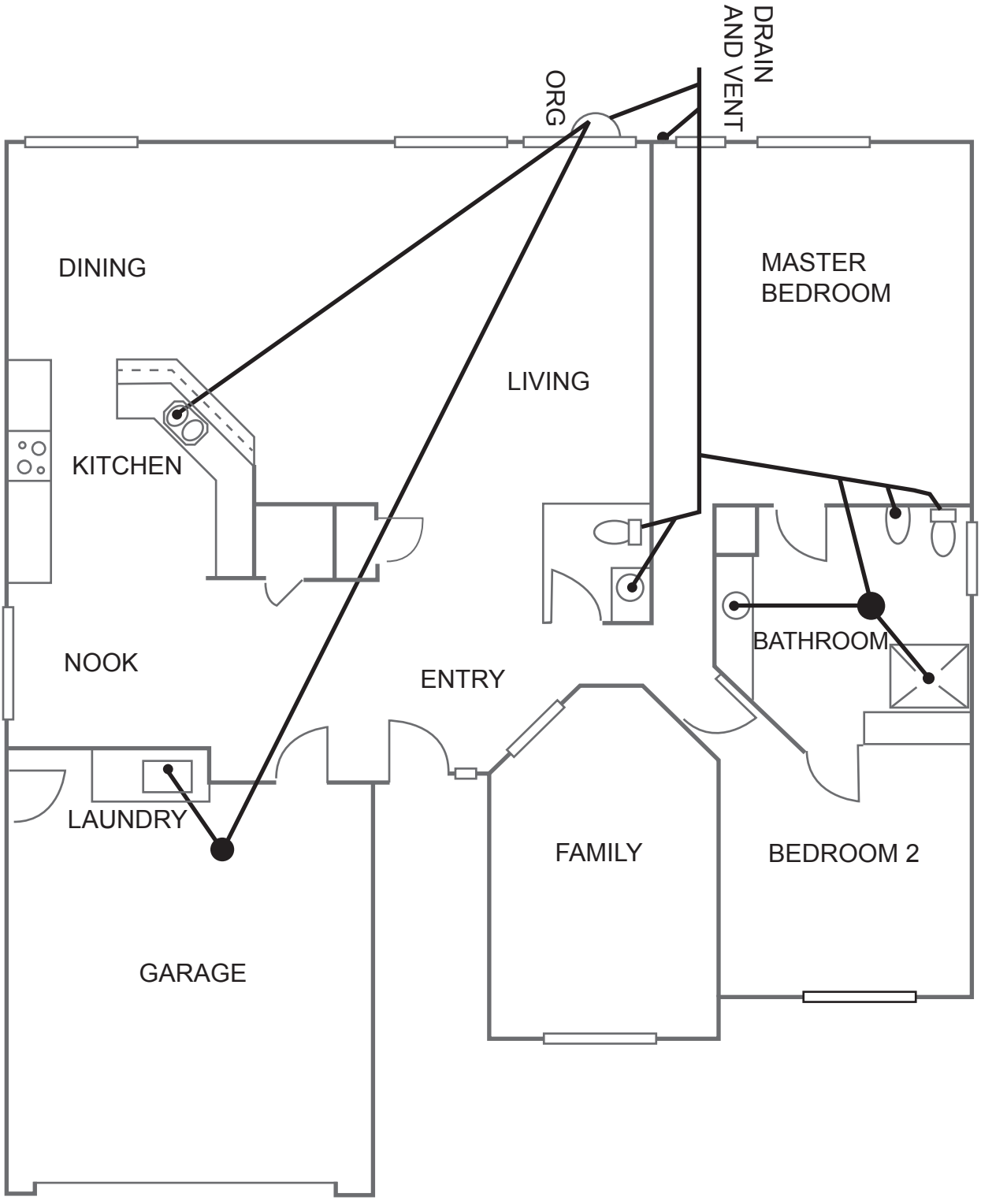
Complete the table below to give the lengths of the underfloor discharge pipework and state whether or not a vent is required for each of the fixtures.

The finished installation is to comply with AS/NZS 3500 Part 2 Sanitary plumbing and drainage.

Legend	Size	Length	Vent required Y/N
Laundry tub	40 mm trap and waste		
Laundry FWG	65 mm outlet		
Shower	Untrapped 40 mm waste		
Bidet	40 mm trap and 65 mm waste		
Bathroom WC pan	100 mm outlet and waste		
Bathroom basin	40 mm trap and waste		
Bathroom FWG	65 mm outlet		
Powder room WC pan	100 mm outlet and waste		
Powder room basin	40 mm trap and 65 mm waste		
Kitchen sink	40 mm trap and 65 mm waste		

Total 10 marks

QUESTION 3 (cont'd)



QUESTION 4

(a) (i) Name FOUR hazardous substances that a plumber may commonly use at work.

1 _____

2 _____

3 _____

4 _____

(2 marks) ☐

(ii) Manufacturers' instructions or product labels can contain information regarding the handling of the substances in (i).

Name the document that gives more detailed information than given in manufacturers' instructions or on product labels.

_____

(1 mark) ☐

(iii) Give THREE pieces of safety information that should be obtained regarding hazardous substances before making contact with them.

1 _____

2 _____

3 _____

(3 marks) ☐

(b) A workplace health and safety manual for a company may contain procedures to manage hazards such as those associated with working at height.

Give FIVE other categories of hazard the manual may contain.

1 _____

2 _____

3 _____

4 _____

5 _____

(5 marks) ☐

QUESTION 4 (cont'd)

(c) (i) Name THREE approved codes of practice or guidelines relating to safety that are relevant to work carried out in the plumbing industry.

1 _____

2 _____

3 _____

(3 marks)

(ii) State why following codes of practice is beneficial if an incident were to occur.

_____

_____

_____

(1 mark)

Total 15 marks

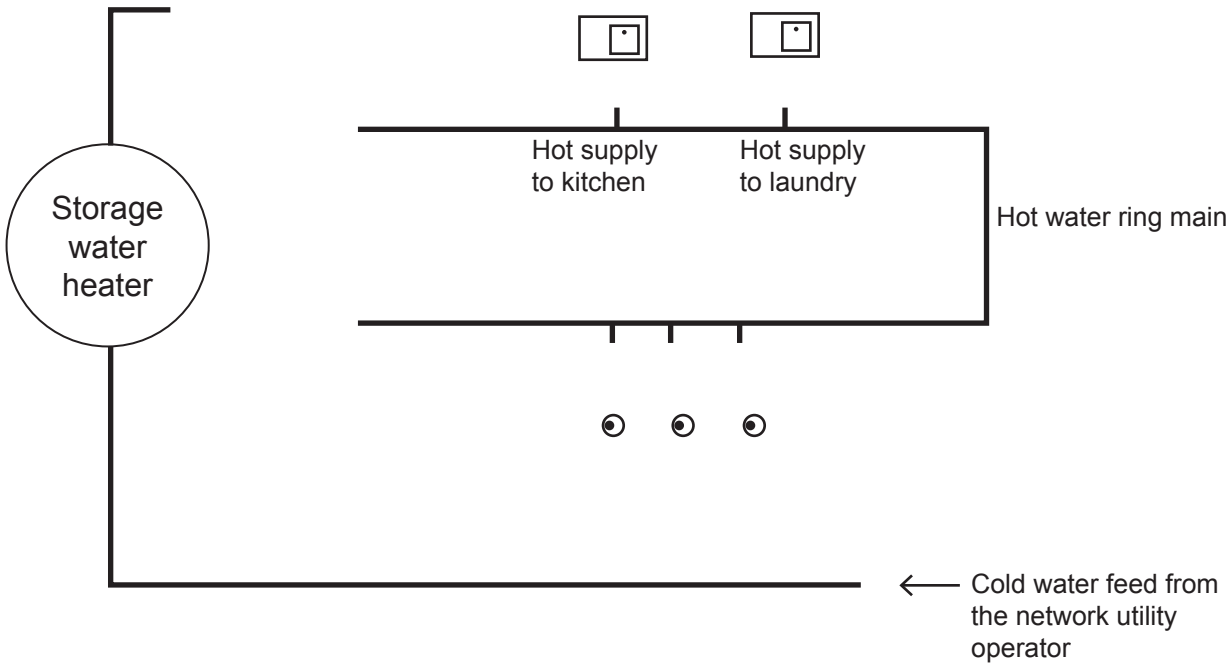
QUESTION 5

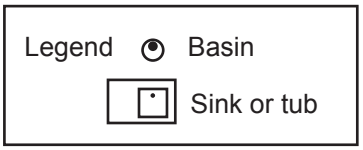
(a) The starter diagram below shows the plan view of part of a hot water system, including a ring main to feed the required outlets.

Complete the diagram to show the pipework connecting the ring main to the mains pressure hot water cylinder and the fixtures.

Include in the drawing all the required valves and components required for the system to operate effectively and safely. Label all valves and components drawn.

Do not include fittings such as nipples, crox nuts etc.





(9 marks)

QUESTION 5 (cont'd)

(b) It is proposed that a 25 mm diameter ring main be installed to supply 15 mm branch feeds to the fixtures in (a).

(i) Using the formula below, calculate the number of laterals that can be fed from a 25 mm ring main.

$$N = \sqrt{\left(\frac{D}{d}\right)^5}$$

where
N = number of laterals (branches)
D = diameter of the ring main
d = diameter of the laterals

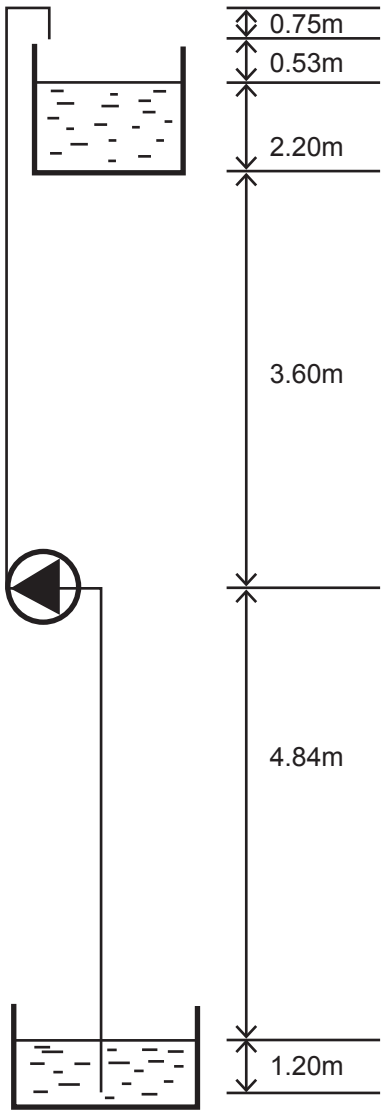
(3 marks)

(ii) Based on the calculation in (i), state whether or not the proposed 25 mm diameter ring main is adequate to supply the installation shown in (a).

(1 mark)

Total 13 marks

QUESTION 6



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 7

A new performing arts theatre is to be constructed.

The theatre is designed to seat 1250 people, and is to have separate male and female toilet facilities.

(a) Complete the tables below to show the minimum number of sanitary fixtures that must be provided for the theatre to comply with New Zealand Building Code clause G1/AS1 Personal Hygiene.

Design number of males	Design number of females

	Basins	WC Pans	Urinals
Male			
Female			

(12 marks)

(b) State the minimum number of toilets that must be accessible for people with disabilities.

_____

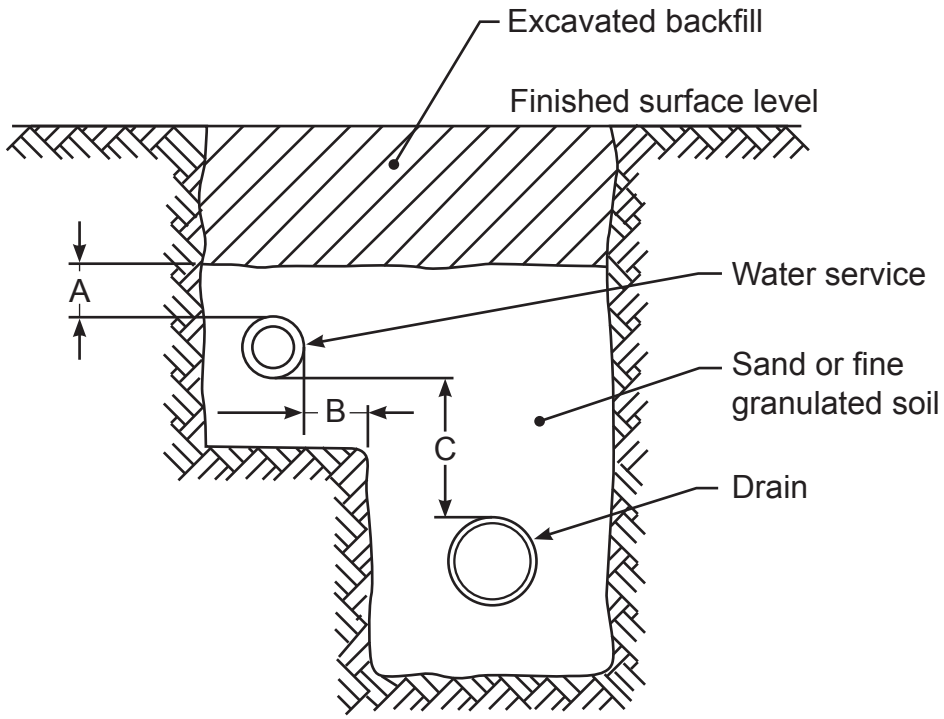
(1 mark)

Total 13 marks

QUESTION 8

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

(a) The diagram below shows a water supply pipe laid in a trench with a drain.



(i) Give the minimum measurement required for each of the distances marked A, B and C.

A _____

B _____

C _____

(3 marks)

(ii) Before entering the building, the water service must cross over the drain pipe.

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 8 (cont'd)

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

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

_____

(1 mark) ☐

(c) The water supply pipe is to be run throughout the building in a service duct.

(i) Give the minimum allowable separation distance from any electrical cables which are also in the duct.

_____

(1 mark) ☐

(ii) Give the minimum allowable separation distance from consumer gas pipe which is also in the duct.

_____

(1 mark) ☐

(iii) Give the minimum allowable separation distance from a parallel non-drinking water supply pipe in the duct.

_____

(1 mark) ☐

Total 9 marks ☐

QUESTION 9

Explain how a free outlet (push through) hot water system operates.

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.

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

1 What is the name of the legislation document that includes the requirements regarding all workplace health and safety?

A Health and Safety in Employment Act.

B WorkSafe New Zealand Guidelines.

C Health and Safety at Work Act.

D Department of Labour Code of Practice.

E Plumbers, Gasfitters and Drainlayers Act.

☐

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

A To prevent blockages occurring.

B To prevent trap seal loss.

C To stop the pipe running full bore.

D To stop oscillation within the discharge stack.

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

☐

3 Which of the following requires the restricted zone at the base of a stack to be increased?

A When the discharge from connected fixtures is expected to be foamy.

B When an offset is included in the stack.

C When the stack receives 200 discharge units per floor.

D When the discharge stack is under 80 mm in diameter.

E When an overflow relief gully is installed.

☐

4 How is the fixture unit rating of a floor waste gully determined?

A The sum of the unit ratings of the fixtures discharging into the floor waste gully.

B The number fixtures are discharging into the floor waste gully.

C The inlet size of the floor waste gully.

D The length of the discharge pipe from the gully to the drain or stack.

E The outlet size of the floor waste gully.

☐

5 How many fixture units are allowed to be discharged through an 80 mm branch discharge pipe laid at a gradient of 2.50%, as stated in AS/NZS 3500 Part 2: Sanitary plumbing and drainage?

A 16

B 20

C 27

D 39

E 65

☐

6 How many fixture units are allowed to be discharged from any one floor to a 100 mm discharge stack that serves four or more levels, as stated in AS/NZS 3500 Part 2: Sanitary plumbing and drainage?

A 25

B 75

C 100

D 125

E 150

☐

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

A Undiluted urinal waste.

B Photographic equipment.

C Cooling towers.

D Grease arrestors.

E Slop hoppers.

☐

8 According to the New Zealand Building Code Clause G1, which of the following fixtures are prohibited from being installed in a unisex bathroom facility?

A A urinal.

B A sanitary towel disposal unit.

C A shower cubicle.

D A cleaner's sink.

E A baby changing table.

☐

9 What is the minimum period that under-slab waste pipes must last in order to be compliant with the New Zealand Building Code?

A 5 years.

B 10 years.

C 15 years.

D 20 years.

E 50 years.

☐

10 What is the minimum period that pipework concealed behind wall linings must last in order to be compliant with the New Zealand Building Code?

A 1 year.

B 2 years.

C 5 years.

D 15 years.

E 50 years.

☐

11 A certifying plumber has employed a trainee who now holds a limited certificate.

What is the minimum length of time must the trainee work in the presence of a qualified supervisor?

A 6 months.

B 12 months.

C 24 months.

D 36 months.

E Until such time as the trainee achieves registration.

☐

12 Within what length of time must the Plumbers, Gasfitters and Drainlayers Board be notified of a registered plumber's change of address?

A 7 days.

B 28 days.

C 6 weeks.

D 3 months.

E 6 months.

☐

Total 12 marks ☐

For Examiner's use only

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