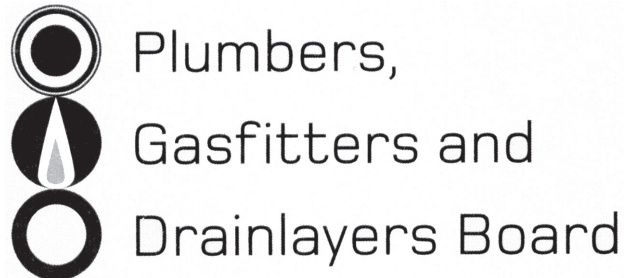


Affix label with Candidate Code  
Number here.  
If no label, enter candidate  
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No. 9195



## REGISTRATION EXAMINATION, NOVEMBER 2010

### 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 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 2010 were provided with the following documents:

- AS/NZS 3500 Part 1: Water services
- AS/NZS 3500 Part 2: Sanitary plumbing and drainage

## SECTION A

### QUESTION 1

A downpipe is to be fitted to an internal gutter. The downpipe will travel through the building and exit through an external wall before discharging to the storm-water drain.

- (a) State the New Zealand Building Code clause number and name that provides information that can be used to size the downpipe

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(1 mark)

- (b) State the New Zealand Building Code clause number and name that provides an acceptable solution for ensuring the moisture barrier of the external wall is maintained

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(1 mark)

**Total 2 marks**

### QUESTION 2

State the circumstance in which it is NOT permissible to use a roof discharge spreader on a concrete tiled roof.

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**Total 1 mark**

### QUESTION 3

Give the meaning of the following terms in relation to backflow.

(a) High hazard

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(1 mark)

(b) Medium hazard

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(1 mark)

(c) Low hazard

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(1 mark)

**Total 3 marks**

### QUESTION 4

Give the circumstances under which each of the following backflow types can occur.

Fully describe the cause of each.

(a) Back pressure

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(2 mark)

(b) Back siphonage

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(2 mark)

**Total 4 marks**

## QUESTION 5

List FOUR factors that should be considered when a solar water heating system is being designed.

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_

Total 2 marks

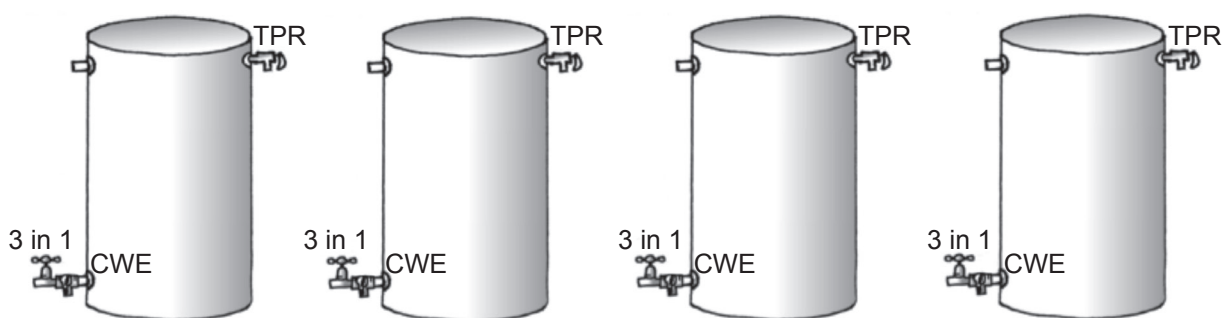
## QUESTION 6

The diagram below shows four commercial un-tempered hot water storage heaters that are to be connected to the water supply and deliver an equal (balanced) flow.

There is to be a common drain line receiving discharge from the temperature and pressure relief valves and the cold water expansion valves. This common drain line is to terminate at the floor waste gully.

On the diagram draw:

- the hot and cold water supply pipes connected to the water heaters
- provision in the pipework to allow for servicing of each water heater
- a combined drain taking the temperature and pressure relief and cold water expansion valve drains to the floor waste gully.



 Cold

 FWG

Total 6 marks

### QUESTION 7

Name the THREE devices that must be installed with a thermostatic mixing valve for the system to comply with AS/NZS 3500 Part 4: Heated water services.

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_

Total 3 marks

### QUESTION 8

Give TWO consequences that may result from a water diffuser NOT being fitted to the inlet of a high pressure hot water storage unit.

- 1 \_\_\_\_\_  
\_\_\_\_\_
- 2 \_\_\_\_\_  
\_\_\_\_\_

Total 2 marks

## QUESTION 9

Complete the starter drawing below to show a push through hot water system which complies with New Zealand Building Code Clause G12.



Cold water supply

Total 4 marks

## QUESTION 10

Answer the following in relation to AS/NZS 3500 Part 1: Water services.

- (a) State the restriction imposed on the use of braided flexible hoses.

\_\_\_\_\_

(1 mark) ☐

- (b) State the TWO restrictions imposed on the use of galvanised pipes and fittings.

1 \_\_\_\_\_

2 \_\_\_\_\_

(2 marks) ☐

- (c) The maximum static pressure allowable at an outlet is 500 kPa.

Give THREE reasons for this.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

(3 marks) ☐

- (d) State the specific requirement relating to a non-potable water supply pipe that has been installed underground.

\_\_\_\_\_

\_\_\_\_\_

(2 marks) ☐

- (e) A water main from the street to a building is to be replaced. A gas supply line and electrical cable were buried without any warning tape or mechanical protection.

State the minimum distance from the existing services the new water supply can be laid.

\_\_\_\_\_

(1 mark) ☐

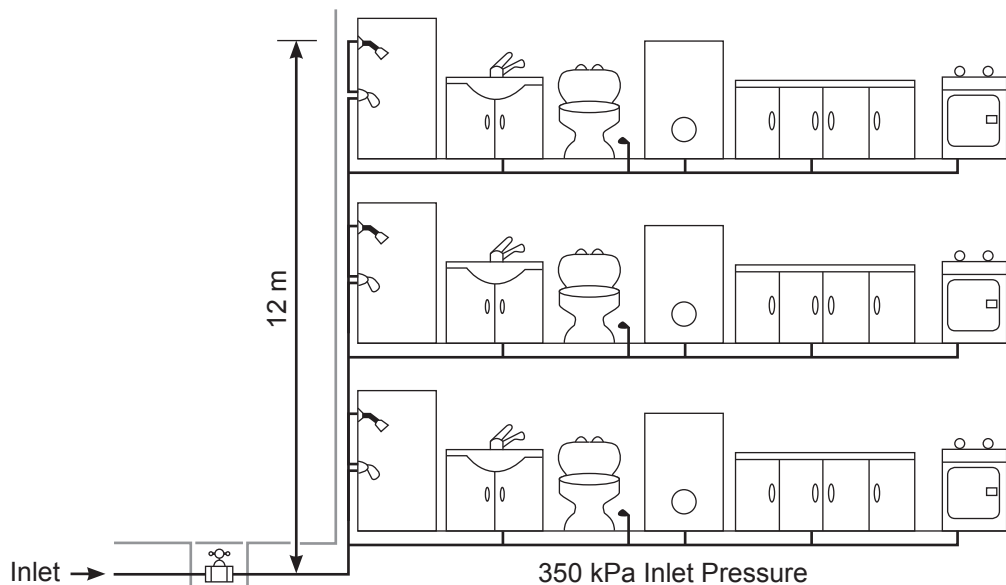
**Total 9 mark**

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## QUESTION 11

The diagram below shows an elevation of part of a three storey building. The building contains three identical apartments. Plumbing specification for the cold water supply is as follows:

- Copper pipe is to be used.
- The pressure required at the furthest fitting is 100 kPa.
- Each apartment has a loading unit factor of 18.
- The index length is 30 metres.



Use Table C.1 from AS/NZS 3500 Part 1: Water services to answer the following.

- (a) Size the index length of the main cold water supply pipe from the inlet to the highest apartment.

Formula:

$$\text{Pressure drop} = H_m - H_s - H_x$$

where

$H_m$  = Minimum available head in metres

$H_s$  = Height of the highest outlet in the apartment in metres

$H_x$  = Minimum head required at any fixture outlet in metres

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- (b) Size the inlet pipe to each apartment.

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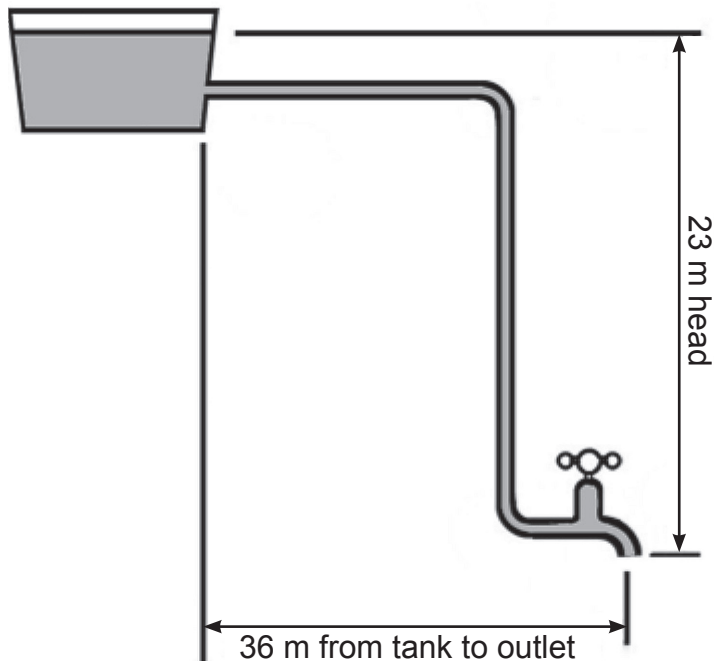


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Total 7 marks

## QUESTION 12

A 4000 litre tank is situated as shown in the diagram below.



A 20 mm pipe has been run from the tank to the outlet.

Allowances for frictional loss of 0.5 m for each bend and 1 m for the tap are to be made.

Calculate, in litres per second, the amount of water that would be available at the outlet.

Box's Formula:

$$Q = \sqrt{\frac{H \times d^5}{25 \times L \times 10^5}}$$

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Total 5 marks

### QUESTION 13

Under the New Zealand Building Code Clause G13, a single discharge pipe and trap cannot be connected to two adjacent sinks in a commercial kitchen.

Give the reason for this.

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Total 1 mark

### QUESTION 14

Explain why it is NOT permissible to use an air admittance valve as a stack vent on a single stack system.

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Total 1 mark

### QUESTION 15

A discharge stack is required for a three storey building.

A commercial laundry occupies the first floor.

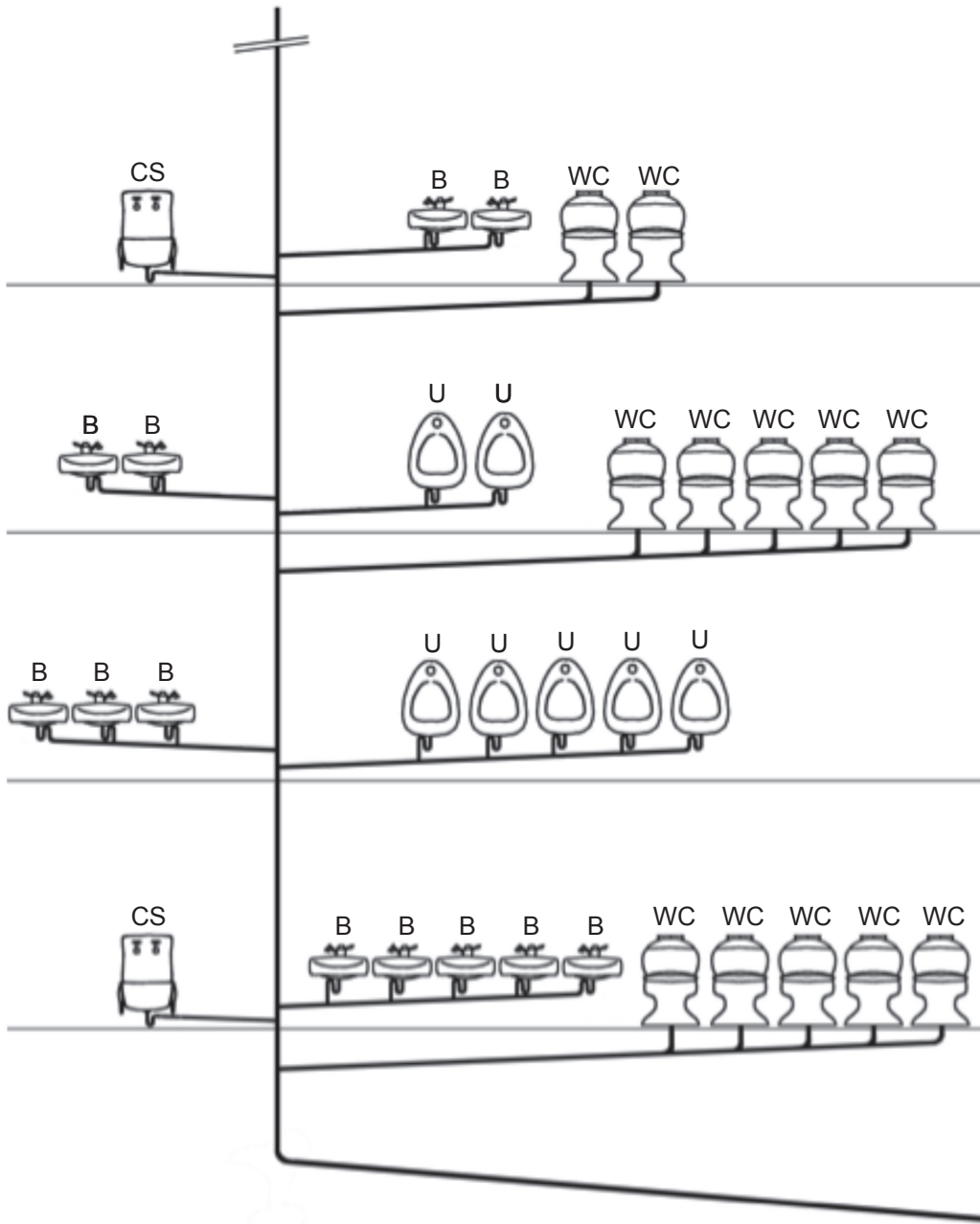
Draw a sketch showing the connection point of the discharge stack and the graded drain pipe so that the installation complies with AS/NZS 3500 Part 2: Sanitary plumbing and drainage.

Show the measurements of the restricted zone of the stack and drain where connections are not permitted.

**Total 6 marks**

QUESTION 16

The diagram below shows a single stack system in a four storey commercial building. Indicate on the diagram the minimum diameter for each common discharge pipe.



Using AS/NZS 3500 Part 2 Sanitary plumbing and drainage complete the table below to show the design requirements for the common discharge pipes used in the system.

Common discharge pipe	WC	U	WHB	CS
Maximum fixtures per floor				
Maximum length				
Minimum gradient				
Maximum gradient				

Total 12 marks

## QUESTION 17

The diagram on the opposite page shows a plan view and part of an elevation of a house.

The house has been relocated to its current site.

Due to existing ground conditions, it is impossible to run the drains externally from the building. A connection to the council sewer has been provided at the location indicated.

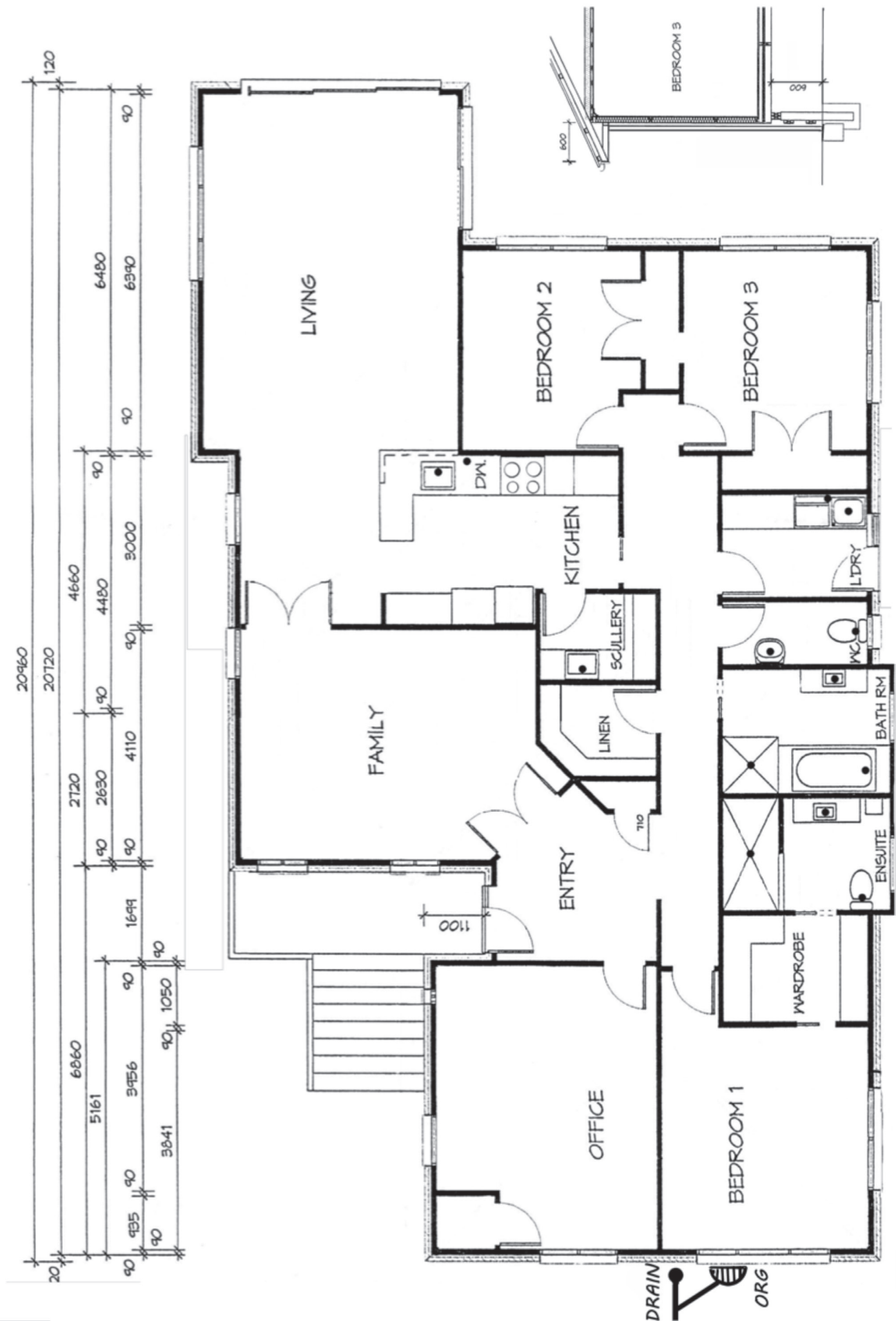
The house owner has requested that floor waste gullies be used as wastes for the showers in the bathroom and ensuite. The showers are tiled.

On the plan, show all waste pipes and drains so that the installation meets the minimum requirements of AS/NZS 3500 Part 2: Sanitary plumbing and drainage.

Label and size all discharge pipes. Indicate on your drawing the minimum acceptable gradient for each section of pipework.

Label and size all venting requirements.

**Total 10 marks**



### QUESTION 18

A copper discharge stack is to be installed in a multi-level apartment building.

State the THREE requirements that must be met regarding the location of an expansion joint in the stack so that the installation complies with AS/NZS 3500 Part 2: Sanitary plumbing and drainage.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

**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. What is the maximum allowable flow rate to a kitchen sink when installed to comply with AS/NZS 3500 Part 1: Water services?

A 5 litres per minute.  
B 9 litres per minute.  
C 12 litres per minute.  
D 15 litres per minute.  
E 20 litres per minute.

2. Potable and non potable water supply pipework is to be installed parallel through a building. What is the minimum distance apart the pipes can be and comply with AS/NZS 3500 Part 1 Water service?

A 50 mm.  
B 100 mm.  
C 150 mm.  
D 200 mm.  
E 250 mm.

3. What is the maximum allowable water velocity in piping according to AS/NZS 3500 Part 1: Water services?

A 3 m/s.  
B 5 m/s.  
C 7 m/s.  
D 10 m/s.  
E 15 m/s.

4. When is it permitted to bypass a backflow device supplying an installation?
- A When the bypass has the identical rating as the device being bypassed.
  - B During maintenance procedures.
  - C While testing of the backflow assembly takes place.
  - D Only at non-peak usage times.
  - E In an emergency fire fighting situation where a high flow rate is required.

☐

5. How often must a backflow prevention assembly be tested?
- A Every six months.
  - B Every year.
  - C Every two years.
  - D Every five years.
  - E On installation and when the installation is altered.

☐

6. When is an air gap NOT an adequate backflow prevention method?
- A On a tank supplying a reduced pressure zone assembly.
  - B When used on a bidet storage tank.
  - C In a medium hazard situation.
  - D In a high hazard situation.
  - E Where polluted air could enter the pipework.

☐

7. Which document covers backflow prevention device construction including materials, design and performance requirements?
- A AS/NZS 5428.2
  - B NZS 5261
  - C AS/NZS 2845.1
  - D AS/NZS 5262
  - E EPA Cross Connection Manual

☐

8. Which of the following must a person be in order to be able to test and certify a backflow prevention device?

- A Backflow Testing Licence holder (BTL).
- B Water Supply Certifier (WSC).
- C Professional Water Engineer (PWE).
- D Supplies Control Technician (SCT).
- E Independently Qualified Person (IQP).

☐

9. 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 cleaner's sink.
- B A sanitary towel disposal unit.
- C A shower cubicle.
- D A urinal.
- E A baby changing table.

☐

10. What is the maximum catchment area permitted to discharge via a spreader on to a lower roof area?

- A 25 m<sup>2</sup>.
- B 30 m<sup>2</sup>.
- C 35 m<sup>2</sup>.
- D 40 m<sup>2</sup>.
- E 45 m<sup>2</sup>.

☐

11. According to the New Zealand Building Code Clause G1, what is the minimum distance allowable between the outlet of a urinal flushing system and the sparge pipe?

- A 350 mm.
- B 450 mm.
- C 550 mm.
- D 650 mm.
- E 750 mm.

☐

12. What is the minimum cross-sectional area of any roof gutter?

- A 1000 mm<sup>2</sup>.
- B 2000 mm<sup>2</sup>.
- C 3000 mm<sup>2</sup>.
- D 4000 mm<sup>2</sup>.
- E 5000 mm<sup>2</sup>.

☐

13. What length of free space must be provided adjacent to a cylinder to allow for the removal of the temperature and pressure relief valve?

- A 75 mm.
- B 150 mm.
- C 175 mm.
- D 200 mm.
- E 300 mm.

☐

14. How many seismic restraint straps must be installed on a 350 litre storage hot water cylinder?

- A 2
- B 3
- C 4
- D 5
- E 6

☐

15. When multiple mains pressure storage cylinders are being installed, how many of the cylinders need to be fitted with temperature and pressure relief valves?

- A Only the first cylinder in the installation.
- B Only the last cylinder in the installation.
- C The first cylinder in the installation and every second cylinder thereafter.
- D Every cylinder in the installation.
- E One relief valve for every three cylinders in the installation.

☐

16. To comply with the New Zealand Building Code Clause G1, what is the minimum capacity of the flushing cistern required for a 2.4 metre continuous wall type urinal?

- A 6 litres.
- B 7 litres.
- C 8 litres.
- D 9 litres.
- E 10 litres.

☐

17. Who is responsible for organising the periodic testing of a backflow prevention assembly?

- A The local territorial authority.
- B The installing plumber.
- C The architect.
- D The building owner.
- E The independently qualified person.

☐

18. At which capacity must an isolating valve be installed on the outlet of a supply tank as stated in AS/NZS 3500 Part 1: Water services?

- A 25 litres.
- B 50 litres.
- C 100 litres.
- D 200 litres.
- E 250 litres.

☐

19. What is the maximum discharge unit loading for a 125 mm foul water pipe which has been laid at a gradient of 1.65% as stated in AS/NZS 3500 Part 2: Sanitary plumbing and drainage?

- A 254.
- B 342.
- C 410.
- D 509.
- E 686.

☐

**Total 19 marks**

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For Examiner's use only

Question number	Marks	Marks
1		
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