

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

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No. 9198



Plumbers,  
Gasfitters and  
Drainlayers Board

## REGISTRATION EXAMINATION, NOVEMBER 2014

# CERTIFYING DRAINLAYER

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 17–21 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 2014 were provided with the following documents:

- AS/NZS 3500 Part 2: Sanitary plumbing and drainage
- New Zealand Building Code Clause E1 – Surface Water
- New Zealand Building Code Clause G13 – Foul Water

## 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 =  $0.7854 \times D^2$

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



length = L

gradient = 1:G

fall = F

# SECTION A

## QUESTION 1

The starter drawing below shows part of a vented drainage system for a floor waste gully discharging into an overflow relief gully. The drawing is not to scale.

A reflux valve is required on the foul water drain from the overflow relief gully to the Network Utility Operator's (NUO) sewer. The invert of the sewer is 1200 mm below ground level.

- (a) Give the measurement at A that makes a reflux valve necessary on this installation.

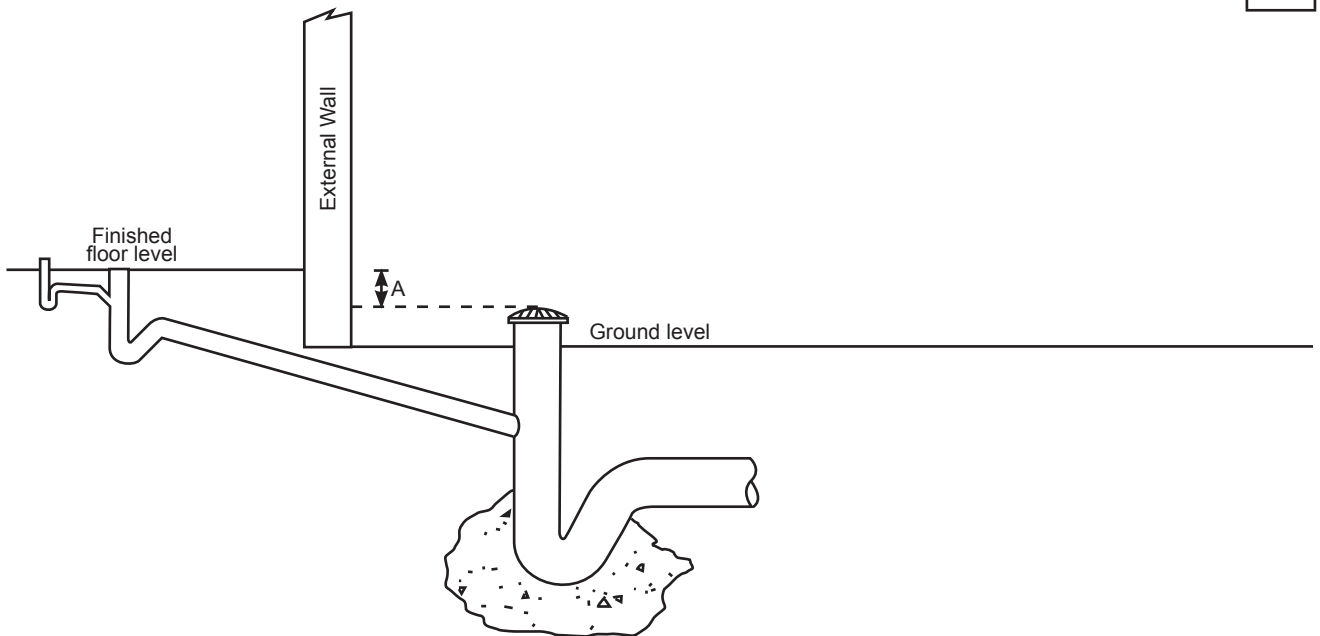
(2 marks)

- (b) Complete the drawing to show the installation of the reflux valve inside a chamber located at the outfall to the NUO sewer.

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

Include all relevant measurements on your drawing.

(4 marks)



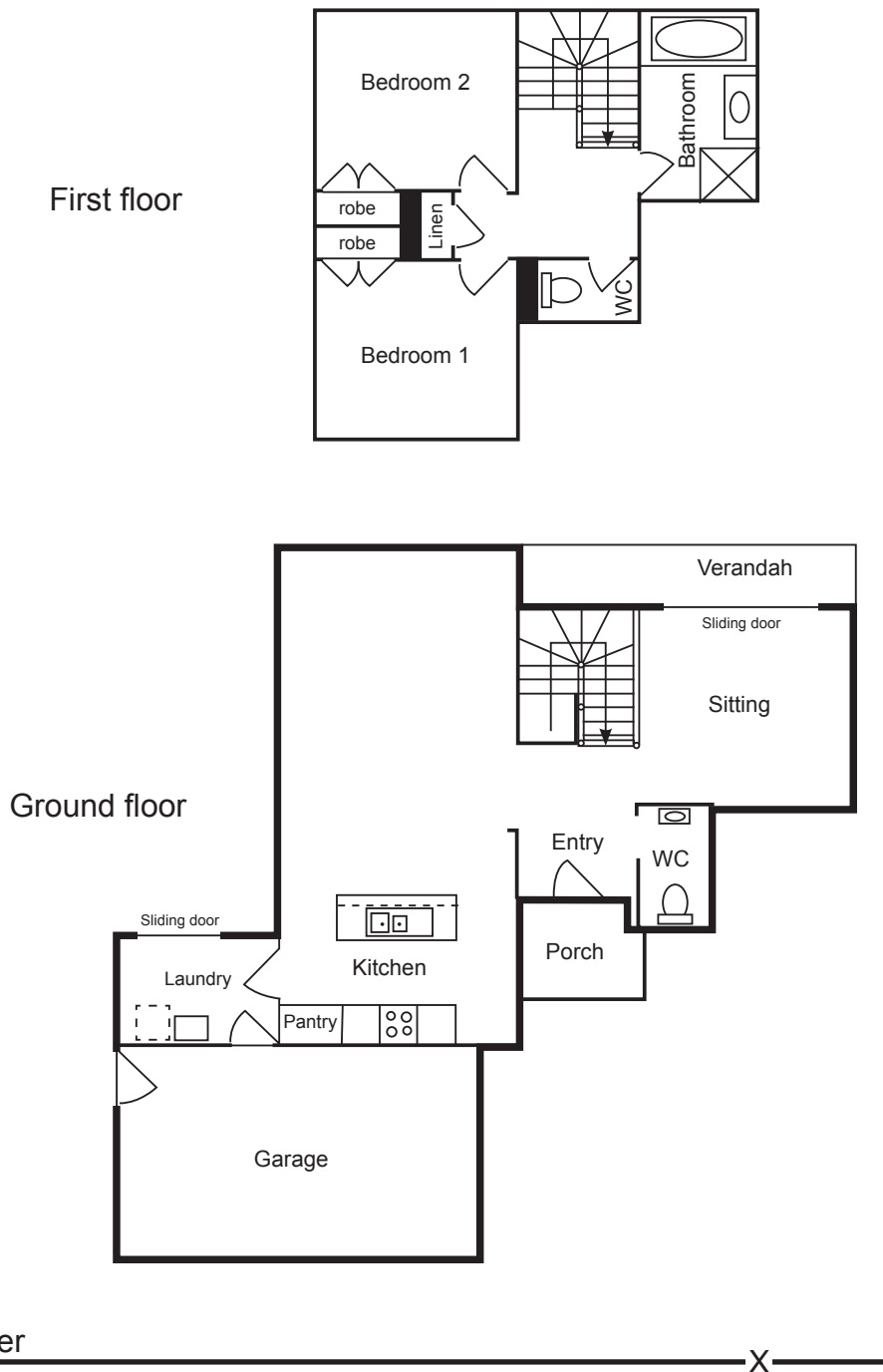
Total 6 marks



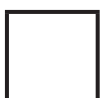
### QUESTION 3

The plan below shows the layout of sanitary fixtures for a new two-storey dwelling and a connection point to the Network Utility Operator (NUO) sewer marked X. The plan has been drawn to a scale of 1:100

- (a) Complete the diagram to show the foul water drains required to convey the waste to the NUO sewer connection point. The system is to comply with the minimum requirements of New Zealand Building Code Clause G13/AS2 Foul Water.
- (b) Label the diagram to show the location of any necessary inspection openings.



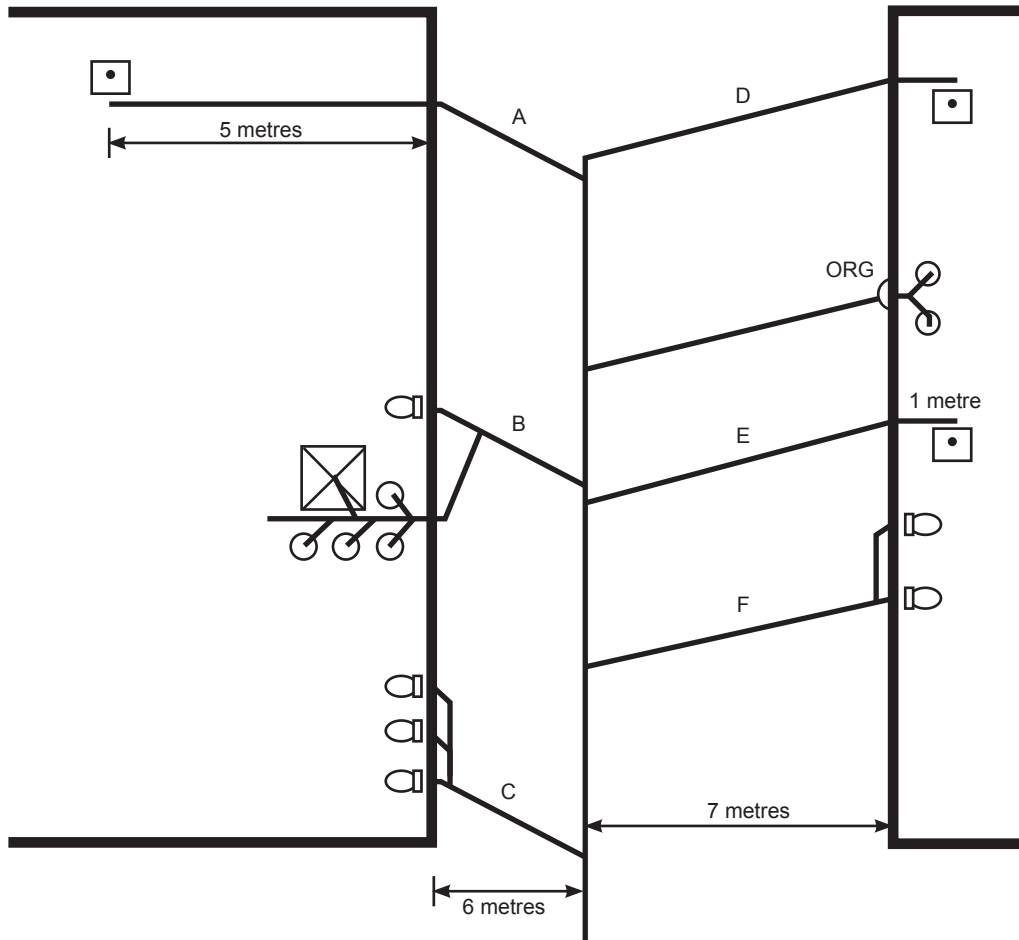
Total 10 marks



### QUESTION 4

The diagram below shows the foul water drainage plan for a commercial property.

(a) Complete the diagram to show the required locations and diameters for vent pipework.



(b) Complete the table below to show the required minimum diameter and gradient for the drains at the points labelled A – F.

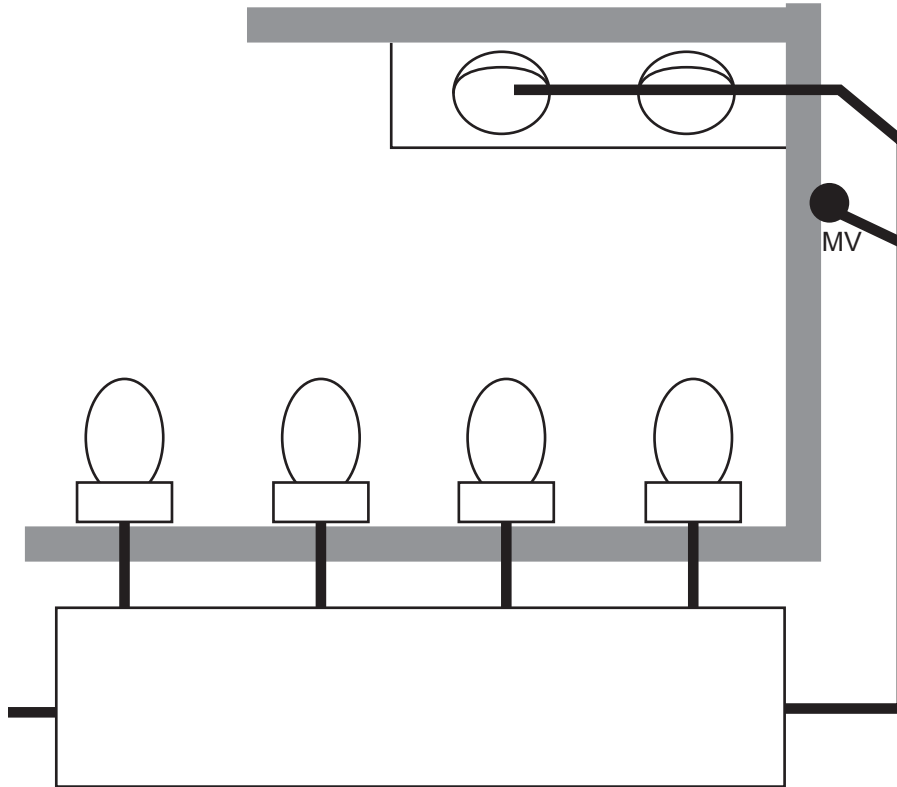
Drain	Minimum diameter	Minimum gradient
A		
B		
C		
D		
E		
F		

Total 13 marks

### QUESTION 5

The plan view below shows part of an ablution block containing four WC pans and two wash hand basins connected to a rectangular inspection chamber.

- (a) Complete and label the diagram to show the finished installation. The completed installation is to comply with the New Zealand Building Code clause G13/AS2 Foul Water.



(4 marks)

- (b) Sketch a cross-section of the inspection chamber in (a).

(2 marks)

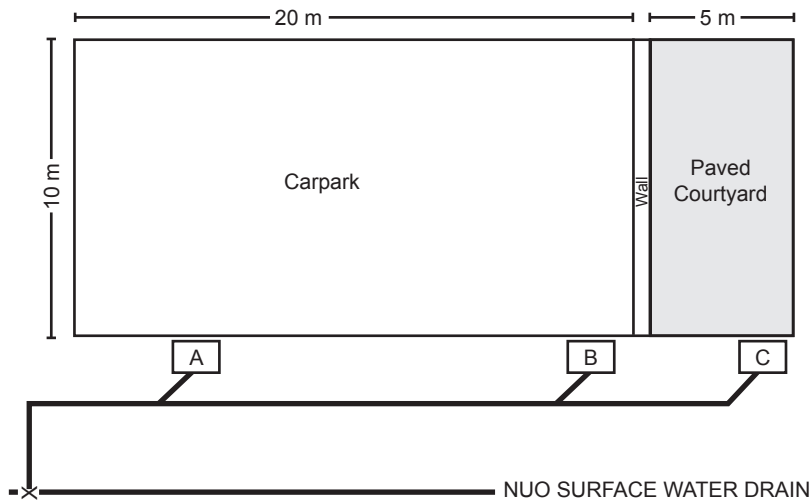
**Total 6 marks**



**QUESTION 6**

The diagram below shows a sealed carpark and paved courtyard separated by a wall.

The surface water from the carpark and courtyard drain into sumps labelled A – C.



The installation is to comply with the minimum requirements of the New Zealand Building Code clause E1/AS1 Surface Water.

- (a) Calculate the modified catchment areas for the carpark and the courtyard.

Modified catchment area =  $0.01 \times \text{Area} \times \text{Rainfall intensity (80 mm/hr)}$

Carpark: \_\_\_\_\_  
 \_\_\_\_\_

Courtyard: \_\_\_\_\_  
 \_\_\_\_\_

(2 marks)

- (b) Determine what type of sump is required for each of the locations A, B and C.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

(2 marks)

**Total 4 marks**

**QUESTION 7**

(a) A cable and pipe locator is being used to locate underground services.

Give TWO reasons why using this type of locator may not be adequate.

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

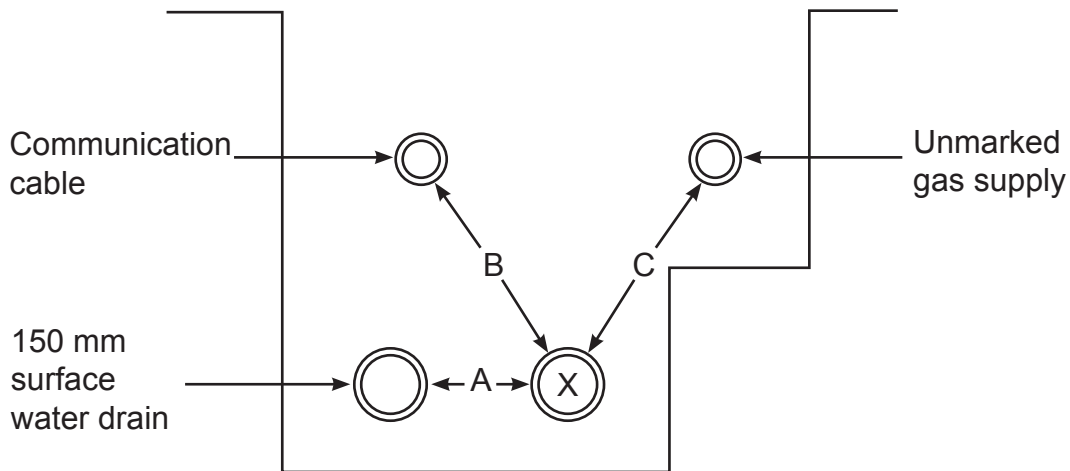
(2 marks)

(b) Name TWO additional methods that could be used together with a cable or pipe locator to locate and reduce the risk of damage to an existing service when excavating.

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

(2 marks)

(c) The diagram below shows a foul water drain marked 'X' laid in a trench shared with other services.



Give the minimum required separation distances between the services as indicated by A, B, and C.

- A \_\_\_\_\_
- B \_\_\_\_\_
- C \_\_\_\_\_

(3 marks)

**Total 7 marks**

**QUESTION 8**

(a) Define the following terms as they relate to domestic waste water management.

(i) Dispersive soil:

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(ii) Setback:

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(iii) Soil Permeability:

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(iv) Reserve area:

---

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(v) Design flow:

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(5 marks)

(b) Give the FIVE design requirements that must be met for an effluent land application system to meet the performance requirements of AS/NZS 1547 On-site domestic wastewater management.

1 

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2 

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3 

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4 

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5 

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(5 marks)

**QUESTION 8 (cont'd)**

(c) Sketch and label a diagram of an above-ground low pressure effluent disposal system.

(5 marks)

**Total 15 marks**

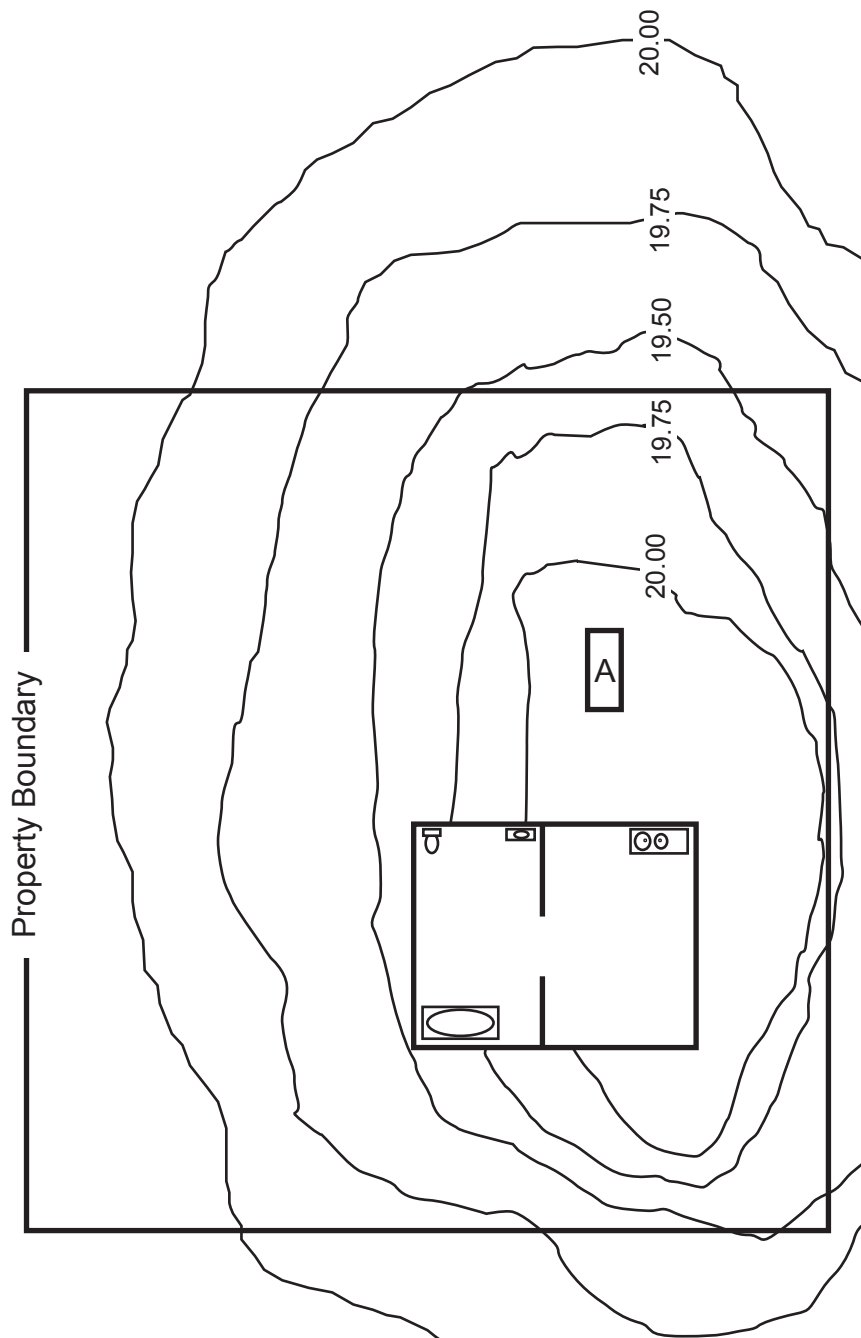
### QUESTION 9

The plan below shows a building and contour lines on a site. The plan is drawn to a scale of 1:200

The finished floor level of the building is 20.25 m above the datum point.

The foul water from the building is to be disposed of through a single stage septic tank (A) and a trench effluent field. The effluent field is to have two separate lines approximately 16 m long.

Complete the drawing to show the foul water drains, including vents, and the complete effluent disposal system for the site. The system is to comply with the minimum requirements of AS/NZS 3500 Part 2: Sanitary plumbing and drainage.



Total 10 marks

**QUESTION 10**

Answer the following questions according to the Health and Safety in Employment Act.

(a) State the purpose of an employee participation system.

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(1 mark)

(b) Give the conditions under which an employee participation system is required.

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(1 mark)

(c) List THREE formal documents a health and safety inspector may issue if safety concerns are found on a work site.

1 

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2 

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3 

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(3 marks)

**Total 5 marks**

**QUESTION 11**

(a) Explain what each of the following terms mean in relation to hazard management at a worksite.

(i) Eliminate.

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(1 mark)

(ii) Isolate.

---

(1 mark)

(iii) Minimise.

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(1 mark)

(b) A petrol-powered pump is to be used to de-water a trench.

Give TWO possible health and safety hazards that may occur.

1 

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2 

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(2 marks)

**QUESTION 11 (cont'd)**

(c) Give TWO ways in which solvent cement can be absorbed into the body.

1 \_\_\_\_\_

2 \_\_\_\_\_

(2 marks)

(d) Give TWO effects solvent cement can have on the body.

1 \_\_\_\_\_

2 \_\_\_\_\_

(2 marks)

(e) List TWO items of safety equipment that should be worn when working with solvent cement.

1 \_\_\_\_\_

2 \_\_\_\_\_

(1 mark)

**Total 10 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. A water test of a surface water drain is to be carried out to comply with New Zealand Building Code clause E1/VM1 Surface Water.

What is the required length of time for the test?

- A 15 minutes.
- B 30 minutes.
- C 4 hours.
- D 12 hours.
- E 24 hours.

2. What length of time should a ceramic surface water drain be soaked before a leakage test complying with New Zealand building Code clause E1/VM1 Surface Water is carried out?

- A 15 minutes.
- B 30 minutes.
- C 4 hours.
- D 12 hours.
- E 24 hours.

3. How many ml per m of pipe length is acceptable for a 100 mm surface water drain pipe to lose per hour during a water test carried out to comply with New Zealand Building Code clause E1/VM1 Surface Water?

- A 15
- B 30
- C 60
- D 110
- E 200

4. A high pressure air test as prescribed in New Zealand Building Code clause E1/VM1 Surface Water is being used to test a 150 mm surface water drain.

How many kPa is the pressure allowed to drop within 4 minutes for the installation to be acceptable.

- A 3
- B 5
- C 8
- D 17
- E 25

5. How long must a drain installed under a building foundation last to comply with New Zealand Building Code clause B2/AS1 Durability.

- A 5 years.
- B 10 years.
- C 15 years.
- D 30 years.
- E 50 years.

6. How long should an in-ground septic tank last for in order to comply with New Zealand Building Code clause B2/AS1 Durability.

- A 5 years.
- B 10 years.
- C 15 years.
- D 30 years.
- E 50 years.

7. A uPVC drain is to be installed to comply with AS/NZS 3500 Part 2: Sanitary plumbing and drainage.

What is the minimum depth of cover that must be provided in an area subject to vehicular traffic.

- A 350 mm.
- B 400 mm.
- C 450 mm.
- D 500 mm.
- E 550 mm.

8. Which of the following best describes a detention tank?

- A A tank designed to hold stormwater until it can be discharged into the network utility operators system.
- B A tank designed to hold stormwater for reuse as a water supply on the property.
- C A tank designed to store any trade waste requiring treatment before disposal.
- D A tank designed to aerate foul water before discharging to an effluent disposal field.
- E A tank designed to contain any overflow from a sewage treatment process when any above expected peak flow occurs.

9. Which of the following best describes a retention tank?

- A A tank designed to hold stormwater until it can be discharged into the network utility operators system.
- B A tank designed to hold stormwater for reuse as a water supply on the property.
- C A tank designed to store any trade waste requiring treatment before disposal.
- D A tank designed to aerate foul water before discharging to an effluent disposal field.
- E A tank designed to contain any overflow from a sewage treatment process when any above expected peak flow occurs.

**Total 9 marks**

For Examiner's use only

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