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, JUNE 2023

CERTIFYING DRAINLAYER

QUESTION AND ANSWER BOOKLET

Time allowed THREE hours

INSTRUCTIONS

Please check that the booking reference number on your booking confirmation slip is the same as the number on the label at the top of this page.

Do not remove the exam booking confirmation slip from your exam paper.

Do not start writing until you are told to do so by the Supervisor.

Total marks for this examination: 100.

This exam booklet consists of 2 sections

Section A – Questions 1 to 12

Section B – Questions 1 to 10

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 28-30 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.

Do not use red pen for drawings or writing in your paper.

Check that this booklet has all of 32 pages in the correct order.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION

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

A trainee under your supervision has completed a 100 mm diameter house drain.

List SIX aspects of the drain that you should check prior to a Territorial Authority inspection.

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

Total 6 marks

INTENTIONALLY BLANK

QUESTION 2

A 3000 litre trade waste tank is to be buried in the ground in an area with a high water table.

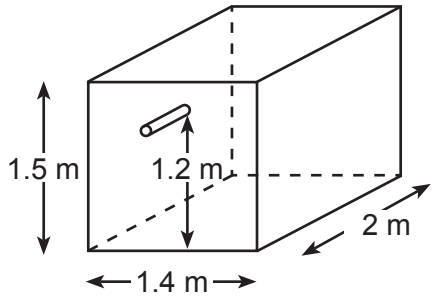
(a) Give TWO methods to protect from uplift.

1 _____

2 _____

(2 marks)

(b) The tank has an outlet 1.2 m above its base. The diagram below shows the tank and some measurements associated with it.



Calculate the volume of waste the tank can hold before discharging.

_____

_____

_____

(2 marks)

Total 4 marks

INTENTIONALLY BLANK

QUESTION 3

(a) Give FOUR actions that could be taken to reduce the risk of an accident when working in an excavation.

1 _____

_____

2 _____

_____

3 _____

_____

4 _____

_____

(4 marks)

(b) A certifying drainlayer is to instruct a trainee how to use a piece of machinery.

Give FOUR matters regarding safety that should be covered in the training.

1 _____

_____

2 _____

_____

3 _____

_____

4 _____

_____

(4 marks)

Total 8 marks

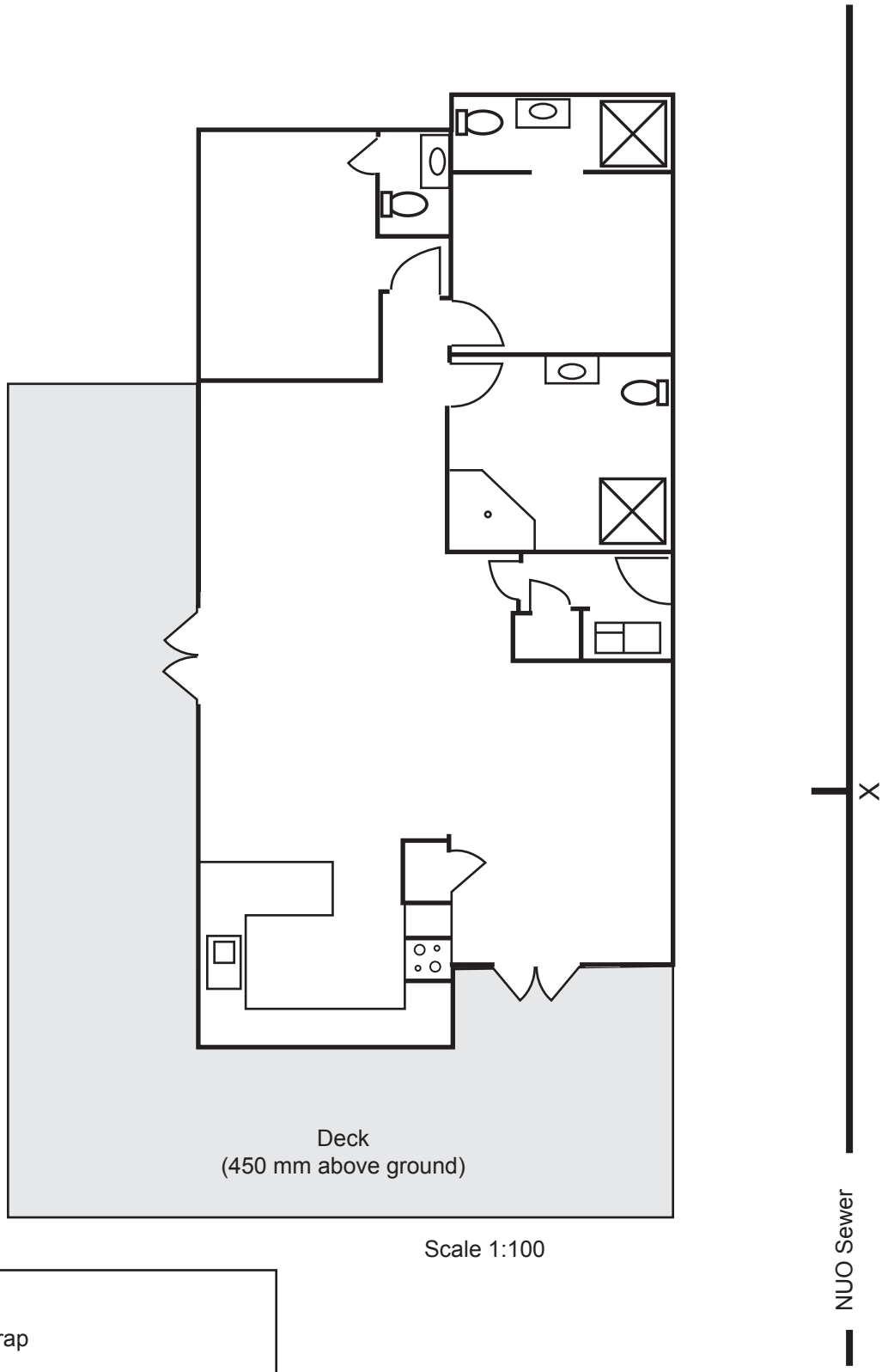
QUESTION 4

The diagram on the next page shows a new dwelling. The diagram has been drawn to a scale of 1:100

On the diagram on the next page, draw a foul water pipework system to carry the waste to the network utility operator's connection point (X). The system is to comply with the minimum requirements of the New Zealand Building Code clause G13/AS2 Foul Water.

Clearly label the components of the system.

QUESTION 4 (cont'd)



Scale 1:100

Legend

MV: Main vent GT: Gully trap

WC		Bath	
Hand basin		Tub and washing machine	
Shower		Kitchen sink	

Total 10 marks

INTENTIONALLY BLANK

QUESTION 5

(a) Complete the following table to show THREE ways in which micro-organisms can enter the body and a method of reducing the risk of each way.

Method of entry	Method of reducing risk

(3 marks)

(b) Name THREE diseases that can be caught from exposure to raw sewage.

1 _____

2 _____

3 _____

(3 marks)

(c) Give THREE actions that should be taken with regard to hygiene after finishing work with raw sewage.

1 _____

2 _____

3 _____

(3 marks)

Total 9 marks

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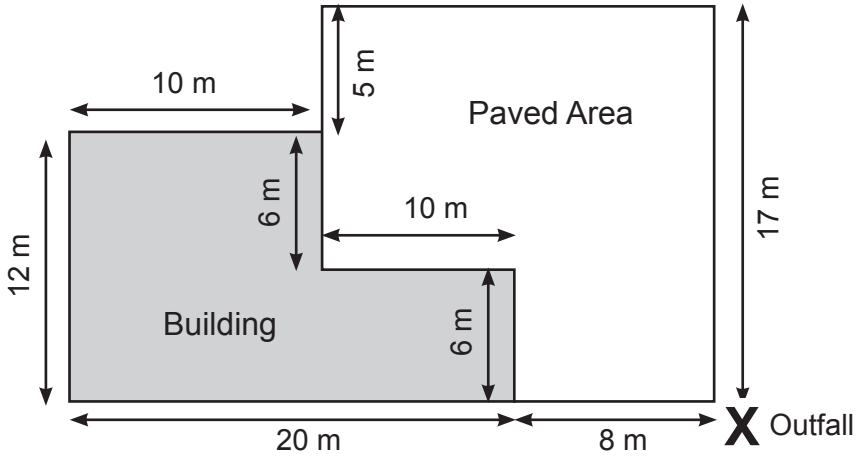
QUESTION 6

The plan below shows the layout for a site in Nelson. The plan is not drawn to scale.



The surface water drain will be laid at a gradient of 1:80

Using the information and Figure 3 from the relevant section of New Zealand Building Code Clause E1/AS1 Surface Water, determine the diameter of the surface water the pipework at the outfall marked X.

Show all working.

Total 5 marks

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QUESTION 7

(a) A house drain connected to an on-site sewage disposal system is overflowing at the gully dish.

Give FOUR different causes of this.

1 _____

2 _____

3 _____

4 _____

(4 marks)

(b) Draw a diagram showing the main features of an above-ground evapotranspiration effluent disposal system.

(3 marks)

(c) Give THREE recommendations that should be given to the end-user to prolong the life of an above-ground evapotranspiration effluent disposal system.

1 _____

2 _____

3 _____

(3 marks)

Total 10 marks

INTENTIONALLY BLANK

QUESTION 8

The Plumbers, Gasfitters and Drainlayers Act defines supervision in relation to drainlaying work.

(a) Give the THREE specific qualities of work carried out under supervision that a certifying drainlayer must ensure, as given in the Act.

1 _____

2 _____

3 _____

(3 marks)

(b) Explain what the term direct supervision refers to.

_____

_____

(2 marks)

(c) A drainlayer has changed his contact address details.

(i) State the length of time within which the drainlayer must notify the Plumbers, Gasfitters and Drainlayers Board of a change of address.

_____

(1 mark)

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

_____

(1 mark)

Total 7 marks

QUESTION 9

The drawing below shows a newly laid surface water drain.

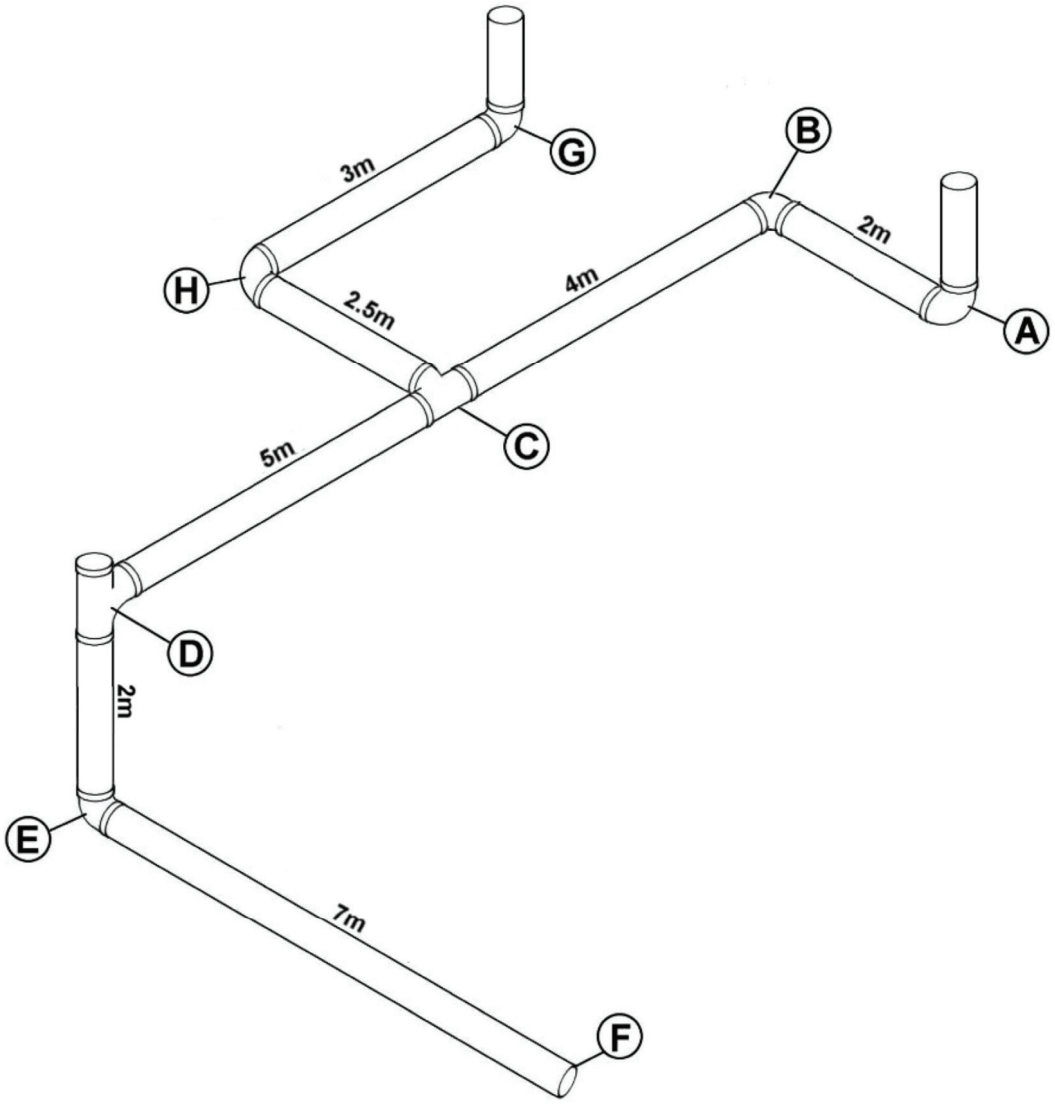
The drain invert at point A is 800 mm below datum.

Section D – E of the drain is vertical.

Sections G – H and H – C have been laid at a gradient of 1:60

The remaining sections of the drain have been laid at a gradient of 1:40

Complete the tables on the next page to show the fall for each section and the depth below the datum to the invert for the excavation at the points indicated.



QUESTION 9 (cont'd)

Section	Fall
A – B	
B – C	
C – D	
D – E	
E – F	
G – H	
H – C	

Point	Depth
B	
C	
D	
E	
F	
G	
H	

Total 10 marks

INTENTIONALLY BLANK

QUESTION 10

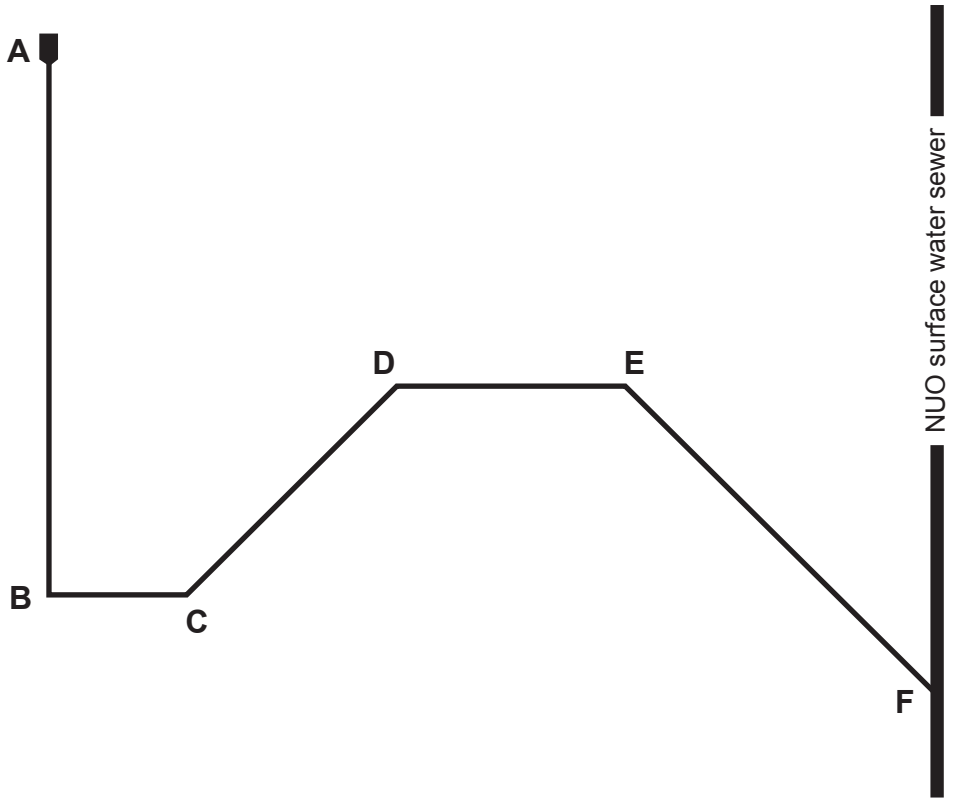
The diagram below shows the plan of a surface water drain from the discharge point at the location marked A to the Network Utility Operator's (NUO) sewer connection at the location marked F.

The changes of direction at points C, D and E are 45º.

The diagram has been drawn to a scale of 1:50

Complete the diagram to show the required locations for the inspection or rodding points required.

The completed drawing is to comply with the minimum requirements of New Zealand Building Code clause E1/AS1.



Total 4 marks

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QUESTION 11

(a) Explain how a smoke test is carried out on a foul water drain.

(3 marks)

(b) Give TWO faults with a foul water system that would show up through the completion of a smoke test.

1

2

(2 marks)

(c) A high pressure air test is to be conducted on a 100 mm diameter drain in accordance with the New Zealand Building Code verification method E1/VM1 Surface Water.

(i) Determine the total acceptable pressure drop.

(½ mark)

(ii) Give the maximum allowable time for the pressure drop to occur.

(½ mark)

Total 6 marks

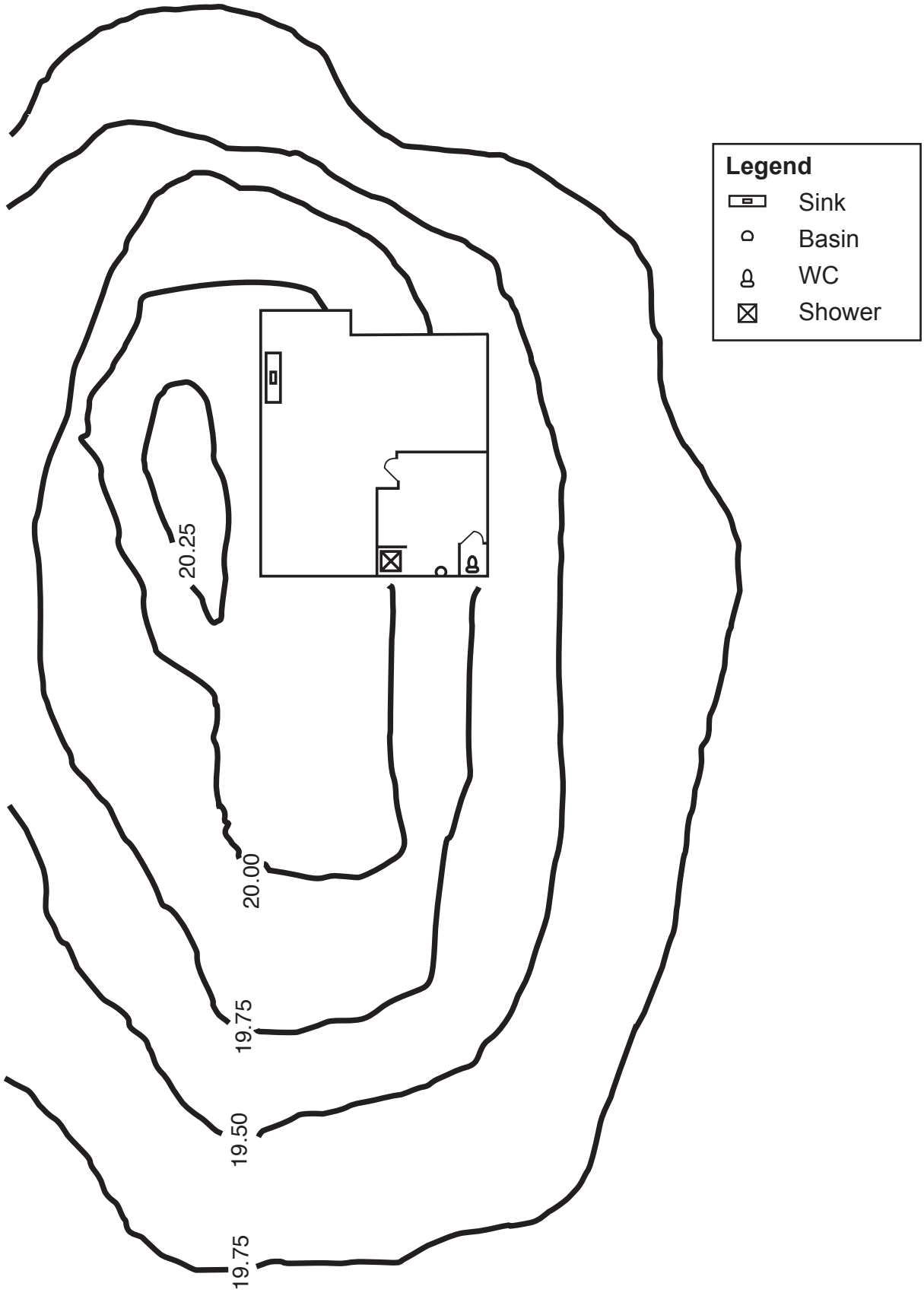
QUESTION 12

The diagram on the next page shows a building on a site with contour lines also shown.
The diagram has been drawn to a scale of 1:200

The foul water from the building is to be disposed of through a single stage septic tank and a dosed trench effluent field.

Complete the drawing to show the foul water drainage system, and the effluent disposal system for the site. The complete system is to comply with the New Zealand Building Code clause G13 Foul Water.

Total 11 marks



Scale 1:200

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. There is a gas that naturally occurs in the ground which smells like rotten eggs. When exposed to large concentrations of this gas, peoples' sense of smell is lost so that the gas cannot be readily detected by its smell.

   What is the gas?

   A Carbon dioxide.

   B Ethane.

   C Hydrogen sulphide.

   D Methane.

   E Propane.

   ☐

2. For 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. What is the minimum allowable gradient for a 225 mm surface water drain?

   A 1:90

   B 1:120

   C 1:250

   D 1:300

   E 1:350

   ☐

4. What is the definition of a ‘drain in common’?

A A drain that conveys both foul and surface water.

B A drain that is maintained by the Local Authority.

C A drain that serves 2 or more properties.

D A drain that is permitted to cross public park.

E A drain that discharges into a watercourse.

☐

5. According to AS/NZS 3500 Part 2: Sanitary plumbing and drainage, what is a steep grade defined as?

A Between 20% and vertical.

B Between 30% and vertical.

C Between 45% and vertical.

D Between 60% and vertical.

E Between 65% and vertical.

☐

6. A rectangular chamber is to provide 9 m^3 of storage volume. The available area to construct the chamber measures 2.4 m × 2.8 m. What depth will the chamber need to have?

A 1.34 m.

B 1.73 m.

C 3.21 m.

D 3.75 m.

E 3.80 m.

☐

7. Drainlayer A has requested the assistance of a tradesman drainlayer employed by drainlayer B.

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

A Drainlayer A.

B Drainlayer B.

C The tradesman drainlayer.

D The Plumbers, Gasfitters and Drainlayers Board.

E WorkSafe.

☐

8. Which of the following correctly describes stratification in relation to sewage treatment?

A A plant absorbing liquid via the root system and releasing the moisture to the air through its leaves.

B How quickly the soil will absorb the moisture from the effluent.

C The moisture from the effluent field vaporising into the atmosphere.

D The sludge, scum and effluent separating while in the septic tank.

E The breaking down of the effluent by bacteria to make a clearer liquid.

☐

9. 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.

☐

10. What is the purpose of a drainage easement on a certificate of title?

A To allow a drain to be laid within a neighbouring property.

B To prevent flooding caused by surface water from a neighbouring property.

C To allow two neighbouring properties to share a drainage system.

D To permit the storm-water from the property to discharge to a curb and channel.

E To show the as-laid location of the drainage system on the certificate of title.

☐

Total 10 marks ☐

This page is available for additional working or answers

Question number _____

This page is available for additional working or answers

Question number _____

This page is available for additional working or answers

Question number _____

For Examiner's use only

Question number	Marks	Marks
1		
2		
3		
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5		
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11		
12		
Section B		
Total		