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 2021

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.

This exam booklet consists of 2 sections

Section A – Questions 1 to 9

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 23–25 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 26 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) A cable and pipe locator is being used to locate any underground services on a site.

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

1 _____

_____

2 _____

_____

(2 marks)

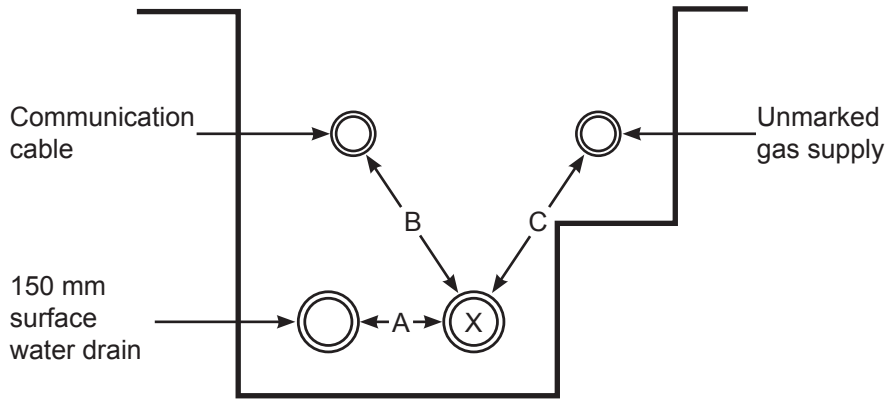
(b) Name TWO additional methods that could be used together with a cable and pipe locator to locate and reduce the risk of damage to an existing service when excavating.

1 _____

2 _____

(2 marks)

(c) The diagram below shows a foul water drain marked X laid in a trench that is 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 2

(a) The New Zealand Building Code verification method E1/VM1 Surface Water gives an acceptable method for the construction of a chamber soak pit, in which a layer of rocks must be included on the base of the soak pit.

(i) State the purpose of this layer of rocks.

_____

_____

_____

(1 mark)

(ii) Give FOUR requirements, other than the rock layer, that must be met in the construction of a chamber soak pit.

1 _____

2 _____

3 _____

4 _____

(2 marks)

(b) Name the test used to determine the suitability of an area to be used for the installation of a soak pit.

_____

_____

(1 mark)

QUESTION 2 (cont'd)

(c) Describe how the test in (b) is performed.

(3 marks)

(d) Explain why the surface water run-off co-efficient is affected by the gradient of a site.

(2 marks)

(e) Calculate the corrected run-off coefficient for a sealed driveway that has a slope of 15%.

(1 mark)

Total 10 marks

QUESTION 3

(a) Describe what is meant by each of the following terms as they relate to drainlaying.

(i) Prohibited trade waste.

_____

_____

(1 mark) ☐

(ii) Conditionally acceptable trade waste.

_____

_____

(1 mark) ☐

(iii) Acceptable trade waste.

_____

_____

(1 mark) ☐

(b) List FOUR waste products that would be classed as prohibited trade waste.

1 _____

2 _____

3 _____

4 _____

(4 marks) ☐

QUESTION 3 (cont'd)

(c) A system for the disposal of trade waste is to be designed.

The waste is not hazardous, but is not permitted to be discharged directly to a sewer.

Give the TWO acceptable options for disposal of the waste.

1 _____

2 _____

(2 marks)

(d) Name TWO clauses of the New Zealand Building Code with which systems designed for collecting hazardous industrial liquid waste must comply.

1 _____

2 _____

(2 marks)

(e) Name the type of trap that must be included in the foul water drainage design if the industrial liquid waste is flammable.

_____

(1 mark)

Total 12 marks

INTENTIONALLY BLANK

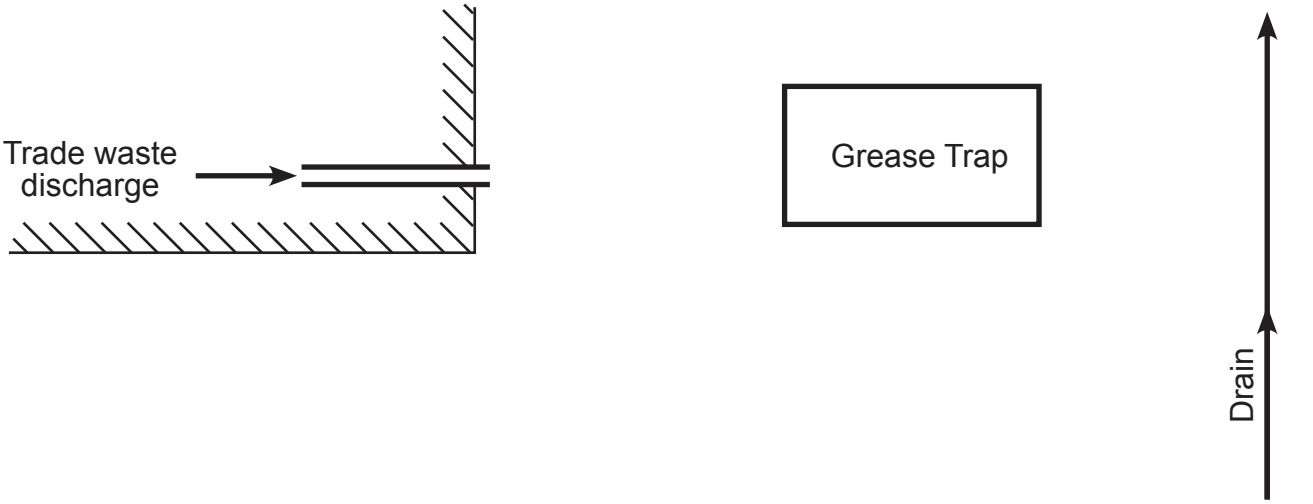
QUESTION 4

(a) Complete the starter drawing below to show a two-chamber grease trap, and label the main components.

(4 marks)

(b) The drawing below shows the plan of a grease trap installation.

Complete the drawing so that the installation complies with the New Zealand Building Code clause G13 Foul Water.



(4 marks)

(c) State how the minimum size of a grease trap used for a cafe is determined.

(2 marks)

Total 10 marks

INTENTIONALLY BLANK

QUESTION 5

(a) Name FOUR hazards that may affect breathing when excavating or laying a drain.

1 _____

2 _____

3 _____

4 _____

(2 marks)

(b) Other than hazards which may affect breathing, give THREE other hazards that may be present when working in an excavation.

1 _____

2 _____

3 _____

(3 marks)

(c) 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)

Total 9 marks

INTENTIONALLY BLANK

QUESTION 6

(a) A drainlayer is going to enter an access chamber on a surface water drain.

Give FOUR conditions that should be checked before the drainlayer enters the access chamber.

1 _____

2 _____

3 _____

4 _____

(4 marks)

(b) Give TWO safety measures that must be provided before the drainlayer enters the access chamber.

1 _____

2 _____

(2 marks)

(c) Give FOUR actions that should be taken to clean and store equipment that has been used to clear a blocked drain in order to reduce the risk of illness from exposure to foul water.

1 _____

2 _____

3 _____

4 _____

(2 marks)

Total 8 marks

INTENTIONALLY BLANK

QUESTION 7

(a) Name THREE methods that may be used to provide oxygen to aerobic bacteria within an aerated waste water system, and briefly explain how each method works.

1 _____

_____

2 _____

_____

3 _____

_____

(6 marks)

(b) Give THREE advantages of an aerated sewage treatment system compared with a septic tank installation.

1 _____

_____

2 _____

_____

3 _____

_____

(3 marks)

(c) Give THREE disadvantages an aerated system has compared with a septic tank installation.

1 _____

_____

2 _____

_____

3 _____

_____

(3 marks)

Total 12 marks

INTENTIONALLY BLANK

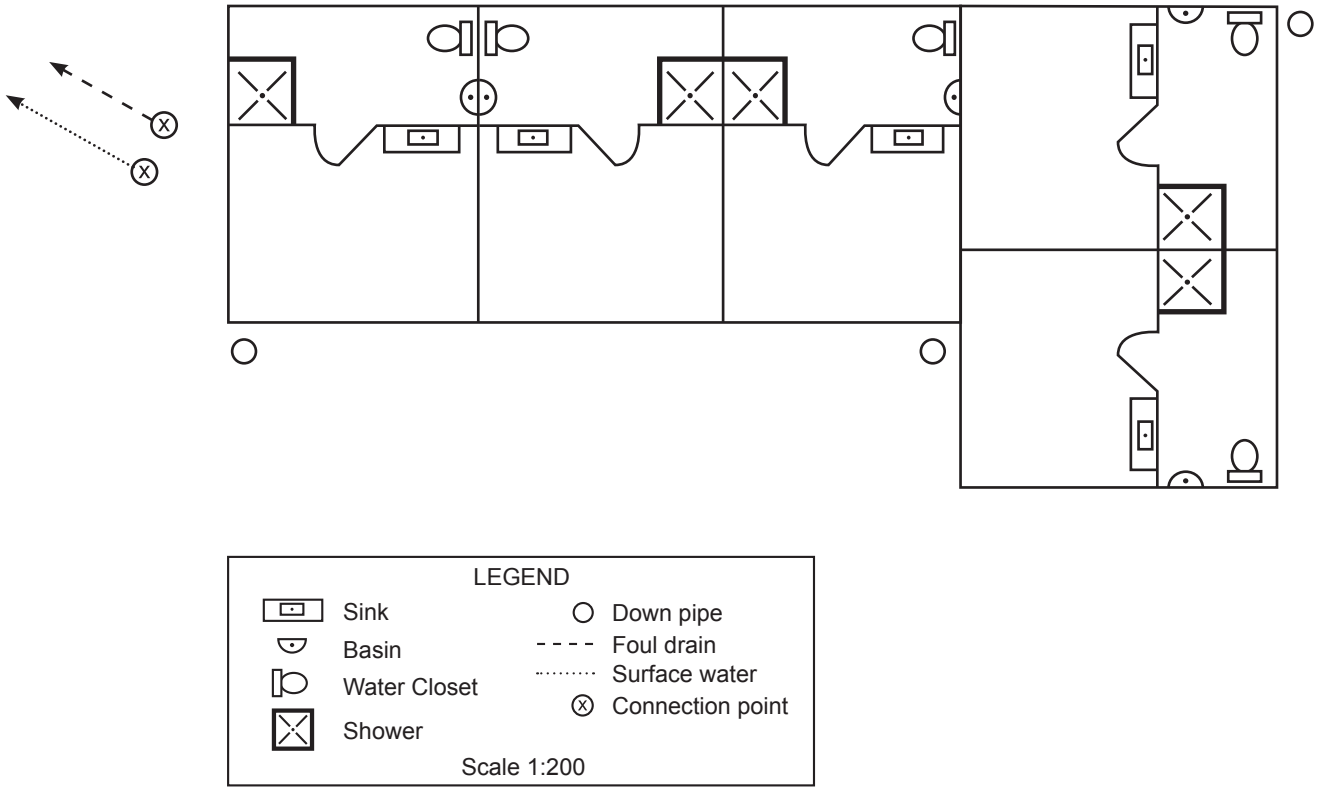
QUESTION 8

(a) The diagram below shows a plan view of a motel block with three separate units, drawn to a scale of 1:200. The connection points for the surface water and foul water drain are also shown.

On the diagram, draw and label an economical drainage plan that complies with New Zealand Building Code acceptable solutions G13/AS2 Foul Water and E1/AS1 Surface Water.

All drainage is to be exterior to the building.

(8 marks)



(b) The invert level at the head of the foul water drain in (a) is 500 mm below the finished floor level, and the drain is to be laid at a gradient of 1:60.

Calculate the depth below the finished floor level of the foul water connection point X.

(3 marks)

Total 11 marks

QUESTION 9

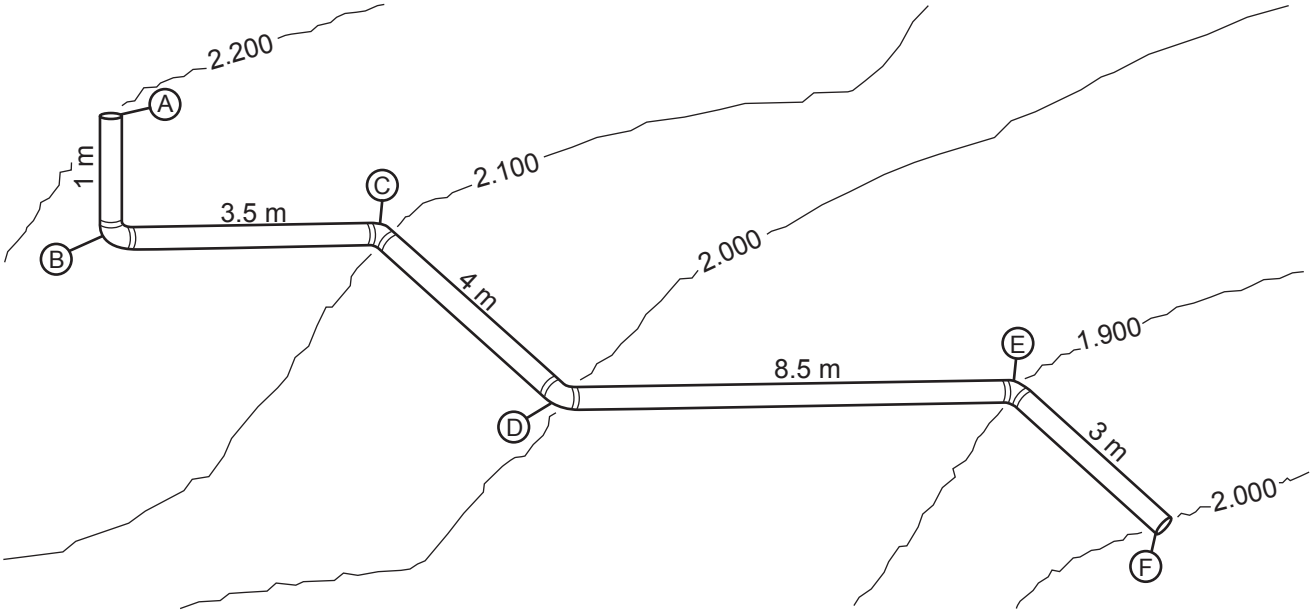
The drawing below (not to scale) shows a newly laid drain and contour lines on a site.

The surface water drain connects to the dwelling at point A and to the network utility operator's (NUO) system at point F.

The drain at point A is at ground level.

Section A – B of the drain is vertical.

The remaining sections of the drain have been laid at 1:60 (1.65%).



(a) Complete the following tables to show the fall for each section listed and the depth below the ground level for the excavation at points C, D, E and F.

Section	Fall (mm)
B – C	
C – D	
D – E	
E – F	

Point	Depth (mm)
A	**Ground Level**
C	
D	
E	
F	

(8 marks)

QUESTION 9 (cont'd)

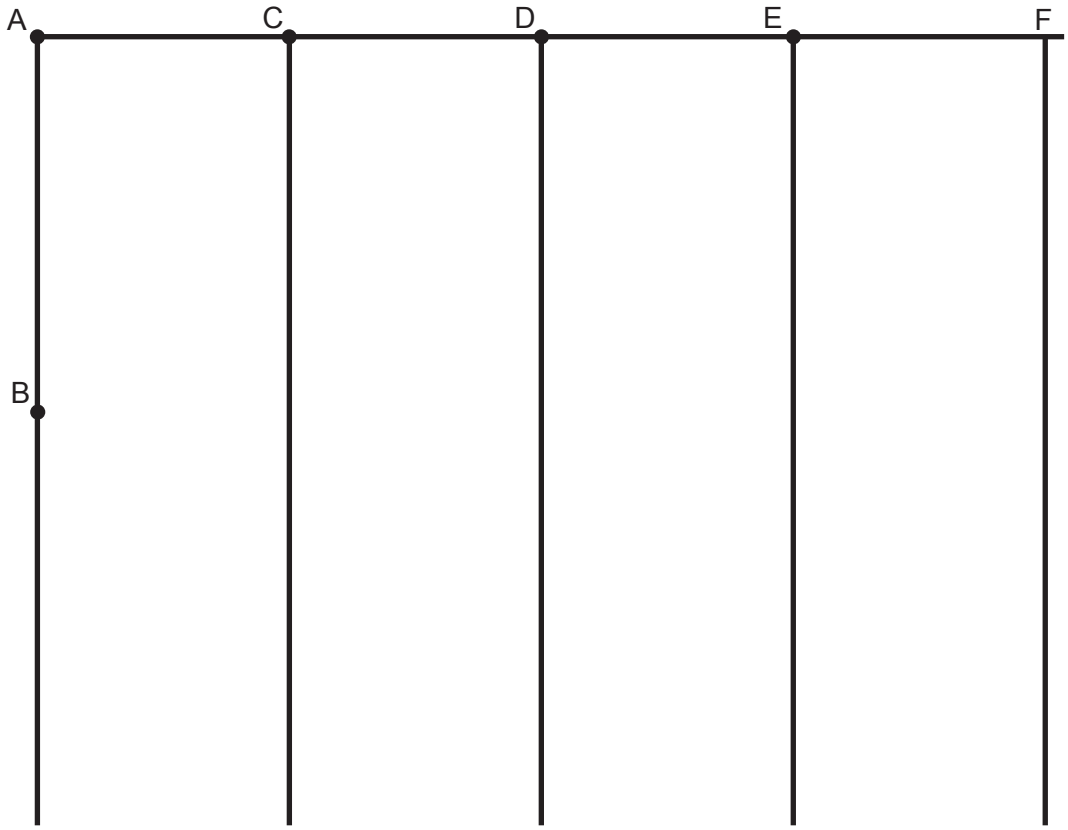
(b) On the chart below show the following information.

(i) The ground levels.

(ii) The depth of the drain invert below the datum.

(iii) The depth of the drain invert below the ground.

The scale for the depths is to be 1:20



(3 marks)

Total 11 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. A pipe has been laid at a gradient of 1:40 (2.50%).

   How much will the pipe fall over a 7 metre run?

   A 70 mm.

   B 175 mm.

   C 280 mm.

   D 1750 mm.

   E 2800 mm.

   ☐

2. A trench is to be dug in line with the footings of a building and will be 2 metres deeper than the footings.

   The trench is expected to be open for 36 hours.

   How far away from the base of the footings must the trench be?

   A 0.5 m.

   B 1.0 m.

   C 1.5 m.

   D 2.0 m.

   E 2.5 m.

   ☐

3. Which of the following must receive a completed Particular Hazardous Work form before the work is started?

   A The local territorial authority.

   B WorkSafe New Zealand.

   C The Plumbers, Gasfitters and Drainlayers Board.

   D The health and safety representative for the site.

   E The regional health and safety inspector.

   ☐

4. There is a gas that occurs in the ground and naturally 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.

   ☐

5. A drain is serving a vertical discharge stack on a three-level building.

   A gully dish is required to be connected to the drain downstream of the base of the discharge stack.

   How close to the base of the discharge stack is the junction for the gully trap permitted to be?

   A 0.500 m.

   B 1.000 m.

   C 1.500 m.

   D 2.000 m.

   E 2.500 m.

   ☐

6. What is the maximum permitted head at the lower end of the pipeline during a water test carried out to comply with New Zealand Building Code verification method E1/VM1 Surface Water?

   A 1.2 m.

   B 2.0 m.

   C 3.0 m.

   D 6.0 m.

   E 10.0 m.

   ☐

7. A rectangular chamber must provide 8 m^3 of storage volume. The area available to construct the chamber measures 3.1 m × 1.8 m.

   What minimum depth will the chamber need to have?

   A 1.43 m.

   B 1.72 m.

   C 1.85 m.

   D 2.58 m.

   E 4.90 m.

   ☐

8. A surface water drain is to be water tested to comply with New Zealand Building Code verification method E1/VM1 Surface Water.

   What is the required length of time for the test?

   A 5 minutes.

   B 15 minutes.

   C 30 minutes.

   D 45 minutes.

   E 60 minutes.

   ☐

9. 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.

   ☐

10. Which of the following effluent disposal options is NOT suitable for use with a single-chamber septic tank treatment system?

A Gravity soakage trenches.

B Soak pit system.

C Sand (Wisconsin) mounds.

D Low pressure (dose loading) effluent distribution.

E Drip line irrigation system.

☐

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 _____

For Examiner's use only

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