

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 2016

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 18–21 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 2016 were provided with the following documents:

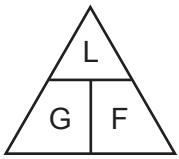
- New Zealand Building Code Clause G13 – Foul Water
- AS/NZS 3500 Part 2: Sanitary plumbing and drainage

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 = $0.7854 \times D^2$

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) Explain how a drainlaying detention system operates.

(2 marks)

(b) Explain why detention of surface water may be required.

(1 mark)

(c) Give TWO types of surface water detention systems.

1

2

(2 marks)

(d) Describe the operation of a foul water detention system.

(3 marks)

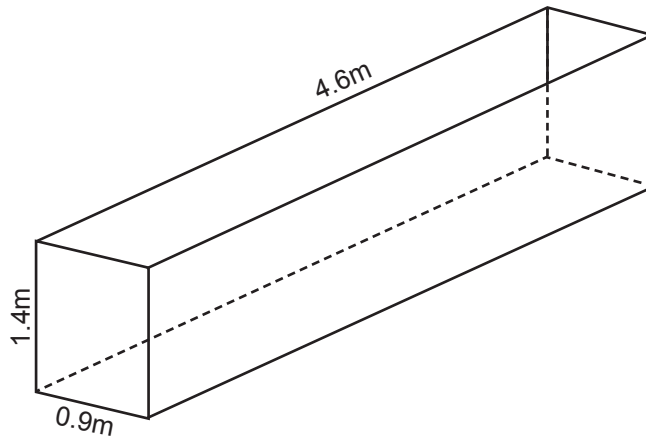
Total 8 marks

QUESTION 2

- (a) The excavation shown below is 4.75 m long, 0.9 m wide and 1.4 m deep. The excavation is $\frac{2}{3}$ full of water.

A dewatering pump has a discharge rate of 400 litres/ minute.

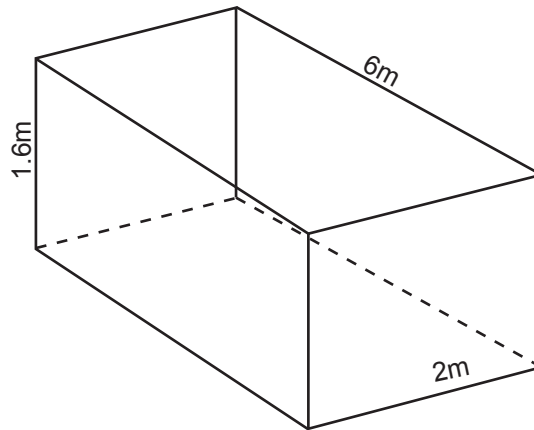
Calculate the time required to dewater the excavation using the pump.



(4 marks)

QUESTION 2 (cont'd)

(b) A sand filter is shown in the diagram below. The filter is 6 m long, 2 m wide and 1.6 m deep.



(i) Calculate the quantity of coarse sand that is needed to fill 60% of the filter.

(ii) Calculate the quantity of fine sand that is needed to fill the remainder of the filter.

(3 marks)

(c) Water has to be taken by truck to test a 100 mm diameter drain that is 50 m long.

Calculate the volume and weight of water required to test the drain.

Allow 10% for spillage and losses.

(5 marks)

Total 12 marks

QUESTION 3

(a) Describe the safety precaution that should be taken immediately prior to commencing a drainlaying rescue operation.

(1 mark)

(b) Give TWO drainage-related accidents where resuscitation (rescue breathing) may be required.

1 _____

2 _____

(1 mark)

(c) Name FOUR hazards that may affect breathing when excavating or laying drains.

1 _____

2 _____

3 _____

4 _____

(2 marks)

(d) State the accepted minimum content of oxygen in air for a safe environment.

(1 mark)

QUESTION 3 (cont'd)

(e) Give EIGHT items of safety equipment in addition to personal protection equipment that may be required in a drainage excavation.

- 1 _____
- 2 _____
- 3 _____
- 4 _____
- 5 _____
- 6 _____
- 7 _____
- 8 _____

(4 marks)

(f) A drainlayer reports to a certifying drainlayer that an unlabelled orange pipe and a second unidentified pipe have been uncovered while an excavation was being dug. The drainlayer asks for advice on the actions to take.

Give the TWO actions the certifying drainlayer should advise the drainlayer to take.

- 1 _____

- 2 _____

(2 marks)

Total 11 marks

QUESTION 4

- (a) The plan opposite (not to scale) shows a building and contour lines on a site. The surface water drain connecting the dwelling to the network utility operator’s (NUO) system is also shown.

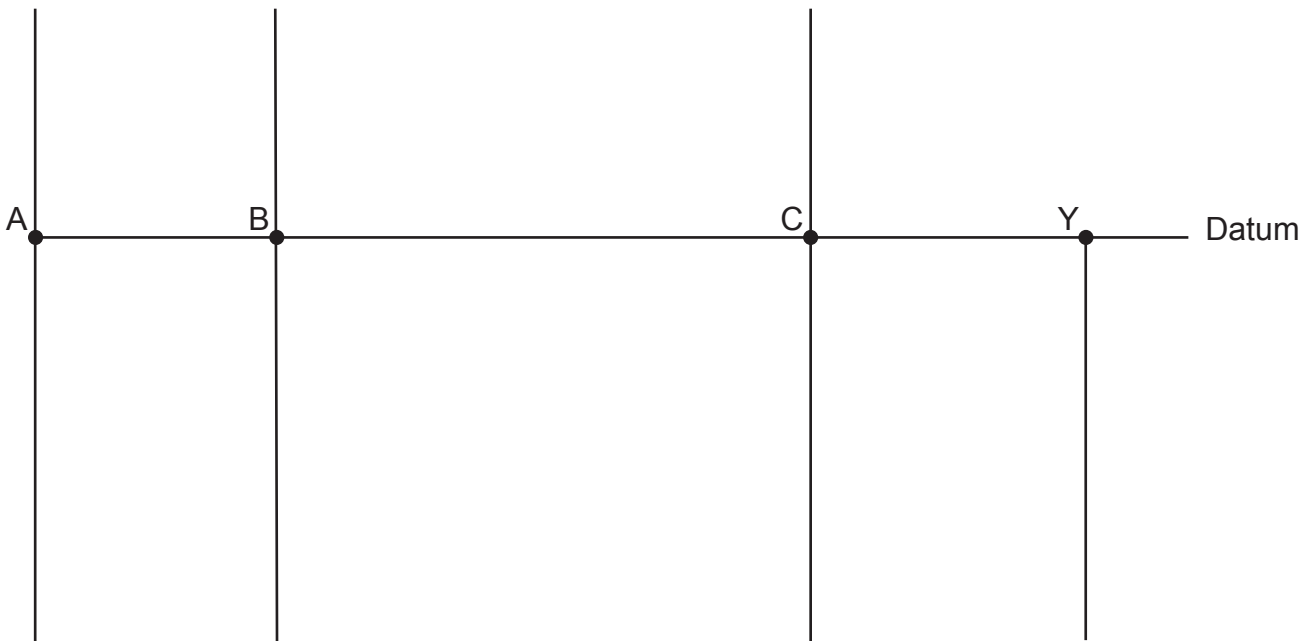
The invert for the NUO’s connection at Y is 0.9 metres below ground level.

The gradient of the drain is 1:50 and the distances between the points are as shown in the table below.

Length of pipe sections	
Pipe section	Distance
A - B	5 metres
B - C	13 metres
C - Y	6 metres

On the chart below show the following information using a scale of 1:20 for the vertical distances.

- (i) The ground levels.
- (ii) The depth of the drain invert below the datum.
- (iii) The depth of the drain invert below the ground.

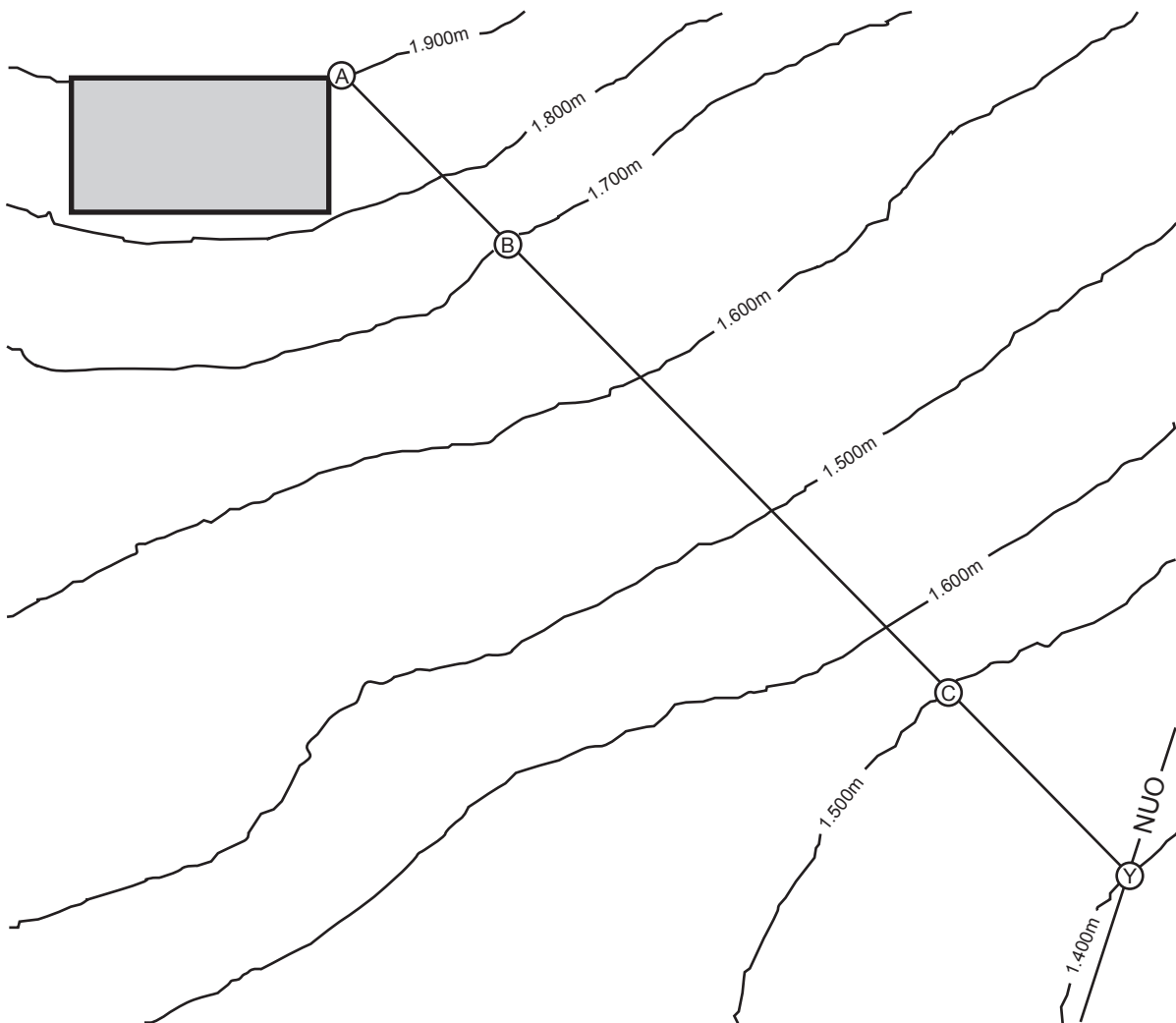


(12 marks)

QUESTION 4 (cont'd)

- (b) State the grade of the drain if the invert of the drain at point C was changed to 500 mm below ground level.

(3 marks)



Total 15 marks

QUESTION 5

The surface water drain from a property is lower than the local Territorial Authority's (TA) connection point.

Name THREE suitable options that could be used to adequately dispose of the surface water from the property, and for each describe a situation in which that option would be most appropriate.

1 Name _____

Situation _____

2 Name _____

Situation _____

3 Name _____

Situation _____

Total 9 marks

QUESTION 6

(a) Define secondary flow path as it applies to drainlaying.

(1 mark)

(b) State the purpose of a secondary flow path.

(1 mark)

(c) List FOUR factors that may have an effect on a secondary flow path.

- 1

- 2

- 3

- 4

(4 marks)

Total 6 marks

QUESTION 7

Give SIX examples of drainlaying work that is Notifiable Work.

- 1 _____
- 2 _____
- 3 _____
- 4 _____
- 5 _____
- 6 _____

Total 3 marks

QUESTION 8

- (a) Give the situation in which an above-ground evapotranspiration effluent disposal system would be required to be installed.

(1 mark)

- (b) Draw and label a cross-sectional view showing the construction of an above-ground evapotranspiration effluent disposal system.

(5 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 9 marks

QUESTION 9

The diagram on the opposite page shows the floor plan of an ablution block, with the layout of the sanitary fixtures shown.

The plan also shows the proposed location of the effluent field for the waste from the ablution block.

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

All drainage is to be outside the building foundations.

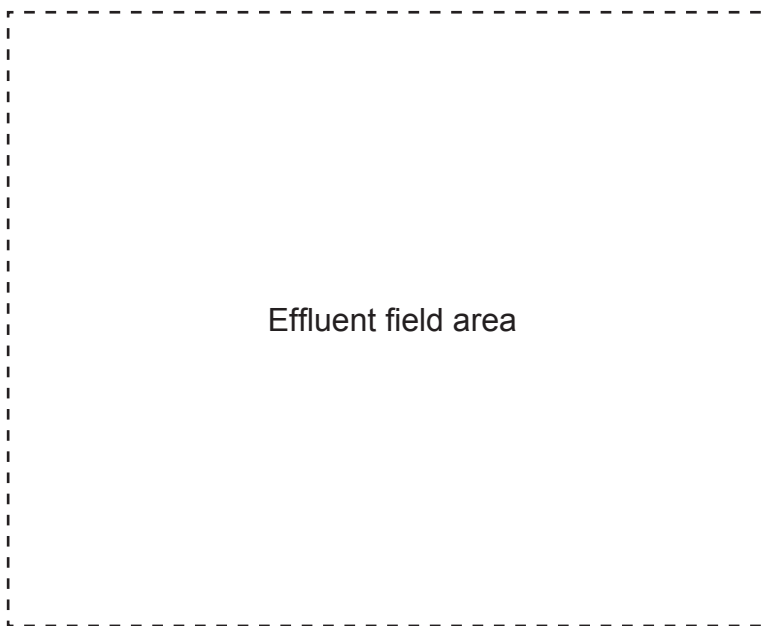
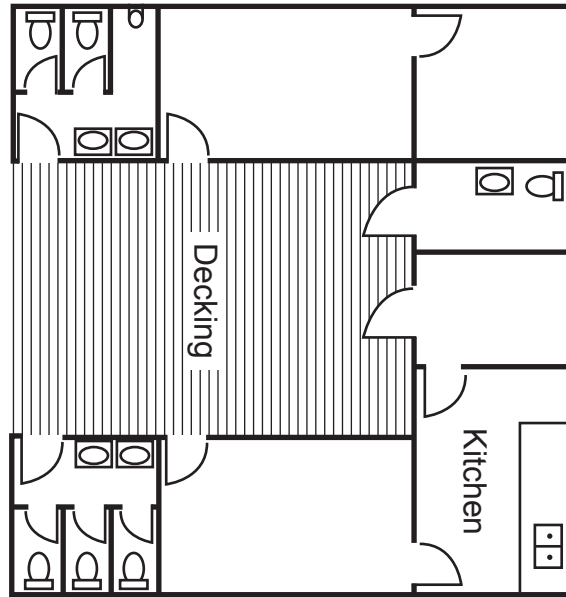
Complete the site plan to show suitable foul water pipework to convey waste to the effluent field.

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

Show the location of any necessary inspection openings and the on-site sewage treatment system.

Total 10 marks

QUESTION 9 (cont'd)



QUESTION 10

(a) List EIGHT waste products that would be classed as industrial liquid waste.

- 1 _____
- 2 _____
- 3 _____
- 4 _____
- 5 _____
- 6 _____
- 7 _____
- 8 _____

(4 marks)

(b) Name THREE methods by which industrial liquid waste can be treated prior to discharge to an outfall.

- 1 _____
- 2 _____
- 3 _____

(3 marks)

Total 7 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 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 discharge stack connection.

How close to the discharge stack connection 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.

2. Which of the following effluent disposal options is NOT suitable for use with a 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.

3. According to New Zealand Building Code clause G13/AS2 Foul Water, verifiable levelling devices must be used to ensure uniform gradients of drains laid at gradients in what range?

- A 1 in 40 or less.
- B 1 in 60 or less.
- C 1 in 80 or less.
- D 1 in 100 or less.
- E 1 in 120 or less.

4. According to the Health and Safety at Work Act, who has a duty to ensure the health and safety of all people on a work site?
- A The PCBU.
 - B The health and safety representative.
 - C The owner of the property.
 - D The workers.
 - E The Ministry of Business, Innovation and Employment.
-
5. 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 breaking down of the effluent by bacteria to make a clearer liquid.
 - E The sludge, scum and effluent separating while in the septic tank.
-
6. Which of the following is NOT an acceptable reason to disturb the scene of an accident that has resulted in serious harm?
- A To recover valuable plant and equipment from the site.
 - B To save a life.
 - C To prevent suffering of an injured person.
 - D To maintain public access to services (e.g. gas and electricity).
 - E To prevent serious damage to property.
-
7. 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 1.75 m.
 - E 2.8 mm.
-

8. The sides of a trench have been cut back to a safe slope.

What is the minimum distance from the top edge of the trench that any vehicles should be permitted to drive?

- A 600 mm.
- B 750 mm.
- C 800 mm.
- D 900 mm.
- E 1000 mm.

9. A certifying drainlayer has employed a trainee who now holds a limited certificate.

For what length of time must the trainee work in the presence of the certifying drainlayer?

- A 6 months.
- B 12 months.
- C 24 months.
- D 36 months.
- E Until such time as the trainee achieves registration.

10. Drainlayer A has asked Drainlayer B if a licensed drainlayer under his supervision could assist him to complete drainlaying work.

Who is responsible for ensuring that the licensed drainlayer completes the proposed work competently?

- A Drainlayer A.
- B Drainlayer B.
- C The licensed drainlayer.
- D The Department of Labour.
- E WorkSafe New Zealand.

Total 10 marks

For Examiner's use only

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