

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

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No. 9197



Plumbers,
Gasfitters and
Drainlayers Board

REGISTRATION EXAMINATION, NOVEMBER 2015

LICENSED 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 19–21 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 2015 were provided with the following documents:

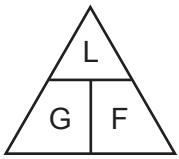
- New Zealand Building Code Clause G13 – Foul Water
- AS/NZS 3500 Part 2: Sanitary plumbing and drainage

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) Give the name used to describe sewage that has been treated by a septic tank.

(1 mark)

(b) State THREE ways that micro-organisms found in sewage may enter the body.

1 _____

2 _____

3 _____

(3 marks)

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

1 _____

2 _____

3 _____

(3 marks)

(d) List THREE precautions that should be taken to lessen the risk of contact with micro-organisms while working with raw sewage.

1 _____

2 _____

3 _____

(3 marks)

(e) Give THREE actions that should be taken with regard to hygiene after working with raw sewage.

1 _____

2 _____

3 _____

(3 marks)

Total 13 marks

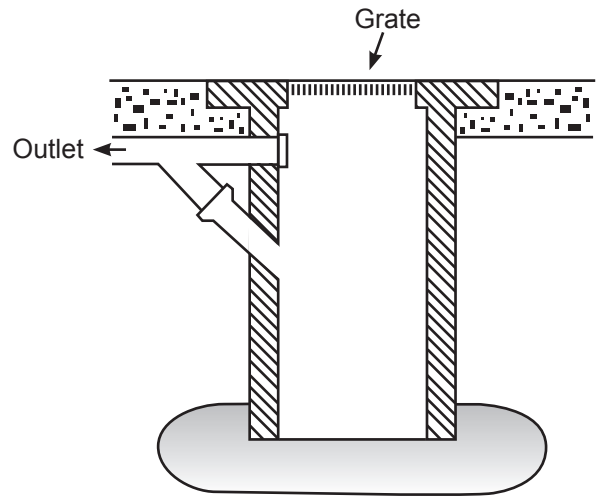
QUESTION 2

Name the structure shown in each of the following diagrams, state its function and give a situation where it would be required.

(a) Name _____

Function _____

Situation _____

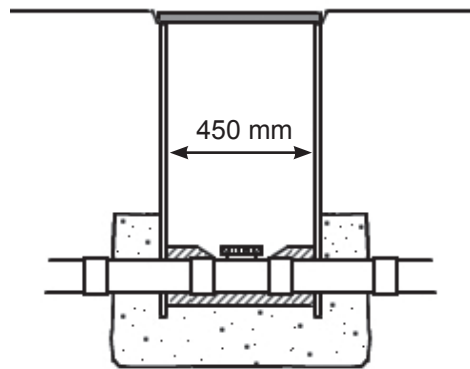


(3 marks)

(b) Name _____

Function _____

Situation _____



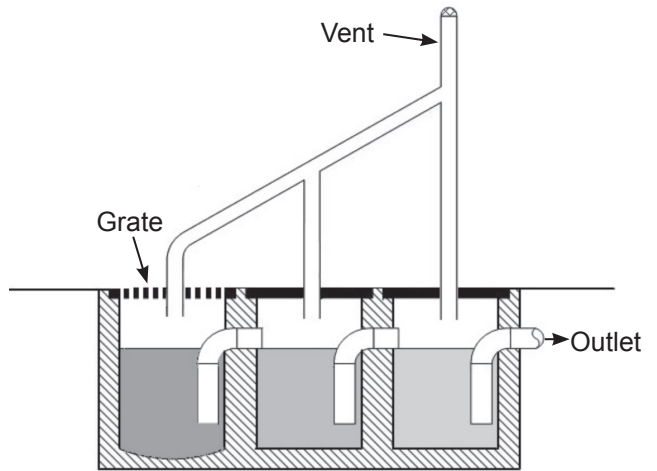
(3 marks)

QUESTION 2 (cont'd)

(c) Name _____

 Function _____

 Situation _____

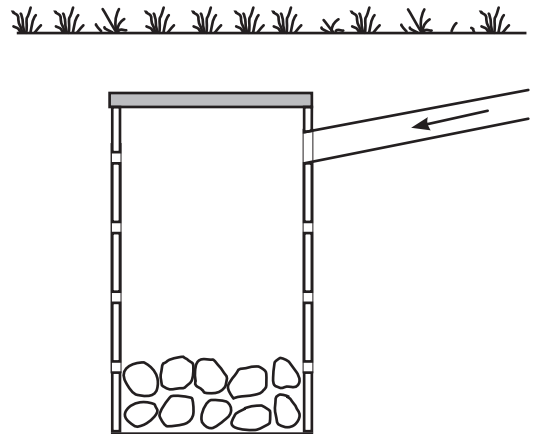


(3 marks)

(d) Name _____

 Function _____

 Situation _____



(3 marks)

Total 12 marks

QUESTION 3

(a) Briefly explain the purpose of a reflux valve as it relates to drainlaying.

(1 mark)

(b) Describe THREE situations that would make the installation of a reflux valve necessary.

1

2

3

(3 marks)

(c) Explain why a drain must be laid on a stable base.

(1 mark)

(d) Describe TWO faults that may occur when a drain is not correctly back-filled.

1

2

(2 marks)

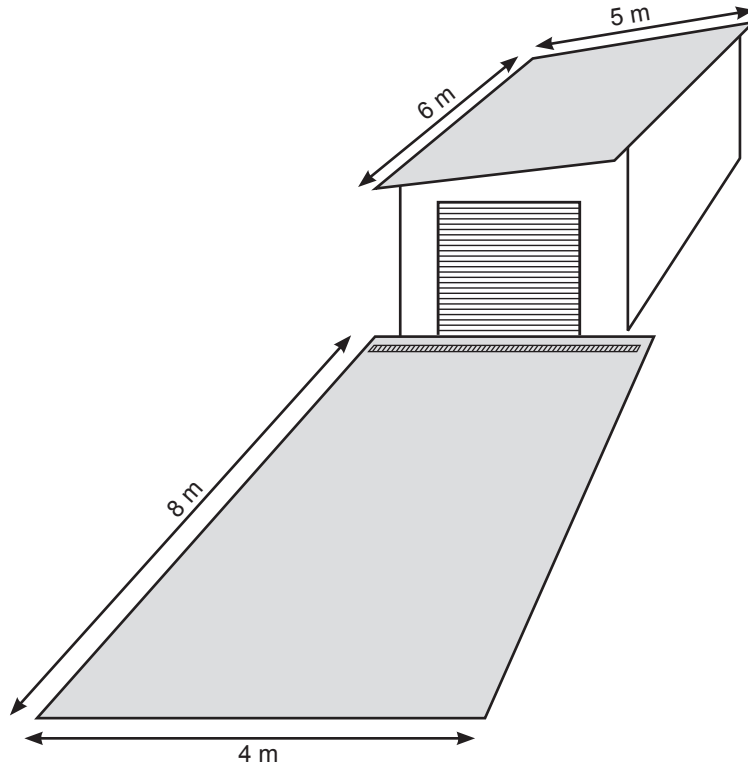
Total 7 marks

QUESTION 4

(a) The diagram below shows a garage and driveway.

Using a rainfall intensity of 85 mm/h, calculate the rainfall volume per hour.

Formula: Volume per hour = Area \times Rainfall intensity



(4 marks)

(b) Convert the volume calculated to litres.

(1 mark)

Total 5 marks

QUESTION 5

(a) Name THREE tools that can be used to locate a buried drain pipe before starting an excavation.

- 1 _____
- 2 _____
- 3 _____

(3 marks)

(b) Give TWO factors that should be considered when setting up a laser level on a worksite.

- 1 _____
- 2 _____

(2 marks)

(c) Name FOUR acceptable pipe materials that can be used to convey foul water according to New Zealand Building Code clause G13/AS2 Foul Water.

- 1 _____
- 2 _____
- 3 _____
- 4 _____

(2 marks)

(d) Give THREE situations where a flexible joint must be installed on a drainage system.

- 1 _____
- 2 _____
- 3 _____

(3 marks)

QUESTION 5 (cont'd)

(e) Sketch and label a diagram showing a flexible joint on a drainage system.

(2 marks)

Total 12 marks

QUESTION 6

(a) List the FIVE steps that must be taken when water testing a surface water drain constructed from concrete pipes.

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

(5 marks)

(b) Describe when the installation of a bubble-up chamber is required.

(2 marks)

(c) Sketch a cross-sectional diagram of a bubble-up chamber and show the direction of flow through the chamber.

(4 marks)

Total 11 marks

QUESTION 7

A trench 1800 mm deep is to be excavated for laying a drainage system.

The excavated spoil is to be placed beside the trench.

(a) A safety checklist is to be prepared regarding the excavated spoil.

List THREE items the checklist should include.

- 1 _____
- 2 _____
- 3 _____

(3 marks)

(b) Give THREE safety measures to be taken regarding worker access to the trench.

- 1 _____
- 2 _____
- 3 _____

(3 marks)

(c) Give THREE measures that should be taken to prevent persons falling into the trench during the hours of darkness.

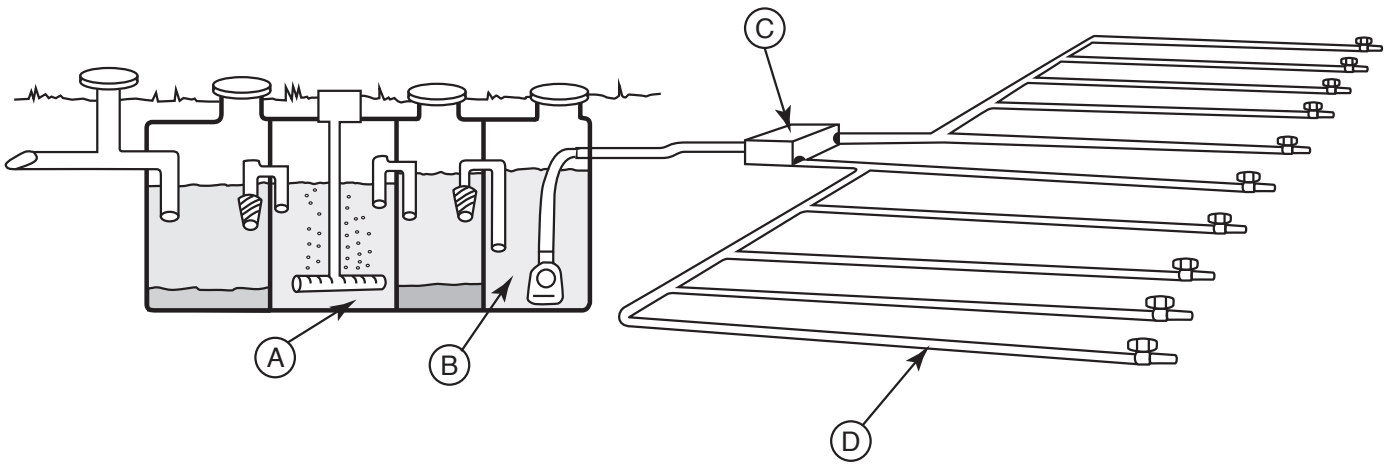
- 1 _____
- 2 _____
- 3 _____

(3 marks)

Total 9 marks

QUESTION 8

The following diagram shows a domestic sewage treatment system and its main components.



Name each component labelled A – D, and state its purpose.

(A) Name: _____
Purpose: _____

(2 marks)

(B) Name: _____
Purpose: _____

(2 marks)

QUESTION 8 (cont'd)

Ⓒ Name: _____

Purpose: _____

(2 marks)

Ⓓ Name: _____

Purpose: _____

(2 marks)

Total 8 marks

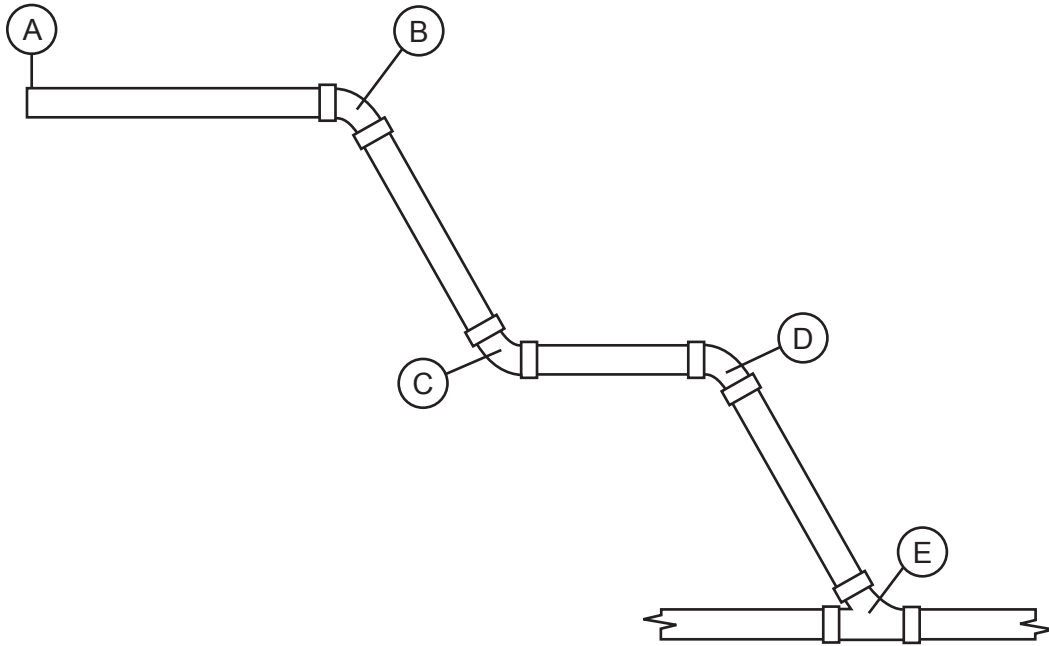
Total 7 marks

QUESTION 10

The diagram below shows a plan view indicating changes of direction for a drain.

The drain invert at peg A is 400 mm below the datum.

The drain has been laid at a gradient of 1:80 (1.25%).



Plan not to scale

(a) Complete the following table to show the fall of the drain for each given section.

Section	Length	Fall in mm
A – B	6 metres	
B – C	10 metres	
C – D	20 metres	
D – E	15 metres	

(2 marks)

QUESTION 10 (cont'd)

(b) Complete the following table to show the depth below the datum at points B, C, D and E.

Point	Depth in mm
A	400
B	
C	
D	
E	

(4 marks)

Total 6 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. According to the New Zealand Building Code clause G13/AS2 Foul Water, what is the minimum clear access space permitted above a gully dish?

- A 200 mm.
- B 300 mm.
- C 400 mm.
- D 500 mm.
- E 600 mm.

2. According to the New Zealand Building Code clause G13/AS2 Foul Water, what is the maximum fixture unit loading for a 100 mm vented drain that has been laid at a gradient of 1.65%?

- A 125
- B 145
- C 175
- D 205
- E 225

3. According to the New Zealand Building Code clause G13/AS2 Foul Water, what is the minimum gradient permitted for a 150 mm diameter drain that is conveying 780 discharge units?

- A 1:20
- B 1:40
- C 1:60
- D 1:80
- E 1:100

4. What is the minimum allowable diameter of an inspection shaft installed on a 300 mm drain?
- A 100 mm.
 - B 150 mm.
 - C 200 mm.
 - D 250 mm.
 - E 300 mm.
-

5. What is the maximum diameter for gravity flow foul water drains covered under the scope of the New Zealand Building Code clause G13/AS2 Foul Water?
- A 150 mm.
 - B 200 mm.
 - C 250 mm.
 - D 300 mm.
 - E 350 mm.
-

6. According to the New Zealand Building Code clause G13/AS2 Foul Water, what is the minimum capacity a grease trap is permitted to have?
- A 50 litres.
 - B 75 litres.
 - C 100 litres.
 - D 200 litres.
 - E 250 litres.
-

7. According to AS/NZS 3500 Part 2: Sanitary plumbing and drainage, what is the maximum number of discharge units permitted to be carried by a 100 mm unvented branch drain?
- A 20
 - B 25
 - C 30
 - D 40
 - E 45
-

8. According to AS/NZS 3500 Part 2: Sanitary plumbing and drainage, what is the maximum number of WC pans permitted to be installed on an unvented branch drain?

A 1

B 2

C 3

D 4

E 5

9. An access point is not required on a branch drain which serves a gully trap only and is less than what length?

A 2 m.

B 4 m.

C 6 m.

D 8 m.

E 10 m.

10. According to the New Zealand Building Code clause G13/AS2 Foul Water, the angle that a branch makes at the point of entry to a main drain should not be greater than which of the following?

A 30°

B 45°

C 60°

D 88°

E 90°

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		