

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, JUNE 2014 **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 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 25 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 June 2014 were provided with the following documents:

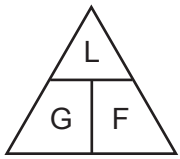
- AS/NZS 3500 Part 2: Sanitary plumbing and drainage
- New Zealand Building Code Clause G13 Foul Water

## 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

(a) State what a penetrometer is used for.

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(1 mark)

(b) Describe how a penetrometer is operated.

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(2 marks)

**Total 3 marks**

## QUESTION 2

Give the name and number of THREE New Zealand Building Code clauses contained in the New Zealand Building Code that relate to drainlaying.

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

Total 3 marks

**QUESTION 3**

(a) Describe what occurs to the pipe material when joining uPVC pipes by solvent welding.

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(2 marks)

(b) Give FOUR factors that can reduce the flow of foul water in a straight section of pipe.

1 

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2 

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3 

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4 

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(2 marks)

**Total 4 marks**

#### QUESTION 4

Complete the table below with respect to New Zealand Building Code clause G13/AS2:  
Foul Water and AS/NZS 3500 Part 2: Sanitary plumbing and drainage.

	NZBC G13/AS2	AS/NZS 3500
Minimum cover over a drain under a driveway		
Maximum depth of a gully trap		
Minimum gradient of a 100 mm drain		
Minimum gradient of 150 mm drain		
Maximum length of a branch drain without a drain vent		
Maximum length of a branch drain to a gully without a vent		
Minimum diameter for a drain		

Total 7 marks

## QUESTION 5

(a) State the purpose of a thrust block.

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(1 mark)

(b) State where a thrust block should be installed.

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(1 mark)

**Total 2 marks**



**QUESTION 6**

(a) Explain the purpose of a duplex pump system.

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(1 mark)

(b) (i) Give the purpose of a float switch alarm in a duplex pump system.

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(1 mark)

(ii) Give TWO situations in which the alarm in a duplex pump system will activate.

1 \_\_\_\_\_

2 \_\_\_\_\_

(2 marks)

(iii) Give TWO ways in which an alarm can be given.

1 \_\_\_\_\_

2 \_\_\_\_\_

(1 mark)

(c) State when a pumped system would be required in a stormwater drainage system.

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(1 mark)

**QUESTION 6 (cont'd)**

(d) Sketch a diagram of a jump-up installed outside an access chamber. Label the main components.

(4 marks)

(e) State TWO purposes of a corbel on a concrete access chamber.

1 \_\_\_\_\_

2 \_\_\_\_\_

(2 marks)

**Total 12 marks**

**QUESTION 7**

(a) State the purpose of a trade waste interceptor trap.

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(1 mark)

(b) List THREE different types of prohibited trade waste.

1 

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2 

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3 

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(3 marks)

**Total 4 marks**

**QUESTION 8**

(a) Give THREE acceptable methods for testing a stormwater drain for water tightness before backfilling.

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

(3 marks)

(b) Give TWO reasons why a foul water drain must be proven water tight before being backfilled.

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

(1 mark)

**Total 4 marks**

**QUESTION 9**

(a) Describe the term infiltration in relation to a drain.

\_\_\_\_\_

(1 mark)

(b) List TWO different situations which could cause infiltration of a drain.

1 \_\_\_\_\_

2 \_\_\_\_\_

(2 marks)

(c) (i) State the purpose of contour lines on a site plan.

\_\_\_\_\_

(1 mark)

(ii) If contour lines are close together, state what this indicates about the site.

\_\_\_\_\_

(1 mark)

(d) A trench is to be excavated to a depth of 2 m.

Give THREE methods that can be used to ensure the trench sides do not collapse.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

(3 marks)

**QUESTION 9 (cont'd)**

(e) List FOUR dangers of working in a trench where gas may be present.

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_

(4 marks)

(f) Give FOUR factors that increase the possibility of the collapse of an unprotected trench wall.

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_

(2 marks)

(g) List THREE visual indications that an unprotected trench wall may collapse.

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

(3 marks)

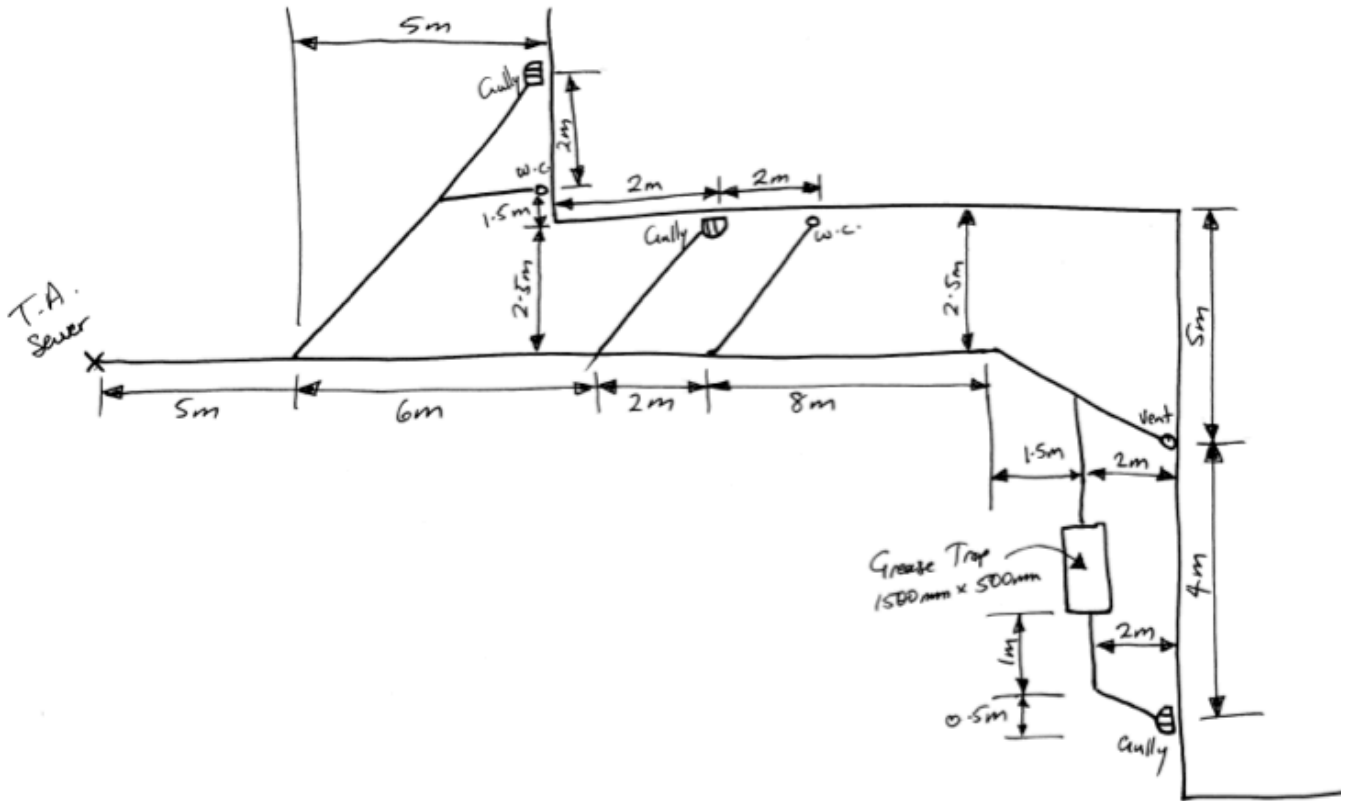
**Total 17 marks**

**QUESTION 10**

The sketch below shows a plan view of a foul water system installation.

On the opposite page, draw an as-built plan of the sketch using a scale of 1:100.

The territorial authority sewer connection X is shown as a start point.



Total 10 marks

**QUESTION 10 (cont'd)**

**X**

T.A. sewer connection



**QUESTION 11**

Describe, in order, the effect on the discharge as it passes through a grease trap.

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**Total 3 marks**

**QUESTION 12**

(a) A house is being built on a site with no sewer connection.

The section is too small to install a trench disposal field.

Give THREE alternative solutions that could be used to dispose of the foul water from the house.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

(3 marks)

(b) State the TWO pieces of information that need to be provided by a territorial authority about a sewer connection.

1 \_\_\_\_\_

2 \_\_\_\_\_

(2 marks)

**Total 5 marks**

### QUESTION 13

(a) Using the following values for length and gradient, calculate the fall for each.

(i) Length = 130 metres      Gradient = 1:20

Fall \_\_\_\_\_

(½ mark)

(ii) Length = 63 metres      Gradient = 10.85%

Fall \_\_\_\_\_

(½ mark)

(b) Using the following values for length and fall, calculate the gradient for each.

(i) Length = 74 metres      Fall = 0.68 m

Gradient \_\_\_\_\_

(½ mark)

(ii) Length = 22 metres      Fall = 0.42 metres

Gradient \_\_\_\_\_

(½ mark)

**QUESTION 13 (cont'd)**

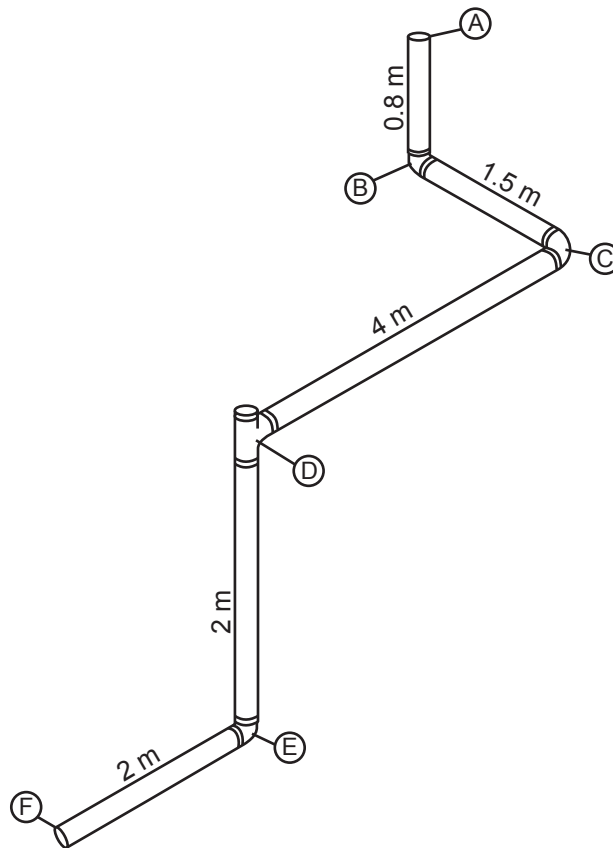
(c) The drawing below shows a newly laid drain on a level section.

The drain at point A is at ground level.

Two sections of the drain are vertical, section A – B and section D – E.

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

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



Section	Fall
B – C	
C – D	
D – E	
E – F	

Point	Depth
A	Ground Level
C	
D	
E	
F	

(6 marks)

**Total 8 marks**

**QUESTION 14**

(a) State what can be installed at the inlet to a culvert to help prevent blockages occurring.

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(1 mark)

(b) Describe how the answer to (a) should be positioned at the culvert inlet.

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(1 mark)

(c) Explain how the positioning in (b) assists in preventing blockages.

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(1 mark)

**Total 3 marks**

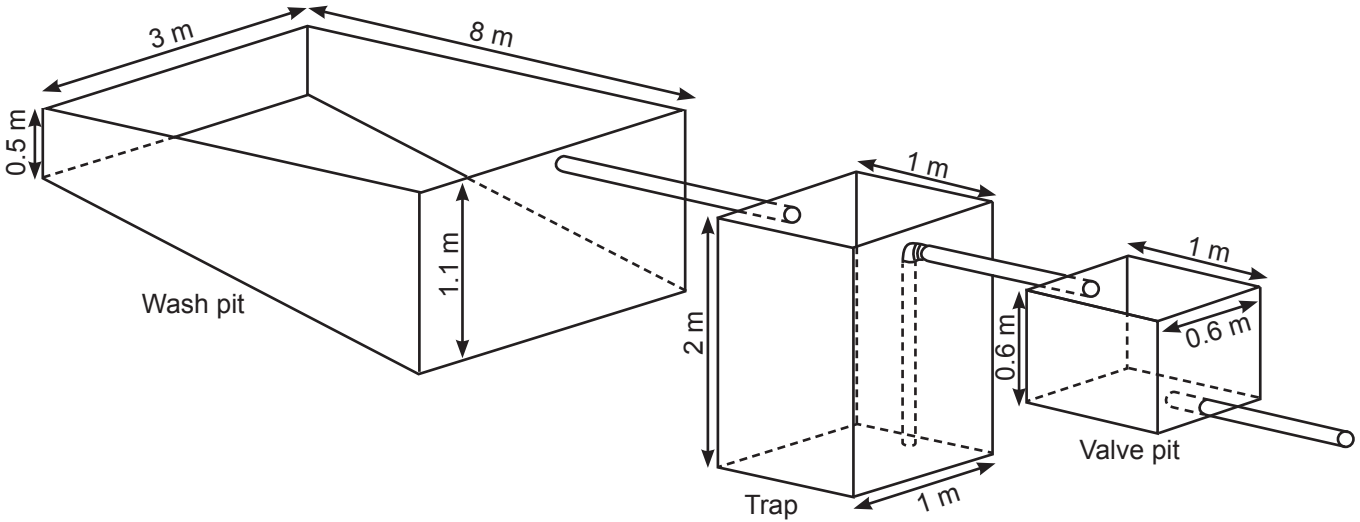
### QUESTION 15

The diagram below shows a three tank tractor wash pit.

Calculate the volume of spoil removed to accommodate the tanks.

Do not allow for the pipework volume.

Allow 20% bulking of the spoil.



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Total 5 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 in this section of the examination no marks will be awarded for that question.

1. AS/NZS 3500 Part 2: Sanitary plumbing and drainage states that excavated soil may be suitable as final backfill provided it is broken up into lumps not larger than what size?

- A 50 mm.
- B 75 mm.
- C 80 mm.
- D 100 mm.
- E 150 mm.

2. 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.

3. Which of the following describes the soffit of a pipe?

- A The top of the outside of a pipe.
- B The highest point of a pipe when it is on a grade.
- C The top of the inside of a pipe.
- D The highest point of a pipe when it is on a grade.
- E The lowest point inside a pipe.

4. What is the minimum allowable capacity of a grease trap that takes the discharge from a 30 seat cafe?

- A 100 litres.
- B 150 litres.
- C 250 litres.
- D 300 litres.
- E 350 litres.

5. What is the maximum angle permitted for a branch drain junction with the main drain in accordance with the New Zealand Building Code clause G13/AS2 Foul Water?

- A 15°
- B 22°
- C 45°
- D 60°
- E 88°

6. Which of the following fixtures is not permitted to discharge into a grey water sullage tank?

- A A bath.
- B A shower.
- C A washing machine.
- D A trapped floor waste.
- E A toilet.

7. At what length does a branch drain require a vent when installed to New Zealand Building Code clause G13/AS2 Foul Water?

- A 2.5 m.
- B 5.0 m.
- C 7.5 m.
- D 10.0 m.
- E 15.0 m.



8. According to the New Zealand Building Code clause G13/AS2 Foul Water, which of the following gives the maximum number of discharge units permitted to be conveyed by a 150 mm pipe laid at a gradient of 1:160?

- A 255
- B 320
- C 462
- D 598
- E 611

9. Which of the following is the definition of transpiration in relation to effluent disposal?

- A The separation of oxygen from effluent during the anaerobic cycle.
- B Liquid converting to gas below boiling point due to heat from the sun.
- C The process of water being absorbed into soil and evaporating due to the warmth of the ground.
- D Liquid being absorbed liquid through a plants root system and released as moisture through its leaves.
- E Evaporation of liquid due to gases being released during the stirring of sludge in a septic tank.

10. According to AS/NZS 3500 Part 2: Sanitary plumbing and drainage, when a concrete pad is used to support a drain it can be no closer than what distance from a flexible joint?

- A 20 mm.
- B 80 mm.
- C 100 mm.
- D 150 mm.
- E 200 mm.

**Total 10 marks**

For Examiner's use only

Question number	Marks	Marks
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Section B		
Total		