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 2017

TRADESMAN 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 June 2017 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

Water has to be supplied by trailer to test a drain of 100 mm diameter and 55 m developed length.

A 10% allowance is to be provided for spillage and losses.

Calculate in m^3 the volume of water required and its weight in kg.

Total 5 marks

QUESTION 2

(a) Explain the purpose of a neutralizing trap.

_____

_____

(2 marks) ☐

(b) Give THREE examples of industrial locations where a neutralizing trap would be required.

1 _____

2 _____

3 _____

(3 marks) ☐

Total 5 marks ☐

QUESTION 3

(a) A section of drain has begun to regularly block.

Give THREE possible causes of this.

1 _____

2 _____

3 _____

(3 marks)

(b) Sketch a diagram showing a trap connected to a section of drainage pipe.

Label the sketch to show the following:

- weir
- water seal depth
- soffit
- invert.

(5 marks)

Total 8 marks

QUESTION 4

(a) Describe the process that occurs in a septic tank's aerated chamber.

(3 marks)

(b) Give TWO factors that contribute to stratification/layering in a septic tank.

1

2

(2 marks)

(c) Name the THREE layers or zones that can be found in a septic tank.

1

2

3

(1 mark)

(d) Describe the process of transpiration in relation to an effluent disposal system.

(2 marks)

(e) Give THREE reasons why surface water should not be disposed of through a septic tank system.

1

2

3

(3 marks)

QUESTION 4 (cont'd)

(f) List SIX items that should not be flushed into an on-site sewage treatment system because they would disrupt the bacteria growth within it.

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

(3 marks)

(g) Give a reason why septic tanks are buried in the ground.

_____

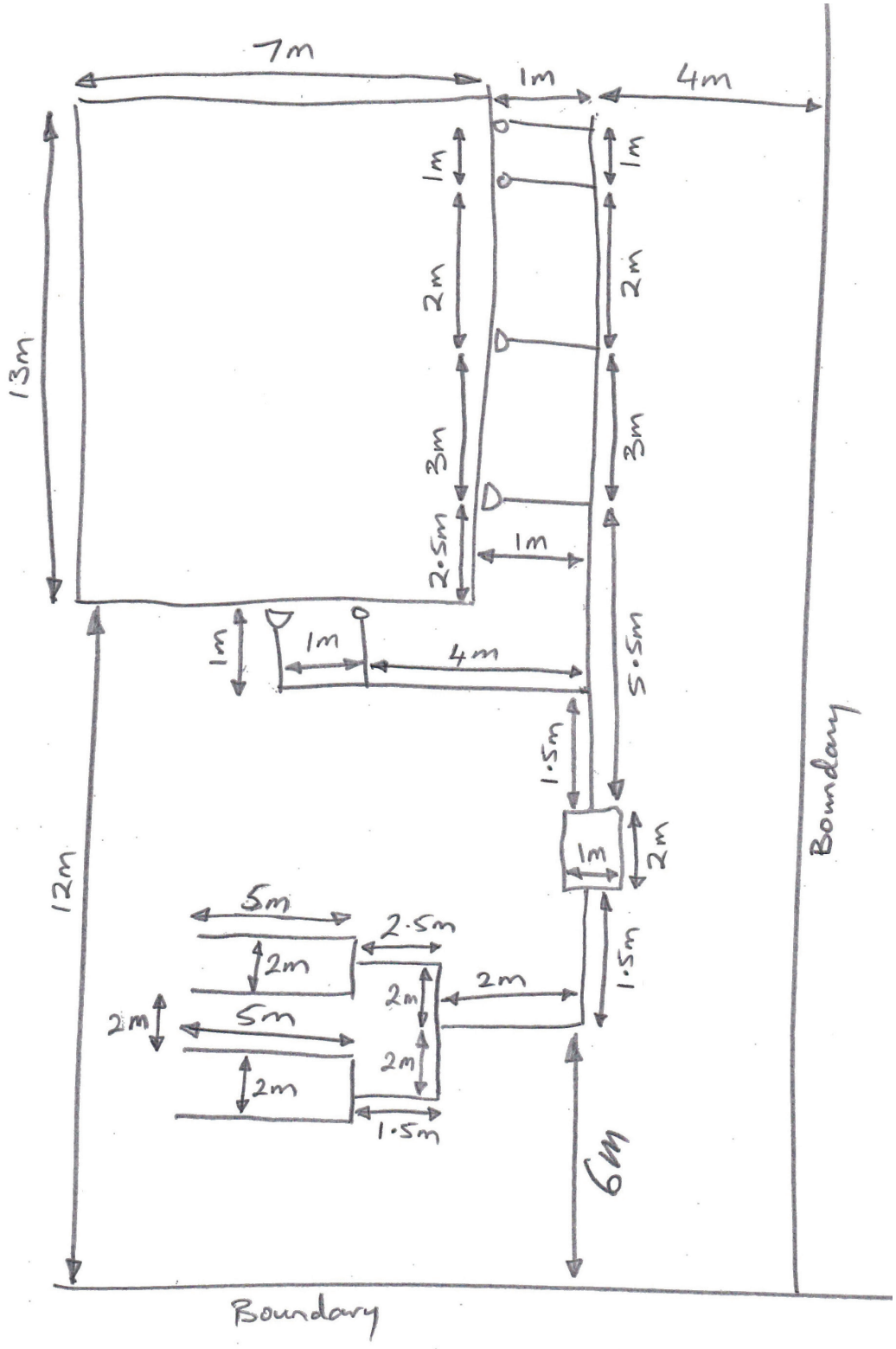
(1 mark)

Total 15 marks

QUESTION 5

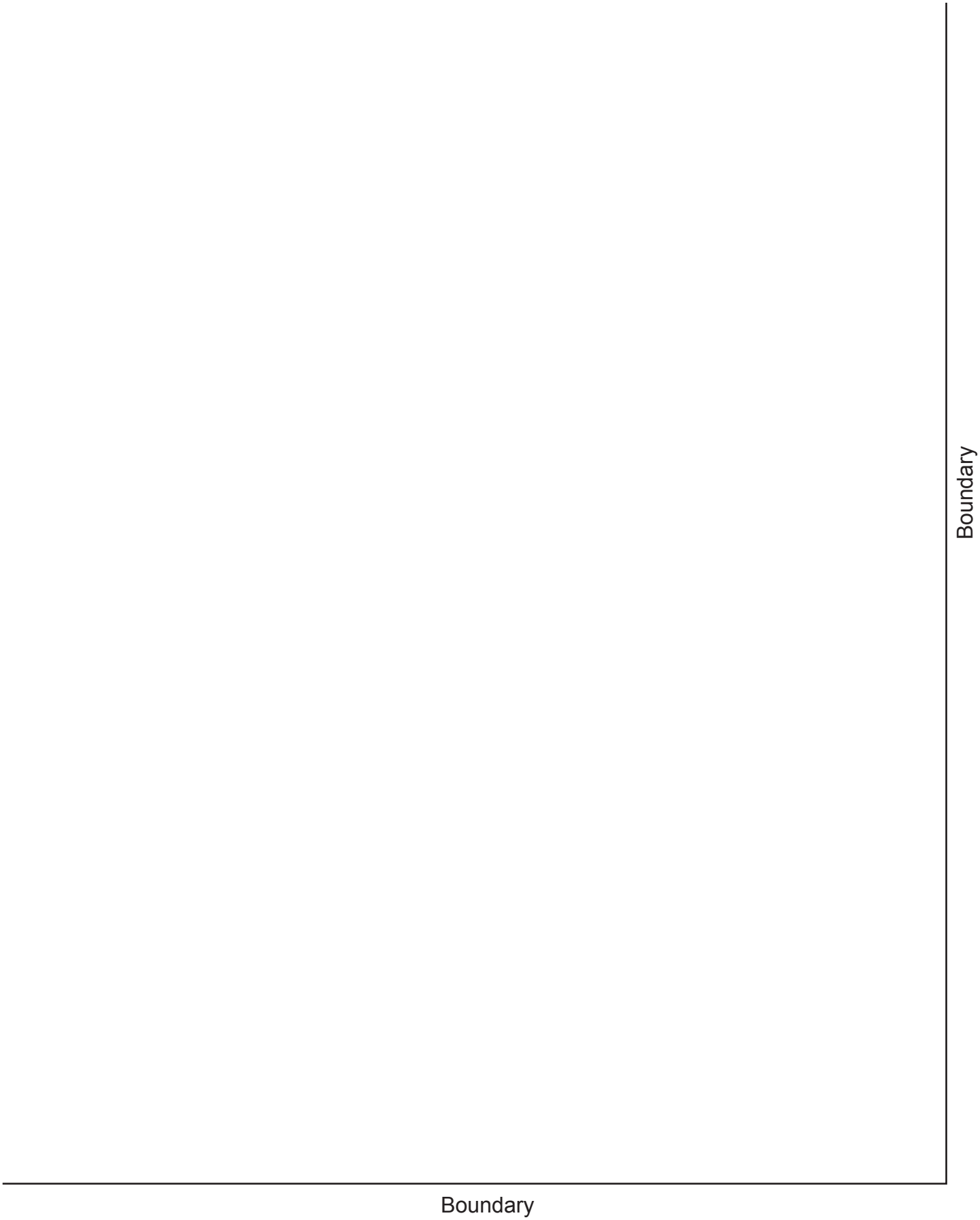
The sketch below shows the foul water drainage system for a residential home.

On the opposite page, draw a diagram of the system using a scale of 1:100.



Total 7 marks

QUESTION 5 (cont'd)



QUESTION 6

(a) A drain is to be installed under a building that has a concrete slab on the ground floor.

Give THREE installation requirements that must be met according to the New Zealand Building Code clause G13/AS2 Foul Water.

1 _____

2 _____

3 _____

(3 marks)

(b) State the purpose of an access point on a foul water drainage system.

_____

(1 mark)

(c) Give THREE locations where access points must be included in a foul water drainage system for the system to comply with New Zealand Building Code clause G13/AS2 Foul Water.

1 _____

2 _____

3 _____

(3 marks)

Total 7 marks

QUESTION 7

Complete the table below.

Gradient as a ratio	Gradient as %	Fall mm per m
	0.5	
		18
1 in 80		
	0.83	

Total 8 marks

QUESTION 8

Give THREE precautions that should be undertaken to ensure that people do not fall into an open excavation during the hours of darkness.

1 _____

2 _____

3 _____

Total 3 marks

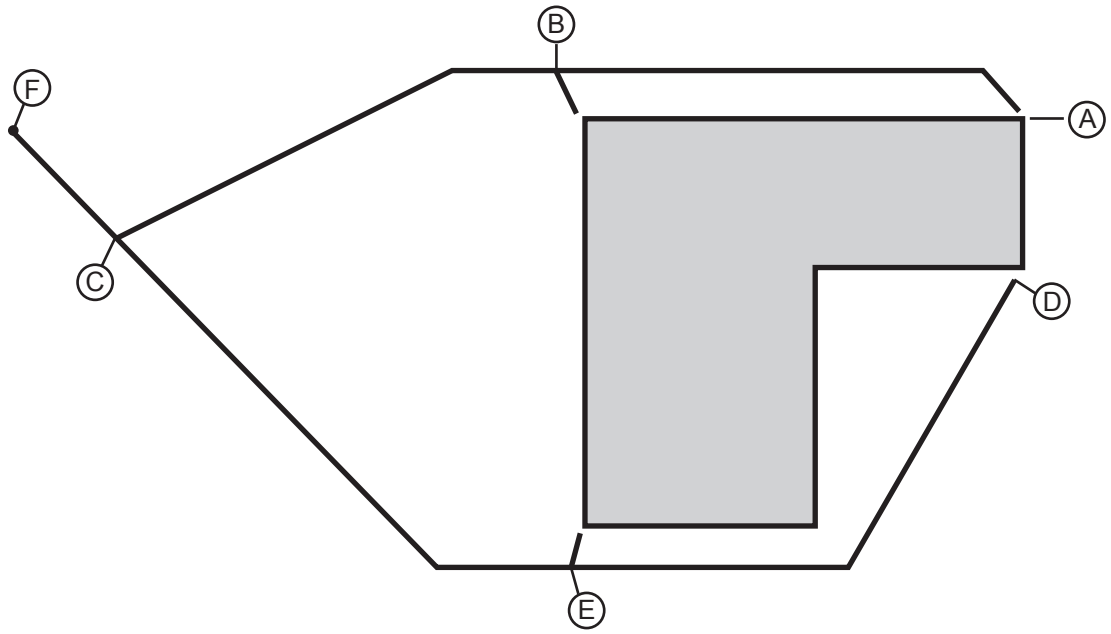
QUESTION 9

The drawing below shows a plan of a drainage system.

The drawing is at a scale of 1:200

All pipework is installed at a gradient of 1:80

The lowest point is F.



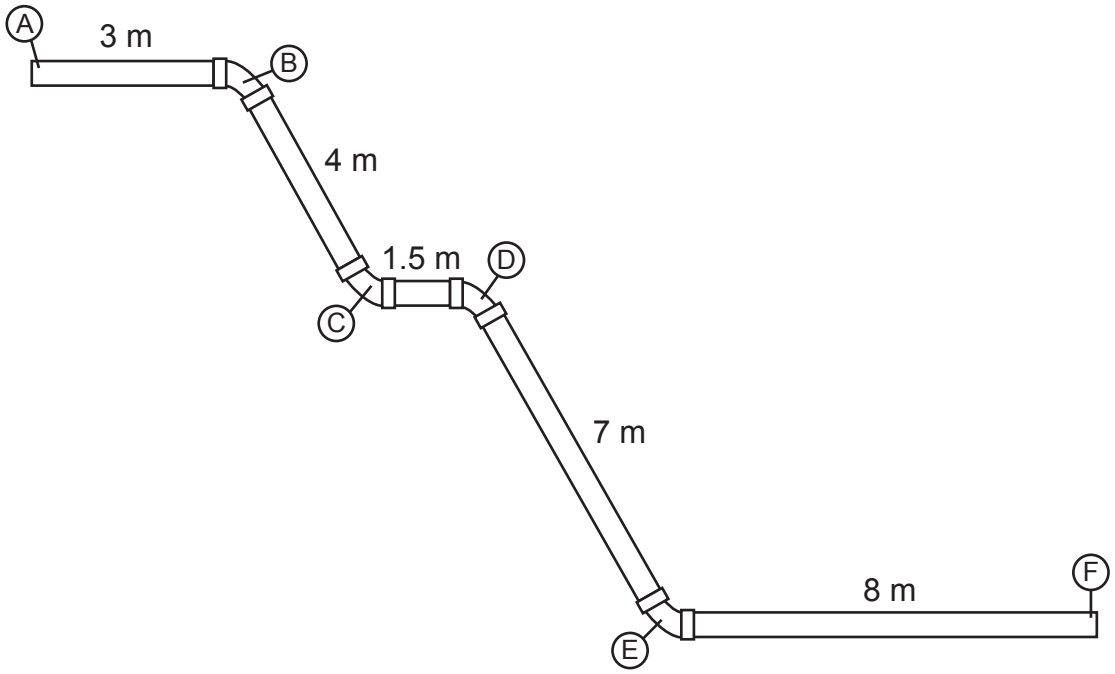
Complete the table below giving the length of each section of pipework and the fall in mm for each section of pipework.

Section	Total length of the section (m)	Total fall of the section (mm)
A – B		
B – C		
D – E		
E – C		
C – F		
A – F		
D – F		

Total 7 marks

QUESTION 10

The diagram below shows a plan view of a house drain.



The drain at point F is the sewer connection and is 900 mm below the datum.

The drain from point A to Point C has been laid at a gradient of 1 in 60 (1.65%).

The drain from point C to point D has been laid at a gradient of 1 in 100 (1.00%).

The drain from point D to point F has been laid at a gradient of 1 in 120 (0.83%).

Complete the following tables to show the fall for each section, and the depth below the datum for the excavation at points A, B, C, D, and E.

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

Point	Depth
A	
B	
C	
D	
E	

Total 10 marks

QUESTION 11

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

(a)

Name _____

_____

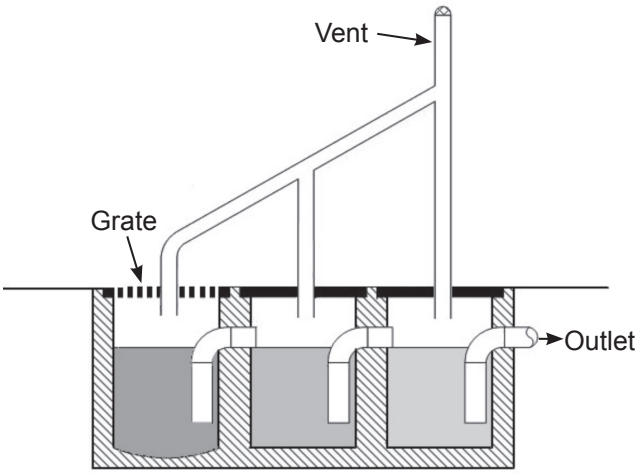
Situation _____

_____

Function _____

_____

_____



(3 marks)

(b)

Name _____

_____

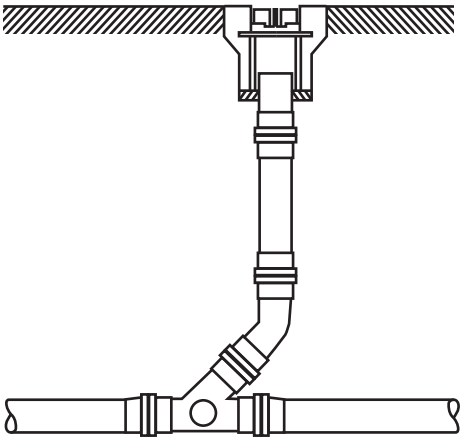
Situation _____

_____

Function _____

_____

_____



(3 marks)

Total 6 marks

QUESTION 12

Name FOUR different methods for jointing two lengths of drainage pipe.

1 _____

2 _____

3 _____

4 _____

Total 4 marks

QUESTION 13

A drainlayer may be required to work within a confined space. Before entering the confined space, it is essential that the space be made safe.

Answer the following with regard to safety.

(a) Give FOUR unsafe conditions that may need to be checked.

1 _____

2 _____

3 _____

4 _____

(4 marks)

(b) When working in a trench, there is a danger from toxic gases.

Explain why some toxic gases may accumulate in the trench.

_____

(1 mark)

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.

Should your choice of answer be unclear no mark will be awarded.

1. A 150 mm drain is to be laid in a trench.

   What is the minimum permitted width of the trench?

   A 250 mm.

   B 300 mm.

   C 350 mm.

   D 400 mm.

   E 450 mm.

   ☐

2. Which of the following best describes the term erosion?

   A Tear.

   B Rip.

   C Decay.

   D Crack.

   E Wear.

   ☐

3. The diameter of a drain is doubled. What effect will there be on the force that is applied to a test plug in that drain.

   A It will halve it.

   B It will remain the same.

   C It will double.

   D It will increase four times.

   E It will increase eight times.

   ☐

4. What is the maximum allowable angle for a junction that connects one drain to another?

A 11½°

B 15°

C 22°

D 45°

E 60°

☐

5. What is the maximum number of discharge units permitted to be conveyed by a 100 mm pipe that is laid at a gradient of 1:40?

A 61

B 205

C 215

D 255

E 515

☐

6. Which of the following is a plumb bob used for?

A To measure the fall or gradient of a pipe.

B To check a pipe is completely vertical.

C To chamfer the end of a uPVC pipe.

D To roughen the external surface of an earthenware pipe.

E To seal the outlet of a pipe for testing purposes.

☐

7. A trench is to be excavated to a depth of 1.5 metres.

When would the excavation become classified as particular hazardous work?

A When the trench crosses a public access route.

B When the trench will be open for more than 48 hours.

C When the trench is in type B (saturated) soil.

D When the trench is 1.0 metres wide.

E When the trench is being excavated with large machinery.

☐

8. According to AS/NZS 3500, what is the maximum distance allowed between anchor blocks installed on an inclined drain?

A 2.500 m.

B 3.000 m.

C 3.500 m.

D 4.000 m.

E 4.500 m.

9. Which of the following shows how flow rate is expressed?

A L/minute.

B m/second.

C kg/m^3.

D mm/m.

E N/m^2.

10. What is the purpose of using flexible joints on a drainage system?

A To allow branches for future connections to be added.

B To provide an easy point for the drain to be disconnected.

C To allow for differential settlement in the system.

D To adjust the angle of a drain during installation.

E To allow two different drainage pipe materials to be jointed.

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		
Section B		
Total		