No. 9198

**Plumbers,
Gasfitters and
Drainlayers Board**

REGISTRATION EXAMINATION, JUNE 2020
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 17 pages in the correct order and that none of these pages is blank.
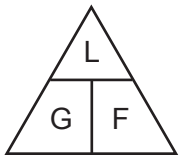
YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION

USEFUL FORMULAE

Circumference of circle = 2 × π × R   or   Circumference of circle = π × D

Area of circle = π × R^2 or   Area of circle = 0.7854 × D^2

Volume of cylinder = π × R^2 × H   or   Volume of cylinder = 0.7854 × D^2 × H

length = L
gradient = 1:G
fall = F

SECTION A

QUESTION 1

(a) A system for the disposal of industrial liquid waste is to be designed.

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

Give the TWO acceptable options for disposal of the liquid waste.

1 _____

2 _____

(2 marks)

(b) Give the number and name of TWO clauses of the New Zealand Building Code that systems designed for collecting hazardous industrial liquid waste must comply with.

1 _____

2 _____

(2 marks)

(c) List FOUR waste products that would be classed as industrial liquid waste.

1 _____

2 _____

3 _____

4 _____

(2 marks)

(d) Name FOUR methods by which industrial liquid waste could be treated prior to discharge to an outfall.

1 _____

2 _____

3 _____

4 _____

(4 marks)

Total 10 marks

QUESTION 2

The drawing below shows a newly-laid surface water drain.

The invert level of the drain at point A is 700 mm below ground level.

The site is level.

Section D – E of the drain is vertical.

The remaining sections of the drain have been laid at a gradient of 1:40

Complete the tables below the diagram to show the fall for each section and the depth of the drain invert below the ground level at points indicated.

Section	Fall (mm)
A – B	75
B – C	100
C – D	112.5
D – E	1500
E – F	150
C – G	50
G – H	87.5
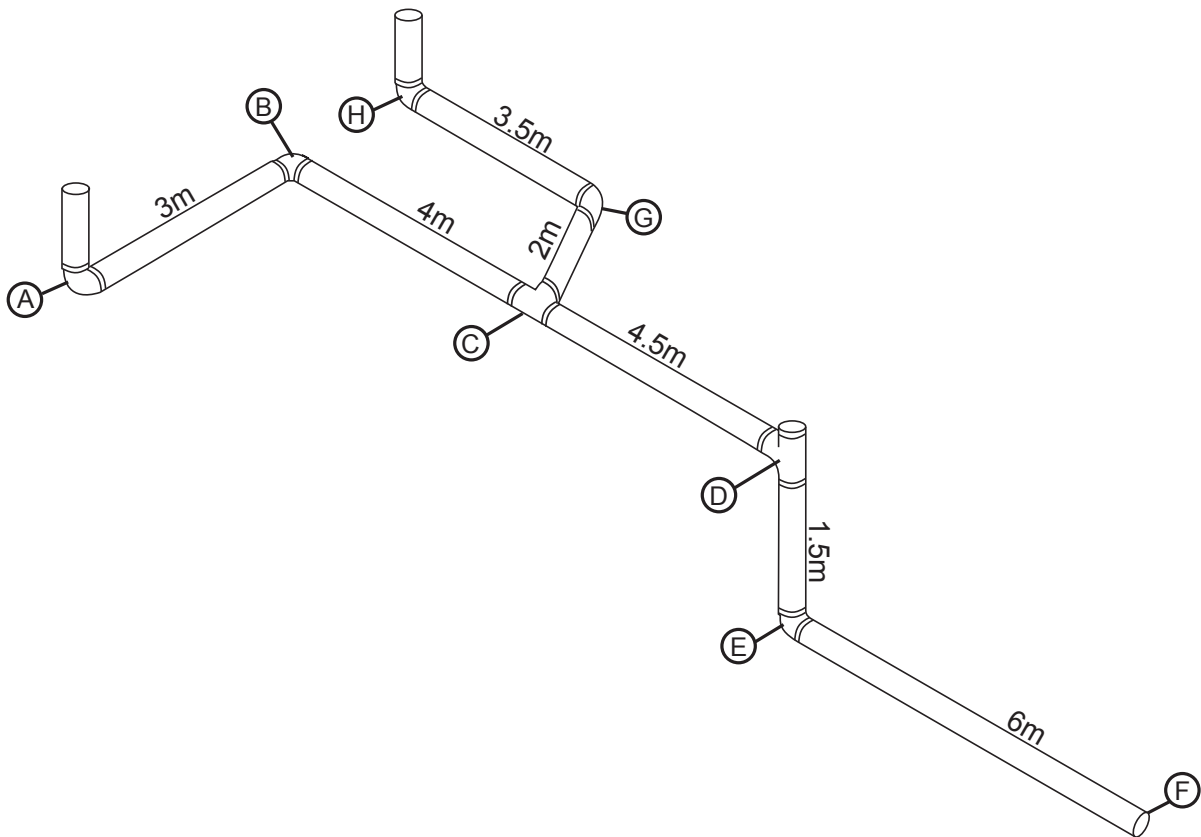
Point	Depth (mm)
B	775
C	875
D	987.5
E	2487.5
F	2637.5
G	825
H	737.5

Total 10 marks

QUESTION 3

(a) A bottomless sand filter is shown below.
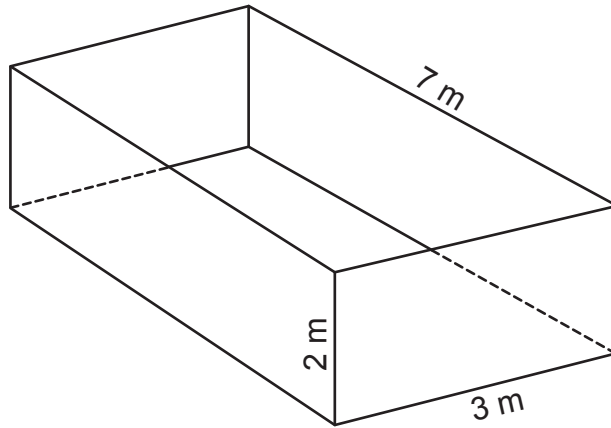
(i) Calculate the volume of the filter.

_____

_____

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

_____

_____

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

_____

_____

(3 marks)

(b) Water has to be taken by truck to test a drain. The drain has an internal diameter of 100 mm and a developed length of 60 m.

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

Allow an additional 10% for spillage and losses.
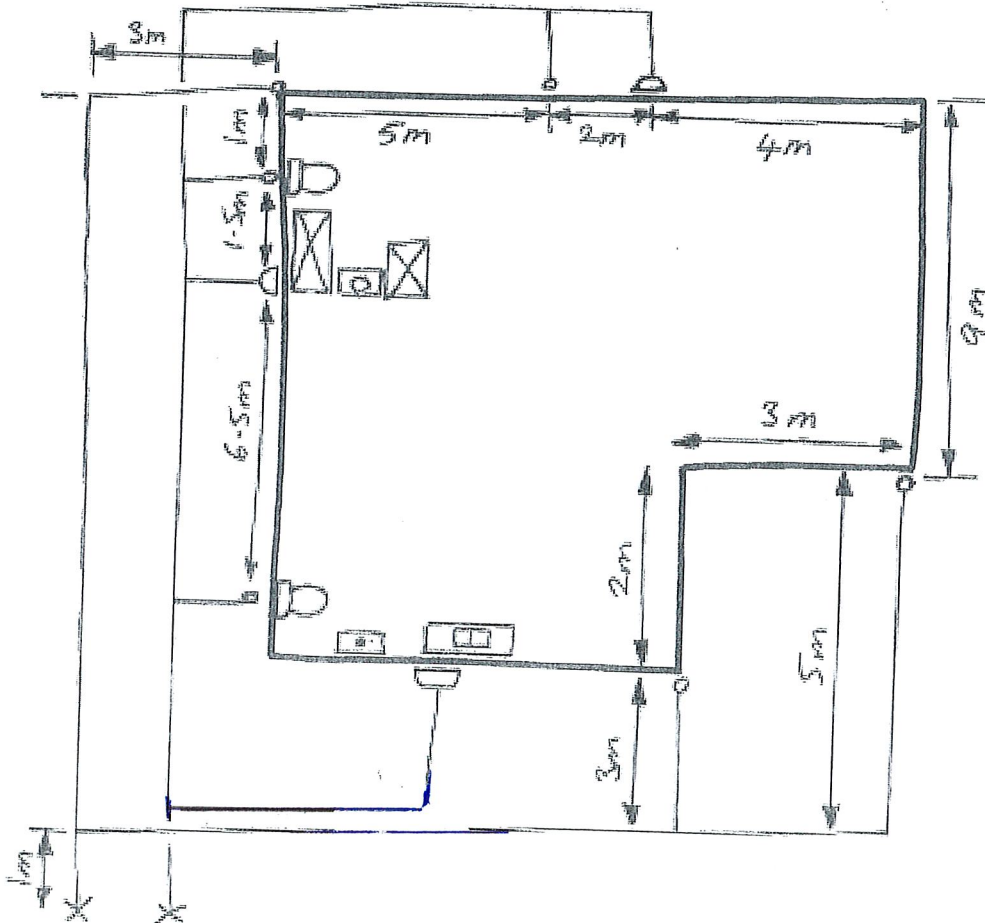
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(5 marks)

Total 8 marks

QUESTION 4

The sketch below shows a plan view of a building and drainage systems.

Using a scale of 1:100, on the following page draw an as-built plan of the surface water drainage system.
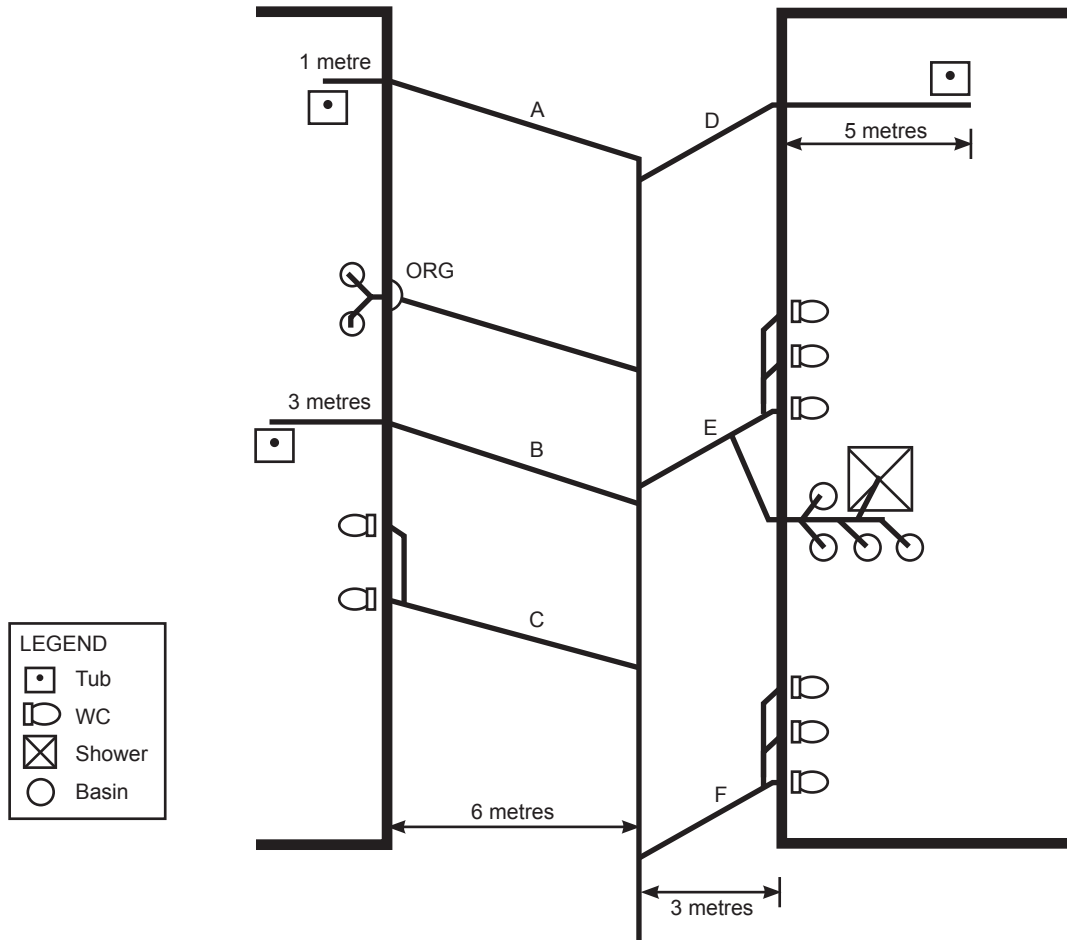

Total 4 marks

QUESTION 4 (cont'd)

QUESTION 5

The diagram below shows part of the foul water drainage system for a commercial property.

(a) Complete the diagram to show the required locations for vent pipework. The completed system is to comply with the minimum requirements of AS/NZS 3500 Part 2: Sanitary plumbing and drainage.

(6 marks)

(b) Complete the table below to show the required minimum diameter and gradient for the drains for each section labelled A – F.

Drain	Minimum diameter (mm)	Minimum gradient
A		
B		
C		
D		
E		
F		

(9 marks)

Total 15 marks

QUESTION 6

Sketch a diagram showing a grease trap suitable for use on a restaurant, and label its main features.

Total 5 marks

QUESTION 7

The plan opposite (not to scale) shows a building and contour lines on a site. The foul 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	Fall (mm)
A - B	7 m	
B - C	16 m	
C - Y	5 m	

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

    (i)   The ground levels.

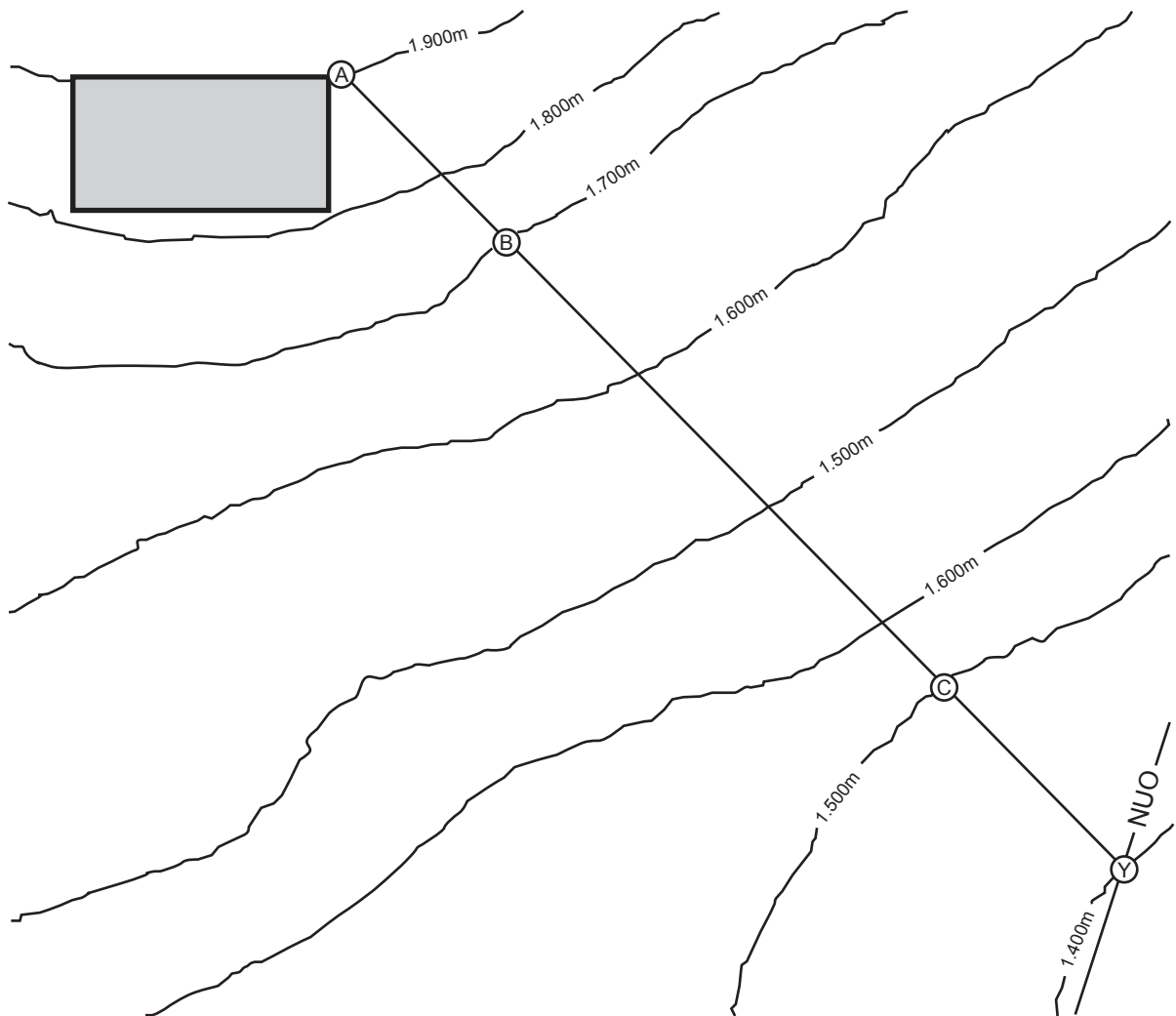   (ii) The depth of the drain invert below the datum.
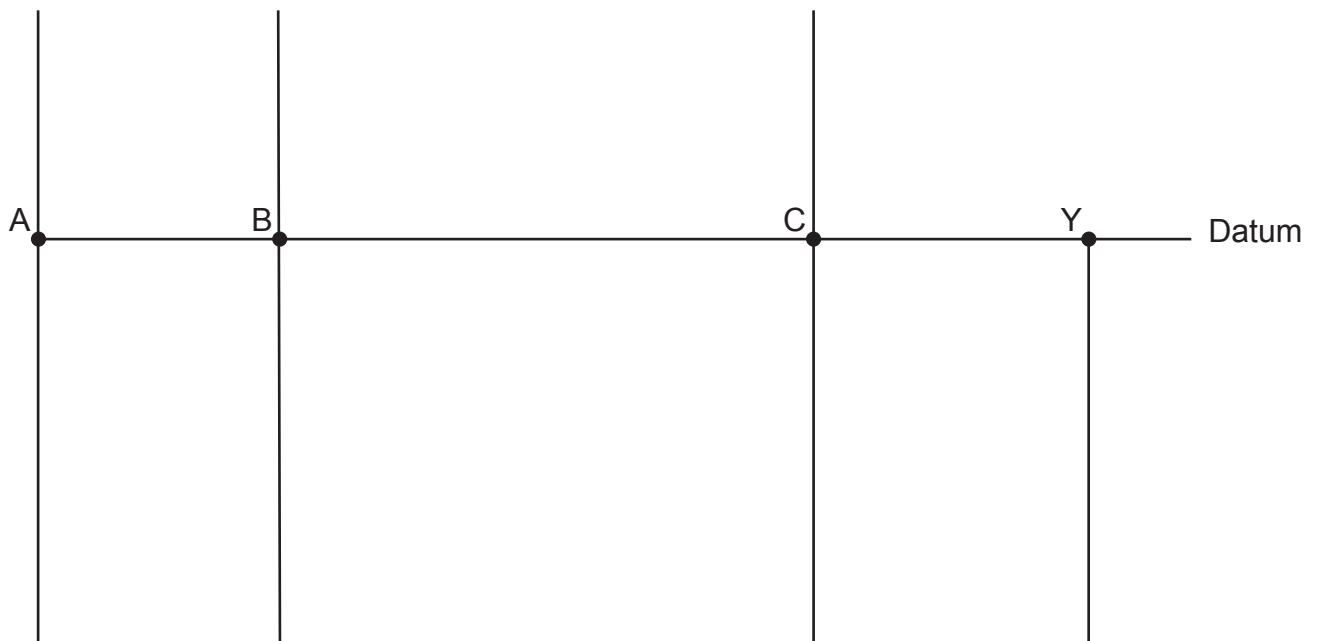
(8 marks)

(b) Complete the following table to give the depth of the drain invert below the ground at each point.

A	B	C	Y

(4 marks)

Total 12 marks

QUESTION 8

A foul water drain is to be installed at an existing petrol station.

(a) State TWO hazards that are specific to an excavated trench on this type of site.

1 _____

2 _____

(2 marks) ☐

(b) Give FOUR safety precautions that should be taken prior to excavating at this type of site.

1 _____

2 _____

3 _____

4 _____

(2 marks) ☐

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

_____

(1 mark) ☐

(d) 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 TWO actions the certifying drainlayer should advise the drainlayer to take.

1 _____

2 _____

(2 marks) ☐

Total 7 marks ☐

QUESTION 9

A certifying drainlayer is to instruct a trainee how to use a piece of machinery.

Give FOUR matters regarding safety that should be covered in the training.

1 _____

2 _____

3 _____

4 _____

Total 4 marks ☐

QUESTION 10

The Plumbers, Gasfitters and Drainlayers Act defines supervision, and what supervisors are set to ensure in relation to drainlaying work.

Give the THREE aspects about any drainlaying work carried out under supervision a certifying drainlayer providing supervision must ensure.

1 _____

2 _____

3 _____

Total 3 marks

QUESTION 11

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

1 _____

2 _____

3 _____

(3 marks) ☐

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

1 _____

2 _____

3 _____

(3 marks) ☐

(c) Give THREE actions that should be taken with regard to safe practice when working with raw sewage.

1 _____

2 _____

3 _____

(3 marks) ☐

(d) Give THREE actions that a drainlayer should take with regard to safe practice after working with raw sewage.

1 _____

2 _____

3 _____

(3 marks) ☐

Total 12 marks ☐

QUESTION 12

Name THREE acceptable methods for testing a surface-water drain for water tightness before backfilling.

1 _____

2 _____

3 _____

Total 3 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. Which of the following is the best method of controlling hazards in the workplace?

    A. Isolate employees from the hazard.

    B. Minimise the hazard to the employees.

    C. Eliminate the hazard from the employees' workplace.

    D. Provide all necessary personal protection equipment to employees.

    E. Monitor the employees' health and exposure to the hazard.

2. 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 plant and equipment from the site.

    B. To provide help to an injured person.

    C. To remove a deceased person.

    D. When directed by a police officer

    E. To make the site safe.

3. Drainlayer A has requested the assistance of a tradesman drainlayer employed by Drainlayer B.

    Who is responsible for ensuring that the tradesman drainlayer is capable of completing the proposed work safely?

    A. Drainlayer A.

    B. Drainlayer B.

    C. The tradesman drainlayer.

    D. The Plumbers, Gasfitters and Drainlayers Board.

    E. WorkSafe.

4. What is the minimum time a foul water drain installed under a concrete slab must last to meet the durability requirements of the New Zealand Building Code?

   A. 1 year.

   B. 2 years.

   C. 5 years.

   D. 15 years.

   E. 50 years.

   ☐

5. 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.

   ☐

6. Why is there a restricted zone at the base of a discharge stack?

   A. To prevent trap seal loss due to compression.

   B. To prevent trap seal loss due to oscillation.

   C. To prevent blockages in the drain.

   D. To prevent blockages in the discharge stack.

   E. To prevent blockages in the drain and discharge stack.

   ☐

7. WorkSafe must be notified before Particular Hazardous Work commences.

How long before starting this type of work is WorkSafe to be notified by?

A. 24 hours.

B. 48 hours.

C. 72 hours.

D. 5 working days.

E. 10 working days.

Total 7 marks

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