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No. 9195



Plumbers,
Gasfitters and
Drainlayers Board

REGISTRATION EXAMINATION, NOVEMBER 2022

CERTIFYING PLUMBER

QUESTION AND ANSWER BOOKLET

Time allowed THREE hours

INSTRUCTIONS

Please check that the booking reference number on your booking confirmation slip is the same as the number on the label at the top of this page. **Do Not** remove the exam booking confirmation slip from your exam paper.

Do not start writing until you are told to do so by the Supervisor.

Total marks for this examination: 100.

This exam booklet consists of 2 sections

Section A – Questions 1 to 11

Section B – Questions 1 to 12

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 27-30 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.

Do not use red pen for drawings or writing in your paper.

Check that this booklet has all of 32 pages in the correct order.

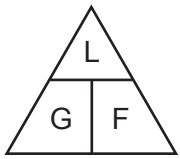
YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION

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

The plan below shows the layout of sanitary fixtures for a dwelling.

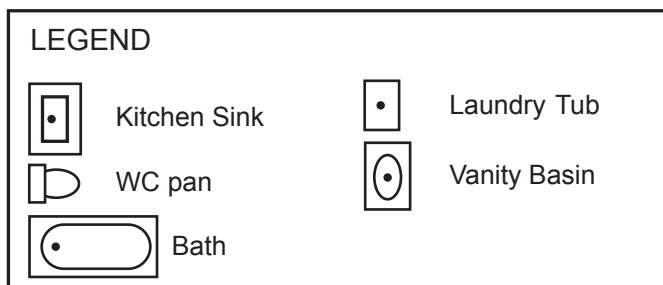
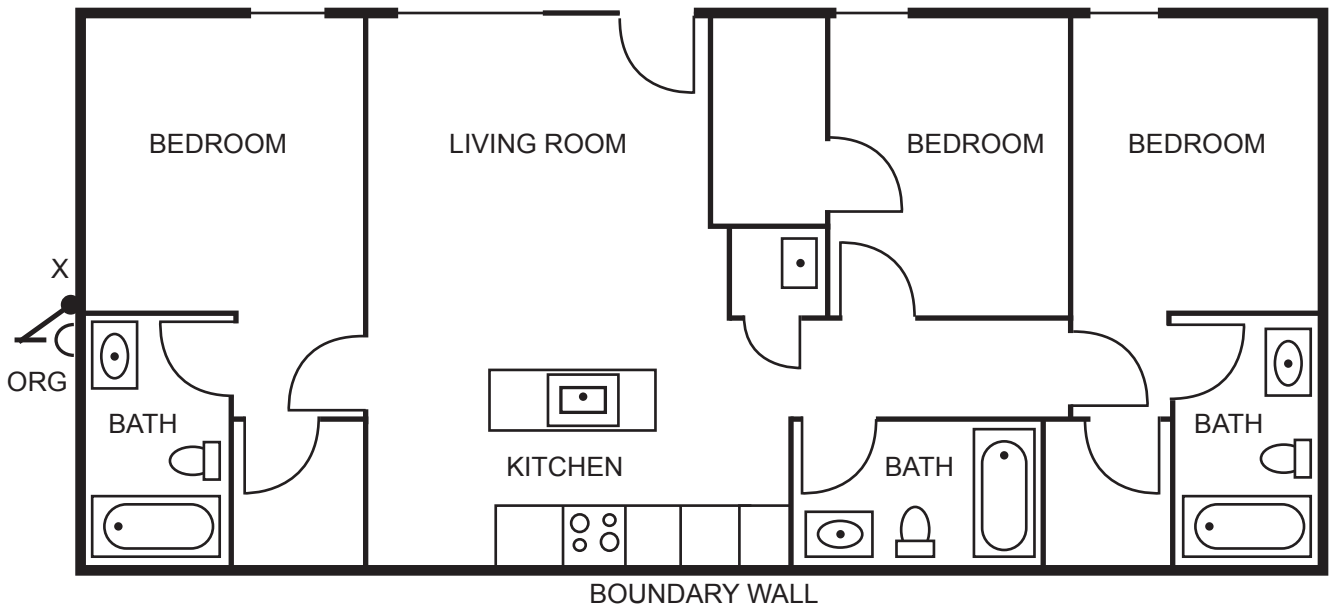
The plan is drawn to a scale of 1:100

The dwelling is to be built on a concrete pad foundation.

The drainage for the dwelling has been completed, and the connection point X for the sanitary plumbing is as shown on the plan.

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

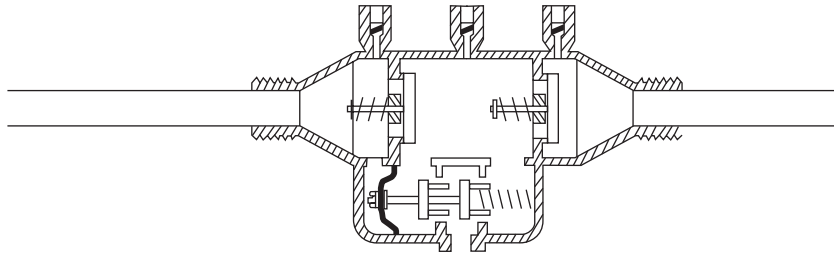
- (a) On the plan, complete the underslab pipework to show all discharge pipes and vent connections that will be required to be installed before the concrete floor is poured.
- (b) On the plan, show the minimum allowable diameter for each section of the discharge and vent pipework.



Total 9 marks

QUESTION 2

(a) The diagram below shows the installation of a reduced pressure zone (RPZ) backflow prevention device.



Ground level

(i) State the minimum distance above ground level at which the device is permitted to be installed.

(1 mark)

(ii) On the diagram, show the two points between which the measurement in (i) is taken.

(1 mark)

(b) Give TWO situations that would cause a reduced pressure zone backflow prevention device to discharge from the relief valve.

1 _____

2 _____

(2 marks)

QUESTION 2 (cont'd)

- (c) Name the authorisation a person must have to be permitted to test a reduced pressure zone device after repairs have been made to ensure a building maintains its warrant of fitness.

(1 mark)

- (d) Name the organisation that grants the authorisation necessary to be permitted to test a reduced pressure zone device that is included on a building compliance schedule.

(1 mark)

Total 6 marks

QUESTION 3

The diagram on the opposite page is a schematic of uPVC water supply pipework in a building.

The building specifications state the following:

- Support is to be provided 100 mm from the end of each pipe.
- Three clips are to be included for each tee, each located 100 mm from the tee.
- Two clips are to be included for each bend, each located 100 mm from the bend.
- The straight lengths of pipework are to be supported to comply with New Zealand Building Code Acceptable Solution G12/AS1 Water Supplies: Table 7.

Table 7 is provided below.

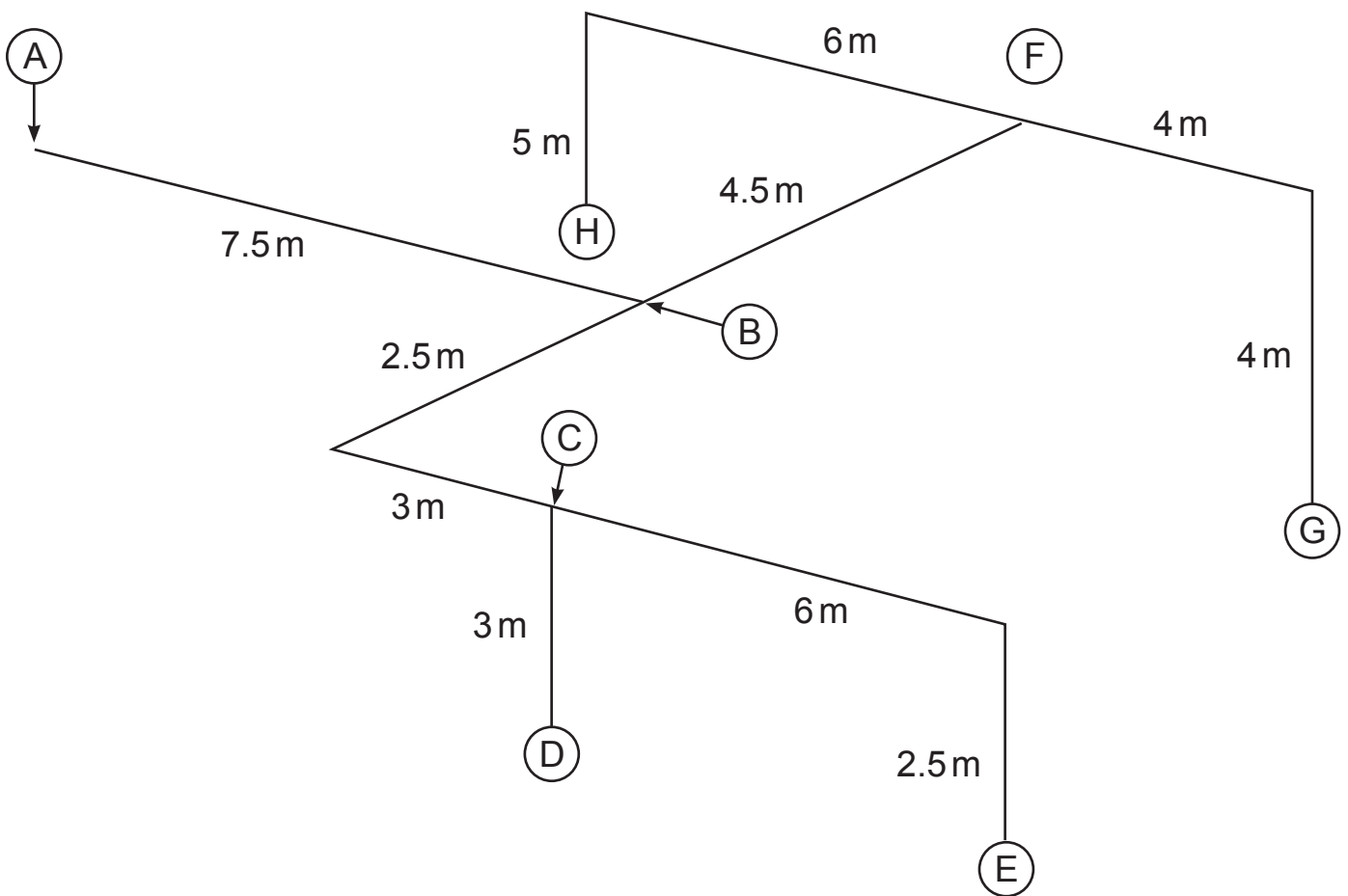
Pipe material	Pipe diameter (mm)	Maximum distance between supports (m)	
		Vertical pipe	Graded and horizontal pipe
Copper	10 – 15	1.5	1.2
	20 – 25	2.0	1.5
Galvanised steel	15 – 20	2.0	1.5
	25	3.0	2.5
uPVC	15 – 20	2.0	1.0
	25	2.4	1.2
Polyethylene and polybutylene (cold water supply)	15 – 20	1.5	0.75
	25	1.8	0.9
Polybutylene (hot water supply)	15 – 18	1.0	0.6
	20 – 22	1.4	0.7

Note:
The spacing for these pipe materials is based on the pipes being located within the *building* structure.

QUESTION 3 (cont'd)

Complete the table to show the number of clips required for each section of pipe listed.

Pipe section	Number of clips
A – B (25 mm)	
B – C (20 mm)	
C – D (15 mm)	
C – E (15 mm)	
B – F (20 mm)	
F – G (15 mm)	
F – H (15 mm)	



Total 7 marks

QUESTION 4

A plan view of a domestic dwelling, drawn to a scale of 1:100, is shown on the opposite page.

The plan shows the proposed layout for the cold water pipework for the dwelling.

The water main connection at (A) will provide 450 kPa water pressure, and is situated 12 lineal metres away from the entry point to the dwelling.

The shower is the highest outlet, and is 2.5 vertical metres above the water main.

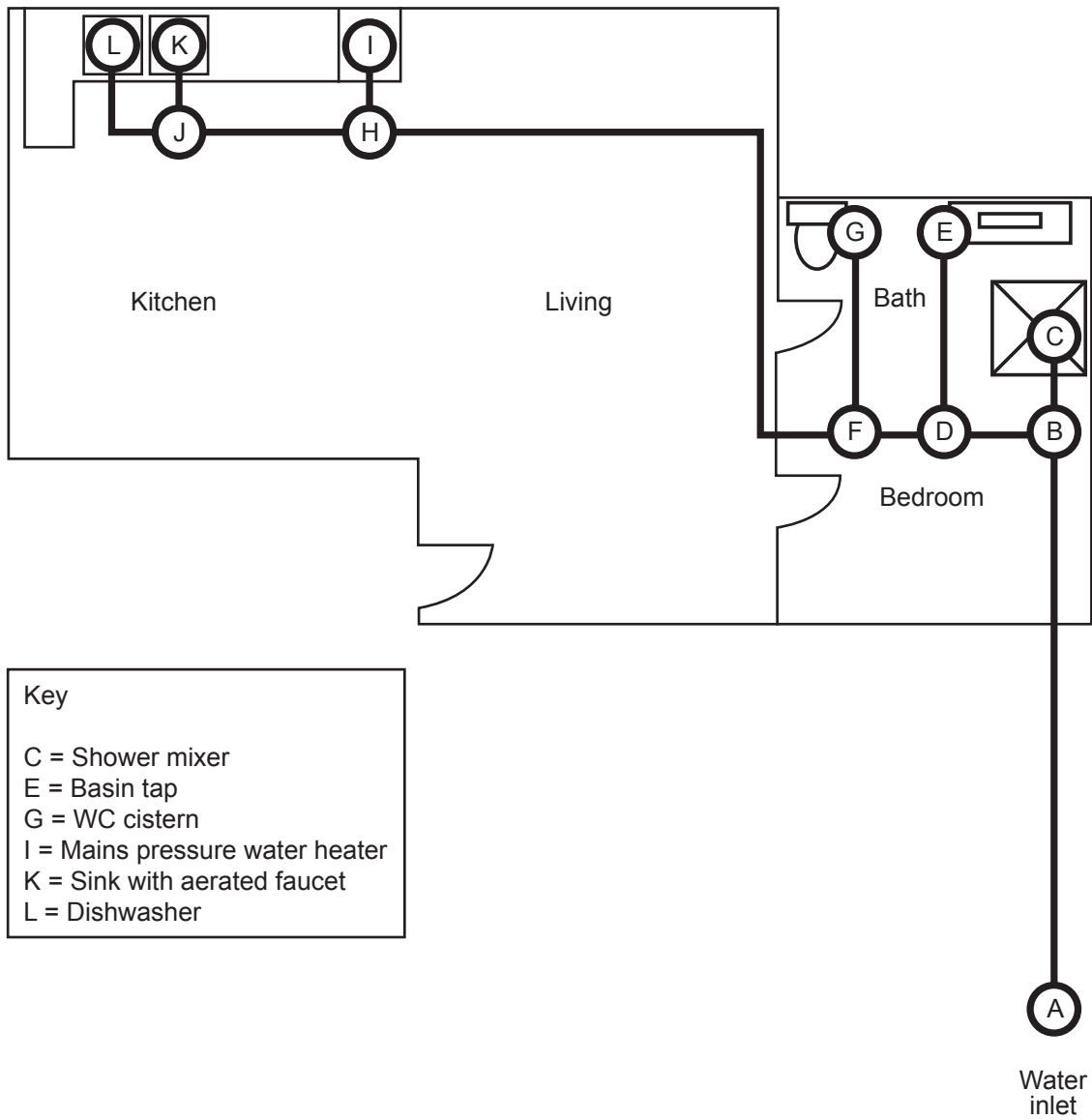
Using the procedure given in AS/NZS 3500 Part 1: Water services, complete the tables below.

Index Length	Pressure Drop

Pipe section	Total loading units	Probable simultaneous flow rate (L/S)	Pipe size (DN)
A – B			
B – C			
B – D			
D – E			
D – F			
F – G			
F – H			
H – I			
H – J			
J – K			
J – L			

Total 16 marks

QUESTION 4 (cont'd)

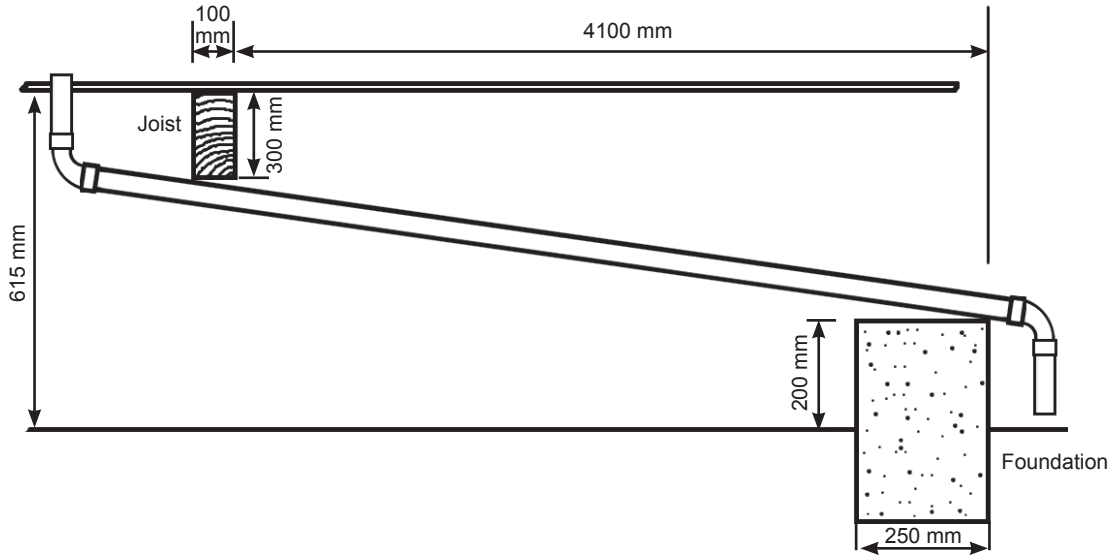


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QUESTION 5

The diagram below shows an elevation of the proposed installation of a safe tray drain.

The discharge pipe is 45 mm OD.



Calculate the maximum gradient achievable for the pipe without cutting the joist or the foundation.

Total 3 marks

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QUESTION 6

- (a) Give TWO factors within a water supply system that can increase the risk of legionella bacteria multiplying to hazardous levels.

1 _____

2 _____

(2 marks)

- (b) Give TWO pieces of advice that should be given to a customer to reduce the risk of contracting legionnaires disease from a plumbing system.

1 _____

2 _____

(2 marks)

Total 4 marks

QUESTION 7

(a) (i) Name FOUR hazardous substances that a plumber may commonly use at work.

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

(2 marks)

(ii) Manufacturers' instructions or product labels can contain information regarding the handling of the substances in (i).

Name the document that gives more detailed information than given in manufacturers' instructions or on product labels.

(1 mark)

(iii) Give THREE pieces of safety information that should be obtained regarding hazardous substances before making contact with them.

- 1 _____
- 2 _____
- 3 _____

(3 marks)

QUESTION 7 (cont'd)

(b) Complete the table below to identify which hazard management category each of the actions listed fits into.

Action	Minimise	Eliminate
Training staff in correct use of equipment		
Completing work usually performed at heights on ground level		
Providing screens around an area where welding is taking place		
Using edge protection when working at heights		

(2 marks)

(c) An accident has occurred on a worksite.

List FOUR actions that must be taken for the situation to be dealt with correctly.

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

(4 marks)

(d) A plumber is to train a work colleague to use a power tool that the colleague is not familiar with.

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

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

(4 marks)

Total 16 marks

QUESTION 8

- (a) A marae is installing new bathroom facilities that will include an independent hot water system to supply 12 showers.

The system is to be designed to supply a peak load each morning, when 85% of the showers will be in use.

The average incoming cold water temperature is 13°C.

The average shower temperature is expected to be 42°C.

The estimated average shower time is 7 minutes.

The showers will be restricted to 9 litres of hot water per minute.

The thermostat on the cylinder is set to maintain a temperature of 65°C.

Calculate the required volume of hot water that will need to be provided to meet the demand of the showers.

Formula:

$$\text{Total storage required} = \frac{\text{Time (seconds)} \times \text{Flow rate (l/s)} \times \text{Number of showers} \times T1}{T2 \times \text{Peak load}}$$

where

T1 = Temperature increase from cold to average shower temperature.

T2 = Temperature increase from cold to hot stored temperature.

(5 marks)

QUESTION 8 (cont'd)

- (b) Draw a diagram to show a plan for seismically restraining a hot water cylinder with a capacity exceeding 200 litres.

The design must comply with New Zealand Building Code Acceptable Solution G12/AS1.

(4 marks)

Total 9 marks

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QUESTION 9

Complete the table below to show the minimum length of time each of the items must last to comply with New Zealand Building Code clause B2 Durability.

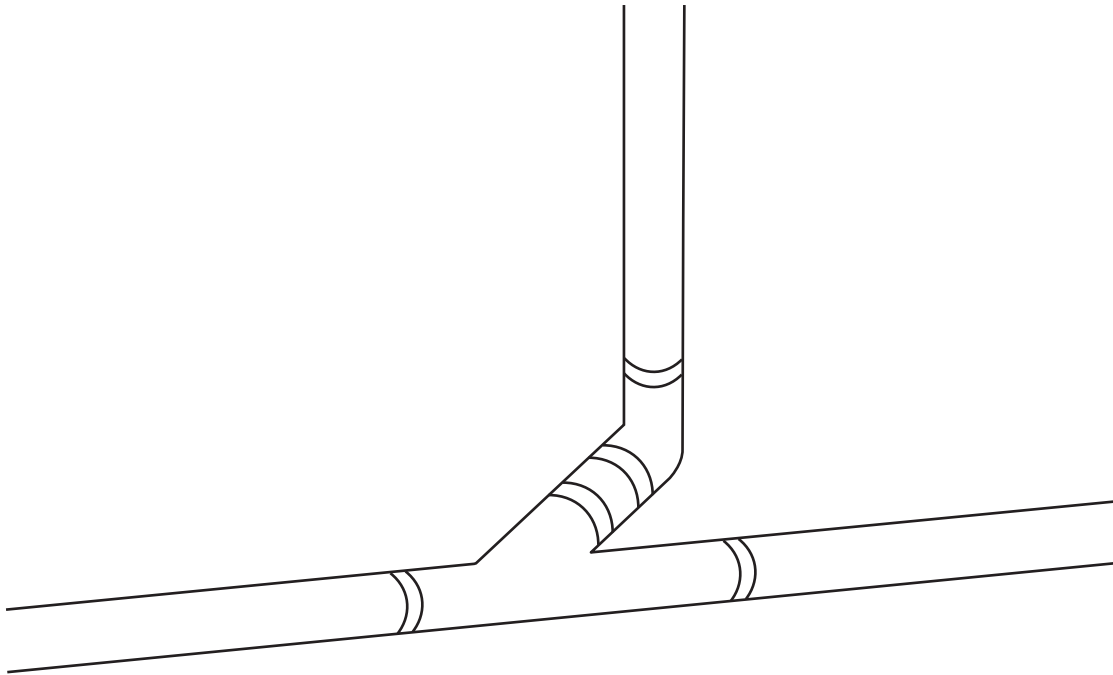
Item	Length of time (years)
Single-lever mixer including flexible connections	
Under-slab discharge pipework	
EDPM rubber boot flashing used to seal a roof penetration	

Total 3 marks

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QUESTION 10

The diagram below shows a two-storey stack connected to a main drain discharge pipe.



- (a) On the diagram, show the section of pipework where any branch connections to the stack are prohibited. Include the relevant measurements.

(2 marks)

- (b) Give a situation that would require the section in (a) to be increased.

(1 mark)

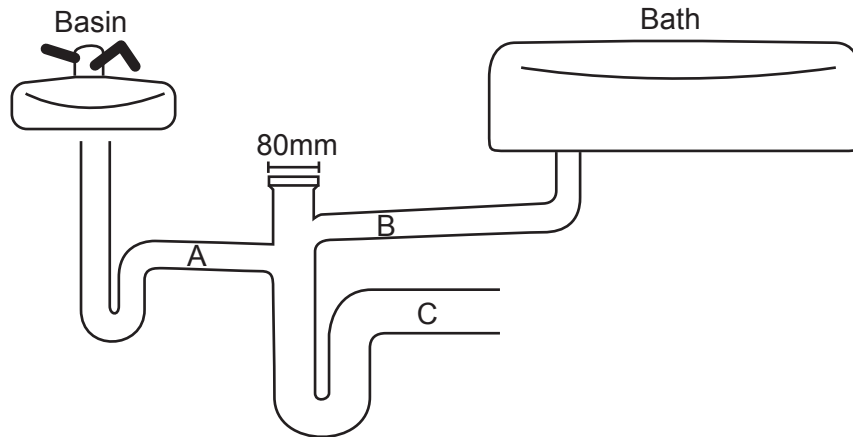
- (c) Give the reason branch connections are prohibited in this area.

(2 marks)

Total 5 marks

QUESTION 11

- (a) The diagram below shows the installation of a floor waste gully installed as the waste for a single-rose shower.



- (i) On the diagram, show the minimum allowable height of the floor waste gully riser and the point at which the measurement is taken.

(2 marks)

- (ii) Give the maximum allowable length for fixture discharge pipe A.

(1 mark)

- (iii) Give the maximum allowable length for fixture discharge pipe B.

(1 mark)

- (iv) Give the fixture unit rating of the floor waste gully.

(2 marks)

- (v) State the minimum diameter for discharge pipe C.

(1 mark)

QUESTION 11 (cont'd)

(b) (i) Name TWO fixtures that are prohibited from discharging discharge into a floor waste gully.

1 _____

2 _____

(2 marks)

(ii) Give a reason why the fixtures in (i) are prohibited from discharging into a floor waste gully.

(1 mark)

Total 10 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 can be discharged into a copper waste pipe without risk of affecting the system?

- A Slop hoppers.
- B Photographic equipment.
- C Cooling towers.
- D Undiluted urinal waste.
- E Grease arrestors.

2. According to the New Zealand Building Code Acceptable Solution G1/AS1, which of the following fixtures is prohibited from being installed in a unisex bathroom facility?

- A A urinal.
- B A sanitary towel disposal unit.
- C A shower cubicle.
- D A cleaner's sink.
- E A baby changing table.

3. What is the maximum discharge unit loading for a 100 mm graded discharge pipe that has been laid at a gradient of 1.65%, as stated in AS/NZS 3500 Part 2: Sanitary plumbing and drainage?

- A 115
- B 142
- C 254
- D 342
- E 410

4. How many fixture units are allowed to be discharged through an 80 mm branch discharge pipe laid at a gradient of 2.50%, as stated in AS/NZS 3500 Part 2: Sanitary plumbing and drainage?

- A 16
- B 20
- C 27
- D 39
- E 65

5. How many fixture units are allowed to be discharged from any one floor to a 100 mm discharge stack that serves four or more levels, as stated in AS/NZS 3500 Part 2: Sanitary plumbing and drainage?

- A 25
- B 75
- C 100
- D 125
- E 150

6. Why is it not permitted to install two commercial sinks that share a single 50 mm water trap?

- A In the event of a waste pipe blockage, dirty water from one sink could contaminate clean water in the other.
- B The total discharge units will exceed the number permitted.
- C If the waste pipe blocked, neither sink could be drained.
- D The temperature of the waste from a commercial sink can exceed 60°C.
- E The grease content in commercial kitchen sink wastes is high and can often cause blockages.

7. What is meant by the term 'submerged inlet' in relation to floor waste gullies?
- A The grate of the floor waste gully is lower than the grate of the overflow relief gully.
 - B The fixture discharge pipe connects to the floor waste gully below the top of the water seal.
 - C The floor waste gully riser is shorter than the recommended minimum height.
 - D The top of the water seal is less than 10 mm below the floor waste gully grate.
 - E The fixture discharge pipe connects to the floor waste gully below finished floor level.

8. Which of the following is permitted to discharge into a floor waste gully located in an adjacent room?
- A Drinking fountain.
 - B Kitchen sink.
 - C Tundish.
 - D Laundry tub.
 - E Shower.

9. What is the minimum allowable diameter for the overflow pipe fitted to a safe tray under a water supply tank?
- A 25 mm.
 - B 32 mm.
 - C 40 mm.
 - D 50 mm.
 - E 65 mm.

10. A sanitary plumbing discharge system is being vacuum tested for soundness.
How many kPa can the pressure drop during the allocated test time before the pipework has failed the test?

- A 3
- B 5
- C 8
- D 10
- E 15

11. An air pressure test is being used to check a 100 mm diameter sanitary plumbing discharge system 120 metres in length.

What is the minimum length of time required for the test?

- A 2 minutes stabilisation followed by a 3 minute test.
- B 2 minutes stabilisation followed by a 5 minute test.
- C 3 minutes stabilisation followed by a 2 minute test.
- D 3 minutes stabilisation followed by a 6 minute test.
- E 3 minutes stabilisation followed by a 10 minute test.

12. What is the minimum allowable pressure for a soundness test on cold water pipework?

- A 100 kPa.
- B 500 kPa.
- C 1000 kPa.
- D 1500 kPa.
- E 2000 kPa.

Total 12 marks

This page is available for additional working or answers

Question number _____

This page is available for additional working or answers

Question number _____

For Examiner's use only

Question number	Marks	Marks
1		
2		
3		
4		
5		
6		
7		
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9		
10		
11		
Section B		
Total		

