

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

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No. 9195



Plumbers,
Gasfitters and
Drainlayers Board

REGISTRATION EXAMINATION, JUNE 2015

CERTIFYING PLUMBER

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

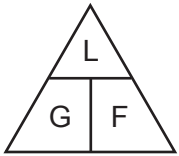
Candidates that sat this examination in June 2015 were provided with the following documents:

- New Zealand Building Code Clause G1 – Personal Hygiene
- AS/NZS 3500 Part 1: Water services
- AS/NZS 3500 Part 2: Sanitary plumbing and drainage

USEFUL FORMULAE

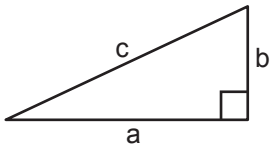
Circumference of circle = $2 \times \pi \times R$ or Circumference of circle = $\pi \times D$

Area of circle = $\pi \times R^2$ or Area of circle = $0.7854 \times D^2$



length = L
gradient = 1:G
fall = F

Volume of cylinder = $\pi \times R^2 \times H$ or Volume of cylinder = $0.7854 \times D^2 \times H$



$$a^2 + b^2 = c^2$$

Heat energy = mass \times specific heat \times temp diff

Litres of hot water \times temp diff cold to hot = litres of mixed water \times temp diff cold to mixed

Heating time = $\frac{\text{mass of water (kg)} \times 4.2 \times \text{temp diff } (^{\circ}\text{C}) \times 100}{\text{heat energy input per hour in kJ} \times \text{efficiency (\%)}}$

Box's formula: $q = \sqrt{\frac{H \times D^5}{25 \times L \times 10^5}}$

where q = quantity discharged in litres per second

H = head in metres

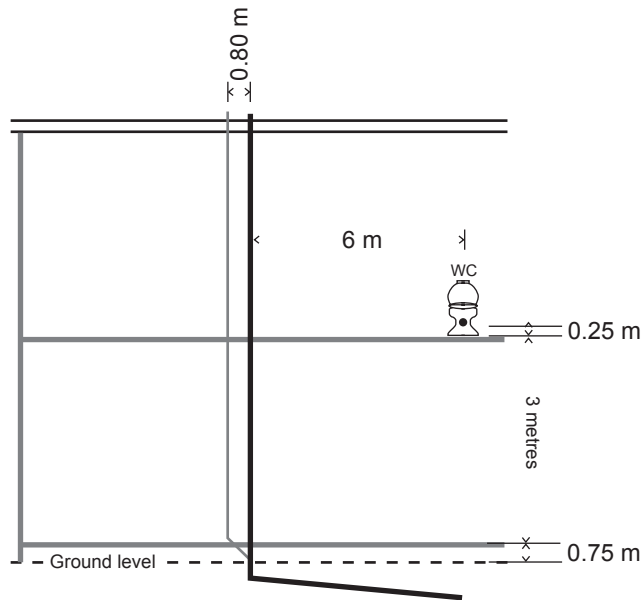
D = diameter of pipe in mm

L = length of pipe in metres

SECTION A

QUESTION 1

The diagram below shows a P trap toilet installed in a building and ready to be connected to the existing discharge stack and relief vent. The installation is to comply with AS/NZS 3500 Part 2: Sanitary plumbing and drainage.



- (a) Calculate the height above ground level the inlet of the junction on the discharge stack will need to be located for the fixture discharge pipe from the toilet pan to be installed at the minimum required gradient.

(3 marks)

- (b) The WC pan vent will rise vertically 500 mm from the WC Pan outlet and then connect to the relief vent.

Calculate the height above floor level the junction to connect the vent pipework is required to be installed to provide the minimum required gradient.

(3 marks)

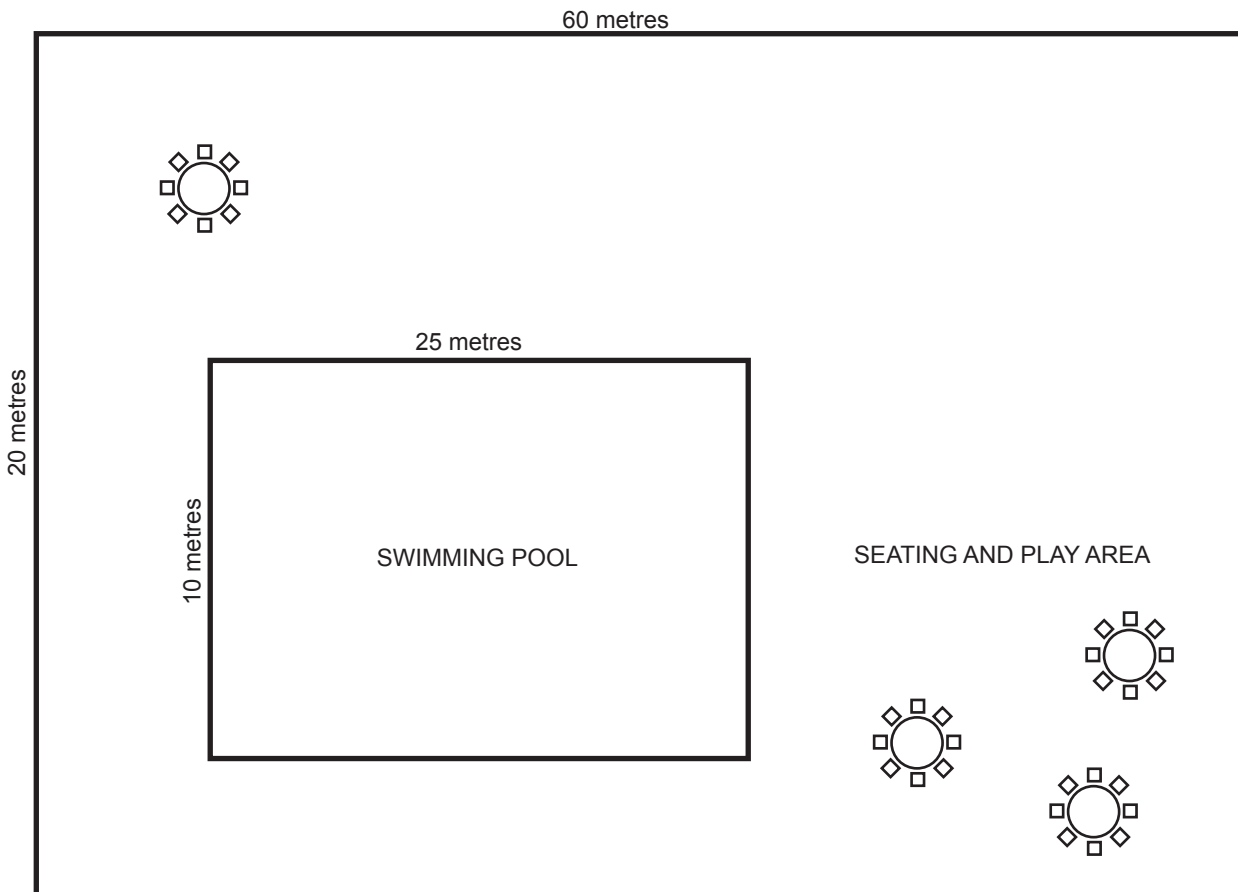
Total 6 marks

QUESTION 2

The plan below shows a swimming pool surrounded by seating and open play area.

Separate male and female toilet facilities are to be provided.

Using the procedure in New Zealand Building Code clause G1/AS1 Personal Hygiene, complete the tables on the opposite page to show the minimum number of sanitary fixtures that must be provided for the complex.



QUESTION 2 (cont'd)

Minimum number of people facilities must be provided for	
Minimum number of females	
Minimum number of males	

	Basins	WC Pans	Urinals
Male			
Female			

Disabled access facilities	
WC Pans	Basins

Total 13 marks

QUESTION 3

A floor plan showing the layout of fixtures and appliances in a factory is shown on the opposite page.

As part of the factory management plan, the owners need to know how much water is used for each of the following:

- Sanitation
- Caustic processes
- Acidic processes
- Wash down hoses.

The factory requires potable water to be supplied to all sanitary fixtures except the WC pans. The WC pans and all other outlets are to be supplied with non potable water.

The water supplies to the caustic and acidic equipment must be protected from each other.

- (a) Complete the plan to clearly show an economical layout for the cold water supply pipework needed to meet the owner's requirements.
- (b) On the plan show the location of each backflow prevention device and each water meter needed to meet the owner's requirements.

Total 11 marks

LEGEND



Water closet



Basin



Sink



Non potable water supply



Potable water supply



Emergency shower



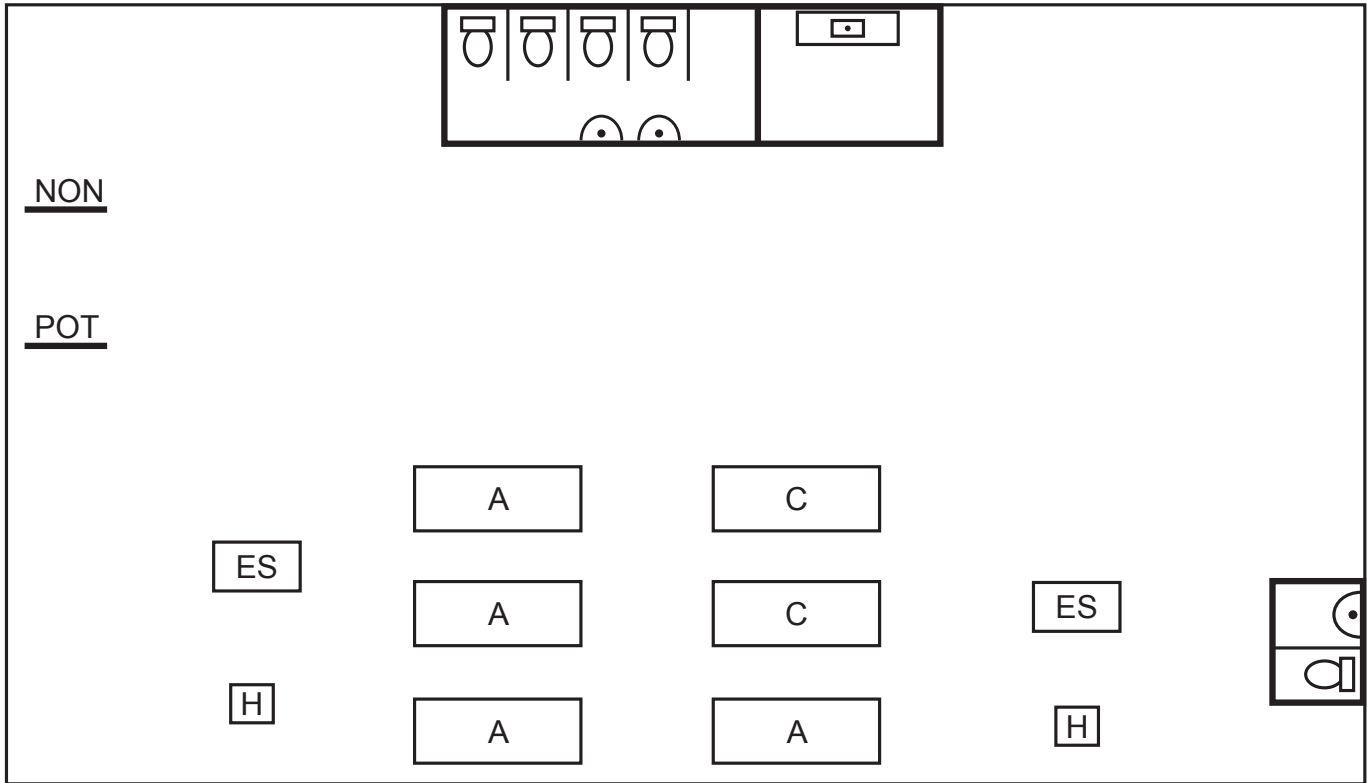
Wash down hose



Caustic bath



Acidic bath



QUESTION 4

- (a) A plumber is to train a work colleague to use a piece of machinery the colleague is not familiar with.

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

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

(4 marks)

- (b) Give THREE steps that should be included in the health and safety cycle for a workplace.

- 1 _____
- 2 _____
- 3 _____

(3 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)

QUESTION 4 (cont'd)

(d) Give THREE examples of different types of injuries that are considered to be serious harm which require notification to the appropriate authority.

- 1 _____
- 2 _____
- 3 _____

(3 marks)

(e) A task is to be completed in a very hot environment.

(i) Give THREE effects to physical health working in that environment could have.

- 1 _____
- 2 _____
- 3 _____

(3 marks)

(ii) Give THREE actions that could be taken to prevent the effects in (i).

- 1 _____
- 2 _____
- 3 _____

(3 marks)

Total 20 marks

QUESTION 5

A tank is to be installed to supply 4 metres head to an ablution block.

20 mm diameter pipe will be used to convey the water from the tank to the outlets.

The pipe is 12 m long.

Calculate the quantity of water that should be discharged per second from the pipe.

Total 5 marks

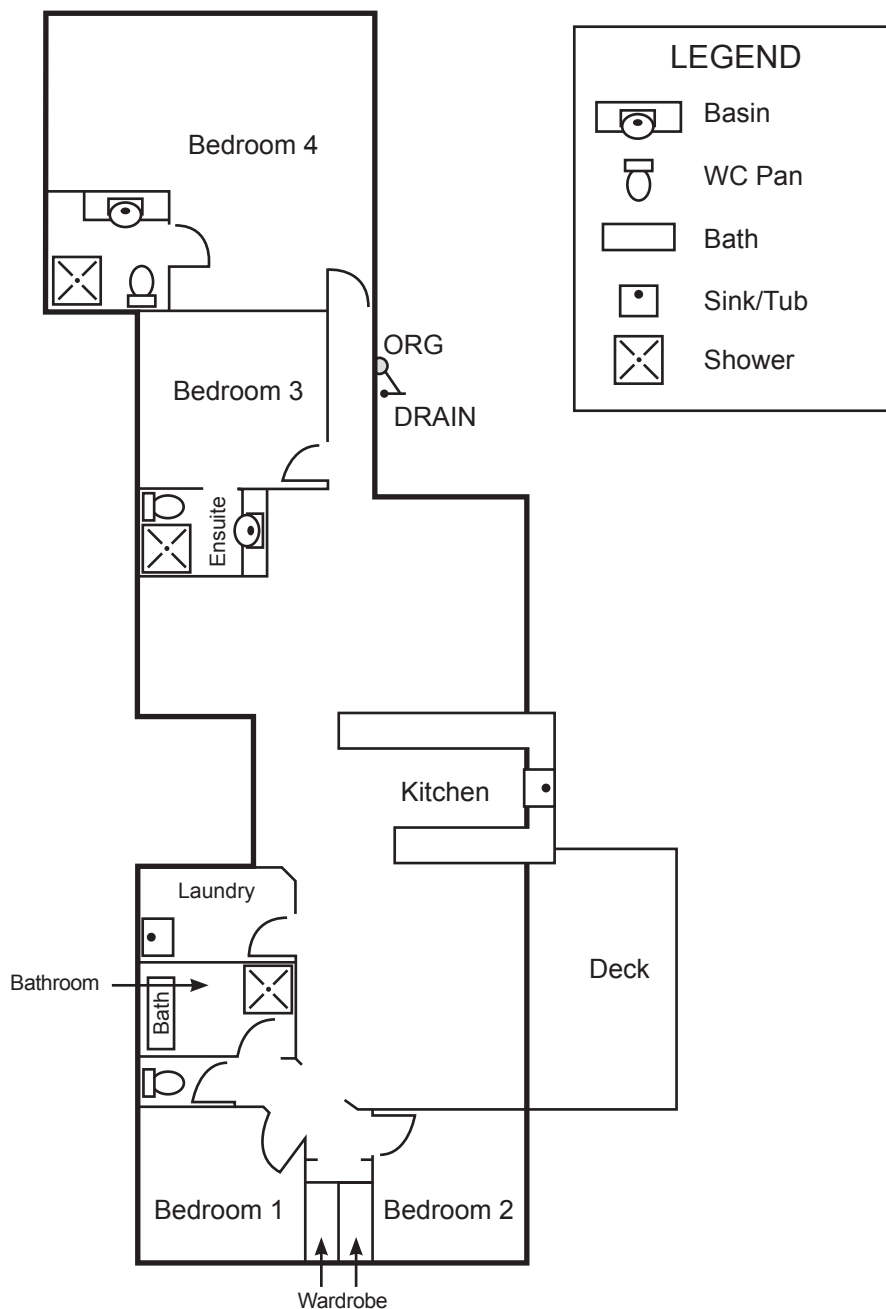
QUESTION 6

The diagram below shows a plan view of a house to be built on a concrete slab. The plan is drawn to a scale of 1:100

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

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

- (a) On the plan, show the location of all discharge pipes and vents.
- (b) On the plan, show the minimum allowable diameter for each section of the discharge and vent pipework.



Total 9 marks

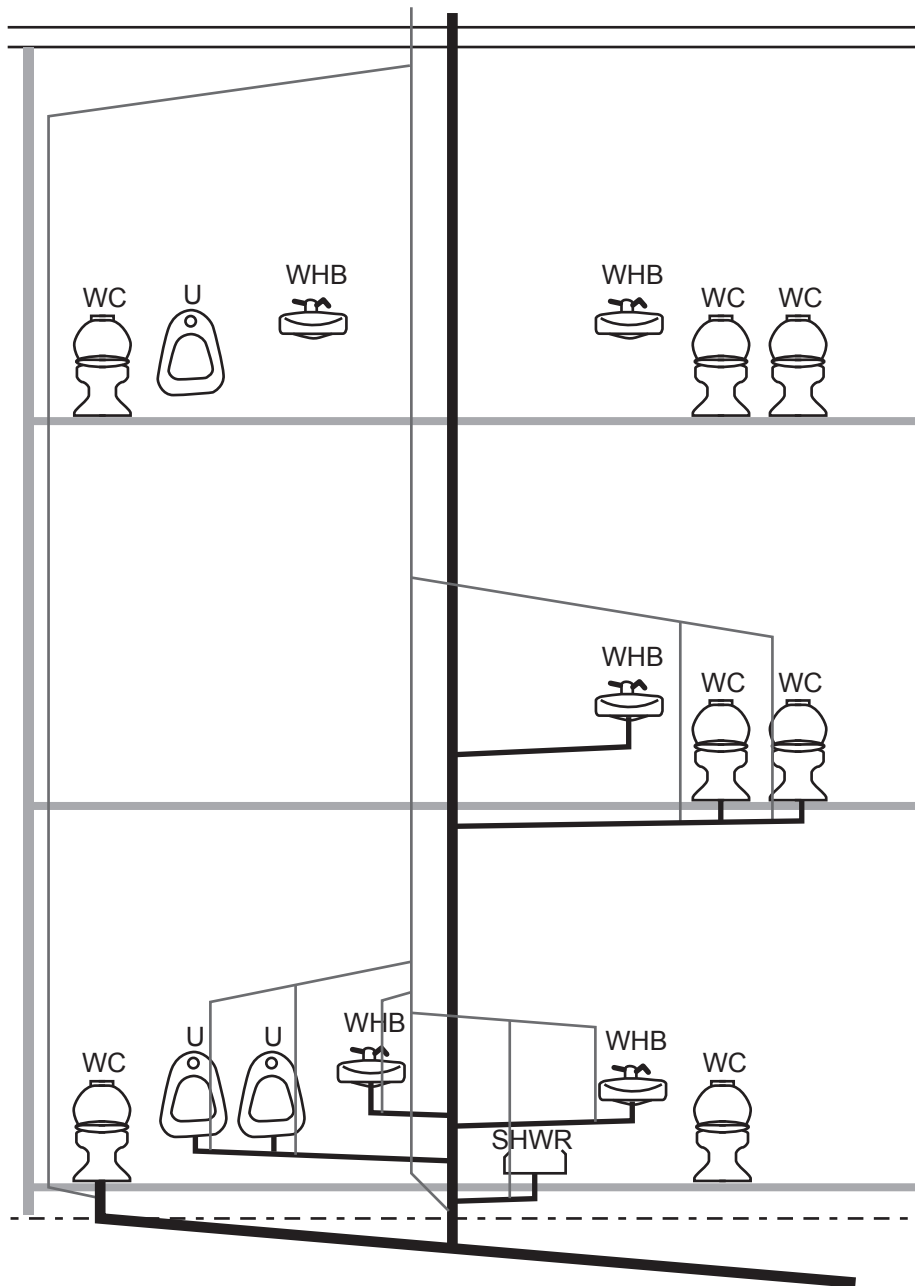


QUESTION 7

An existing three-storey office block has a waste discharge system installed to comply with New Zealand Building Code clause G13/AS1 Foul Water.

An additional WC pan is to be installed on the ground floor and SIX additional fixtures are to be installed on the top floor of the building as shown on the diagram below.

Complete the diagram to show the discharge pipes for additional fixtures that must be connected to the existing system and any additional venting requirements.



Total 5 marks

QUESTION 8

- (a) Give THREE differences between the valve design and installation requirements of a pressure vacuum breaker and an atmospheric vacuum breaker.

1 _____

2 _____

3 _____

(3 marks)

- (b) Describe a situation that could cause back pressure to occur in a water supply system.

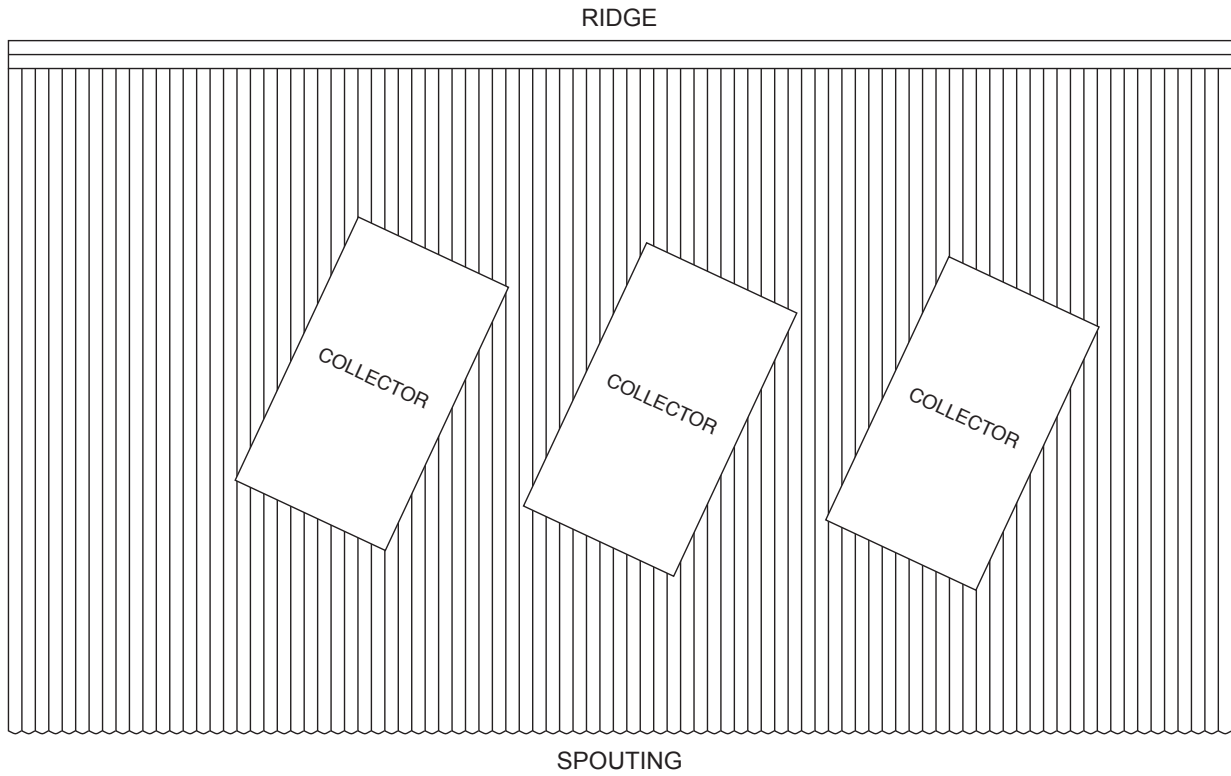
(2 marks)

Total 5 marks

QUESTION 9

The starter drawing below shows three solar panels installed on a roof.

- (a) Complete the diagram to show the pipework required to manifold the panels together in parallel.



(3 marks)

- (b) Give an advantage of installing solar panels with a parallel type manifold system compared with a series type manifold system.

(1 mark)

QUESTION 9 (cont'd)

(c) State the factor that determines the inclination at which a solar panel must be installed to gain maximum efficiency.

(1 mark)

(d) Give FOUR other environmental factors that affect the efficiency of a solar panel.

1

2

3

4

(2 marks)

Total 7 marks

QUESTION 10

Answer the following to comply with AS/NZS 3500 Part 1: Water services.

- (a) A water service is being installed between two buildings at a waste water treatment plant.

Give the TWO options available for installing the pipework to protect it from any possible ground contamination.

1 _____

2 _____

(2 marks)

- (b) Water service mains are being installed together in a trench excavated to the side of a shared driveway to feed two separate dwellings.

- (i) State the minimum separation distance that must be provided between the two water service pipes.

(1 mark)

- (ii) The temperature in the area regularly falls below 0°C.

Give TWO ways in which the water service pipes could be protected from freezing.

1 _____

2 _____

(2 marks)

- (iii) One of the water services will be required to cross the driveway to reach the dwelling.

The driveway is to be sealed.

State the minimum depth the water pipe is required to be installed at this point.

(1 mark)

QUESTION 10 (cont'd)

(iv) The dwellings are in an area prone to freezing.

Give THREE areas within the building envelope that should be avoided when installing the pipework inside.

1 _____

2 _____

3 _____

(3 marks)

Total 9 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 no mark will be awarded for that question.

1. What is the maximum permitted length for an untrapped fixture discharge pipe connected to a floor waste gully?

A 1200 mm.

B 1800 mm.

C 2000 mm.

D 2500 mm.

E 3000 mm.

2. What is the maximum permitted length for a trapped fixture discharge pipe connected to a floor waste gully?

A 1200 mm.

B 1800 mm.

C 2000 mm.

D 2500 mm.

E 3000 mm.

3. 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 Laundry tub.

D Shower.

E Tundish.

4. 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.

5. How is the fixture unit rating of a floor waste gully determined?
- A The length of the discharge pipe from the gully to the drain or stack.
 - B The number of fixtures discharging into the floor waste gully.
 - C The inlet size of the floor waste gully.
 - D The sum of the unit ratings of the fixtures discharging into the floor waste gully.
 - E The outlet size of the floor waste gully.

6. 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 kPa.
- B 5 kPa.
- C 8 kPa.
- D 10 kPa.
- E 15 kPa.

7. 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 the 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.

8. A home for the elderly houses 35 people.

How many litres of water must be stored to supply the facilities in the case of an emergency?

- A 875 litres.
- B 1050 litres.
- C 1400 litres.
- D 1750 litres.
- E 2100 litres.

9. What is the maximum allowable temperature for the hot water outlets feeding basins at a home for the elderly?

- A 32°C.
- B 36°C.
- C 45°C.
- D 50°C.
- E 55°C.

10. A registered plumber has changed address.

Within what period of time should the Plumbers, Gasfitters and Drainlayers Board be notified of the new address?

- A 24 hours.
- B 7 Days.
- C 14 Days.
- D 1 month.
- E 3 months.

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		