No. 9195

Plumbers, Gasfitters and Drainlayers Board

REGISTRATION EXAMINATION, JUNE 2022
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.

This exam booklet consists of 2 sections

Section A – Questions 1 to 11

Section B – Questions 1 to 10

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 26-28 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.

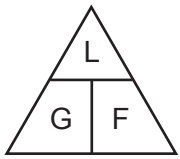Check that this booklet has all of 30 pages in the correct order.

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

USEFUL FORMULAE

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

Area of circle = π × R²   or   Area of circle = 0.7854 × D²

Volume of cylinder = π × R² × H   or   Volume of cylinder = 0.7854 × D² × H

length = L
gradient = 1:G
fall = F

SECTION A

QUESTION 1

(a) Give FOUR different situations/environments in which a plumber should wear a mask
to protect their lungs.

_____

_____

3 _____

4 _____

(4 marks) ☐

(b) In addition to wearing a mask, steps can be taken to ensure that the atmosphere in which a
plumber is working is safe.

Give TWO such steps.

1 _____

2 _____

(2 marks) ☐

(c) In addition to inhaling contaminants into the lungs, give THREE other ways in which toxins
can enter the body.

1 _____

2 _____

3 _____

(3 mark) ☐

Total 9 marks ☐

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QUESTION 2

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

The plan is drawn to a scale of 1:100

The dwelling is to be built on a concrete slab.

The drainage 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, complete the underslab pipework to show all discharge pipes and vent connections that will need 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.

LEGEND

WC Pan	
Basin	
Shower	
Laundry Tub	
Floor Waste Gully	
Kitchen Sink	
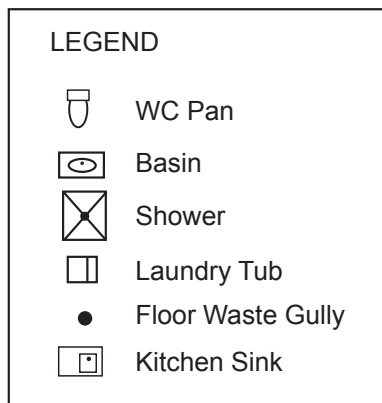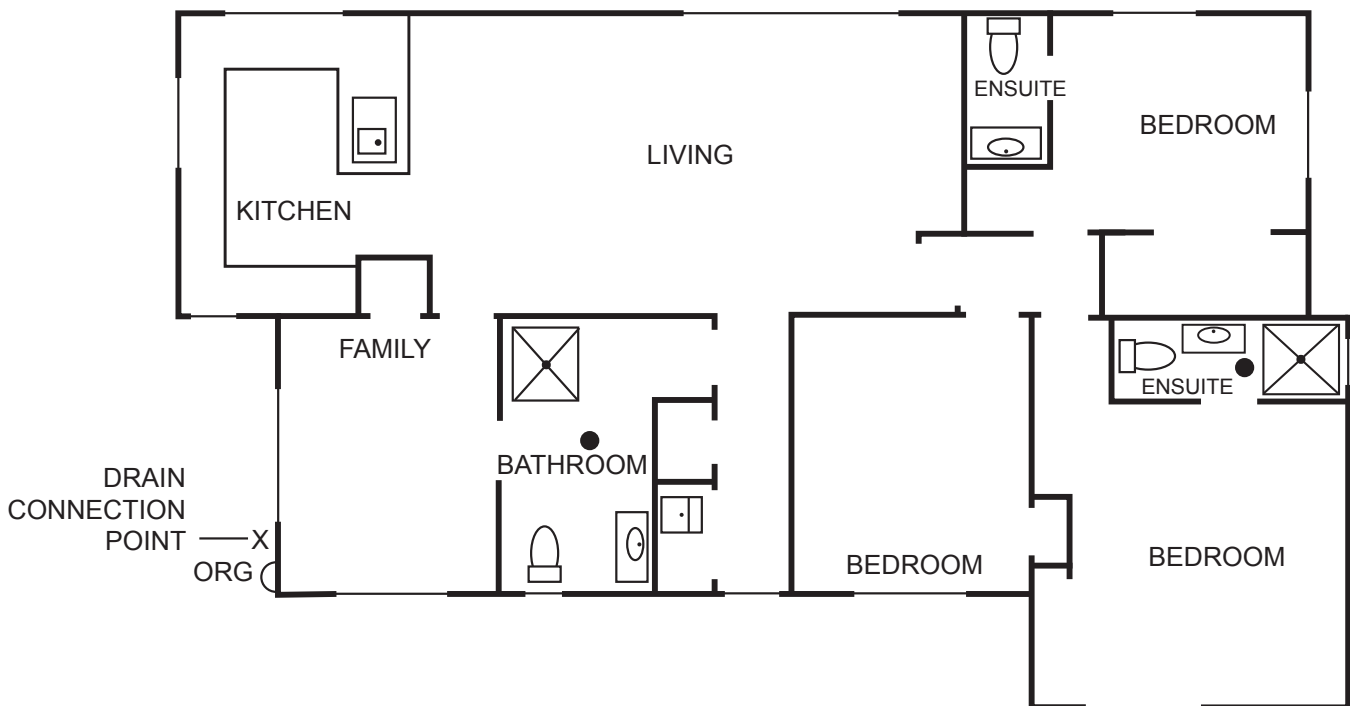
**Total 9 marks**

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QUESTION 3

The diagram below shows a 300 litre mains pressure electric hot water cylinder that is to be installed to supply personal hygiene fixtures in a sports club.

The cylinder has a maximum working pressure of 850 kPa and is supplied with a 1000 kPa rated temperature pressure relief valve.

(a) Complete the diagram to show all pipework and valves needed, including pressure and temperature ratings and all other components needed to complete the installation, include the required installation distances for the valves and components.

The completed installation is to comply with New Zealand Building Code Acceptable Solution G12/AS1.
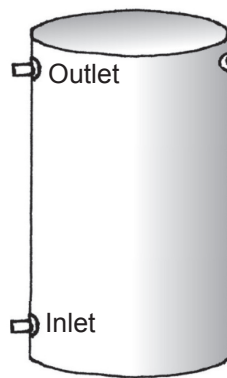
(11 marks)

(b) Give THREE examples of when changes to an existing hot water cylinder installation would require a building consent from the local authority.

1 _____

2 _____

3 _____

(3 marks)

Total 14 marks

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QUESTION 4

(a)   Give the meaning of the following terms in relation to backflow.

   (i)   High hazard

   _____

                                                                    (1 mark) ☐

   (ii)   Medium hazard

   _____

                                                                    (1 mark) ☐

   (iii)   Low hazard

   _____

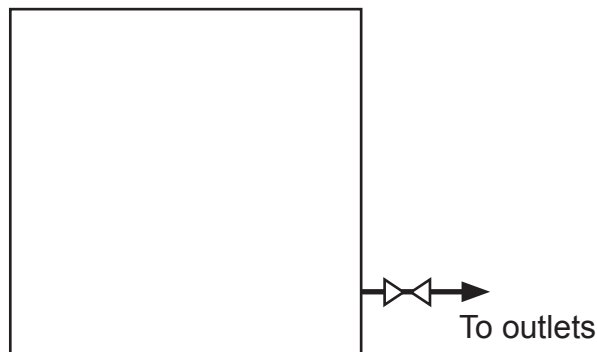   (1 mark) ☐

(b)   An air gap is to be used to provide backflow prevention from a water storage tank.

        The water is supplied to the tank through a 25 mm diameter float valve (ball cock).

   (i)   Complete the diagram to show how an air gap can be achieved. Also show the
           two points between which an air gap is measured.

                                                                    (2 marks) ☐

To outlets

   (ii)   State the minimum permitted height of the air gap so that the system complies
           with New Zealand Building Code Acceptable Solution G12/AS1 Water
           Supplies.

   _____

                                                                    (1 mark) ☐

                                                        Total 6 marks ☐
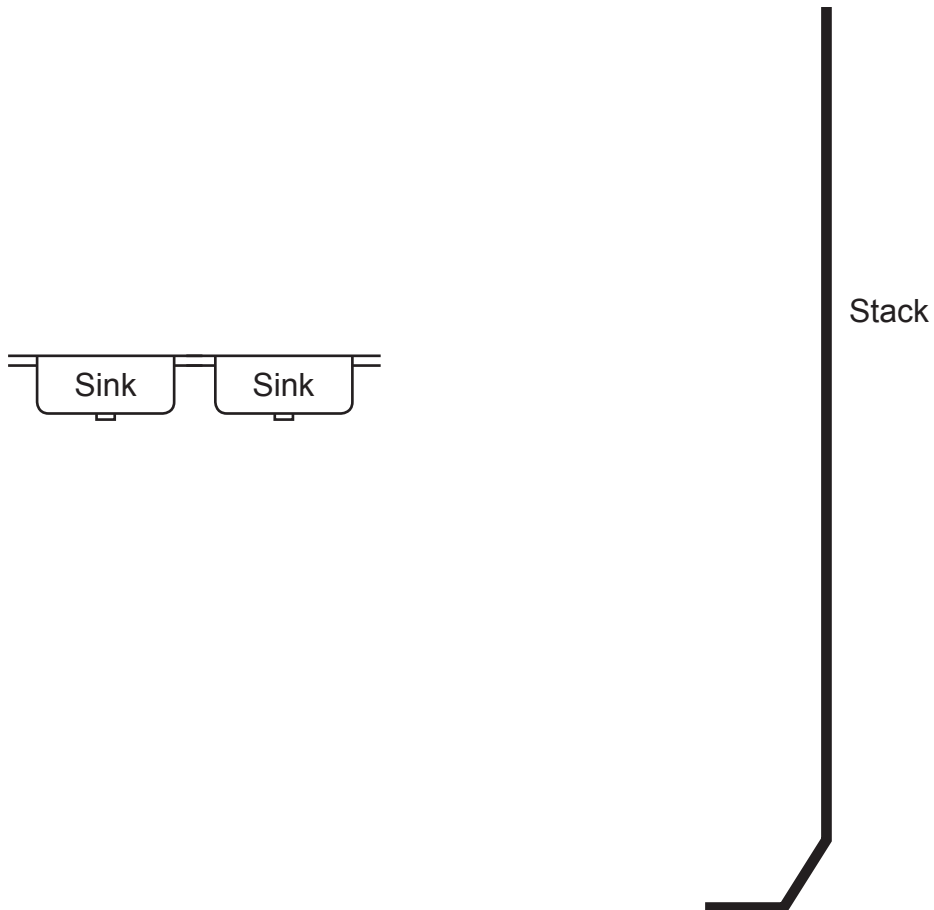
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QUESTION 5

The starter diagram below shows a domestic kitchen sink and a 100 mm discharge stack.

The diagram is not to scale.

The stack is 3 storeys high and the sink is not the highest fixture connected to the stack.

(a)   Complete the diagram to show all of the pipework required to connect the sink to the foul water discharge and vent systems. An air admittance valve must not be used, and the installation is to comply with New Zealand Building Code Acceptable Solution G13/AS1 Foul Water.

(b)   On the diagram write the minimum diameter, gradient, and any critical installation distances that must be achieved for each section of pipework.

Stack

Total 7 marks

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QUESTION 6

A tank is to be installed to supply water at 40 kPa 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, in litres per second, the expected flow rate at the outlet of the pipe.

Formula: $\quad q \ = \ \sqrt{\dfrac{H \times D^5}{25 \times L \times 10^5}}$

        where   q = expected flow rate in litres per second
                     H = head in metres
                     D = diameter of pipe in mm
                     L = length of pipe in metres

Total 3 marks

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QUESTION 7

A corrugated iron roof has a pitch of 15°.

The maximum wind speed expected for the location is 20 metres per second.

A 100 mm vent has been installed, penetrating the roof 600 mm below the ridge.

Sketch a diagram showing the flashing required for the installation, including measurements.

The completed installation is to comply with the minimum requirements of the New Zealand Building Code Acceptable Solution E2/AS1 External Moisture.

Total 7 marks

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QUESTION 8

(a) Give FIVE procedures relating to working at height that a workplace health and safety manual should include.

1 _____

2 _____

3 _____

4 _____

5 _____

(5 marks) ☐

(b) Name THREE approved Codes of Practice or guidelines other than the Best Practice Guidelines for working at height in New Zealand relating to safety that are relevant to work carried out in the plumbing industry.
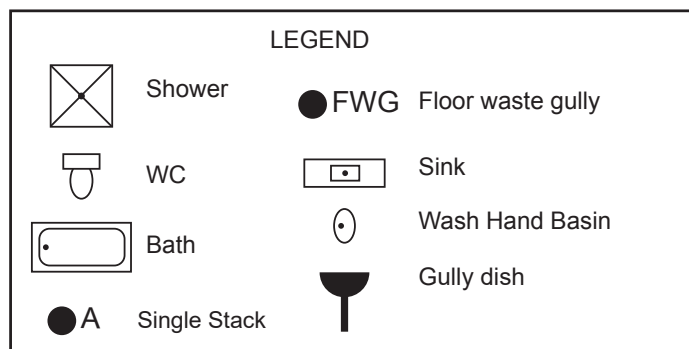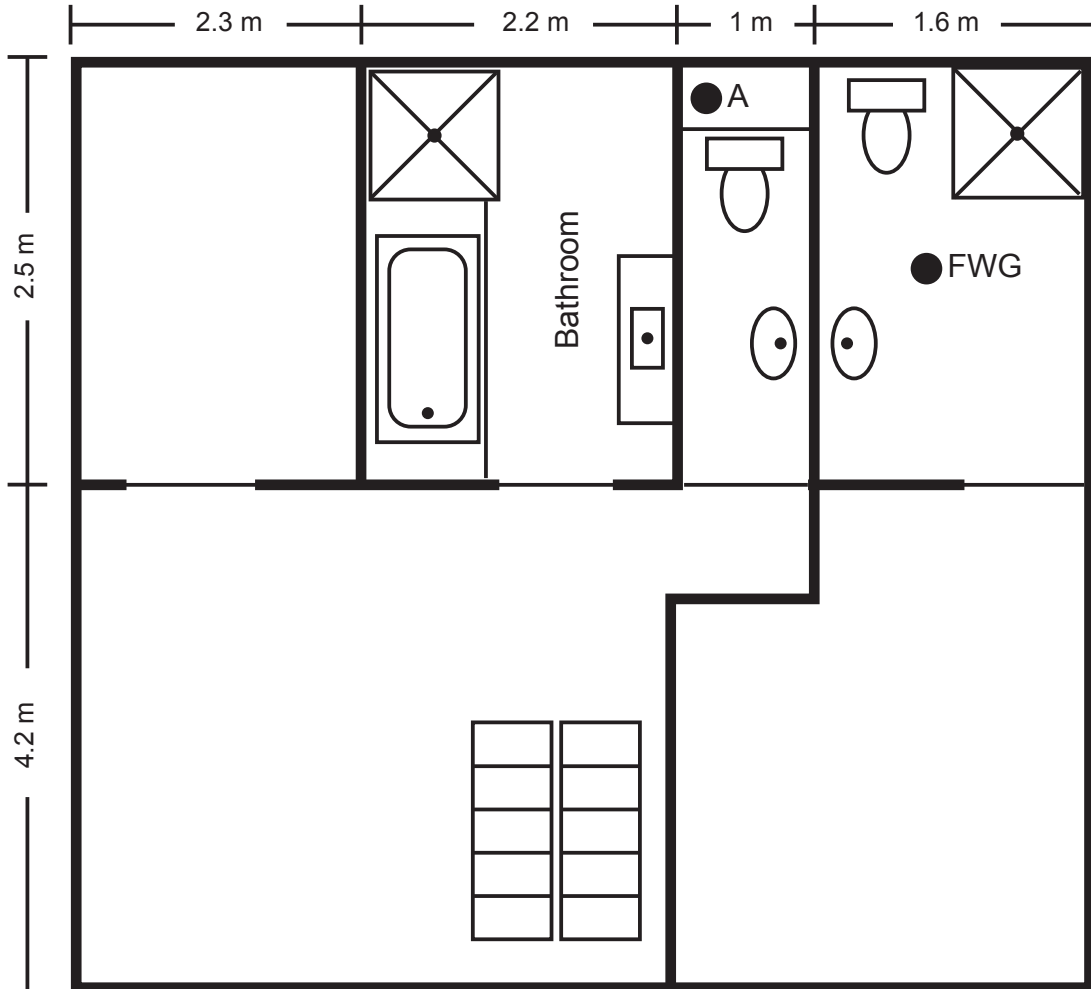
1 _____

2 _____

3 _____

(3 marks) ☐

Total 8 marks ☐

The drawing below shows a plan view of the first level of a dwelling with the sanitary fixtures.

The fixtures are to discharge to the drainage system via a SINGLE STACK installed at the location marked A.

Complete the diagram on the following page to show the discharge and vent pipework required to complete the installation. On the diagram, also show the diameter of each section of pipework. The sanitary discharge pipework is to comply with the minimum requirements of AS/NZS 3500 Part 2: Sanitary plumbing and drainage.

ROOF

WHB

WC   WC   WHB   WHB

BATH   SHWR

SHWR

FWG

WC   WHB

STACK

SHWR
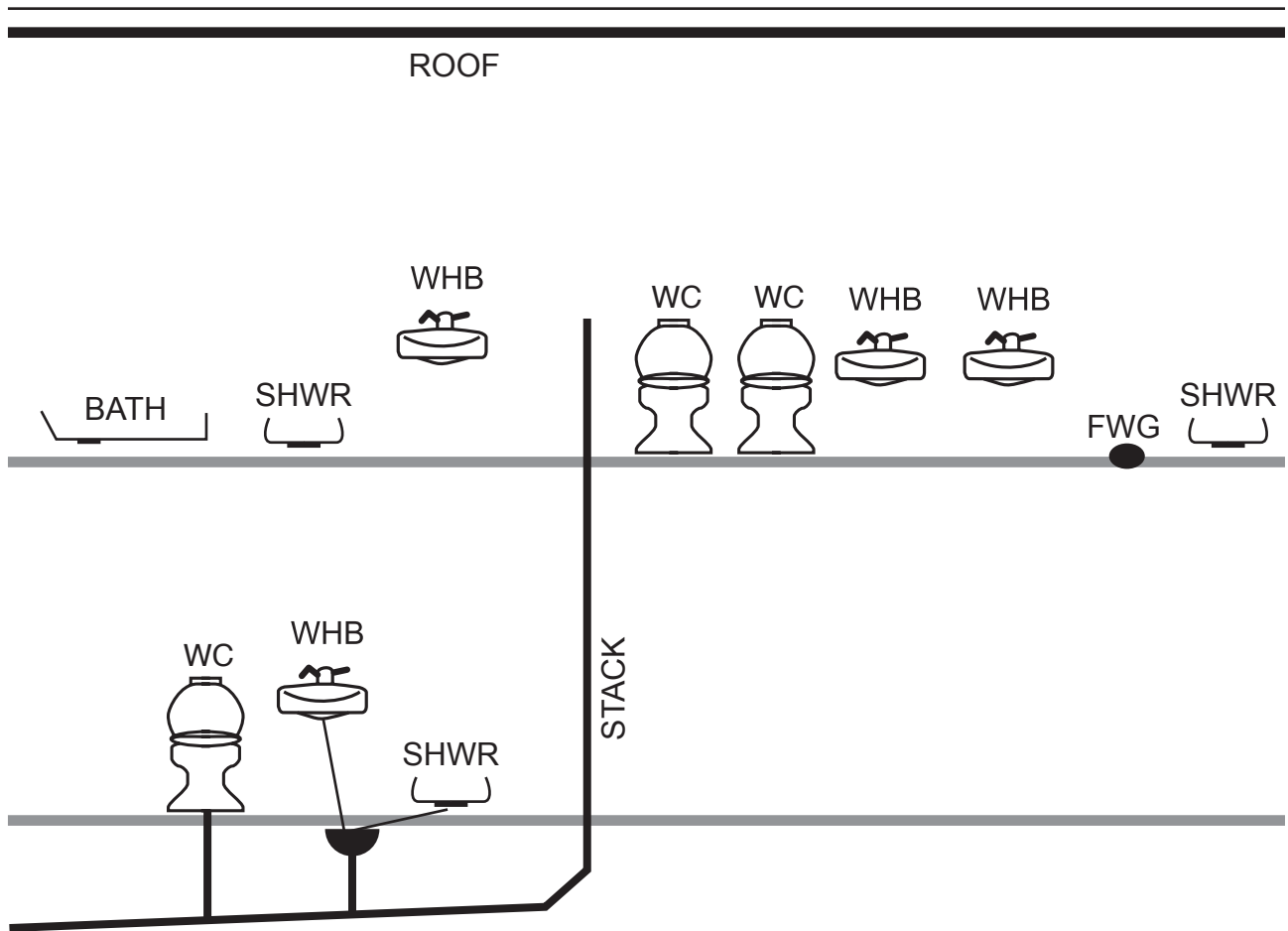
Total 13 marks

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QUESTION 10

(a) Give SIX factors that should be considered when a solar water heating system is being designed.

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

(3 marks)

(b) State FIVE checks that should be carried out during the maintenance on a solar collector panel.

1 _____

2 _____

3 _____

4 _____

5 _____

(5 marks)

Total 8 marks

QUESTION 11

The diagram below is a schematic of the potable cold water pipework from a 1500 litre tank supplying a series of cold water outlets.

The cold water pipework dimensions are given in the table below the diagram.
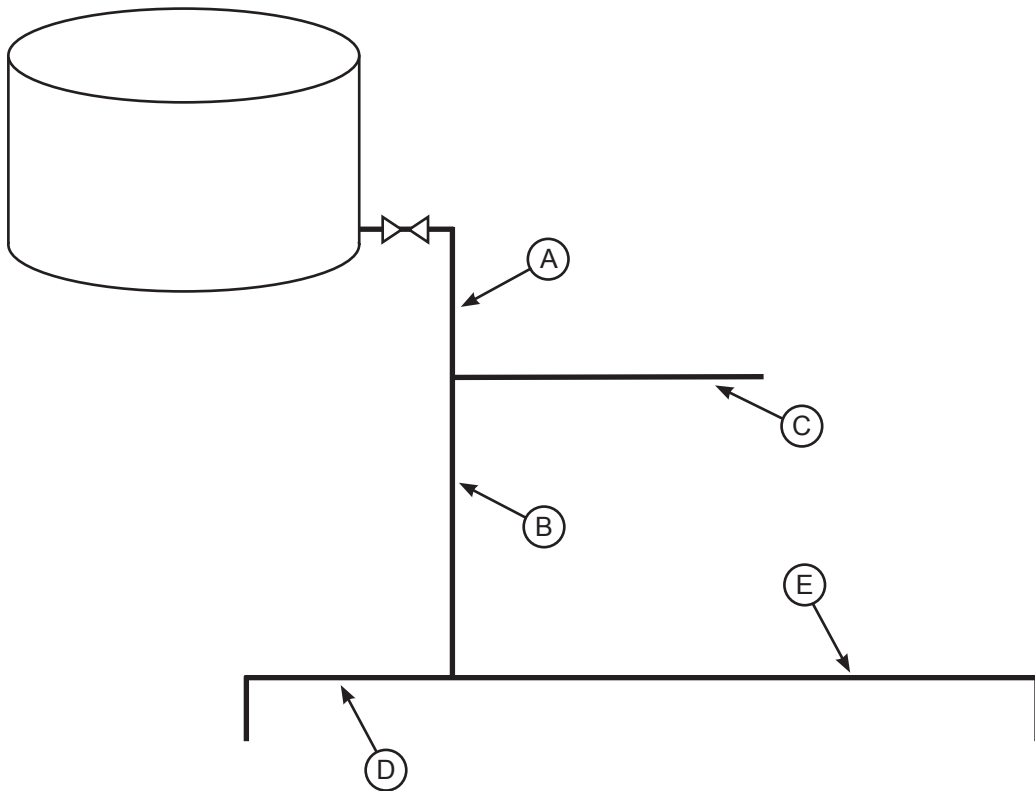
Section of pipework	Length	Diameter (ID)
A	4 metres	32 mm
B	5 metres	25 mm
C	5 metres	20 mm
D	4 metres	15 mm
E	8 metres	15 mm

QUESTION 11 (cont'd)

(a) Calculate the total volume of the pipework.

_____

_____

_____

_____

_____

_____

_____

_____

_____

(4 marks)

(b) AS/NZS 3500 Part 1: Water services recommends an initial chlorine dose of 50 mg/litre when disinfecting a water tank.

Calculate how many grams of chlorine is required for the initial dose to disinfect the tank.

_____

_____

_____

_____

(2 marks)

Total 6 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. Plumber A has requested the assistance of a tradesman plumber employed by Plumber B.

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

   A   The tradesman plumber.

   B   The Plumber, Gasfitters and Drainlayers Board.

   C   WorkSafe.

   D   Plumber A.

   E   Plumber B.

2. Which of the following is the best solution when hazards are identified in the workplace to comply with the Health and Safety in Employment Act?

   A   Minimise the hazard to the employees'.

   B   Eliminate the hazard from the employee's workplace.

   C   Isolate employees from the hazard.

   D   Provide all necessary personal protection equipment to employees.

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

3. A home for the elderly houses 35 people.

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

   A   875 L.

   B   1050 L.

   C   1400 L.

   D   1750 L.

   E   2100 L.

4. What is the maximum allowable temperature for hot water delivered to basin taps at a home for the elderly?

    A   32ºC

    B   36ºC

    C   45ºC

    D   50ºC

    E   55ºC

5. Which of the following is an advantage of using an indirect heating system?

    A   Higher temperatures can be achieved.

    B   The temperature can be maintained at a more stable level.

    C   A tempering valve is not required on the installation.

    D   The pressure rating of the circulating pump can be increased.

    E   One heat source can be used for both potable and non-potable hot water supplies.

6. Which of the following components would you NOT expect to find in a thermo-siphon solar water heating system?

    A   A pump.

    B   An element.

    C   A non-return valve.

    D   A thermostat.

    E   An air eliminator/vent.

7. 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.

8.	What is the maximum diameter pipe permitted to be flashed with an EDPM rubber boot without requiring a soaker flashing in accordance with the New Zealand Building Code Acceptable Solution E2/AS1 External Moisture?

A	50 mm.

B	65 mm.

C	85 mm.

D	90 mm.

E	100 mm.

9.	What is the minimum roof pitch suitable to have a soaker flashing installed to seal a penetration in accordance with New Zealand Building Code Acceptable Solution E2/AS1 External Moisture?

A	5º

B	10º

C	15º

D	20º

E	25º

10.	A soaker flashing is to be installed in an area designated a very high wind zone.

How many millimetres below that penetration must the flashing extend?

A	50 mm

B	70 mm

C	130 mm

D	200 mm

E	250 mm

Total 10 marks

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Question number _____

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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		