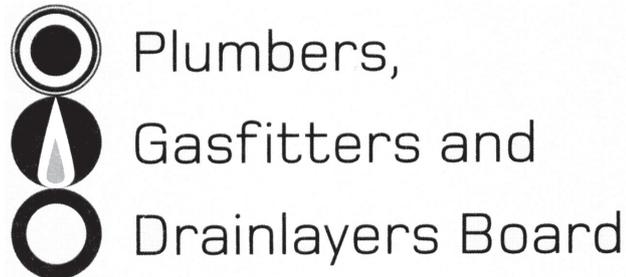


Affix label with Candidate Code  
Number here.  
If no label, enter candidate  
Number if known

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No. 9192



## REGISTRATION EXAMINATION, JUNE 2015

# LICENSED 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 22–25 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 25 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**

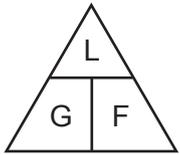
Candidates that sat this examination in June 2015 were provided with the following documents:

- New Zealand Building Code Clause E2 – External Moisture

## USEFUL FORMULAE

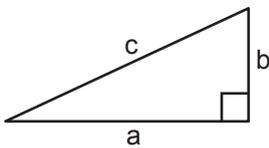
Circumference of circle =  $2 \times \pi \times R$  or Circumference of circle =  $\pi \times D$

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

- (a) Loading and unloading oxy/acetylene welding kits into the back of a van has been identified as a workplace hazard.

State how the hazard could be eliminated, isolated or minimised to reduce the risk of injuries.

Eliminated:

---

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Isolated:

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Minimised:

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(3 marks)

- (b) A ladder is being used to access the roof of a dwelling.

Give SIX ways the risk of an accident can be minimised.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

4 \_\_\_\_\_

5 \_\_\_\_\_

6 \_\_\_\_\_

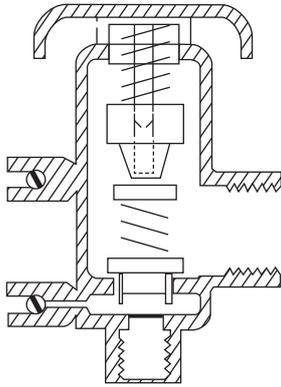
(3 marks)

**Total 6 marks**

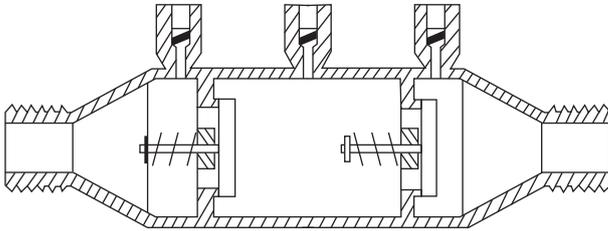
## QUESTION 2

(a) Name each of the backflow prevention devices shown below. Write the name in full.

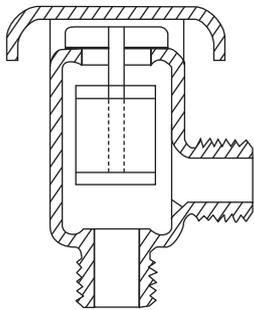
(i)



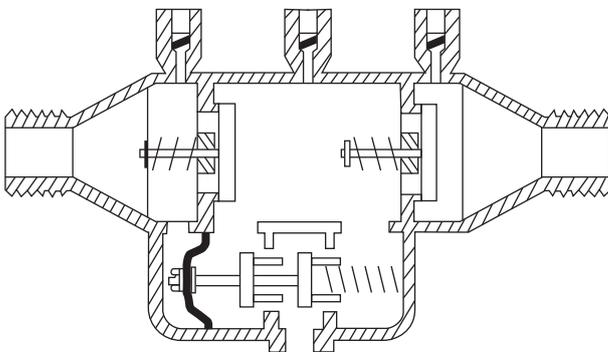
(ii)



(iii)



(iv)

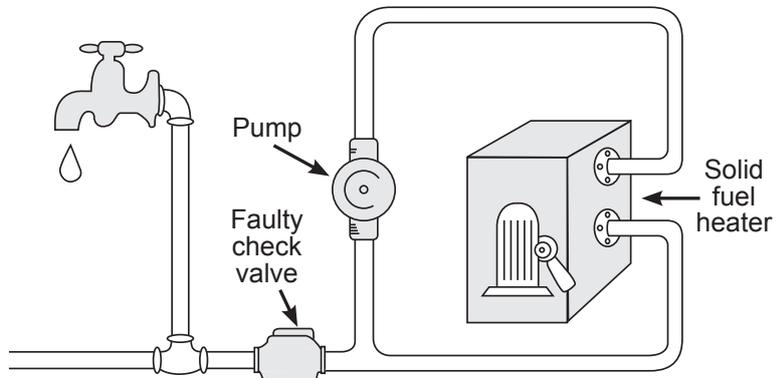


(4 marks)

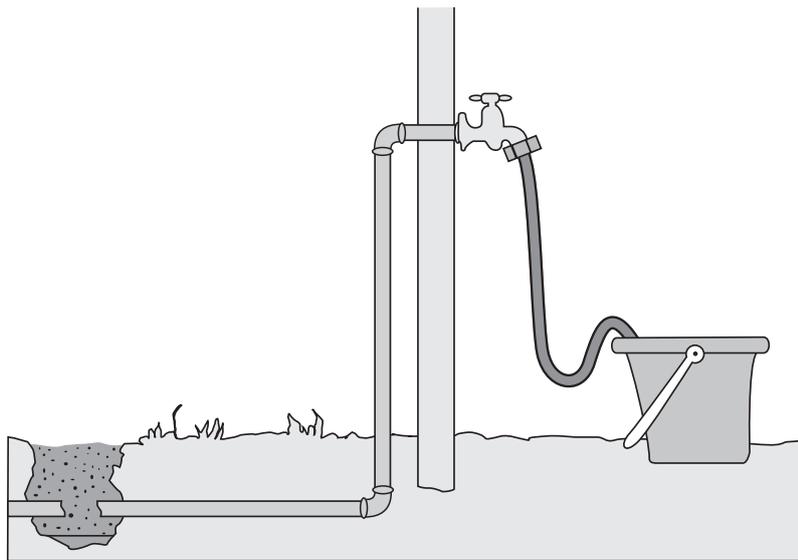
**QUESTION 2 (cont'd)**

(b) Name the different type of backflow situation shown in each drawing below.

(i)



(ii)



(2 marks)

**Total 6 marks**

### QUESTION 3

A sports club uses the changing rooms and shower facilities every second weekend during the winter season.

In order to lower the water heating costs, it has been decided to only heat the hot water cylinder when required.

The hot water is supplied from a 360 litre hot water cylinder fitted with two 3 kW elements that have 95% efficiency.

The water temperature is to be raised from 11°C to 70°C.

The hot water for the showers is needed at 4:00 pm.

Calculate the time of day the power supply to the elements needs to be turned on to ensure the water is heated for post-match showers.

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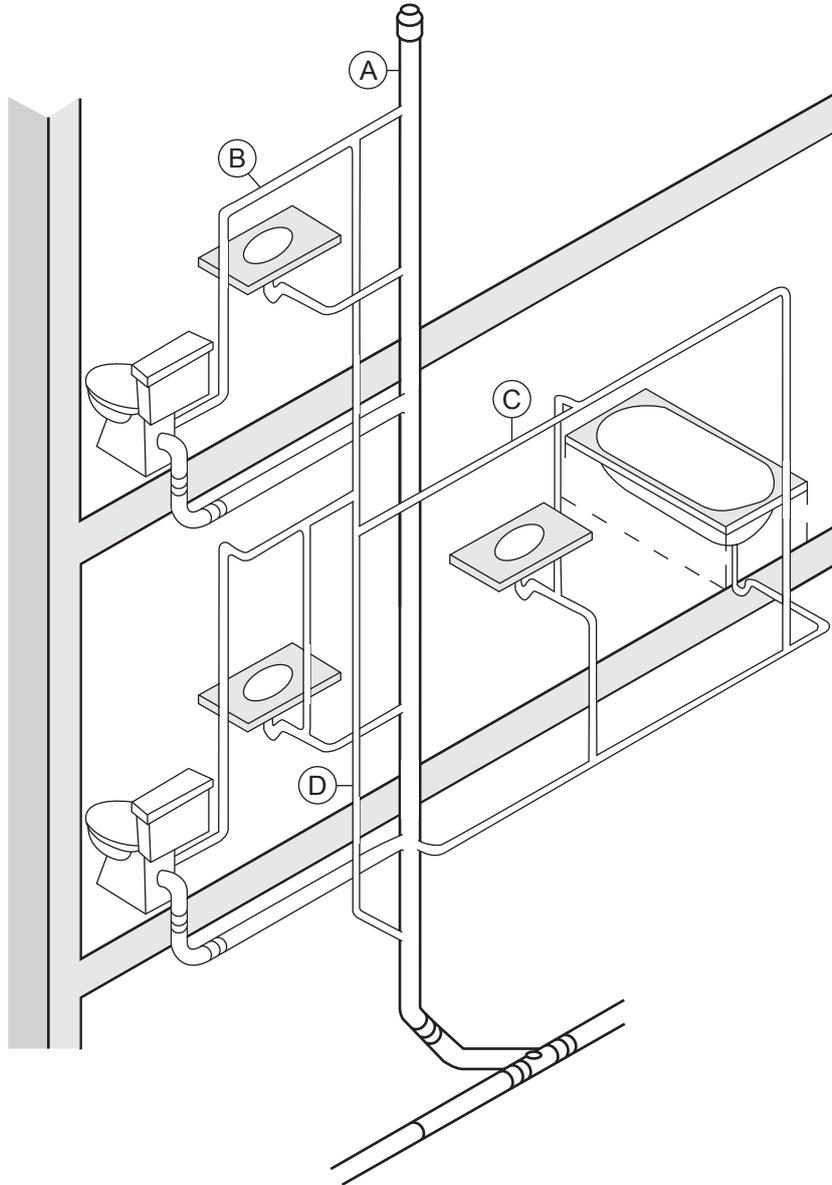
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Total 6 marks

**QUESTION 4**

The diagram below shows a foul water stack system complete with vents.

Sections of vent pipework are labelled A to D.



Complete the table below by giving the name of each section of pipework A – D.

A	
B	
C	
D	

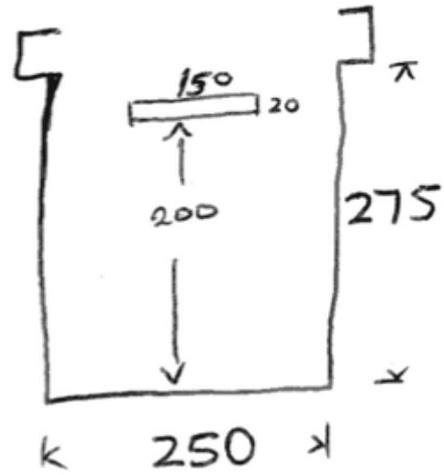
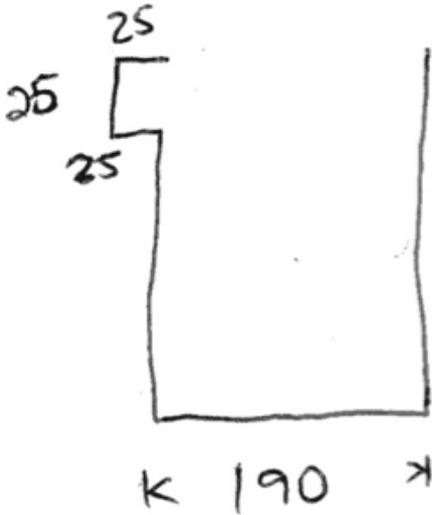
**Total 4 marks**

### QUESTION 5

The sketches below show the side and front elevation of a rain water head to be made from sheet metal.

On the opposite page, draw a cutting and folding pattern for the sheet metal required to construct the rain water head.

The pattern is to be drawn at a scale of 1:5



Total 5 marks



**QUESTION 6**

(a) Give the meaning of the term 'fixture pair'.

---

(1 mark)

(b) Name THREE fixtures that are permitted to be installed as a fixture pair.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

(3 marks)

(c) Circle TWO of the following fixtures, appliances and outlets that are permitted to be supplied with non-potable water as specified in AS/NZS 3500 Part 1: Water services.

Wash hand basin	Garden hose tap
Laundry tub	Dishwasher
Kitchen sink	Clothes washing machine
Bath	WC cistern

(2 marks)

**Total 6 marks**

**QUESTION 7**

(a) A solar panel is to be installed on a zinc roof.

Give TWO materials that are suitable to construct a support frame for the solar panel.

1 \_\_\_\_\_

2 \_\_\_\_\_

(2 marks)

(b) Name TWO materials that cannot be used to construct flashings that make contact with a cedar clad building.

1 \_\_\_\_\_

2 \_\_\_\_\_

(2 marks)

(c) Materials used in the plumbing trade are usually selected by considering their compatibility with other materials, as well as their physical properties, such as their conductivity.

Name FOUR physical properties of materials, other than conductivity, that may be considered during the material selection process.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

4 \_\_\_\_\_

(2 marks)

(d) Give THREE factors that determine the required size of a soaker flashing.

1 \_\_\_\_\_

2 \_\_\_\_\_

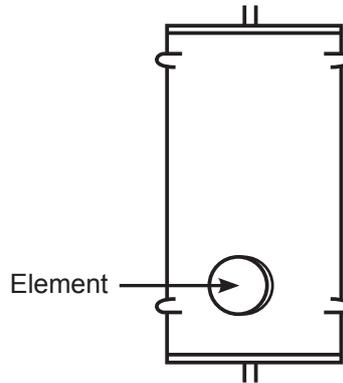
3 \_\_\_\_\_

(3 marks)

**Total 9 marks**

**QUESTION 8**

(a) Complete the diagram below to show a gravity fed, open vented, indirect storage water heater.



(3 marks)

(b) Name FOUR different sources of energy that can be used to supply hot water to a dwelling.

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_

(2 marks)

(c) Give the THREE methods of heat transfer.

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_

(3 marks)

**QUESTION 8 (cont'd)**

(d) Name ONE of the heat transfer methods in (c) and explain the characteristics of that method.

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(2 marks)

(e) Explain each of the following terms in relation to hot water systems.

Sacrificial anode

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Seismic restraint

---

---

Un-tempered

---

---

Continuous flow

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(4 marks)

**Total 14 marks**

## QUESTION 9

(a) Give the name of TWO tools designed to create a bend in copper tube.

1 \_\_\_\_\_

2 \_\_\_\_\_

(1 mark)

(b) (i) Give the names of THREE tools that can be used to create a fold in sheet metal.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

(ii) Give THREE ways two pieces of sheet metal can be fixed together.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

(3 marks)

**Total 4 marks**

**QUESTION 10**

(a) Explain how each of the following pumps operate and state if each pump is displacement or non-displacement type.

(i) Reciprocating

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(2 marks)

(ii) Centrifugal

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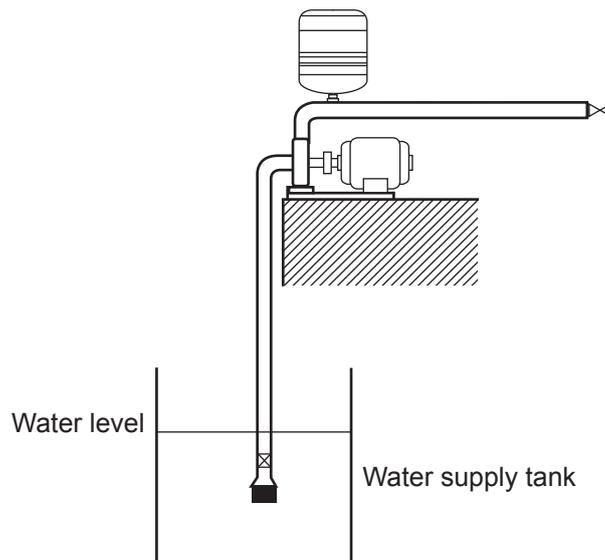
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(2 marks)

(b) Label the drawing below to show each of the following:

- Suction lift
- Delivery pipe
- Pressure vessel
- Pump
- Filter/strainer
- Non-return valve



(3 marks)

**Total 7 marks**

## QUESTION 11

A solid fuel heater with a wetback is being installed to heat the water for a domestic hot water cylinder.

- (a) Name the material from which the pipework between the wetback and the cylinder may be constructed.

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(1 mark)

- (b) Explain why pipework between a wet back and a hot water cylinder must be installed at a gradient.

---

(1 mark)

- (c) Explain why isolating valves are not permitted within pipework between a wetback and a hot water cylinder.

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(2 marks)

- (d) Name the type of vent that must be installed on a wet back installation

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(1 mark)

- (e) (i) Sketch a diagram to show how a completed joint on a vertical section of the flue for a solid fuel heater should be installed.

(3 marks)

- (ii) Give the reason why the joints in (i) should be installed as shown.
- 

(1 mark)

**Total 9 marks**

## QUESTION 12

Name FOUR fixtures that are permitted to discharge into a floor waste gully trap.

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_

Total 4 marks

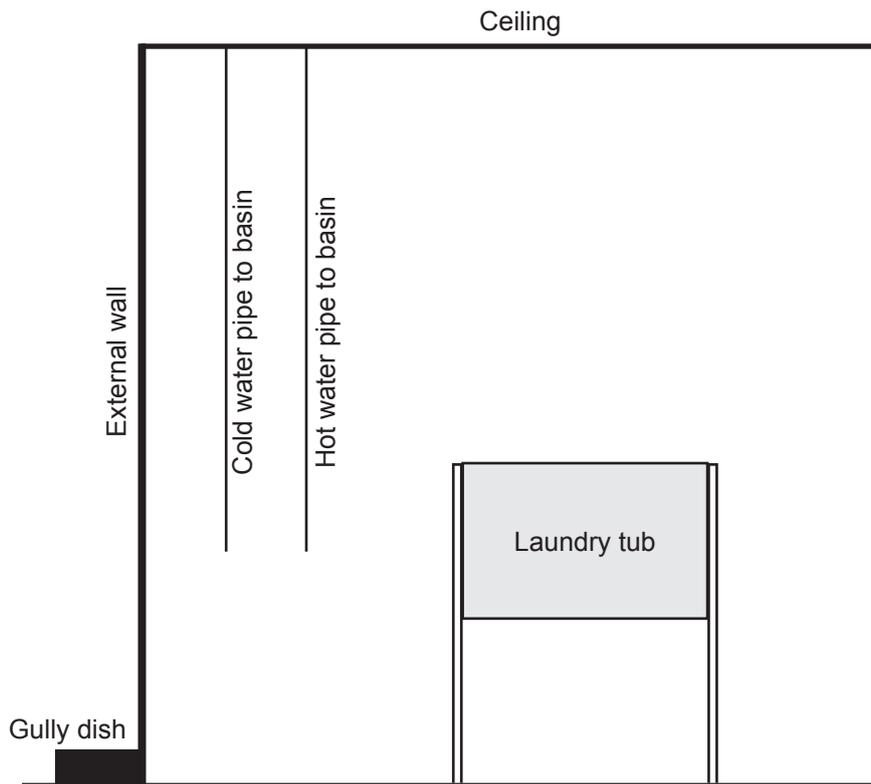
**QUESTION 13**

The diagram below shows the proposed location of a laundry tub to be installed in the garage of a dwelling.

Hot and cold polybutylene water pipes feeding a wash hand basin in the adjacent room are also shown.

The customer has requested that the laundry tub be fitted with a side pipe to receive discharge from the washing machine.

The customer has supplied the laundry tub, cabinet and a pair of laundry conversion taps.



List the plumbing materials required to carry out the installation.

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**Total 5 marks**

**QUESTION 14**

(a) State the common term used to describe water that has a high calcium carbonate content.

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(1 mark)

(b) Give a situation where water with a high calcium carbonate level is likely to occur.

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(1 mark)

(c) Describe a common complaint that results from water with a high calcium carbonate content being supplied to a house, and give a possible remedy.

Complaint

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Remedy

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(2 marks)

**Total 4 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. Which of the following best describes the term 'hydraulics'?
- A The litres per second water travels through pipework.
  - B Pipework full of water with all outlets closed.
  - C Pipework full of water with an outlet open.
  - D Water wearing away the internal surface of pipework.
  - E The metres per second water travels through pipework.

2. Which of the following best exemplifies where the principles of hydrostatics can be observed?
- A The litres per second water travels through pipework.
  - B Pipework full of water with all outlets closed.
  - C Pipework full of water with an outlet open.
  - D Water wearing away the internal surface of pipework.
  - E The metres per second water travels through pipework.

3. Which of the following is the best definition of velocity?
- A The litres per second water travels through pipework.
  - B Pipework full of water with all outlets closed.
  - C Pipework full of water with an outlet open.
  - D Water wearing away the internal surface of pipework.
  - E The metres per second water travels through pipework.

4. Which of the following is the best definition of flow rate?
- A The litres per second water travels through pipework.
  - B Pipework full of water with all outlets closed.
  - C Pipework full of water with an outlet open.
  - D Water wearing away the internal surface of pipework.
  - E The metres per second water travels through pipework.

5. Which of the following best describes the term 'erosion'?
- A The litres per second water travels through pipework.
  - B Pipework full of water with all outlets closed.
  - C Pipework full of water with an outlet open.
  - D Water wearing away the internal surface of pipework.
  - E The metres per second water travels through pipework.

6. What is the maximum permitted temperature for a hot water supply to a domestic shower installed to comply with New Zealand Building Code clause G12/AS1 Water Supplies?
- A 35°C.
  - B 40°C.
  - C 45°C.
  - D 50°C.
  - E 55°C.

7. When adjusting the temperature for the hot water supply to sanitary fixture outlets in a retirement home, the temperature should be measured at which of the following to ensure it is correct?
- A The thermostat.
  - B The tempering valve outlet.
  - C The basin tap outlet.
  - D The drain port of the temperature and pressure relief (TPR) valve.
  - E The top of the hot water cylinder.

8. The purpose of a water seal on a sanitary discharge pipe is to prevent which of the following?

- A Water dripping from a faucet outlet.
- B Foul gases entering a dwelling from the drainage system.
- C Non-potable water entering the potable water supply.
- D A tap from leaking through the spindle.
- E The trap from self-siphoning.

9. Which of the following is permitted to discharge to a floor waste gully in an adjacent room?

- A Dishwasher.
- B Kitchen sink.
- C Tundish.
- D Urinal.
- E Washing machine.

10. Which of the following is trap seal loss that can occur when wind blows over the top of a vent pipe?

- A Compression.
- B Evaporation.
- C Momentum.
- D Oscillation.
- E Siphonage.

11. Which of the following is trap seal loss that can occur when a fixture is not used for a period of time and the ambient temperature is high?

- A Compression.
- B Evaporation.
- C Momentum.
- D Oscillation.
- E Siphonage.

**Total 11 marks**

For Examiner's use only

Question number	Marks	Marks
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
Section B		
Total		