

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

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No. 9192



Plumbers,
Gasfitters and
Drainlayers Board

REGISTRATION EXAMINATION, JUNE 2017

TRADESMAN 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

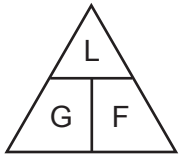
Candidates that sat this examination in June 2017 were provided with the following documents:

- New Zealand Building Code Clause G1 – Personal Hygiene

USEFUL FORMULAE

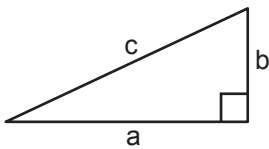
Circumference of circle = $2 \times \pi \times R$ or Circumference of circle = $\pi \times D$

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

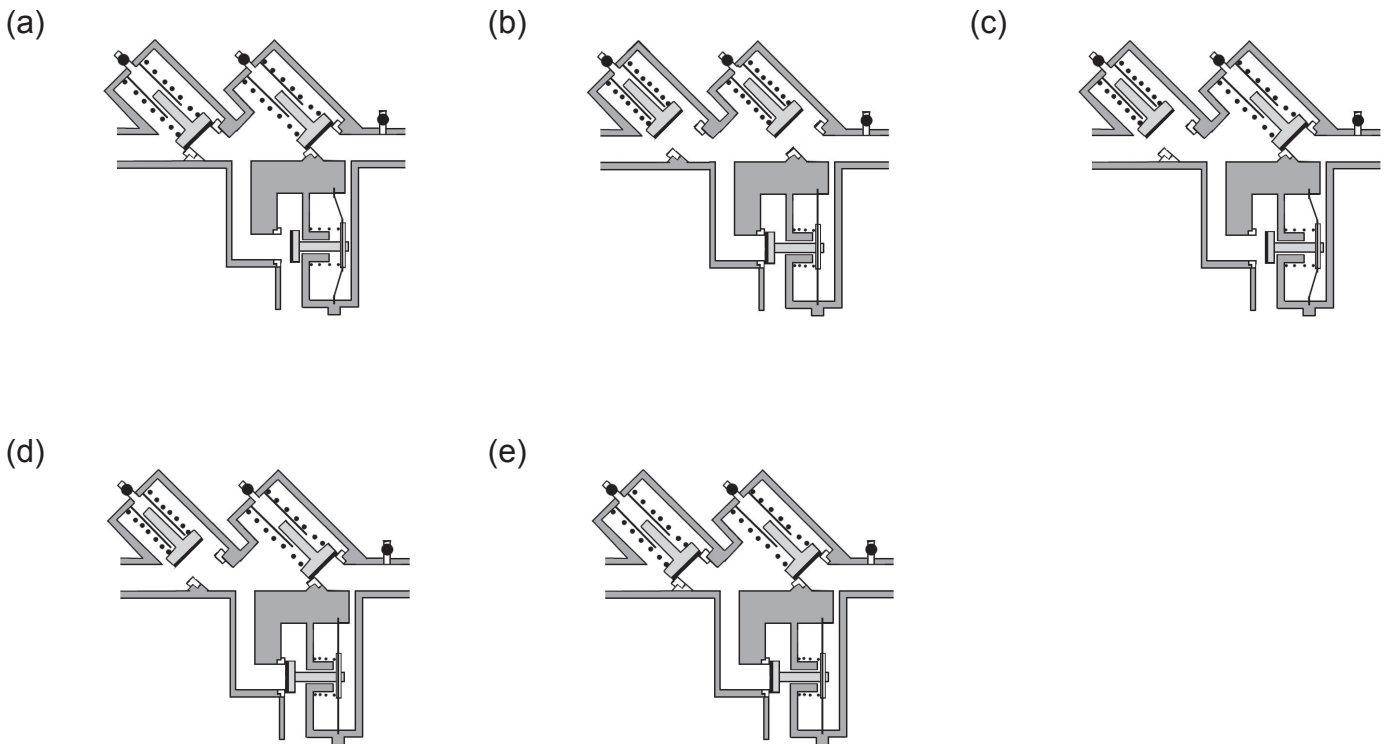
Give FIVE factors that can shorten the lifespan of plastic water pipes.

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

Total 5 marks

QUESTION 2

The diagrams below show reduced pressure backflow prevention devices in four different situations.



Give the letter of the diagram that corresponds with each of the following conditions.

Condition	Diagram
No fault with water flowing	
Back pressure with faulty second check valve	
Back syphonage	
No fault in static situation	

(4 marks)

QUESTION 2 (cont'd)

(b) Explain back pressure in relation to backflow protection.

(2 marks)

(c) Explain back syphonage in relation to backflow protection.

(2 marks)

(d) An air gap or a reduced pressure zone (RPZ) backflow prevention device can both protect against back pressure and back siphonage.

Give the advantage an RPZ device has compared with an air gap.

(1 mark)

Total 9 marks

QUESTION 3

(a) Below are names of four common ways a water trap in a waste discharge system can lose its seal.

Give the cause and a possible remedy for each type of seal loss.

Oscillation

Cause _____

Remedy _____

(3 marks)

Induced siphonage

Cause _____

Remedy _____

(3 marks)

Compression

Cause _____

Remedy _____

(3 marks)

Momentum

Cause _____

Remedy _____

(3 marks)

QUESTION 3 (cont'd)

(b) Name FIVE different water seal traps used in sanitary plumbing discharge systems.

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

(5 marks)

Total 17 marks

QUESTION 4

(a) A WC is installed with a manual flushing cistern.

Water is running constantly through the flush-pipe and into the WC pan.

One possible cause is that the float valve (ball cock) is over-filling the cistern.

Give ONE other reason for this to occur.

(1 mark)

(b) A float valve (ball cock) in a toilet cistern has been re-washed but the cistern continues to over-fill.

Give TWO reasons this may be occurring

1 _____

2 _____

(2 marks)

(c) The open vent on a hot water cylinder is overflowing.

Give THREE possible reasons for this to occur

1 _____

2 _____

3 _____

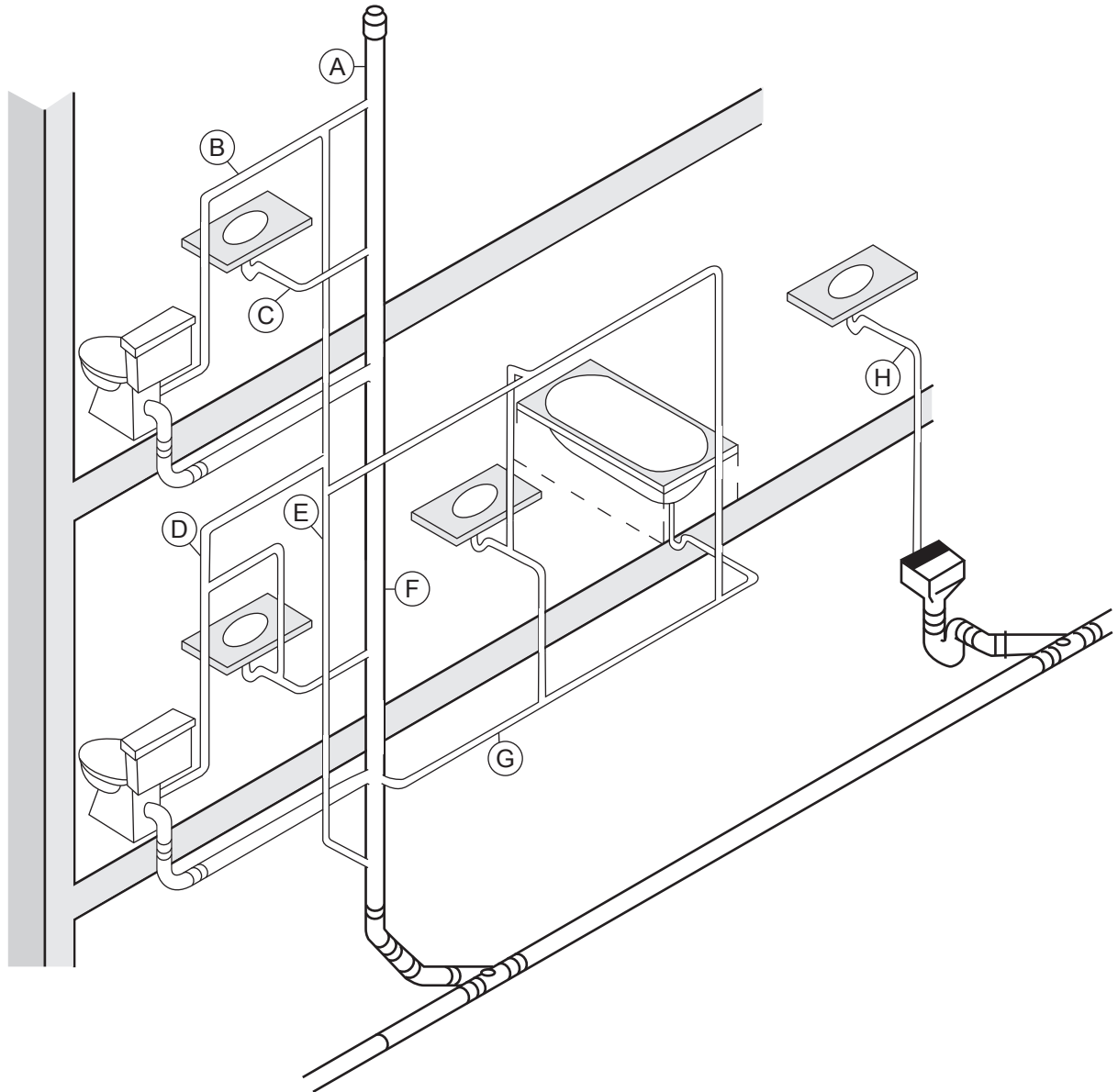
(3 marks)

Total 6 marks

QUESTION 5

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

Sections of the pipework are labelled A – H.



Complete the table below by giving the name of each section of pipework A – H for the system to comply with New Zealand Building Code clause G13 Foul Water.

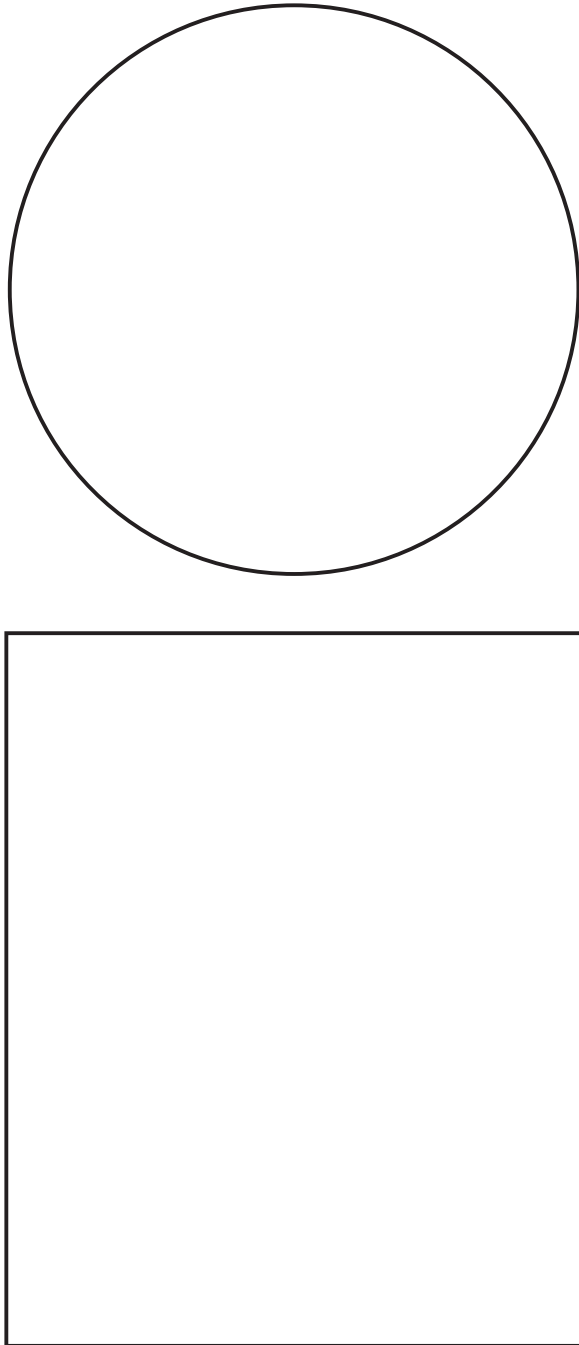
A		E	
B		F	
C		G	
D		H	

Total 8 marks

QUESTION 6

The diagram below shows a plan view and side elevation of a water storage tank.

The diagram has been drawn to a scale of 1:50



Calculate the volume of the tank.

Total 5 marks

QUESTION 7

An ablution block installation is to comply with New Zealand Building Code clause G1/AS1 Personal Hygiene.

(a) An accessible compartment fitted with a toilet and a basin with shroud, for use by people with disabilities, is to be included in the ablution block.

(i) State FOUR measurements regarding the location of the basin and shroud that must be complied with.

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

(4 marks)

(ii) Give the required measurement from a side wall to the centre of the WC pan.

(1 mark)

(b) The ablution block will include a urinal.

(i) Give the maximum height above floor level the front lip of a men's wall-hung urinal is permitted to be.

(1 mark)

(ii) The urinal is to be manually flushed.

Give the maximum height from floor level the operating control is permitted to be installed.

(1 mark)

(iii) Give THREE methods that could be used to flush the urinal automatically.

- 1 _____
- 2 _____
- 3 _____

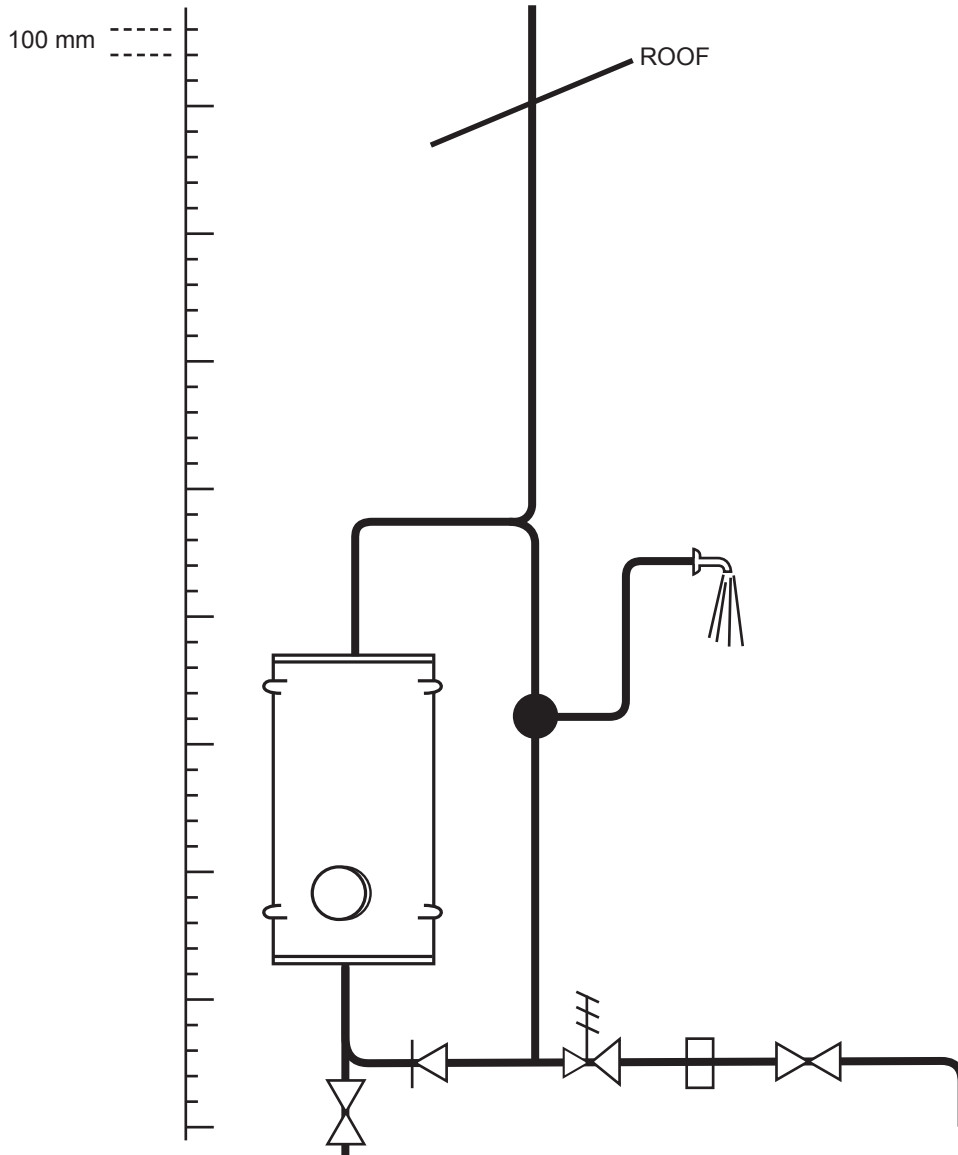
(3 marks)

Total 10 marks

QUESTION 8

The diagram below shows a part of a low pressure open-vented hot water cylinder installation supplying a shower.

The pressure reducing valve has been factory set to 36 kPa.



(a) On the diagram, show the height the water will reach in the vent pipe before the cylinder is heated.

(1 mark)

(b) State the expected available pressure in kPa at the shower head.

(1 mark)

QUESTION 8 (cont'd)

- (c) (i) A tempering valve is to be included in the installation.

On the diagram, show where a tempering valve and required pipework should be located.

(1 mark)

- (ii) State the minimum allowable pipework length from the outlet of the cylinder to the tempering valve.

(1 mark)

- (iii) The cylinder is installed in an area prone to frosts.

Give the requirements that must be met regarding lagging of the vent pipe.

(2 marks)

Total 6 marks

QUESTION 9

(a) State the maximum vertical height in metres that a pump is theoretically able to lift water.

(1 mark)

(b) Give SIX factors that will reduce the head to which a centrifugal pump will be able to supply potable water.

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

(3 marks)

(c) Sketch a cross-section of a centrifugal pump and label the inlet, outlet and impellers/vanes.

(3 marks)

QUESTION 9 (cont'd)

(d) Give an advantage a centrifugal pump has compared with a reciprocating pump.

(1 mark)

(e) Give an advantage a reciprocating pump has compared with a centrifugal pump.

(1 mark)

Total 9 marks

QUESTION 10

- (a) Mobile scaffolding has been erected by a qualified scaffolding contractor, and has been tagged as safe to use.

Give FIVE checks that should be carried out at the beginning of each day to ensure the scaffolding is still safe to use.

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

(5 marks)

- (b) A trench is to be excavated

- (i) State THREE environmental factors that increase the risk of a trench collapsing.

- 1 _____
- 2 _____
- 3 _____

(3 marks)

- (ii) Give FOUR practices that can be used to protect workers from trench collapse.

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

(2 marks)

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. What is the minimum gradient for a vent pipe as specified in the New Zealand Building Code clause G13/AS1 Foul Water?

- A 1:20
- B 1:40
- C 1:60
- D 1:80
- E 1:100

2. Which of the following percentages is equivalent to a gradient of 1:60?

- A 60%
- B 16%
- C 1.65%
- D 0.65%
- E 0.60%

3. A pipe is to be laid at a gradient of 1:40.
How much fall per metre will the pipe have?

- A 25 mm.
- B 40 mm.
- C 80 mm.
- D 250 mm.
- E 400 mm.

4. How many millimetres fall will a 3 metre length of pipe that has been laid at a gradient of 1:20 have?
- A 0.05
 - B 0.15
 - C 1.5
 - D 15
 - E 150

5. A 5 metre length of pipe has 83 mm fall.
What gradient has the pipe been laid at?

- A 1:10
- B 1:20
- C 1:40
- D 1:60
- E 1:80

6. Which of the following items of information are required to determine the minimum allowable gradient for a discharge pipe?
- A The diameter and the length of the pipe.
 - B The diameter of the pipe and the total discharge loading.
 - C The length of the pipe and the total discharge loading.
 - D The material the pipe is constructed from and the length of the pipe.
 - E The total discharge loading and the amount of fall available.

7. What is the purpose of a heat trap in a plumbing system?
- A To absorb energy from the sun in a solar water heating system.
 - B To prevent a thermosiphon current from forming.
 - C To improve the efficiency of a central heating system.
 - D To recover heat from waste hot water in a commercial premises.
 - E To control the temperature of water within a hot water ring main.

8. Which of the following can reduce the effects of temporary hard water?

- A Carbon filter.
- B Aerator.
- C Line strainer.
- D Chlorine.
- E Boiling.

9. Which of the following statements best describes convection heat transfer?

- A Heat that is transferred molecule to molecule by direct contact.
- B Heat that is obtained from a non-potable liquid and transferred to potable water.
- C Heat that is transferred with the assistance of a fan.
- D Heat that can travel through a vacuum.
- E Heat that is circulated through air or liquid due to differing densities.

10. Which of the following statements best describes radiation heat transfer?

- A Heat that is transferred molecule to molecule by direct contact.
- B Heat that is obtained from a non-potable liquid and transferred to potable water.
- C Heat that is transferred with the assistance of a fan.
- D Heat that can travel through a vacuum.
- E Heat that is circulated through air or liquid due to differing densities.

11. Which of the following statements best describes conduction heat transfer?

- A Heat that is transferred molecule to molecule by direct contact.
- B Heat that is obtained from a non-potable liquid and transferred to potable water.
- C Heat that is transferred with the assistance of a fan.
- D Heat that can travel through a vacuum.
- E Heat that is circulated through air or liquid due to differing densities.

12. Which of the following describes the effect increasing the pressure has on water?

- A Decreases the volume.
- B Increases the volume.
- C Lowers the boiling point.
- D Raises the boiling point.
- E Increases the pH level (hard water).

13. How many litres of water can be contained in 1 cubic metre at 4°C?

- A 10.
- B 100.
- C 1000.
- D 10 000.
- E 100 000.

14. Which statement best describes a forced hot water system?

- A A system that must be vented through a temperature/pressure relief (TPR) valve.
- B A system where the water is circulated by a pump.
- C A system that uses thermosiphon currents to circulate the water.
- D A system where the water is heated by a high pressure gas burner.
- E A system that uses a high output fan to blow air over a heat exchanger filled with hot water.

15. What is the maximum allowable temperature at which the hot water in a childcare centre can be supplied?

- A 35°C.
- B 40°C.
- C 45°C.
- D 50°C.
- E 55°C.

Total 15 marks

For Examiner's use only

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