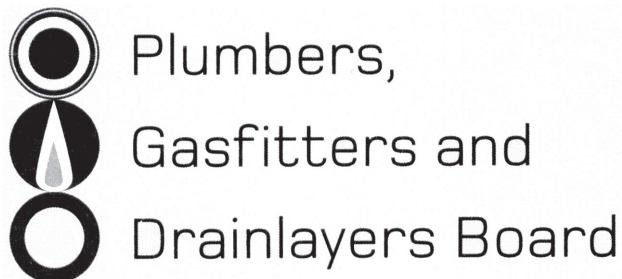


Affix label with Candidate Code
Number here.
If no label, enter candidate
Number if known

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No. 9192



REGISTRATION EXAMINATION, NOVEMBER 2014

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 24–25 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

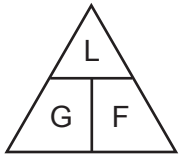
Candidates that sat this examination in November 2014 were provided with the following documents:

- New Zealand Building Code Clause E2 – External Moisture
- New Zealand Building Code Clause G1 – Personal Hygiene

USEFUL FORMULAE

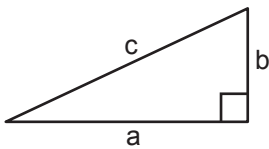
Circumference of circle = $2 \times \pi \times R$ or Circumference of circle = $\pi \times D$

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

Complete the table below by naming the piece of equipment used to measure each item listed and giving the unit of measurement for each one.

	Name of equipment	Unit of measurement
Water Pressure		
Relative Humidity		
Gradient		

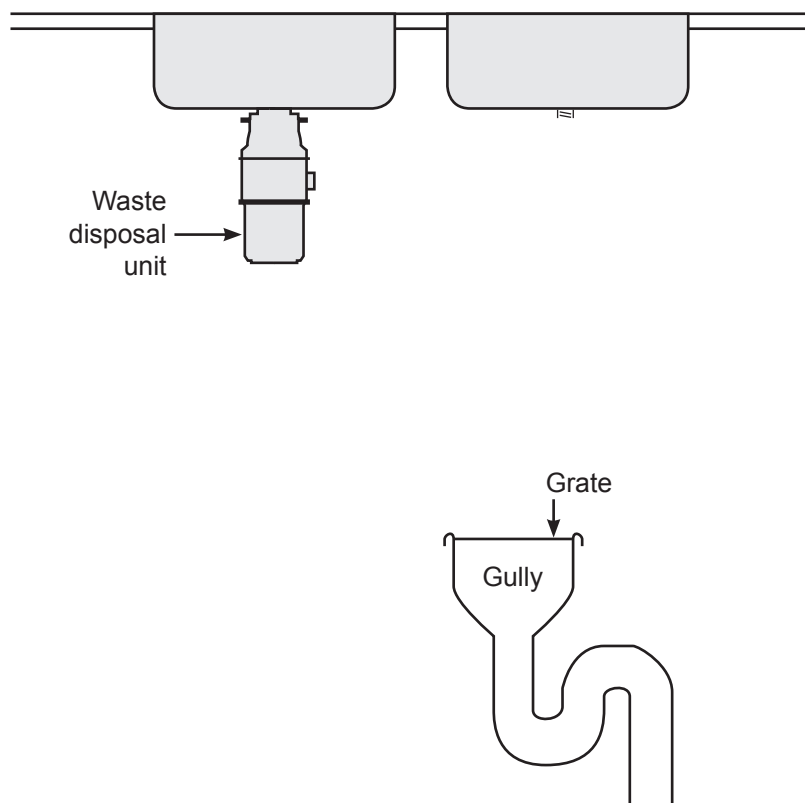
Total 3 marks

QUESTION 2

- (a) The starter drawing below shows two adjacent domestic kitchen sinks with a waste disposal unit and a gully dish.

The fixture discharge pipes from the sinks are to combine before discharging to the gully dish.

- (i) Complete the diagram to show the pipework required for the waste from the sinks to the gully dish so the installation complies with New Zealand Building Code G13/AS1 Foul Water.
- (ii) On the drawing show the acceptable location of the outlet of the discharge pipe in relation to the gully. Include relevant measurements.
- (iii) On the drawing show the minimum diameter of the discharge pipe.



(4 marks)

QUESTION 2 (cont'd)

(b) Give FOUR functions of a ventilation pipe on a foul water system.

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

(2 marks)

(c) Give TWO reasons why vent pipes require a gradient.

- 1 _____
- 2 _____

(2 marks)

Total 8 marks

QUESTION 3

- (a) A rectangular water tank has the following dimensions:
2100 mm long
1500 mm wide
1700 mm deep.

The water inlet is centred on one of the 1500 mm sides and 250 mm from the top of the tank.

The water outlet is centred on the opposite 1500 mm side and is 120 mm from the bottom of the tank.

Draw to scale of 1:20, and label, a three-dimensional diagram of the water tank and show the centre point for the inlet and outlet locations with a cross (+).

(5 marks)

QUESTION 3 (cont'd)

(b) Calculate how many m² of sheet metal are required to construct the tank in (a).

Make no allowance for laps or a lid.

(3 marks)

(c) Calculate the volume of the tank in (a).

(1 mark)

Total 9 marks

QUESTION 4

- (a) A low pressure open-vented hot water cylinder has been installed in a dwelling for approximately 30 years.

The cylinder is to be replaced with a mains pressure hot water cylinder.

The installation is to comply with New Zealand Building Code clause G12/AS1 Water Supplies.

Give SIX modifications to the installation that are likely to be required.

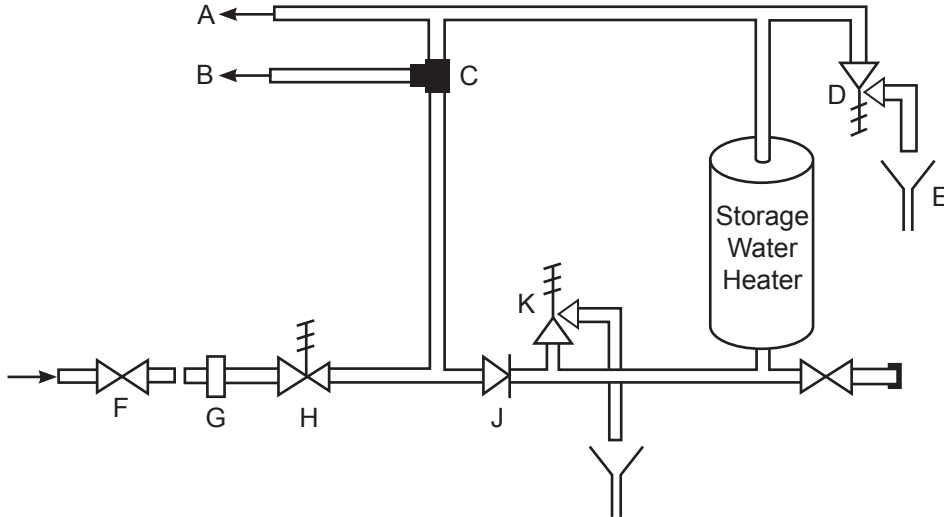
- 1 _____
- 2 _____
- 3 _____
- 4 _____
- 5 _____
- 6 _____

(3 marks)

QUESTION 4 (cont'd)

(b) Name each of the components labelled A – H, J, K in the hot water system shown below.

Write the names of all components in full.



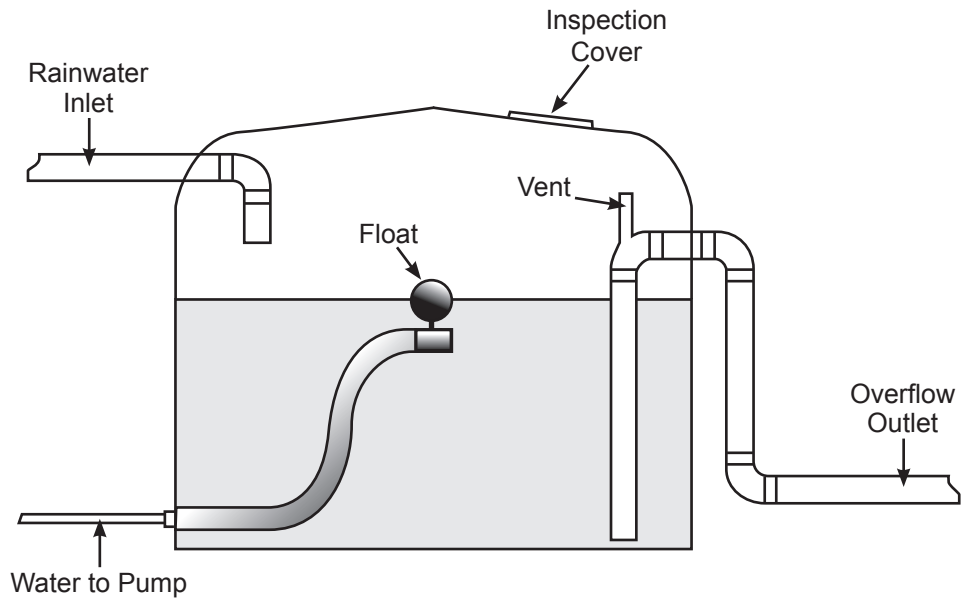
- A _____
- B _____
- C _____
- D _____
- E _____
- F _____
- G _____
- H _____
- J _____
- K _____

(5 marks)

Total 8 marks

QUESTION 5

The drawing below shows a rain water storage tank with an overflow fitted.



- (a) Give an advantage of the float holding the delivery pipe just below the surface of the water.

(1 mark)

- (b) Explain why a vent has been included on the overflow pipe.

(1 mark)

- (c) State the benefit of the overflow inlet being located near the bottom of the tank.

(1 mark)

QUESTION 5 (cont'd)

(d) Indicate on the drawing on page 8 the location where a non-return valve would be installed.

(1 mark)

(e) Give the reason a non-return valve would be installed in this system.

(1 mark)

(f) A pump is connected to the outlet of the tank.

Give FOUR factors that may affect the flow rate achievable by the pump.

1

2

3

4

(2 marks)

Total 7 marks

QUESTION 6

Explain how and when water supply piping should be tested to meet the requirements of the New Zealand Building Code clause G12/AS1 Water Supplies.

Include in your answer the minimum test pressures and test time.

Total 4 marks

QUESTION 7

(a) The following statements give steps in the sequence of actions required to backfill a trench supported by timber shoring having one set of walings.

- A Remove the walings
- B Compact soil
- C Remove poling boards/sheeting
- D Back fill to a level even with the bottom of the walings
- E Remove the struts
- F Remove the props

Write the letters A – F in the spaces below to put the steps in the correct order.

1 _____ 2 _____ 3 _____
4 _____ 5 _____ 6 _____

(3 marks)

(b) (i) Draw a diagram showing a benched trench excavation.

(1 mark)

(ii) Draw a diagram showing a trench excavated to a safe slope.

(1 mark)

(iii) Give TWO factors that determine the vertical to horizontal ratio of a safe slope excavation.

1 _____
2 _____

(2 marks)

Total 7 marks

QUESTION 8

- (a) Give the date each year by which a licensed plumber must ensure his or her licence is renewed to continue to do plumbing work.

(1 mark)

- (b) Give THREE requirements a licensed plumber must meet to relicense each licence period.

1 _____

2 _____

3 _____

(3 marks)

Total 4 marks

QUESTION 9

(a) Give TWO ways induced siphonage of a trap seal on a fixture discharge pipe can be avoided.

1 _____

2 _____

(2 marks)

(b) Give THREE different ways the trap seal of a floor waste gully can be maintained.

1 _____

2 _____

3 _____

(3 marks)

(c) Explain how capillary attraction can cause the loss of the water seal in a trap.

(2 marks)

Total 7 marks

QUESTION 10

A customer recently changed from a fixed shower rose to a slide rail shower.

However, the customer now advises that the slide rail shower is not supplying sufficient water to the shower user.

The hot water system is an open vented low pressure storage cylinder that the customer does not want to replace.

Complete the table below to show THREE aspects of the installation that should be checked, changes that could be made and why those changes would improve the performance of the slide rail shower.

Installation checks	Proposed changes	Reason for improvement

Total 6 marks

QUESTION 11

A low pressure storage hot water system is overflowing through the open vent pipe.

(a) List, in sequence, the steps required to replace a washer in a pressure reducing valve.

(3 marks)

(b) After successfully replacing the washer, the system continues to overflow.

Give THREE reasons why this could be occurring.

1

2

3

(3 marks)

Total 6 marks

QUESTION 12

Give the meaning of each of the following terms in relation to plumbing.

(a) Grey water.

(1 mark)

(b) Soil water.

(1 mark)

(c) Potable water.

(1 mark)

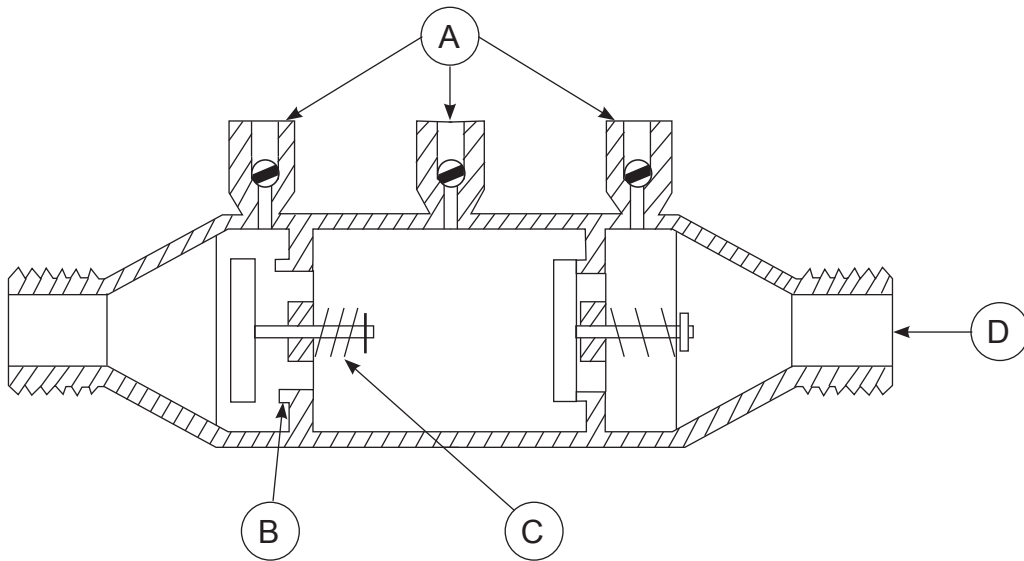
(d) Surface water.

(1 mark)

Total 4 marks

QUESTION 13

(a) Name the type of backflow prevention device shown below. Write the name in full.



(1 mark)

(b) Name the components of the backflow prevention device shown above as labelled A – D.

A _____

B _____

C _____

D _____

(4 marks)

(c) State the maximum cross-connection hazard rating the device in (a) is permitted to provide protection against.

(1 mark)

Total 6 marks

QUESTION 14

A toilet and basin are to be installed in a bathroom intended for use by people with disabilities.

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

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

1 _____

2 _____

3 _____

4 _____

(4 marks)

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

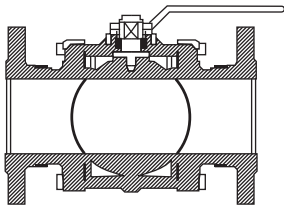
(1 mark)

Total 5 marks

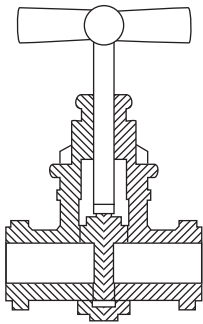
QUESTION 15

Name each of the different types of valve pictured below.

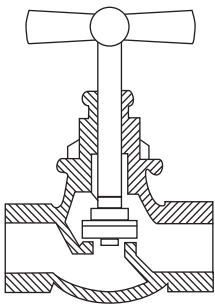
(a)



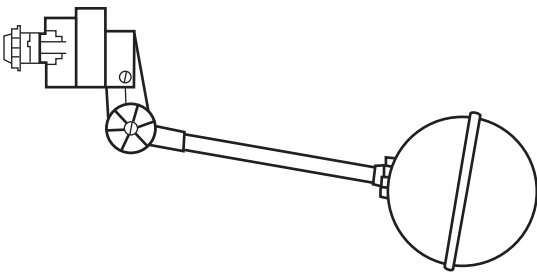
(b)



(c)



(d)



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 is not a type of urinal?

- A Stall.
- B Continuous Wall.
- C Trough.
- D Bowl.
- E Gutter.

2. How high above floor level should the front lip of a men's wall-hung urinal be installed?

- A 450 mm.
- B 500 mm.
- C 550 mm.
- D 600 mm.
- E 650 mm.

3. What is the maximum time allowable for a toilet cistern to take to fill up after it has been emptied during a flush?

- A 2.0 minutes.
- B 2.5 minutes.
- C 3.0 minutes.
- D 3.5 minutes.
- E 5.0 minutes.

4. 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.

5. 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.

6. At which pipe diameter does a soaker flashing become necessary to seal a roof penetration to comply with New Zealand Building Code clause E2 External Moisture?
- A 48 mm.
 - B 66 mm.
 - C 74 mm.
 - D 86 mm.
 - E 112 mm.

7. An EDPM rubber boot flashing is required to cover two complete troughs of the roofing profile.

What is the minimum pitch the roof is allowed to be in this situation?

- A 0°
- B 5°
- C 10°
- D 15°
- E 20°

8. When a soaker flashing has been installed, what is the minimum distance the top of the soaker flashing must extend up under the roofing material?
- A 200 mm.
 - B 250 mm.
 - C 300 mm.
 - D 350 mm.
 - E 400 mm.
-

9. A soaker flashing is being installed to seal a square penetration. How high must the upstand on the soaker flashing be?
- A 50 mm.
 - B 60 mm.
 - C 80 mm.
 - D 100 mm.
 - E 110 mm.
-

10. Which of the following statements best describes convection heat transfer?
- A Heat that is transferred molecule to molecule by direct contact.
 - B Heat that can travel through a vacuum.
 - C Heat that is obtained from a non-potable liquid and transferred to potable water.
 - D Heat that is transferred with the assistance of a fan.
 - E Heat that is circulated through air or liquid due to differing densities.
-

11. Which of the following statements best describes radiation heat transfer?
- A Heat that is transferred molecule to molecule by direct contact.
 - B Heat that can travel through a vacuum.
 - C Heat that is obtained from a non-potable liquid and transferred to potable water.
 - D Heat that is transferred with the assistance of a fan.
 - E Heat that is circulated through air or liquid due to differing densities.
-

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

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

Total 12 marks

For Examiner's use only

Question number	Marks	Marks
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Section B		
Total		