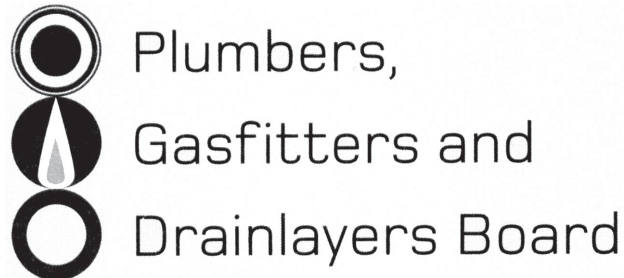


Affix label with Candidate Code
Number here.
If no label, enter candidate
Number if known

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No. 9192



REGISTRATION EXAMINATION, JUNE 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 21–25 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

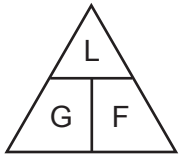
Candidates that sat this examination in June 2014 were provided with the following document:

- New Zealand Building Code Clause G13 Foul Water

USEFUL FORMULAE

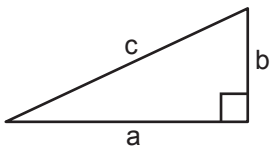
Circumference of circle = $2 \times \pi \times R$ or Circumference of circle = $\pi \times D$

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) A soaker flashing is to be installed to seal a roof penetration.

Give FOUR personal safety hazards that are commonly present when working in this situation.

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

(4 marks)

(b) A process on the work site involves the use of machinery, causing a noise hazard.

Describe how the hazard can be minimised, isolated or eliminated to prevent harm.

Method of minimisation

Method of isolation

Method of elimination

(3 marks)

Total 7 marks

QUESTION 2

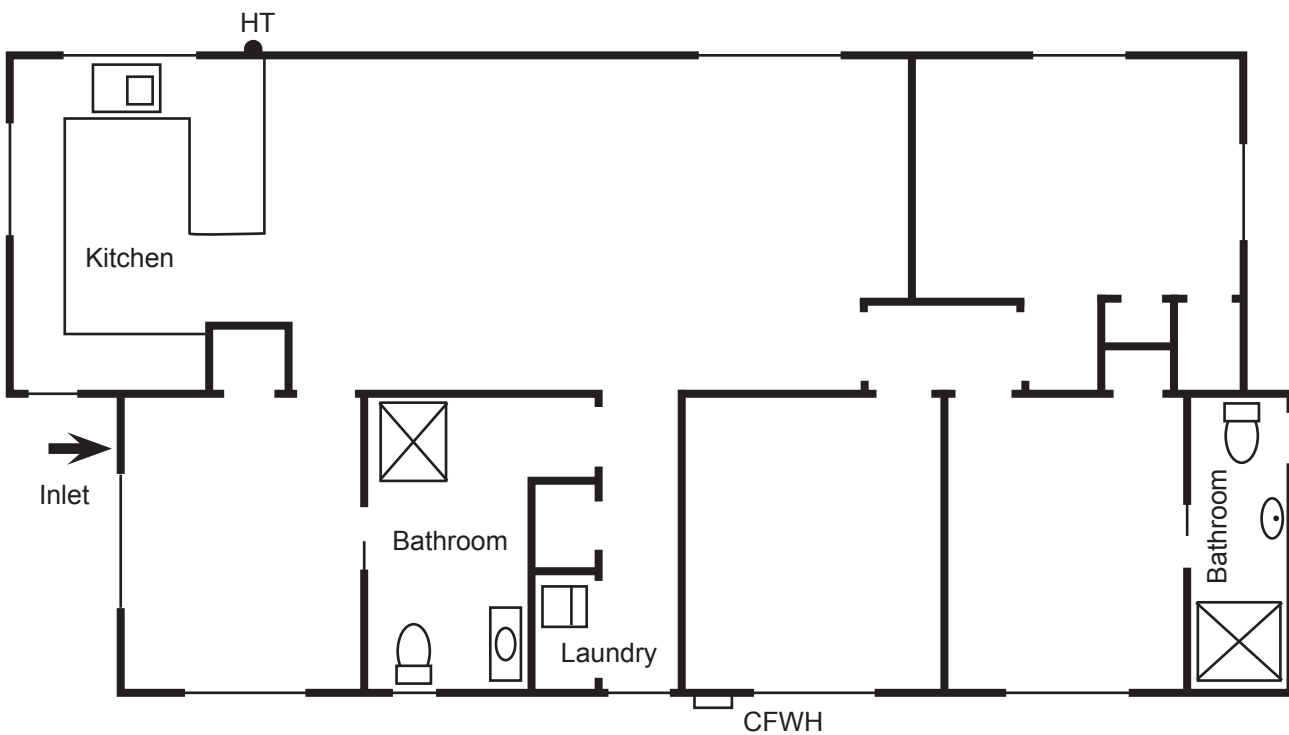
The diagram below shows a floor plan of a dwelling requiring pre-line pipework.

The shower roses will be fed from single lever shower mixers.

The hot and mixed water pipework will be in copper. The cold water pipework will be in polybutylene.

A bracket elbow (wingback) is to be installed for the cold and hot water connections for the continuous flow water heater.

Key: HT = Hose Tap
CFWH = Continuous flow water heater



Complete the table below to show the number of each type of fitting listed required to complete the pre-line pipework for the dwelling.

Fitting	Number required for pre-line pipework
Copper brazing tees	
Brass brazing bracket elbows (wingbacks)	
Crox nuts	
Polybutylene tees	
Polybutylene bracket elbows (wingbacks)	

Total 5 marks

QUESTION 3

(a) Give the purpose of a cold water expansion valve that is installed in a plumbing system.

(1 mark)

(b) State where in a plumbing system a cold water expansion valve should be installed.

(1 mark)

(c) A cold water expansion valve has a 20 mm outlet and has a combined drain with a 15 mm outlet temperature and pressure relief valve.

State the minimum size for the combined drain.

(1 mark)

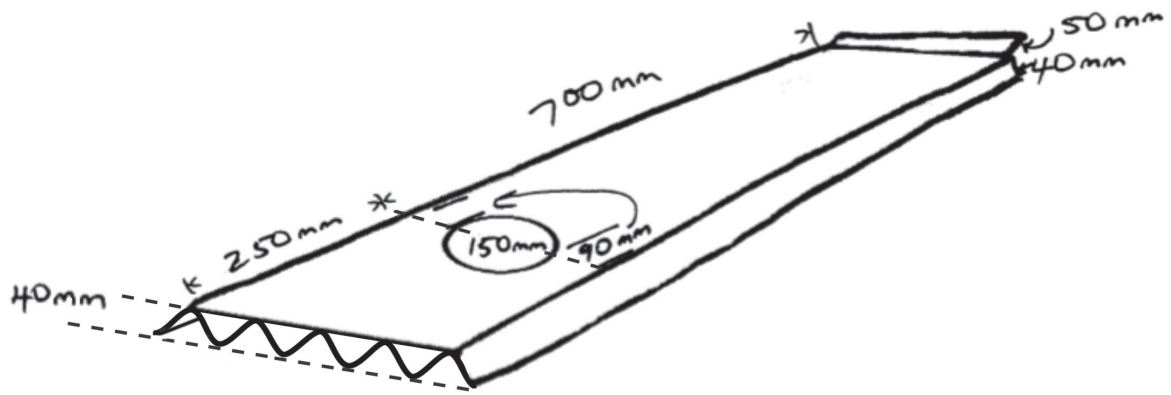
(d) State the material a relief valve drain must be constructed from.

(1 mark)

Total 4 marks

QUESTION 4

Below is a sketch of a soaker flashing required to seal a roof penetration.



- (a) On the page opposite, draw to a scale of 1:5 a cutting and folding plan showing the sheet metal required to construct the soaker flashing.

(6 marks)

- (b) Give THREE pieces of information that are required to determine the size of a soaker flashing.

- 1 _____
- 2 _____
- 3 _____

(3 marks)

QUESTION 4 (cont'd)

Total 9 marks

QUESTION 5

(a) Below are THREE possible ways a trap on a sanitary plumbing system can lose its seal.

Explain how each type of trap seal loss could be prevented.

(i) Momentum

(2 marks)

(ii) Oscillation

(2 marks)

(iii) Compression

(2 marks)

(b) Give THREE additional ways in which a trap on a sanitary plumbing system can lose its seal.

1

2

3

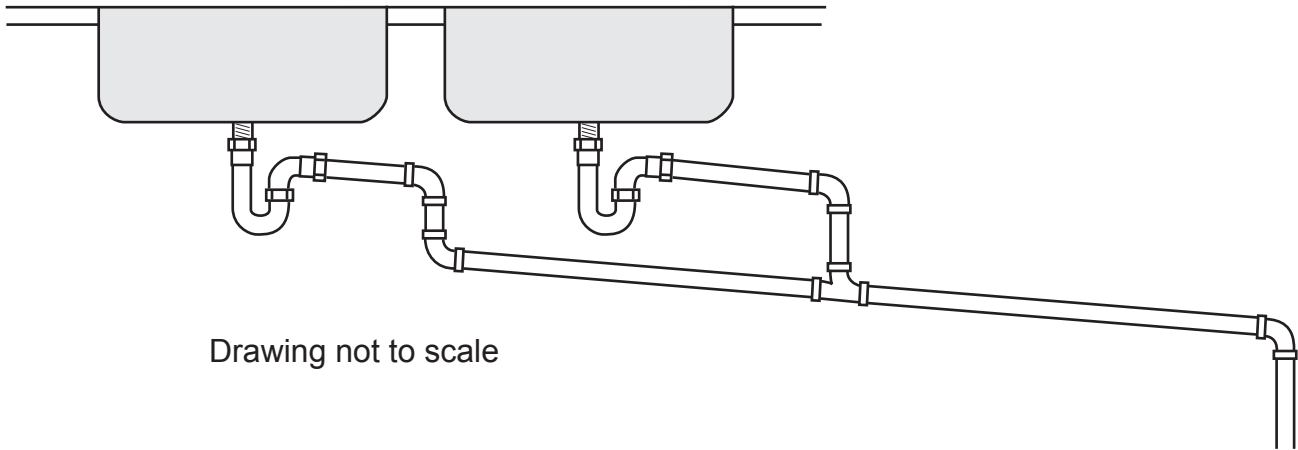
(3 marks)

Total 9 marks

QUESTION 6

The drawing below shows two domestic kitchen sinks that discharge to a gully dish via a 40 mm diameter combined waste pipe.

The completed installation is to comply with the New Zealand Building Code Clause G13/AS1 Foul Water.



- (a) State the number of fixture vents required for the installation.

(1 mark)

- (b) State the minimum diameter for the vent pipework.

(1 mark)

- (c) On the diagram, mark with X the points between which the vent pipework may connect to the installation. Include relevant measurements.

(2 marks)

Total 4 marks

QUESTION 7

(a) Give the meaning of the following terms in relation to hot water systems.

(i) Stratification

(1 mark)

(ii) Peak load

(1 mark)

(iii) Uncontrolled heat source

(1 mark)

(iv) Quick recovery system

(1 mark)

(v) Indirect

(1 mark)

QUESTION 7 (cont'd)

(b) A 180 litre supply tank is to be installed in a ceiling space.

The ceiling space is accessed through a hole that is 540 mm × 540 mm.

A 15 mm clearance is required around the cylinder as it passes through the hole.

(i) Calculate the maximum possible diameter of the tank.

(1 mark)

(ii) Calculate the height of the tank with maximum diameter.

(3 marks)

(c) State when a safe tray must be installed under a hot water storage cylinder.

(1 mark)

Total 10 marks

QUESTION 8

(a) A floor waste has been installed in a bathroom on the upper level of a house.

Its purpose is to prevent any accidental overflow causing damage to the property.

Give FOUR requirements that must be met for the installation to comply with New Zealand Building Code Clause G13/AS1 Foul Water.

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

(2 marks)

(b) Give the TWO acceptable discharge points for a discharge pipe from a soil fixture.

- 1 _____
- 2 _____

(2 marks)

Total 4 marks

QUESTION 9

(a) Name FOUR devices that can be used to automatically turn a pump on and off.

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

(4 marks)

(b) Give TWO benefits of including an air/pressure vessel on a pump installation.

- 1 _____
- 2 _____

(2 marks)

(c) State where in a pumped water supply system an air/pressure vessel would be installed.

(1 mark)

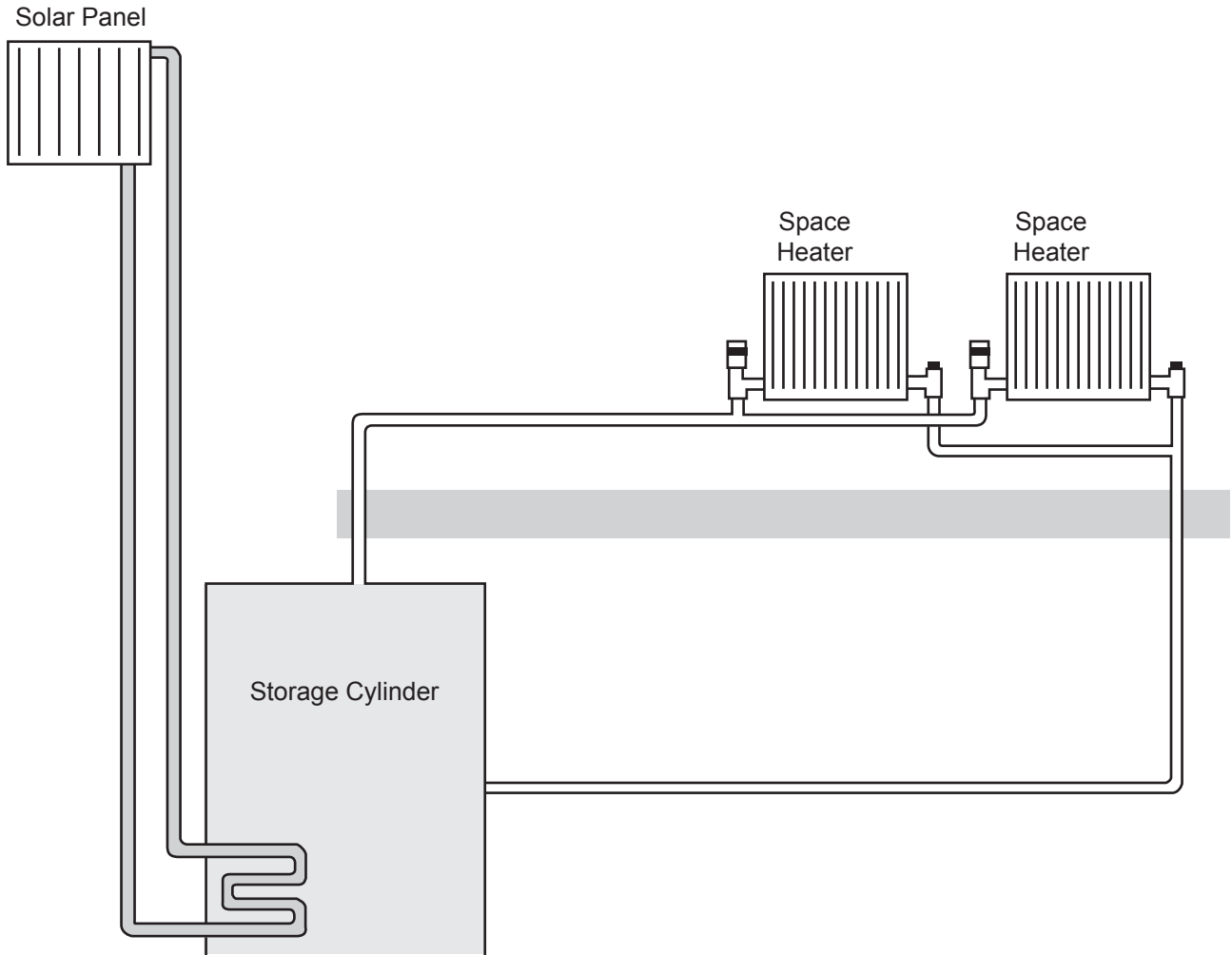
Total 7 marks

QUESTION 10

Below is a diagram showing components of a hot water space heating system.

Label the drawing to show where different types of heat transfer will occur.

Use arrows to show the paths of heat transfer.



Total 6 marks

QUESTION 11

Sketch and label a cross sectional diagram of a solenoid valve as used on an automatic urinal flushing system.

Total 5 marks

QUESTION 12

(a) Describe what is meant by the following terms in relation to backflow.

(i) Low hazard

(1 mark)

(ii) Medium hazard

(1 mark)

(iii) High hazard

(1 mark)

(b) Give the minimum allowable height dimensions for an airgap used to prevent backflow in a plumbing system.

(2 marks)

Total 5 marks

QUESTION 13

The table below lists different types of plastic pipe material.

Complete the table by giving a jointing method that may be used for type of material.

Pipe material	Jointing Method
Polypropylene	
Polybutylene	
Cross-linked polyethylene	
Unplasticised polyvinyl chloride	
High density polyethylene	

Total 5 marks

QUESTION 14

(a) Name SIX valves required for the installation of a domestic valve-vented mains pressure storage hot water system.

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

(3 marks)

(b) A shower is supplied by a low pressure open vented storage water heater system.

State the TWO points between which the available pressure for the shower is measured.

- 1 _____
- 2 _____

(2 marks)

Total 5 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 marks will be awarded for that question.

1. What is the minimum height above ground level at which a main drain vent must terminate?

A 2.0 m.

B 2.5 m.

C 3.0 m.

D 4.0 m.

E 5.0 m.

2. What is the minimum distance above the weir of a fixture trap at which an air admittance valve is permitted to be installed?

A 32 mm.

B 40 mm.

C 50 mm.

D 65 mm.

E 100 mm.

3. A 150 mm uPVC vertical discharge stack is to be installed in a two story building. How far apart can the supports for the stack be spaced?

A 1.000 m.

B 1.200 m.

C 1.800 m.

D 3.000 m.

E 3.500 m.

4. What is the minimum distance below a gully trap grate that a waste pipe should discharge?
- A 20 mm.
 - B 30 mm.
 - C 40 mm.
 - D 50 mm.
 - E 60 mm.

5. Which of the following is a requirement when a fixture vent pipe is being connected to a discharge stack vent?
- A The connection point must be at least 50 mm above the overflow level of the fixture.
 - B The fixture discharge pipe must be over 3.5 metres long.
 - C The fixture discharge pipe must connect to the discharge stack vent within 1200 mm of the fixture trap.
 - D The connection must be made with 2 × 45° bends or 1 × 45° bend and a Y junction.
 - E The fixture vent pipe must have a diameter of at least 40 mm.

6. What is a wet vent?
- A A vent that is designed to allow rain water to enter and flush a waste system.
 - B A vent that is connected to a floor waste gully in a wet floor bathroom.
 - C A vent that is connected to a discharge pipe before the last fixture.
 - D A vent that allows water to be relieved during an excess pressure situation.
 - E A vent that allows water to be relieved during excess pressure or temperature.

7. Which of the following pumps is most suitable to transfer waste from a toilet outlet to the foul water drain?
- A A reciprocating pump.
 - B A hydraulic ram.
 - C A macerating pump.
 - D A positive displacement pump.
 - E A jet pump.

8. Which of the following is termed as grey water?
- A Water supplied by a network utility operator.
 - B Rainwater collected from a roof.
 - C Water sourced from a bore or well.
 - D Waste water from a basin or laundry.
 - E Waste water from a toilet or urinal.

9. How many discharge units does a wall-hung urinal have?
- A 1
 - B 2
 - C 3
 - D 4
 - E 5

10. 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%

11. 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.

12. Where in a forced hot water circulation system should the pump be installed?

- A On the flow line.
- B On the return line.
- C On the vent.
- D On the cold water inlet.
- E On the hot water feed to the tempering valve.

13. Which of the following can be used to help prevent the growth of legionella bacteria in a potable water supply?

- A A tempering valve.
- B A temperature pressure relief valve.
- C A cooling tower.
- D Glycol.
- E A UV filter.

14. How many litres of water are in 0.8 of a cubic metre?

- A 0.8
- B 8
- C 80
- D 800
- E 8000

15. A plan has been drawn at a scale of 1:50.
How many mm on the plan represent 1 metre?

- A 2
- B 5
- C 20
- D 50
- E 100

Total 15 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		