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

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No. 9195

Plumbers, Gasfitters and Drainlayers Board

REGISTRATION EXAMINATION, JUNE 2014

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.

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 20–21 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

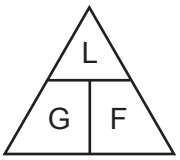
Candidates that sat this examination in June 2014 were provided with the following documents:

- AS/NZS 3500 Part 1: Water services
- AS/NZS 3500 Part 2: Sanitary plumbing and drainage
- New Zealand Building Code Clause E2 External Moisture

USEFUL FORMULAE

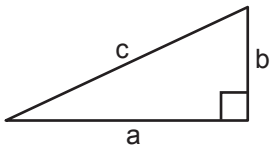
Circumference of circle = $2 \times \pi \times R$ or Circumference of circle = $\pi \times D$

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 × specific heat × temp diff

Litres of hot water × temp diff cold to hot = litres of mixed water × temp diff cold to mixed

$$\text{Heating time} = \frac{\text{mass of water (kg)} \times 4.2 \times \text{temp diff (°C)} \times 100}{\text{heat energy input per hour in kJ} \times \text{efficiency (\%)}}$$

Box's formula: $q = \sqrt{\dfrac{H \times D^5}{25 \times L \times 10^5}}$

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 starter drawing below to show a push through hot water system that complies with New Zealand Building Code Clause G12/AS1 Water Supplies.

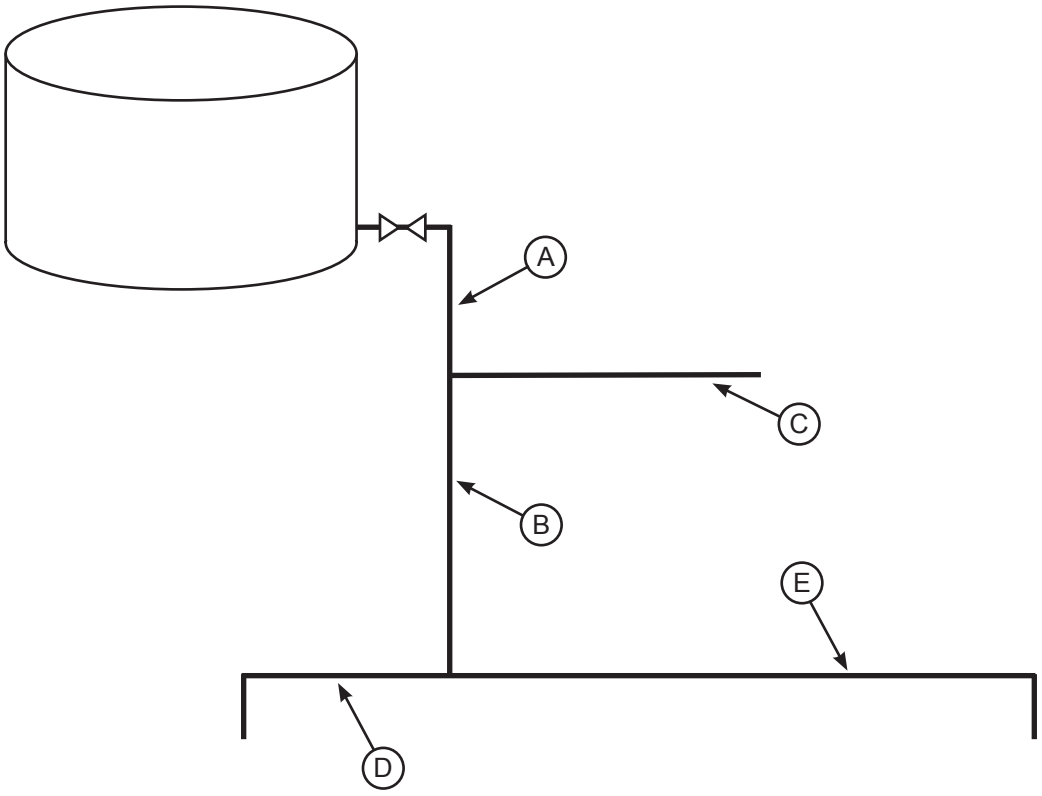
Cold water supply

Total 4 marks

QUESTION 2

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

The cold water pipe work dimensions are given in the table below.



Section of pipework	Length	Diameter (ID)
A	3 metres	25 mm
B	4 metres	20 mm
C	4 metres	15 mm
D	3 metres	15 mm
E	7 metres	15 mm

QUESTION 2 (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 and supply pipework.

Calculate how many grams of chlorine is required to disinfect the tank and pipework.

(2 marks)

(c) Give a circumstance where a 50 mg/litre dose would not be adequate.

(1 mark)

Total 7 marks

QUESTION 3

A plan view of a domestic dwelling, drawn to a scale of 1:100 is shown on the opposite page. The plan shows the proposed layout for the cold water pipework for the dwelling.

The water main supply can provide 500 kPa water pressure and is situated 15 lineal metres away from the entry point to the dwelling.

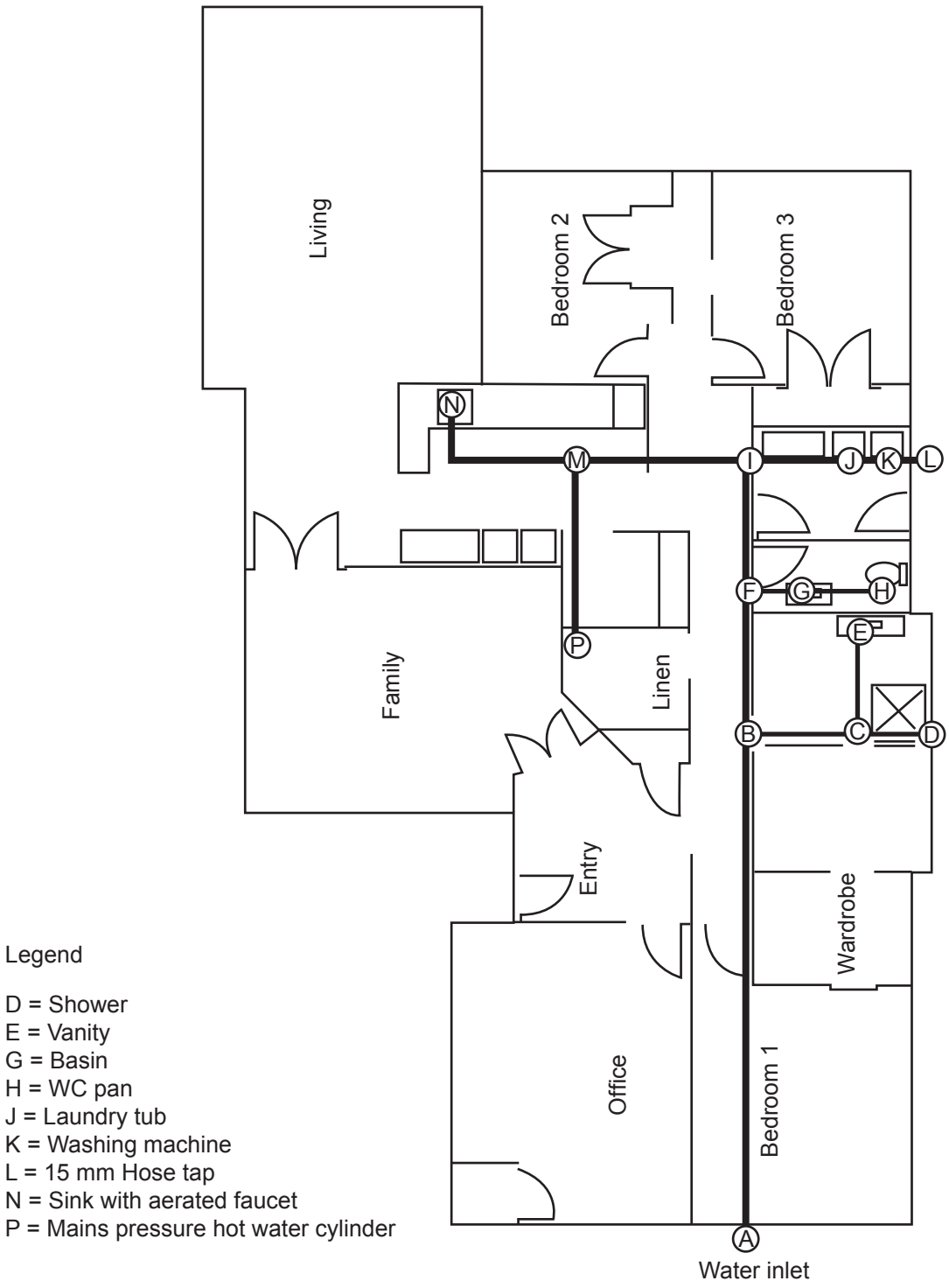
The shower is the highest outlet and is 3 vertical metres above the water main.

Using the procedure given in AS/NZS 3500 Part 1 Water services Appendix D, complete the tables below.

Index Length	Pressure Drop

Pipe section	Total Loading Units	Probable Simultaneous Flow Rate (L/S)	Pipe size (DN)
A – B			
B – C			
C – D			
C – E			
B – F			
F – G			
G – H			
F – I			
I – J			
J – K			
K – L			
I – M			
M – P			
M – N			

QUESTION 3 (cont'd)



Legend

D = Shower
E = Vanity
G = Basin
H = WC pan
J = Laundry tub
K = Washing machine
L = 15 mm Hose tap
N = Sink with aerated faucet
P = Mains pressure hot water cylinder

Total 19 marks

QUESTION 4

The diagram on the opposite page shows a plan view of a house.

The dwelling has a wooden floor, which is 1400 mm above ground.

The drainage plan for the dwelling has been completed, and the connection point for the sanitary plumbing is as shown on the plan.

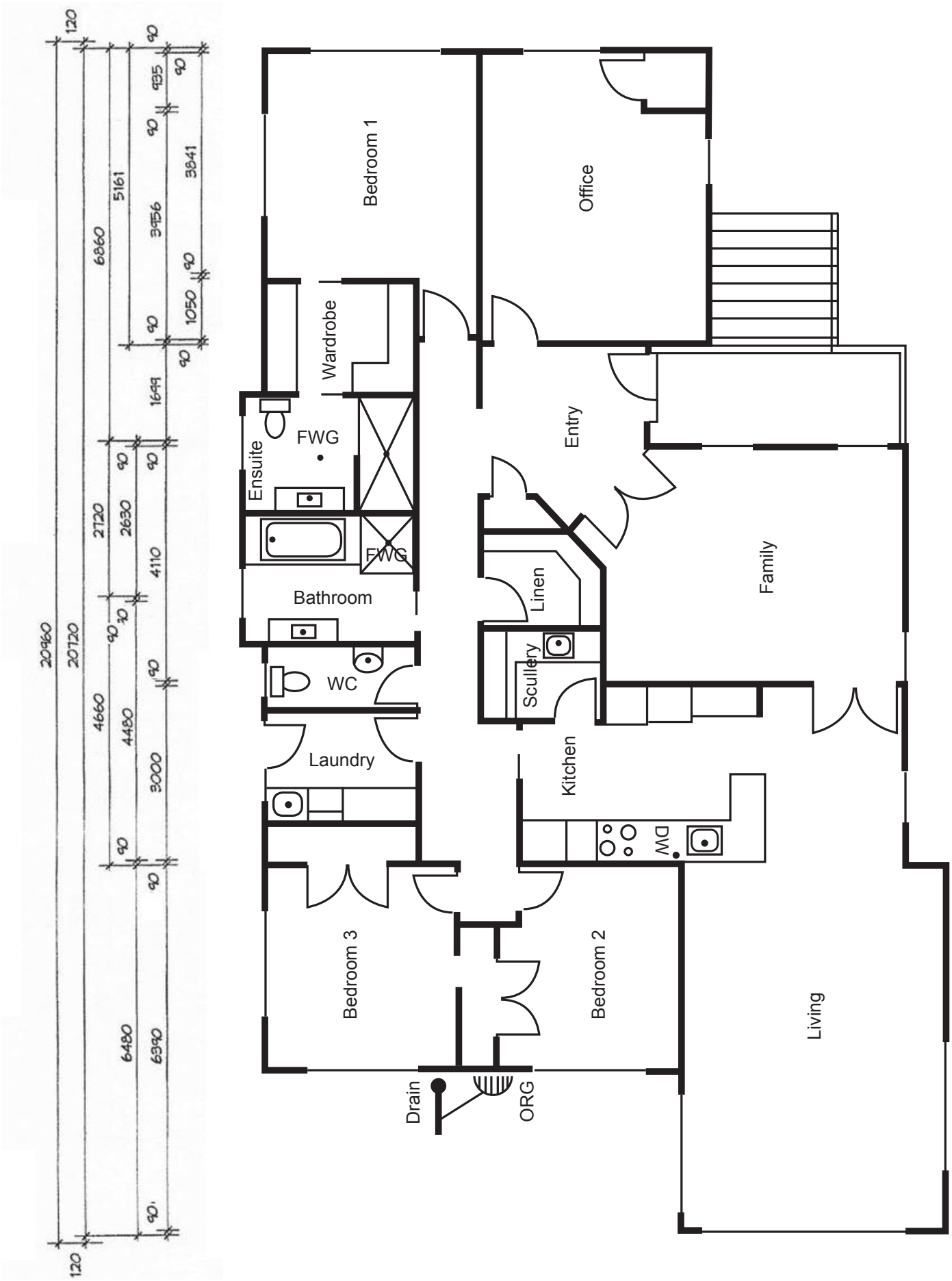
The sanitary plumbing system is to comply with the minimum requirements of AS/NZS 3500 Part 2: Sanitary plumbing and drainage.

(a) On the plan draw all discharge pipes and vents.

(b) On the plan show the minimum allowable diameter for each section of the discharge and vent pipework.

Total 9 marks

QUESTION 4 (cont'd)



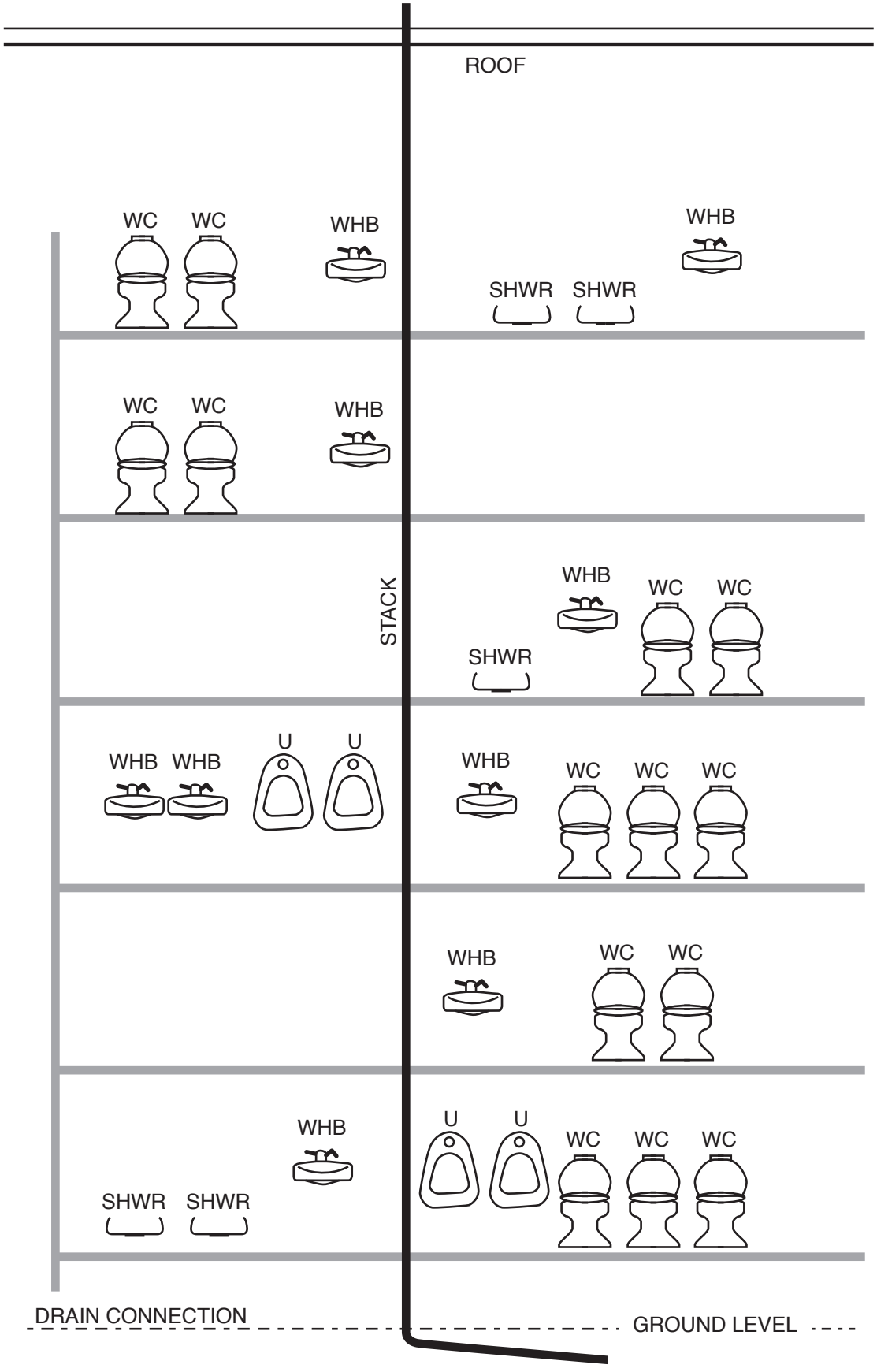
QUESTION 5

The schematic diagram on the page opposite shows the layout of the sanitary fixtures in a commercial building.

Complete the drawing to show a single stack modified system to convey waste from the fixtures to the stack shown. Include the venting requirements and show the minimum allowable diameters of each section of pipework.

The completed design is to comply with the minimum requirements of AS/NZS 3500 Part 2: Sanitary plumbing and drainage.

QUESTION 5 (cont'd)



Total 11 marks

QUESTION 6

(a) Describe a solar booster hot water system.

(1 mark)

(b) Complete the table to show the acceptable hot water temperatures for the situations given in accordance in the New Zealand Building Code clause G12/AS1 Water Supplies.

Situation	Temperature
Supply to a basin at a preschool	
Supply to a wash hand basin in a commercial building	
Supply to a bath in a dwelling	
Internal cylinder temperature to prevent growth of legionella bacteria	

(2 marks)

(c) Several requirements must be met when installing a relief drain from a storage water heater – for example, must be copper, discharge in appropriate location, have continuous fall.

Give the THREE additional requirements that must be met when a relief drain from a storage water heater is located in an area where freezing is likely.

1

2

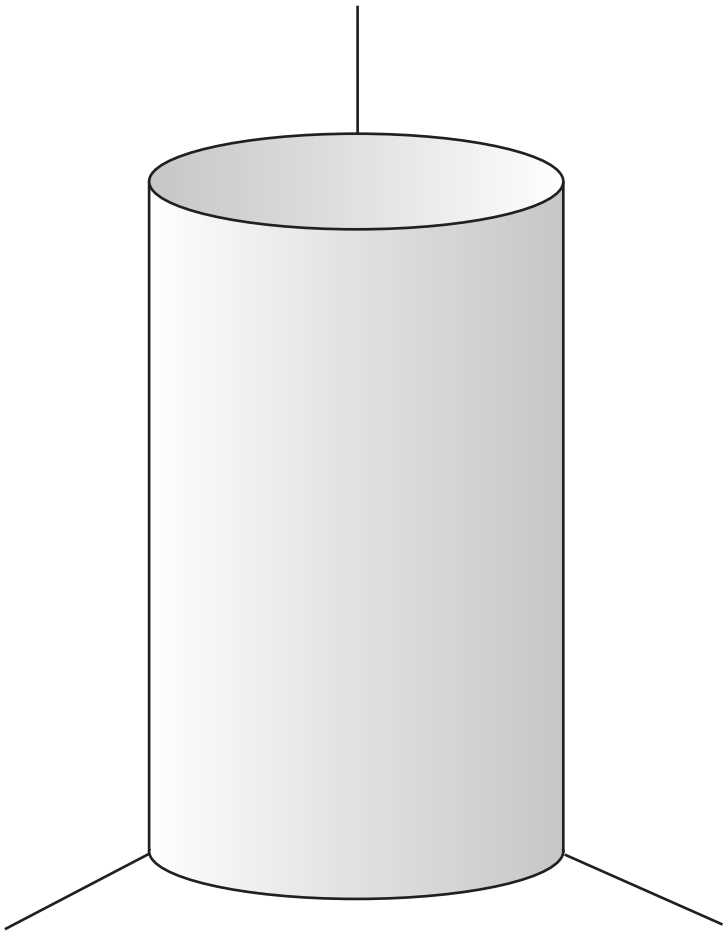
3

(3 marks)

QUESTION 6 (cont'd)

(d) The starter drawing below shows a 250 litre hot water cylinder ready to be installed in the corner of a room.

Complete the drawing to show the seismic restraint requirements for the installation of the cylinder. Include all relevant measurements.



(4 marks)

Total 10 marks

QUESTION 7

(a) Give THREE different types of harness system.

1 _____

2 _____

3 _____

(3 marks)

(b) Describe the pendulum effect in relation to fall arrest systems.

_____

_____

_____

(2 marks)

(c) Give TWO ways the pendulum effect can be prevented when using a fall arrest system.

1 _____

2 _____

(2 marks)

Total 7 marks

QUESTION 8

(a) Sketch and label a cross-sectional diagram of a reduced pressure zone backflow prevention device.

(8 marks)

(b) Give TWO conditions that would cause a reduced pressure zone backflow prevention device to discharge.

1 _____

2 _____

(2 marks)

Total 10 marks

QUESTION 9

(a) (i) Give TWO examples of items or products that may contain friable asbestos.

1 _____

2 _____

(2 marks)

(ii) Give TWO examples of items or products that may contain non-friable asbestos.

1 _____

2 _____

(2 marks)

(b) State TWO actions that are to be taken if friable asbestos is found on a work site.

1 _____

2 _____

(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.

Note that should your choice of answer be unclear in this section of the examination no marks will be awarded for that question.

1. Two holes will be drilled 300 mm apart through a 160 mm timber joist.

   According to AS/NZS 3500 Part 1: Water services, what is the maximum allowable diameter for the holes in the joist?

   A 20 mm.

   B 25 mm.

   C 40 mm.

   D 50 mm.

   E 53 mm.

   ☐

2. Two 15 mm holes will be drilled as close together a possible through a 160 mm timber joist.

   According to AS/NZS 3500 Part 1: Water services, what is the minimum separation distance the holes in the joist are permitted to be drilled?

   A 25 mm.

   B 40 mm.

   C 80 mm.

   D 160 mm.

   E 200 mm.

   ☐

3. A 50 mm hole has been drilled through a 250 mm timber joist.

   According to AS/NZS 3500 Part 1: Water services, what is the minimum separation distance before another hole is permitted to be drilled?

   A 160 mm.

   B 200 mm.

   C 250 mm.

   D 300 mm.

   E 1800 mm.

   ☐

4. 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 Clause E2 External Moisture?

A 50 mm.

B 65 mm.

C 85 mm.

D 90 mm.

E 100 mm.

☐

5. What is the minimum roof pitch suitable to have a soaker flashing installed to seal a penetration?

A 5°

B 10°

C 15°

D 20°

E 25°

☐

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

How many mm below that penetration must the flashing extend?

A 50

B 70

C 130

D 200

E 250

☐

7. Which of the following materials is acceptable for use where water is likely to run off onto a zinc roof?

   A Butyl rubber.

   B Aluminium.

   C Lead.

   D Copper.

   E Stainless steel.

   ☐

8. Edge protection is to be erected around the perimeter of a roof.

   What is the maximum allowable gap from the edge of the spouting to the guardrail?

   A 50 mm.

   B 100 mm.

   C 150 mm.

   D 200 mm.

   E 250 mm.

   ☐

9. When using an inertia reel as part of a fall arrest system, where should the anchor point be located in relation to the worker?

   A Within 2 metres of where the worker is working.

   B Above the worker's head height.

   C At the worker's chest level when standing.

   D At a 30° angle below where the worker is working.

   E At ground level directly below the worker.

   ☐

10. A four metre length of pipe has 200 mm fall.

    What is the gradient of the pipe?

    A 1:20

    B 1:40

    C 1:60

    D 1:80

    E 1:100

    ☐

11. How much fall is required when 29 metres of pipe is installed at a gradient of 2.50%?

A 11.6 mm.

B 72.5 mm.

C 116 mm.

D 725 mm.

E 1116 mm.

☐

12. A floor waste gully receives the discharge from two basins, and a shower over a bath.

How many fixture units is the floor waste gully considered to have?

A 2

B 3

C 4

D 5

E 6

☐

13. A floor waste gully is receiving 10 fixture units.

What is the minimum permitted diameter for the outlet of the floor waste gully?

A 40 mm.

B 50 mm.

C 65 mm.

D 80 mm.

E 100 mm.

☐

14. What is the maximum height (from the water seal to the finished floor level) for a floor waste gully riser?

A 100 mm.

B 200 mm.

C 300 mm.

D 400 mm.

E 600 mm.

☐

15. A floor waste gully has been installed for accidental spillage and washdown purposes only.

What is the minimum permitted diameter for the gully riser?

A 40 mm.

B 50 mm.

C 65 mm.

D 80 mm.

E 100 mm.

☐

16. How often must a backflow prevention device be tested?

A Once a month.

B Once every 6 months.

C Once every year.

D Once every 2 years.

E Once every 5 years.

☐

17. When is it permitted to bypass a backflow device supplying an installation?

A When the bypass has a device installed with the identical rating as the device being bypassed.

B During maintenance procedures.

C While testing of the backflow assembly takes place.

D Only at non-peak usage times.

E In an emergency fire fighting situation where a high flow rate is required.

☐

Total 17 marks ☐

For Examiner's use only

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