No. 9195

Plumbers, Gasfitters and Drainlayers Board

REGISTRATION EXAMINATION, NOVEMBER 2011
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 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 November 2011 were provided with the following documents:

- New Zealand Building Code clause G1

- New Zealand Building Code clause G12 Water Supplies

- AS/NZS 3500 Part 2: Sanitary plumbing and drainage

SECTION A

QUESTION 1

(a) Give TWO reasons why a cover is fitted to a storage water tank installed in a roof space.

1 _____

2 _____
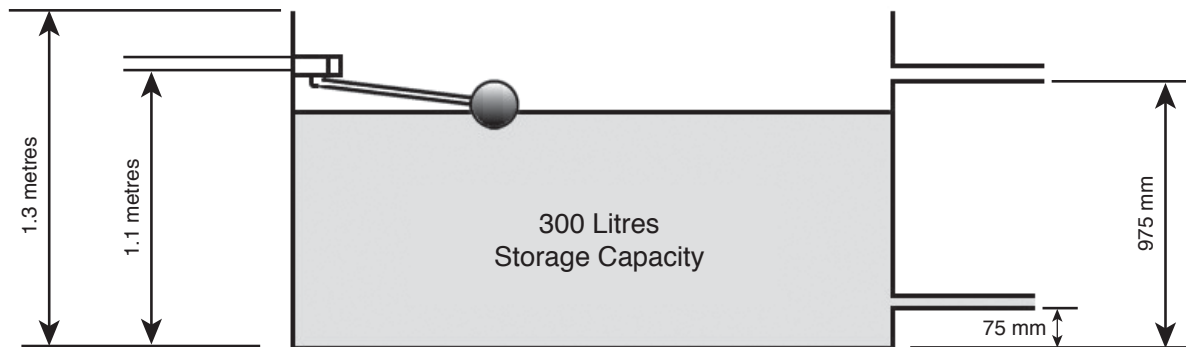
(2 marks) ☐

(b) AS/NZS 3500 Part 1: Water services section 8.3.2 Capacity of storage tanks – Measurement states the following.

The storage capacity of any tank shall be taken to be the volume of water above the invert of the outlet pipe when the water surface is 20 mm below overflow level.

The diagram below shows a tank that meets this requirement.

All connection points for the tank are 25 mm.

Using the information shown on the diagram, calculate the diameter of the tank.

_____

_____

_____

_____

_____

_____

(5 marks) ☐

QUESTION 1 (cont'd)

(c)   In addition to a cover, state FOUR factors that must be provided for the installation of a tank to comply with New Zealand Building Code Clause G12/AS1 Water Supplies.

1   _____

2   _____

3   _____

4   _____

(4 marks)

(d)   Give TWO benefits of installing break tanks in a high rise building.

1   _____

_____

2   _____

_____

(2 marks)

Total 13 marks

QUESTION 2

A section of land is being converted into a camping ground.

The camping ground will have 200 sites, and is to provide separate male and female ablution blocks.

(a) State the minimum number of people the site ablution blocks must cater for.

_____

(1 mark)

(b) Complete the table below to show the minimum number of fixtures required for the ablution blocks.

	Camper Facilities			
	WC Pans	Urinals	Basins	Showers/baths
Female				
Male				

Disabled access facilities		
WC Pans	Basins	Showers/baths

(13 marks)

Total 14 marks

QUESTION 3

(a)   The drawing opposite shows a schematic diagram of the cold water supply pipework for a commercial operation. Possible locations for backflow prevention devices are shown numbered 1-18.

Only reduced pressure zone (RPZ) devices and double check valve assemblies (DCVA) are to be used to complete the backflow prevention system. The system is to comply with the minimum requirements of New Zealand Building Code Clause G12/AS1 Water Supplies.

(i)   In the table below write the numbers identifying the locations, in addition to location 2, where backflow prevention devices must be installed.

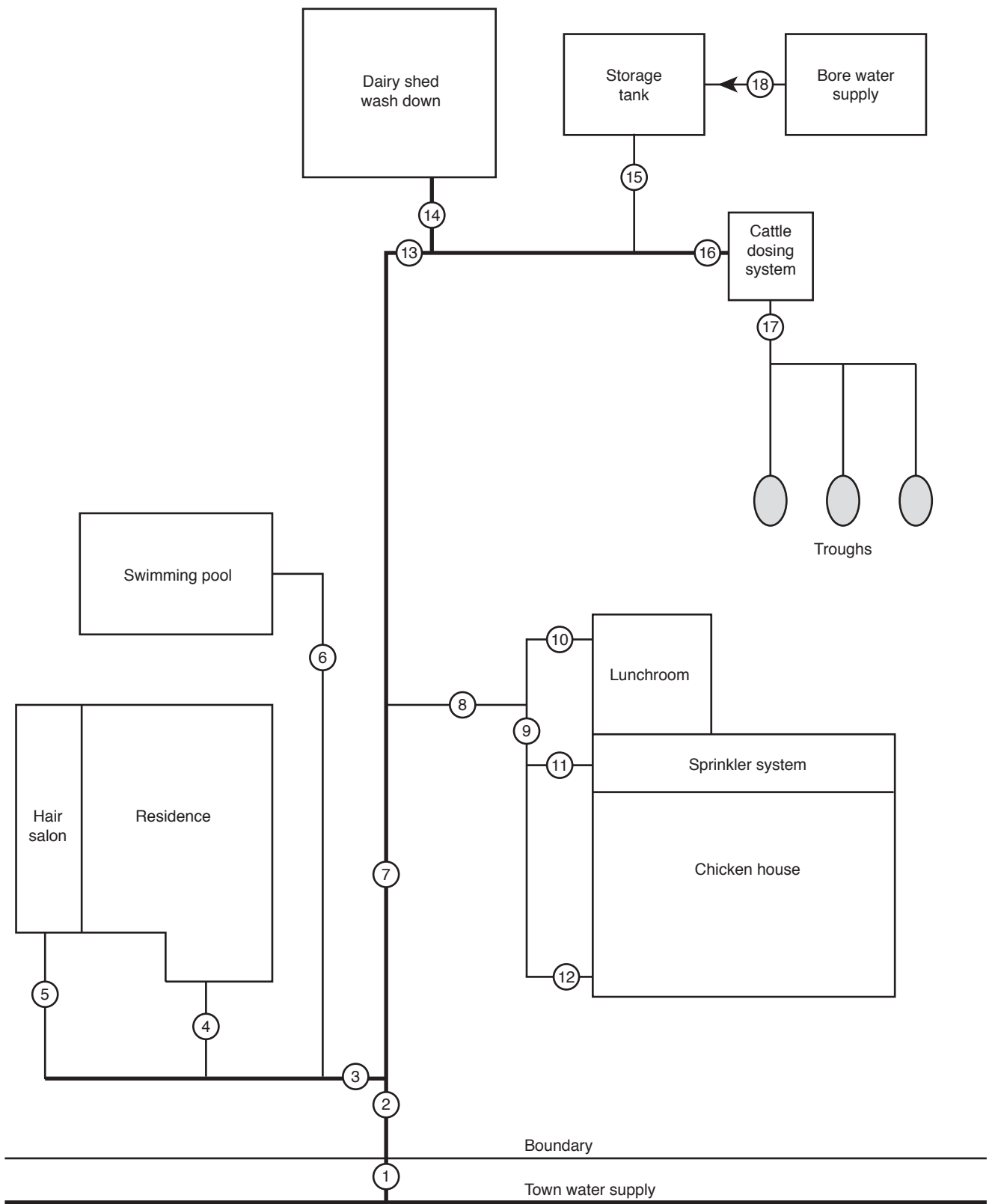| Location number	Hazard rating	Device type	Protection type
2	H	RPZ	C

(ii)   For each of the locations identified in (i) complete the table to show:

- the hazard rating
- the device type
- the protection type (Containment – C, Zone – Z or Individual – I)

The first row of the table has been completed for you as an example.

(12 marks)

Dairy shed wash down

Storage tank

⑱

Bore water supply

⑭

⑮

⑬

⑯ Cattle dosing system

⑰

Troughs

Swimming pool

⑥

Lunchroom

⑩

⑧

⑨

⑪ Sprinkler system

Hair salon

Residence

Chicken house

⑦

⑤

④

⑫

③

②

Boundary

①

Town water supply

QUESTION 3 (cont'd)

(b) Fully describe a solution that will provide adequate backflow prevention for a site during an annual test without interrupting the water supply.

_____

_____

_____

_____

(2 marks)

(c) Explain why a reduced pressure zone device cannot be installed in an area subject to ponding.

_____

_____

_____

_____

(1 mark)

Total 15 marks
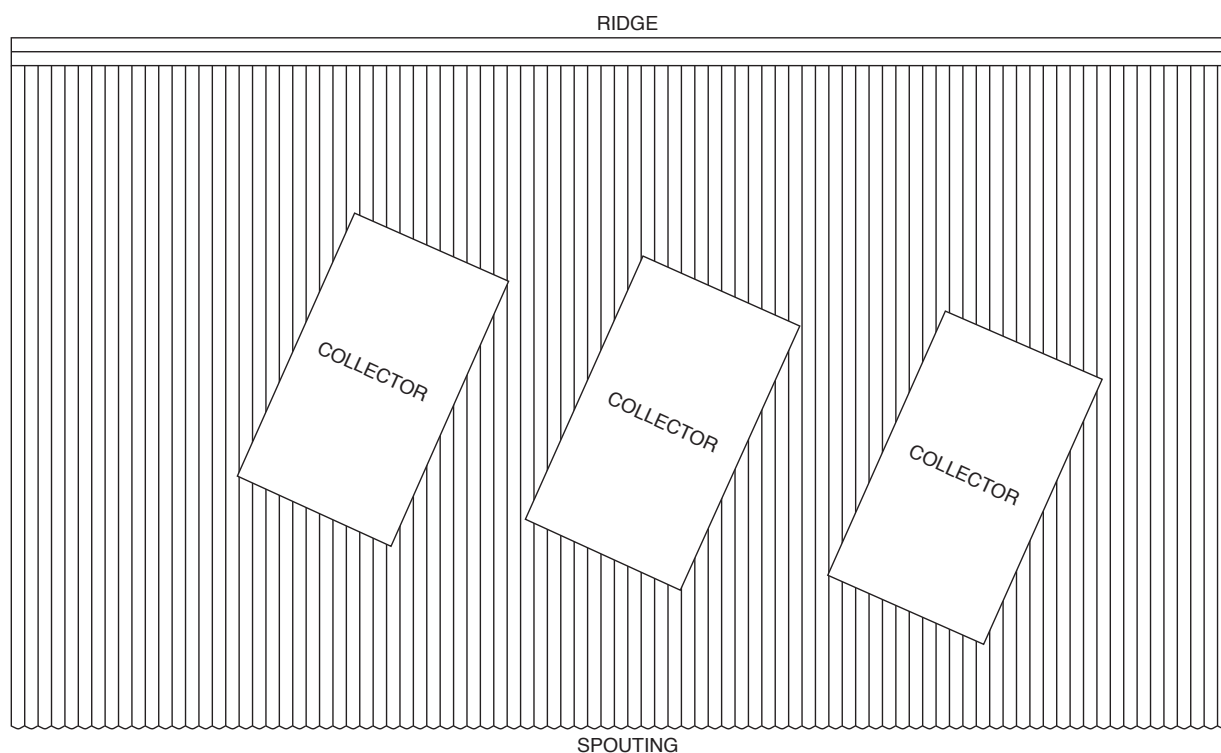
QUESTION 4

(a)   The starter drawing below shows three flat plate solar collector panels.

(i)   There are two ways in which the panels can be manifolded.

Select one of these ways, and write the name of this way.

_____

(1 mark) ☐

(ii)   Complete the drawing to show the required pipework to manifold the panels according to the way given in (i). On the drawing, show and label the flow and return pipework to the storage unit.

RIDGE

COLLECTOR

COLLECTOR

COLLECTOR

SPOUTING

(3 marks) ☐

(b)   Give an advantage of installing solar panels using the way selected in (a).
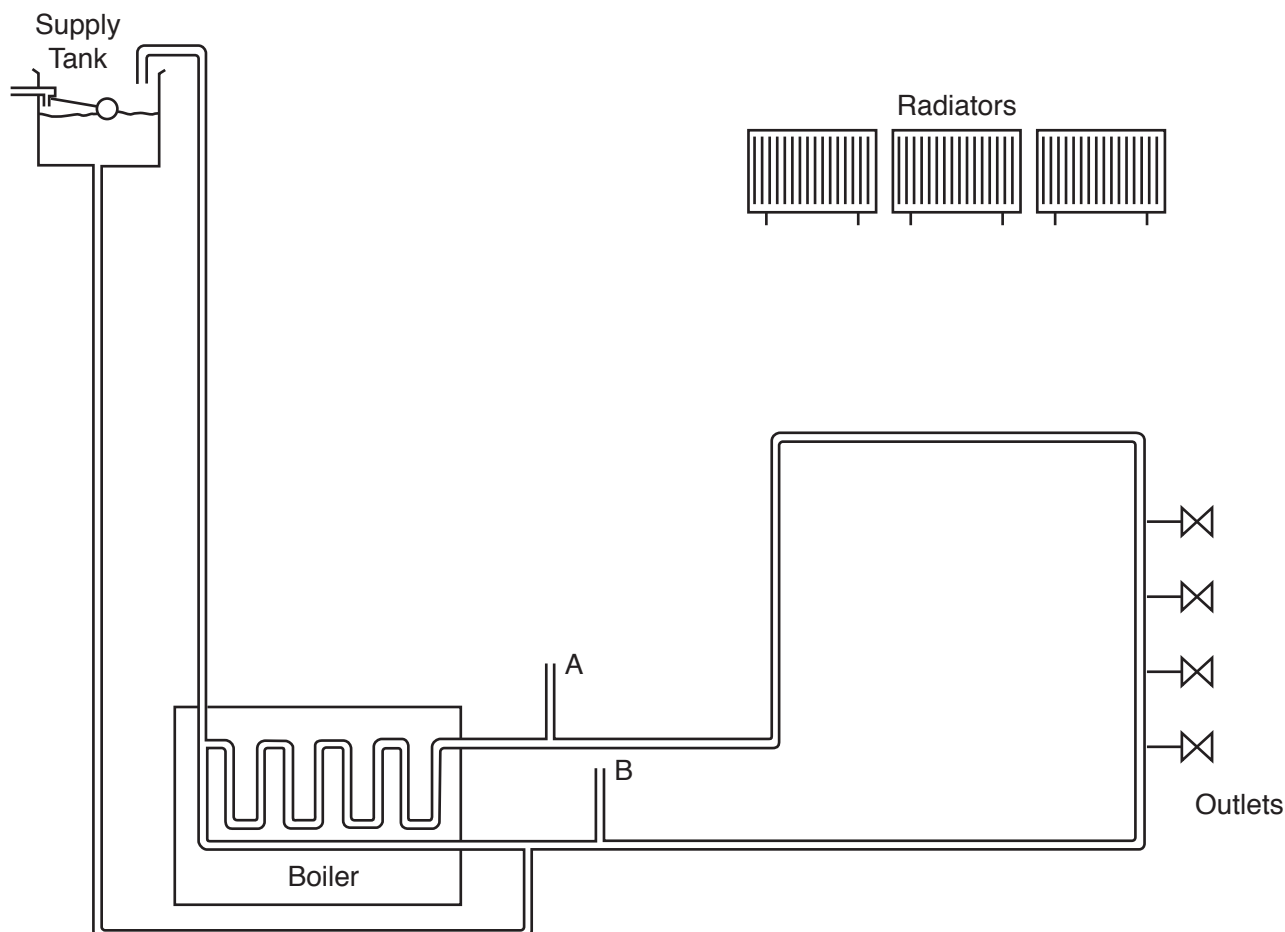
_____

_____

_____

_____

(2 marks) ☐

Total 6 marks ☐

QUESTION 5

(a) The starter drawing below shows a primary hot water circuit feeding hot water outlets.

Complete the drawing to show a secondary circuit system connected to points A and B feeding the radiators.

Indicate on the diagram where the secondary circuit pump should be installed.

(5 marks) ☐

(b) Give an advantage of installing a secondary circuit.

_____

_____

_____

_____

(1 mark) ☐

Total 6 marks ☐

QUESTION 6

A 100 mm diameter single stack system has been installed on a three-storey commercial building. The system has been installed to comply with AS3500 Part 2: Sanitary plumbing and drainage.

(a) Complete the table below to give the maximum number of each fixture permitted to be connected to a single stack from any floor level of the building.

Fixture	Number permitted per floor
Basins	
Cleaner's sinks	
Kitchen sinks	
Wall hung urinals	
WC pans	
Showers	

(3 marks)

(b) Complete the table below relating to sanitary fixtures that are allowed to enter the stack system through floor waste gullies on any one level of the building.

Sanitary fixture	Quantity	Total discharge units

(6 marks)

(c) Give the TWO design criteria that must be met if a stack vent is to serve as a fixture vent pipe for a basin.

1 _____

2 _____

(1 mark)

Total 10 marks

QUESTION 7

The drawing opposite is a plan view of a proposed concrete-floored building.

(a) Complete the drawing to show the following:

•   under slab pipework required to convey discharge from fixtures.
•   the diameter of each pipe.
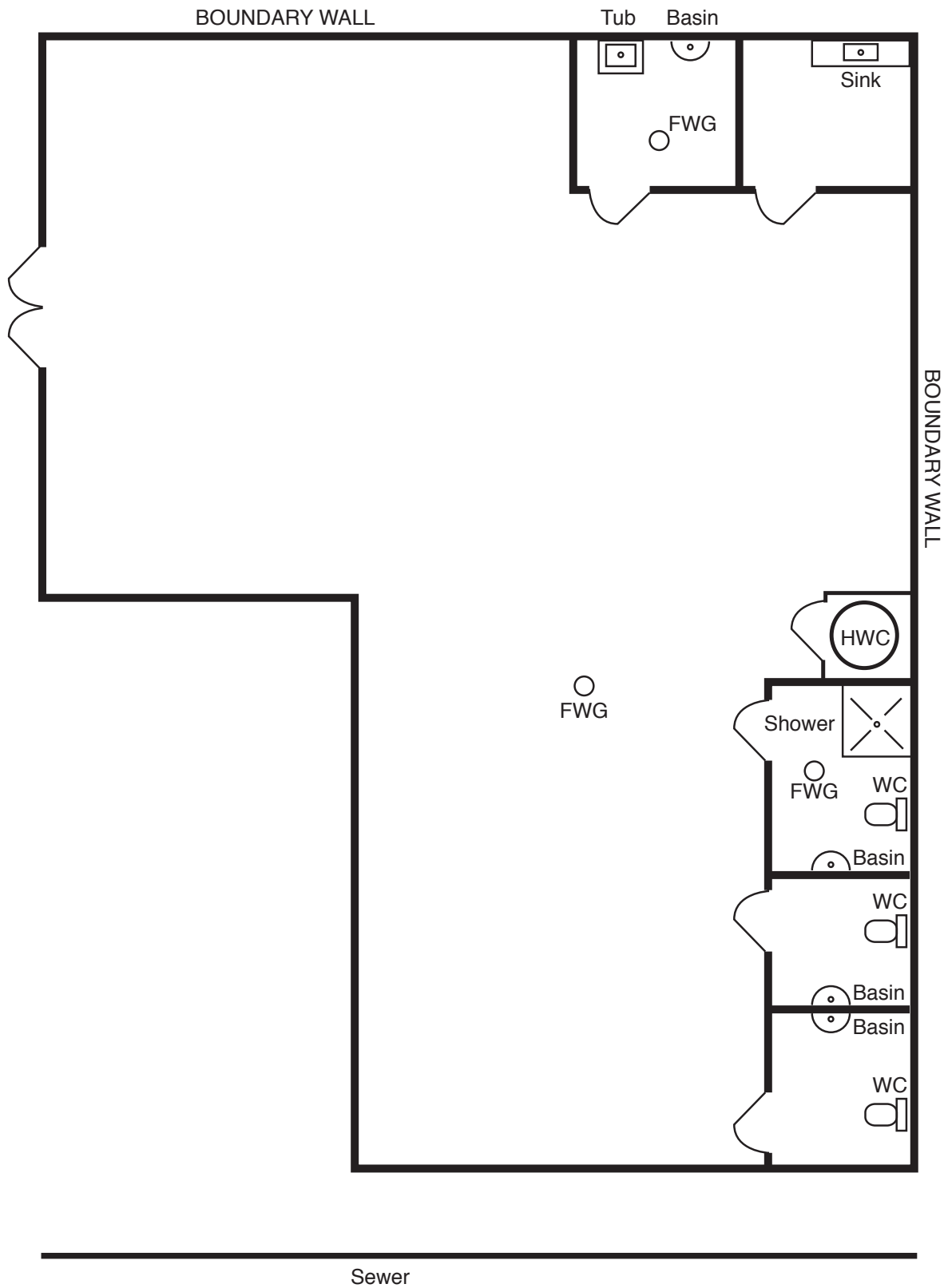•   any required vent connections.

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

(b) Complete the following table by entering the diameter of each pipe used in (a) and the gradient for each diameter pipe.

Diameter	Gradient

Total 10 marks

BOUNDARY WALL

Tub   Basin

Sink

FWG

BOUNDARY WALL

HWC

FWG

Shower

FWG   WC

Basin

WC

Basin

Basin

WC

Sewer

QUESTION 8

(a) It is possible for a trap to lose its water seal due to hydraulic jump.

    (i)   Explain how hydraulic jump occurs.

_____

_____

_____

_____

                                             (2 marks)

    (ii)   Explain why hydraulic jump results in loss of seal.

_____

_____

_____

_____

                                             (2 marks)

(b) Give TWO design solutions that will help prevent water seal loss due to hydraulic jump.

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. What is the maximum diameter for a roof penetration that is permitted to be sealed with an EDPM rubber boot flashing before a soaker flashing is required?

    A   50 mm.

    B   60 mm.

    C   75 mm.

    D   90 mm.

    E   110 mm.

2. What is the maximum diameter a penetration in a corrugated profile roof can be before additional framing support must be provided at the edge of the penetration?

    A   100 mm.

    B   200 mm.

    C   250 mm.

    D   300 mm.

    E   500 mm.

3. What is the minimum distance under a cover sheet a soaker flashing must extend?

    A   100 mm.

    B   200 mm.

    C   250 mm.

    D   300 mm.

    E   500 mm.

4. What is the maximum permissible pitch of a corrugated profile roof on which an EDPM rubber boot flashing can be used to seal a roof penetration?

    A   10°

    B   15°

    C   20°

    D   30°

    E   45°

5. What is the minimum period a flashing sealing a roof penetration must last in order to be compliant with the New Zealand Building Code?

    A   1 year.

    B   2 years.

    C   5 years.

    D   15 years.

    E   50 years.

6. What is the minimum period under-slab waste pipes must last in order to be compliant with the New Zealand Building Code?

    A   1 year.

    B   2 years.

    C   5 years.

    D   15 years.

    E   50 years.

7. What is the minimum period pipework concealed behind wall linings must last in order to be compliant with the New Zealand Building Code?

    A   1 year.

    B   2 years.

    C   5 years.

    D   15 years.

    E   50 years.

8.   Which of the following specifies the minimum diameter for an overflow pipe on a safe tray situated under a 180 litre water tank?

   A   25 mm.

   B   40 mm.

   C   50 mm.

   D   2 × the inlet pipe diameter.

   E   The same size as the inlet pipe diameter.

   ☐

9.   A waste disposal unit is to be installed in one of two sink bowls in a kitchen. A single trap is to be used to serve both bowls.

   What is the maximum length of waste pipe permitted between the waste disposal outlet and the trap water seal?

   A   1.0 m

   B   1.2 m

   C   1.5 m

   D   1.8 m

   E   2.0 m

   ☐

10. How many discharge units does a double sink and waste disposal unit combination have?

   A   2

   B   3

   C   4

   D   5

   E   6

   ☐

11. Why is it not permitted to install two commercial sinks sharing a single 50 mm plastic trap?

    A   In the event of a waste pipe blockage, dirty water from one sink could contaminate clean water in the other.

    B   The total discharge units will exceed the amount permitted.

    C   If the waste pipe blocked, neither sink could be drained.

    D   The temperature of the waste from a commercial sink can exceed 60°C.

    E   The grease content in commercial kitchen sink wastes is high and can often cause blockages.

12. What is the purpose of the charge pipe in relation to an overflow relief gully?

    A   To provide an overflow point for the gully.

    B   To convey any overflow to a suitable location.

    C   To keep an effective water seal in the trap.

    D   To bring the height of the overflow relief gully to above ground level.

    E   To convey waste from the overflow relief gully to an appropriate outfall.

13. What is the minimum permitted capacity for a storage hot water cylinder for a solar water heating system with 7 m^2 of solar panels?

    A   180 litres.

    B   200 litres.

    C   250 litres.

    D   300 litres.

    E   350 litres.

14. Why must a minimum capacity be provided for hot water storage in a solar water heating system?

    A   To prevent the system from overheating.

    B   To provide the water at an adequate temperature.

    C   To prevent the growth of legionella bacteria.

    D   To ensure there is enough water to meet the demand.

    E   To give an equal volume of water in the cylinder and panels.

15. What do solar water heating systems and wetback systems have in common?

    A   They are both indirect heating systems.

    B   They both use radiant heat exchange methods.

    C   They must both be installed below the storage cylinder.

    D   They can be installed as open vented or valve vented systems.

    E   They are both uncontrolled heat sources.

    ☐

16. What is the maximum number of 90º bends permitted in a relief valve drain that is 8 metres long?

    A   4

    B   5

    C   6

    D   7

    E   8

    ☐

17. Which of the following is a supplementary heating source as stated in AS/NZS 3500 Part 0: Glossary of terms?

    A   A solar panel.

    B   A wetback heat exchanger.

    C   A continuous flow water heater feeding a swimming pool.

    D   An electric element connected to a solar water heating system.

    E   An extra element installed near the top of an electric storage water cylinder.

    ☐

18. What is the maximum sized hole that can be drilled through a 200 mm floor joist under NZS 3604: Timber Framed Buildings?

    A   15 mm.

    B   20 mm.

    C   25 mm.

    D   32 mm.

    E   40 mm.

    ☐

19. Where in a floor joist does NZS 3604: Timber-Framed Buildings recommend a hole be drilled?

    A   In the top third.

    B   In the top half.

    C   In the middle third.

    D   In the bottom half.

    E   In the bottom third.

20. According to NZS 3604: Timber-Framed Buildings, how close are notches in a stud allowed to be cut?

    A   200 mm

    B   300 mm

    C   400 mm

    D   500 mm

    E   600 mm

Total 20 marks