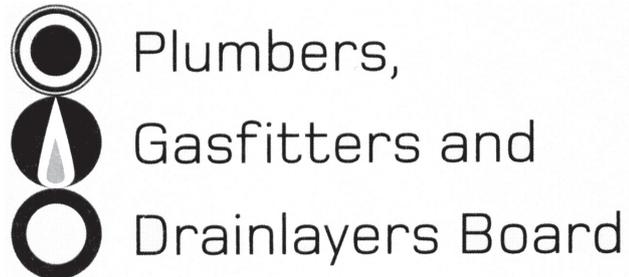


No. 9195



CRAFTSMAN EXAMINATION, JUNE 2008
PLUMBING

ANSWER SCHEDULE

ANSWER 1

(a) Any SIX:

- 1 A Craftsman Plumber.
- 2 A Registered Plumber.
- 3 A holder of a limited certificate in plumbing working under the direct supervision of a craftsman or registered plumber or if the limited licence has been held for a continuous period of two years the direct supervision is not required.
- 4 An apprentice in the Plumbing and Gasfitting Industry who holds a limited certificate.
- 5 Any person who is legally permitted, by law, in terms of the Plumbers, Gasfitters and Drainlayers Act exemption clauses to do Sanitary Plumbing.
- 6 A Craftsman Gasfitter or registered Gasfitter who holds an exemption to connect and disconnect hot water cylinders.

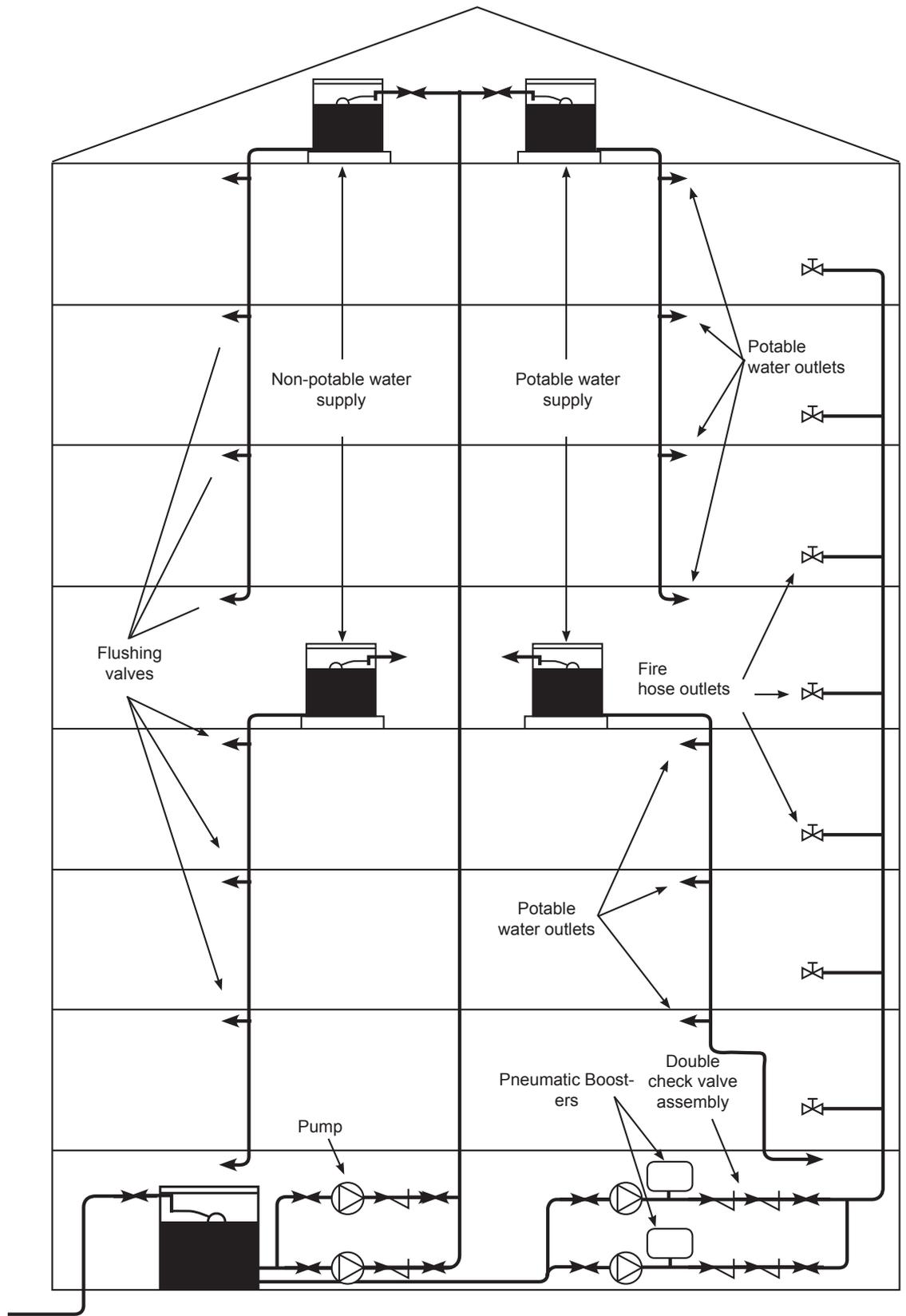
(1 mark each) (5 marks)

- (b)
- 1 Safeguard people from illness caused by infection from contaminated water or food.
 - 2 Safeguard people from injury due to explosion of a pressure vessel or from contact with excessively hot water.
 - 3 Safeguard people from loss of amenity arising from lack of hot water for personal hygiene or from a water supply, which is offensive in appearance or odour.
 - 4 Ensure that people with disabilities are able to carry out normal activities and functions within buildings.

(4 marks)

Total 9 marks

ANSWER 2



- | | |
|---|---|
| 1 mark each tank (5 marks) | ½ mark each bypass (1 mark) |
| ½ mark each pneumatic booster (1 mark) | ½ mark each backflow valve (1 mark) |
| 1 mark potable feed (1 mark) | 1 mark non-potable feed (1 mark) |
| 1 mark fire hose outlets (1 mark) | 1 mark for potable water pumps (1 mark) |
| 2 mark for valve trains (½ mark for each valve train set) | |

Total 14 marks

ANSWER 3

- 1 Install the pump as close to the source of water supply as possible.
- 2 Ensure accessibility and easy removal of the pump for maintenance.
- 3 Secure pump to a level solid base and weatherproof.
- 4 Ensure the system is flushed clean of foreign matter before operating.
- 5 Ensure the diameter of the pipework on the suction line is at least the same diameter as the pump inlet connection and one diameter larger than the pipework on the delivery side of the pump.
- 6 Pipework on the inlet or suction line should be as short as possible and within the limitations of the pumps functioning capacity (manufacturer's specifications) and when below the pump should rise all the way with as few changes of direction as possible.
- 7 All inlet pipework must be airtight.
- 8 A foot valve (non-return valve) and strainer to exclude foreign matter must be installed on every suction line thereby reducing the degree of priming necessary.
- 9 Install a non-return and control valve to the delivery line to prevent a head of water in the delivery line driving the pump in reverse after stopping and prevent water loss if the pump is disconnected for servicing.

(Any 6, one mark each) (6 marks)

Total 6 Marks

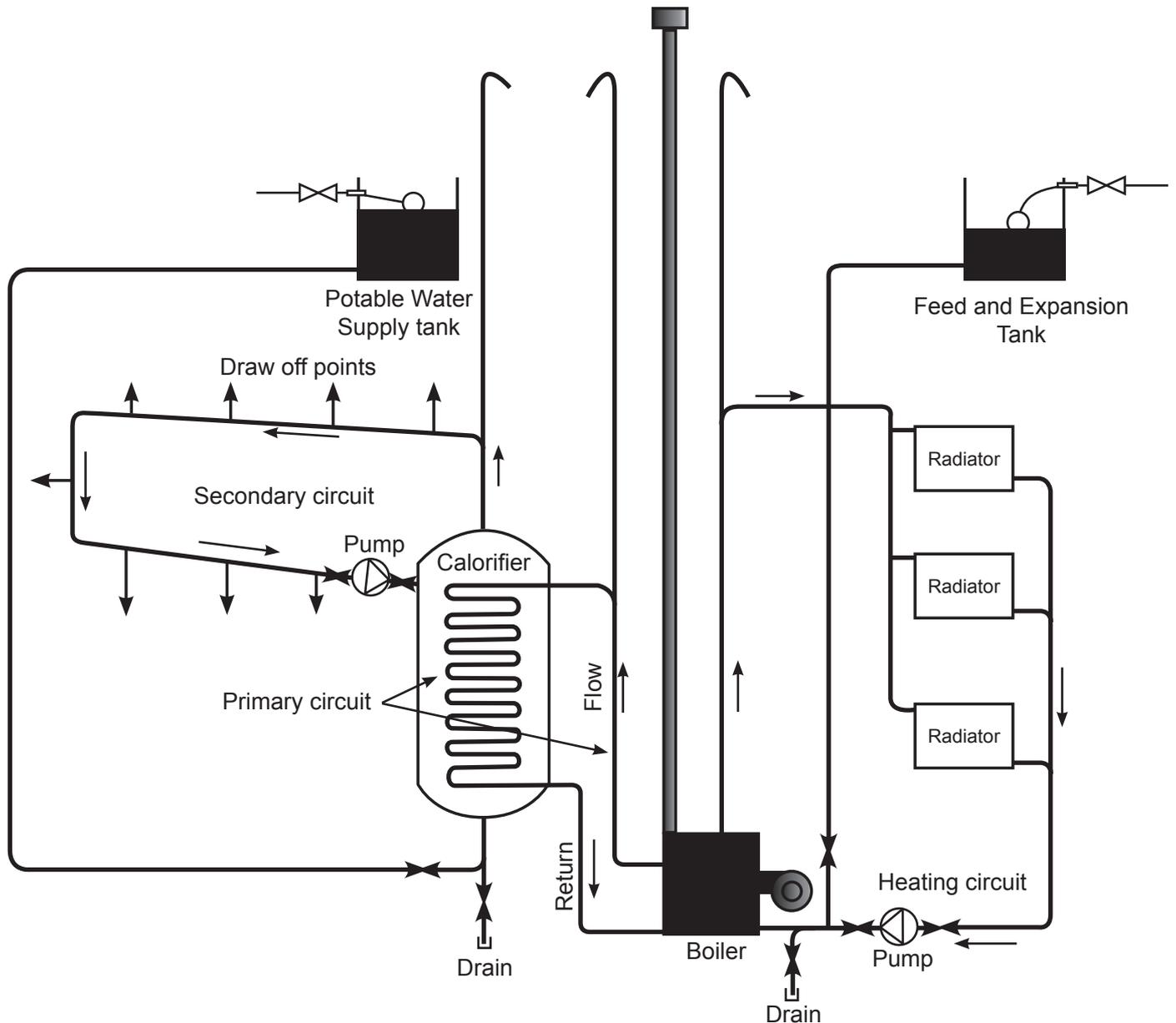
ANSWER 4

Position of F & E ballcock (1 mark)
Pipework secondary (1 mark)
Venting (2 marks – both systems must be vented)
Labelling (1 mark)
Position of pump in secondary circuit correct (1 mark)
Connections to heat exchanger (1 mark)

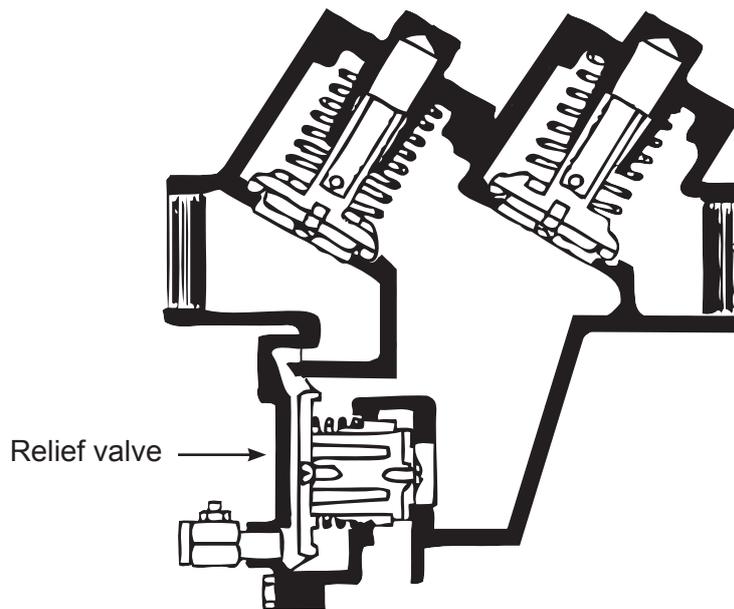
Pipework primary (1 mark)
Pipework heating (1 mark)
Position of valves (8 at ½ mark each)
Position of heating circuit pump (1 mark)
Heat exchanger (1 mark)
Drains (½ mark each, 1 mark)

Note: Any design that is unsafe maximum mark 7

Total 16 marks



ANSWER 5



- (a) Reduced Pressure Zone Device (1 mark)
- (b) (i) Normal Operation (2 marks)
During normal operation the first check valve creates a reduced pressure zone between the two check valves, and under flow conditions both check valves open allowing water to flow to the downstream piping. The relief valve is held closed by the supply pressure acting on the diaphragm of the relief valve.
- (ii) No flow (2 marks)
In a no flow or static pressure condition, both check valves will close and the supply pressure will hold the relief valve shut. Again, the relief valve is held closed by the supply pressure acting on the diaphragm of the relief valve.
- (iii) Back-siphonage protection (2 marks)
If the supply pressure drops, the relief valve will maintain a minimum pressure in the zone between the numbers 1 and number 2 check valves. If the supply pressure becomes less than the relief valve setting, the relief valve opens, discharging the reduced pressure zone to the atmosphere at the relief valve outlet. There will then be an internal air gap within the device ensuring protection against any backflow.
- (iv) Backpressure protection (2 marks)
As the downstream pressure increases, caused by backpressure, both number 1 and 2 check valves and the differential pressure relief valve close tightly. If the number 2 check valve leaks, water under higher pressure will flow into the area between check valves 1 and 2. As the pressure in that zone increases, the relief valve will start to open still maintaining a pressure 21 kPa lower than the supply pressure. The relief valve will continue to discharge while the condition remains.

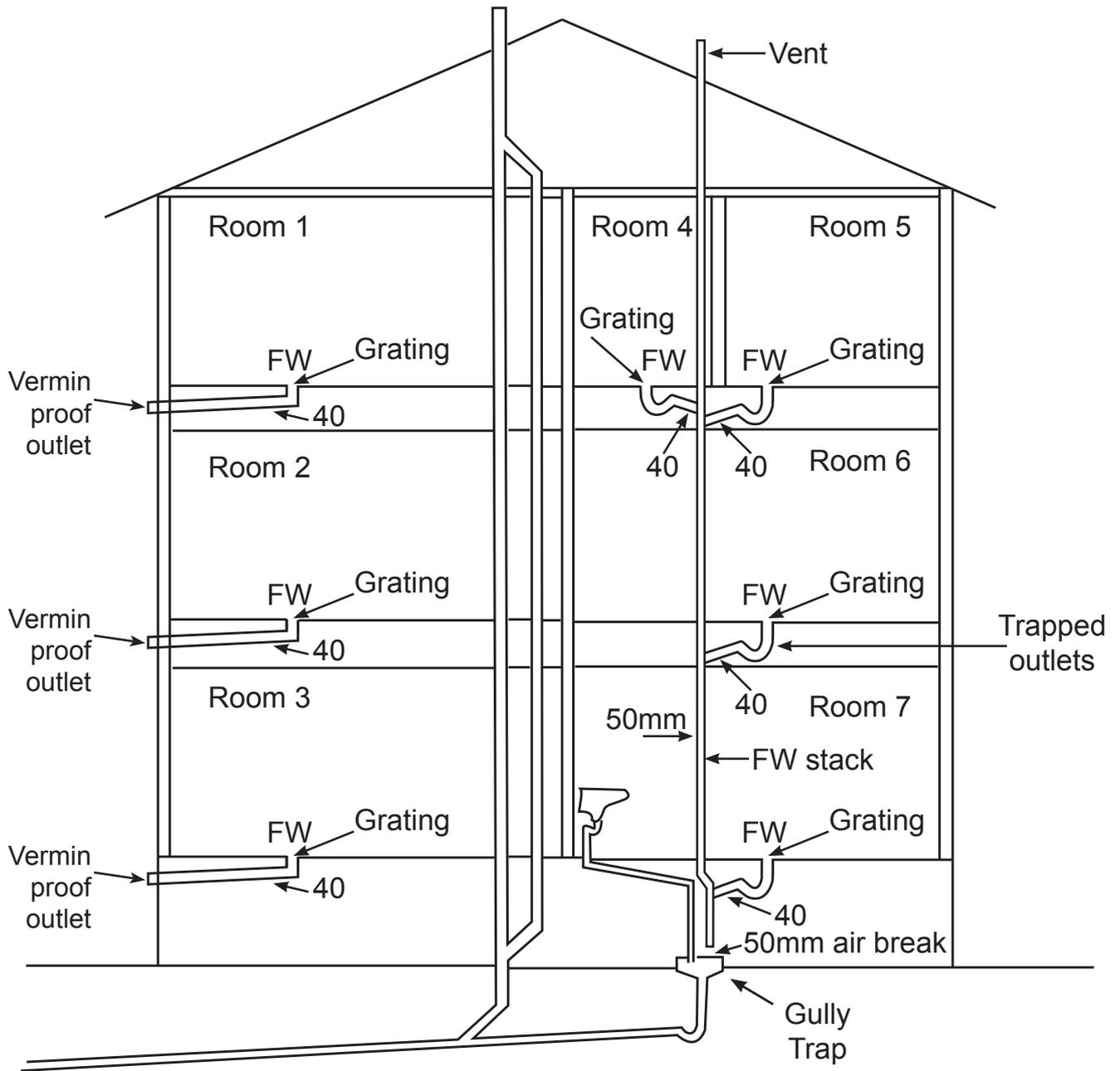
(c) Any SIX:

- 1 Unless specifically designed otherwise, valves must be located so they can be installed in a horizontal position.
- 2 Valves must be readily accessible for maintenance and testing.
- 3 Valves must be located where they can never be submerged.
- 4 Valves must be protected from freezing.
- 5 Valves must be located as close as possible to the point of contamination.
- 6 The relief valve outlet must be fully ventilated to the atmosphere.
- 7 Valves must be located and installed in a manner which will prevent the relief drain causing a nuisance.
- 8 Protected from extreme temperature.

(½ mark each correct answer) (3 marks)

Total 12 marks

ANSWER 6

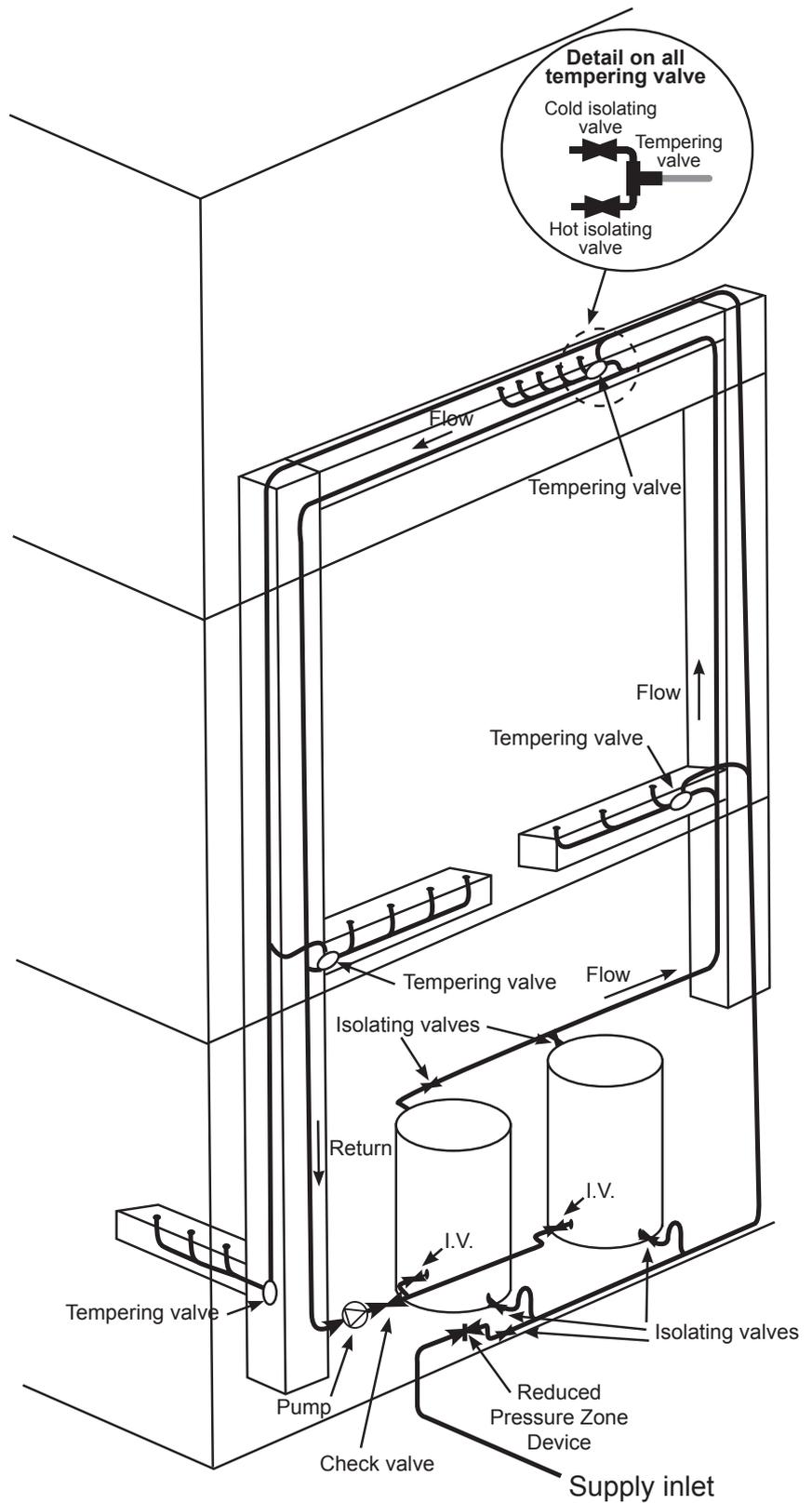


Any other solutions from G13 eg, trapped outlets into stack

- Sizing (2 marks) accept 50 or 40 discharge pipes – 50 or 80 stacks, depending on number of trap connections
- Vermin proof outlets (1 mark)
- Trapped outlets (1 mark)
- Discharge points (2 mark)
- Venting (1 mark)
- Stack (1 mark)

Total 8 Marks

ANSWER 7

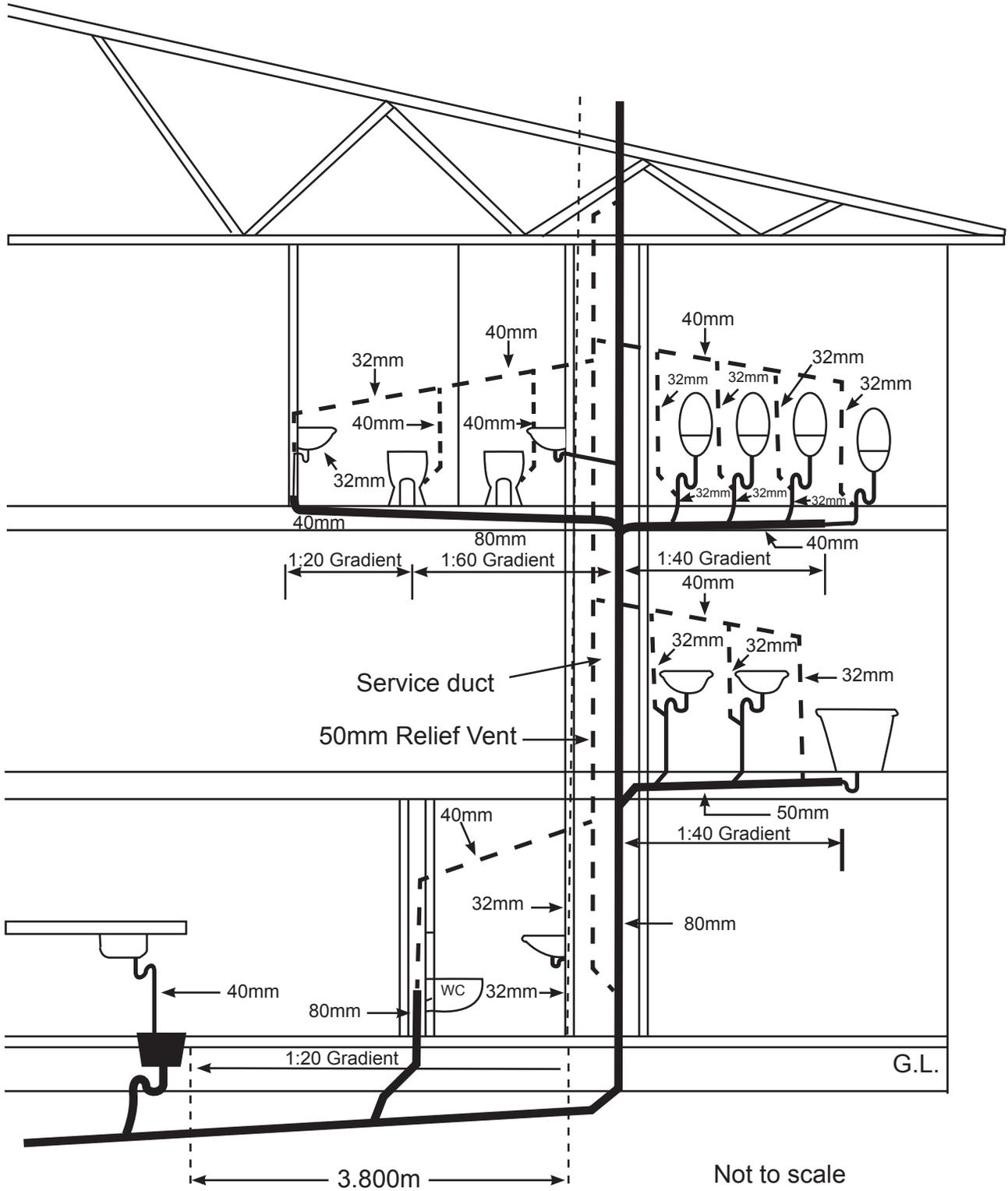


- Correct flow and return pipework (1 mark)
- Cold water pipework (1 mark)
- Isolating valves in correct positions (1 mark)
- Reduced pressure zone device (1 mark)
- Isolating valves to RPZ or DCV (1 mark)
- Isolating valves to HWCs (1 mark)

- Equa flow pipework (1 mark)
- Tempering valves and pipework (1 mark)
- Non-return valve at pump (1 mark)
- Pump in correct position (2 marks)
- Isolating valves to TLVs (1 mark)

Total 12 Marks

ANSWER 8



Vents	(½ mark)	Relief vent	(½ mark)
Fixture vents	(½ mark)	Combined vents	(½ mark)
Vent sizes	(7½ marks)	Stack and Discharge pipes	(½ mark)
Stack	(½ mark)	Branch discharge	(½ mark)
Fixture discharge pipes	(½ mark)	Pipe sizing	(7½ marks)
Gradients	(1 mark)		(20 marks) OR -½ per error

Total 20 marks

ANSWER 9

(a) $22.500 \times 15.500 = 348.750\text{m}^2$

Pitch 22.5°

48000mm^2 (47000 – 50000)

(2 marks)

(b) 150mm diameter

(1 mark)

Total 3 Marks

