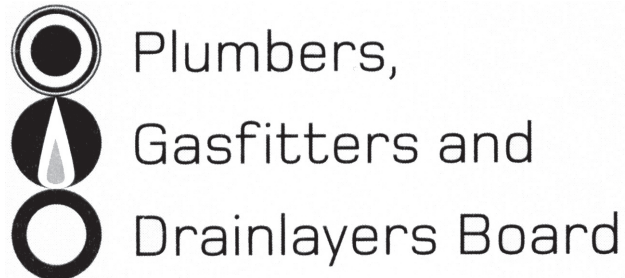


No. 9195



CRAFTSMAN EXAMINATION, NOVEMBER 2007
PLUMBING

ANSWER SCHEDULE

ANSWER 1

- (a) Testing of backflow prevention devices must be carried out by an independently qualified person (IQP) who is acceptable to the Local Authority. The Building Code requires that an IQP have no financial interest in the building to which the device is installed. Unless the IQP is a suitably Licensed Plumber he cannot undertake maintenance of the appliance.

(3 marks)

- (b)
- 1 AS/NZS 3500 Part 0 1995 Glossary of Terms
 - 2 AS/NZS 3500 Pt.1 Water Supply Acceptable Solutions
 - 3 AS/NZS 3500 Pt.2 Sanitary plumbing and drainage
 - 4 AS/NZS 3500 Pt.3 Storm Water Drainage
 - 5 AS/NZS 3500 4 Heated Water Supply Systems
 - 6 AS/NZS 3604 Code of Practice Light Timber From Buildings
 - 7 AS/NZS 4614 Installation of Domestic Solar Heating
 - 8 AS/NZS 2642 Water Supply Backflow Prevention Devices
 - 9 AS/NZS 2845 Air Gaps and Break Tanks

(Any 5 – 1 mark each $\frac{1}{2}$ for the number & $\frac{1}{2}$ mark for the name) (Total 5 marks)

- (c)
- 1 A qualified electrician
 - 2 A plumber and or gasfitter who is a holder of a Tradesperson's Electrical Work Certificate.

($\frac{1}{2}$ mark each) (1 mark)

(Total 9 marks)

ANSWER 2

Any EIGHT:

- 1 The capacity of the storage tank shall be calculated so as to provide no less than 50 litres per person occupying the building
- 2 The water tank shall have an overflow pipe to discharge any overflow to a visible place within the same property that does not create a nuisance. The outlet of the overflow pipe shall not permit the entry of birds or vermin and to be 40mm dia mim.
- 3 The provision of a safe try is necessary if water is to be prevented from penetrating another household unit within the same building. It is always wise to provide for a safe tray in your design
- 4 Storage tanks must be provided with removable covers to prevent contamination, the entry of vermin and condensation if in a roof space
- 5 Covers must be removable to allow access for inspection and maintenance and there must be a minimum height clearance of 350mm above the cover for easy access
- 6 Storage water tanks must be adequately supported.
- 7 Where fittings and pipework are attached to the water tank, pass through the support platform, the floor or any other fixed structure clearance shall be provided between the fitting or pipe and the structure. Where the clearance could allow the passage of moisture or vermin it shall be sealed with a flexible membrane
- 8 Seismically Restrained.

(1 mark each)

Total 8 marks

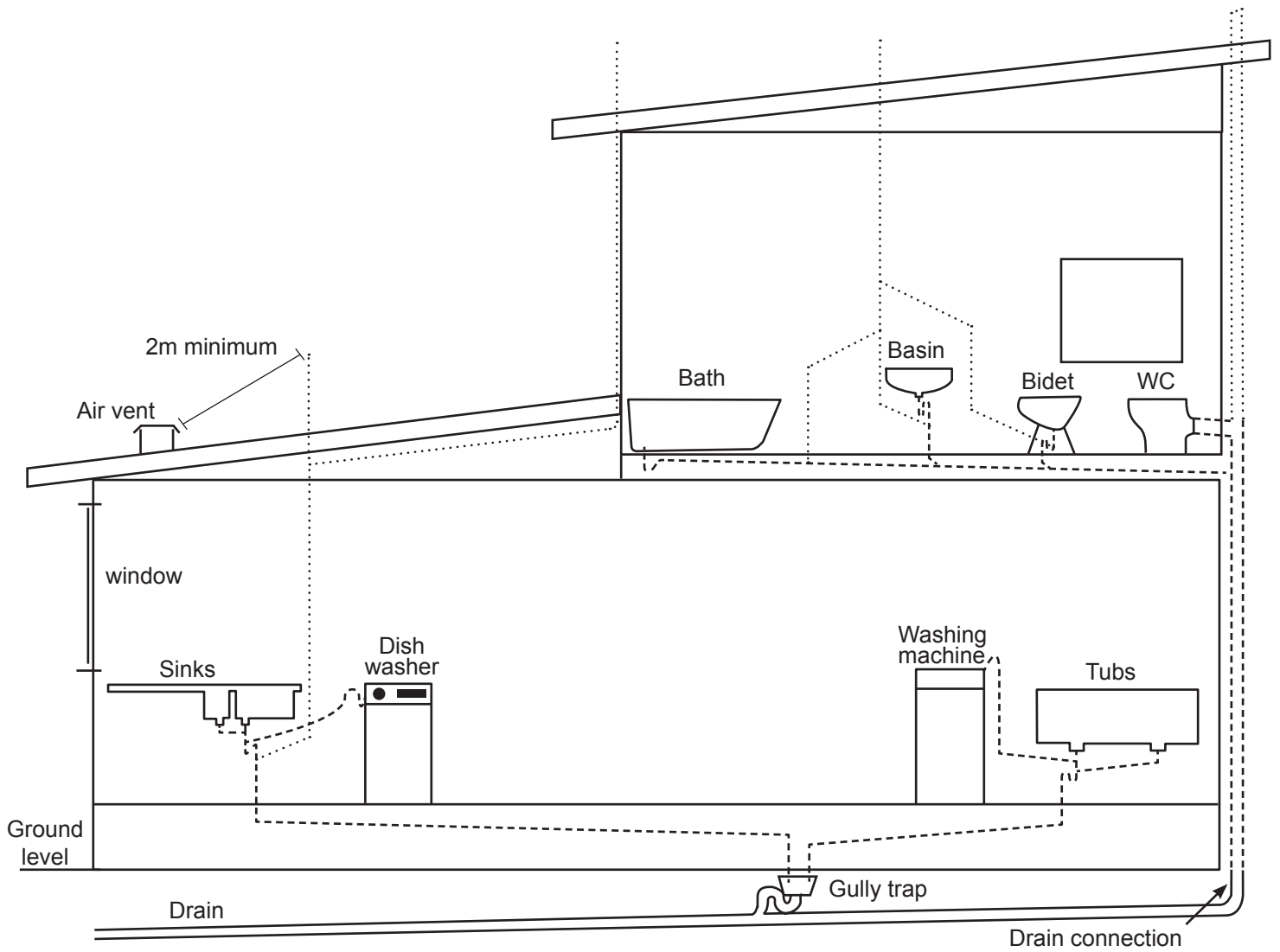
ANSWER 3

Any FIVE:

- (a)
- 1 The difference in height between the pump and the water surface at the source of the water.
 - 2 The difference in height between the pump and the highest point of the delivery pipe work.
 - 3 The maximum simultaneous flow rate through the outlets
 - 4 The pressure required at the outlets
 - 5 The pipe diameter (ID) and type (material) of the system
 - 6 The total length of the suction pipe
 - 7 The total length of the delivery pipe (5 marks)
- (b)
- $3.2 \times 3.2 \times 2.4 \times 0.7854 = 19.302 \text{ m}^3$ (1 mark)
- $19.302 \times 5 = 96.51 \text{ grams}$ (1 mark)
- (2 marks)
- (c)
- (i) 10.3m
(accept 10 – 10.5) (1 mark)
- (ii) Any TWO:
- Height above sea level
- Frictional resistance
- Pumping efficiency
- Admittance of air (2 marks)
- (iii) The pump must be installed down the well (bore) (1 mark)
- (d) Buildings provided with drinking water outlets, sanitary fixtures or sanitary appliances shall have a safe and adequate water supply. (1 mark)

Total 12 Marks

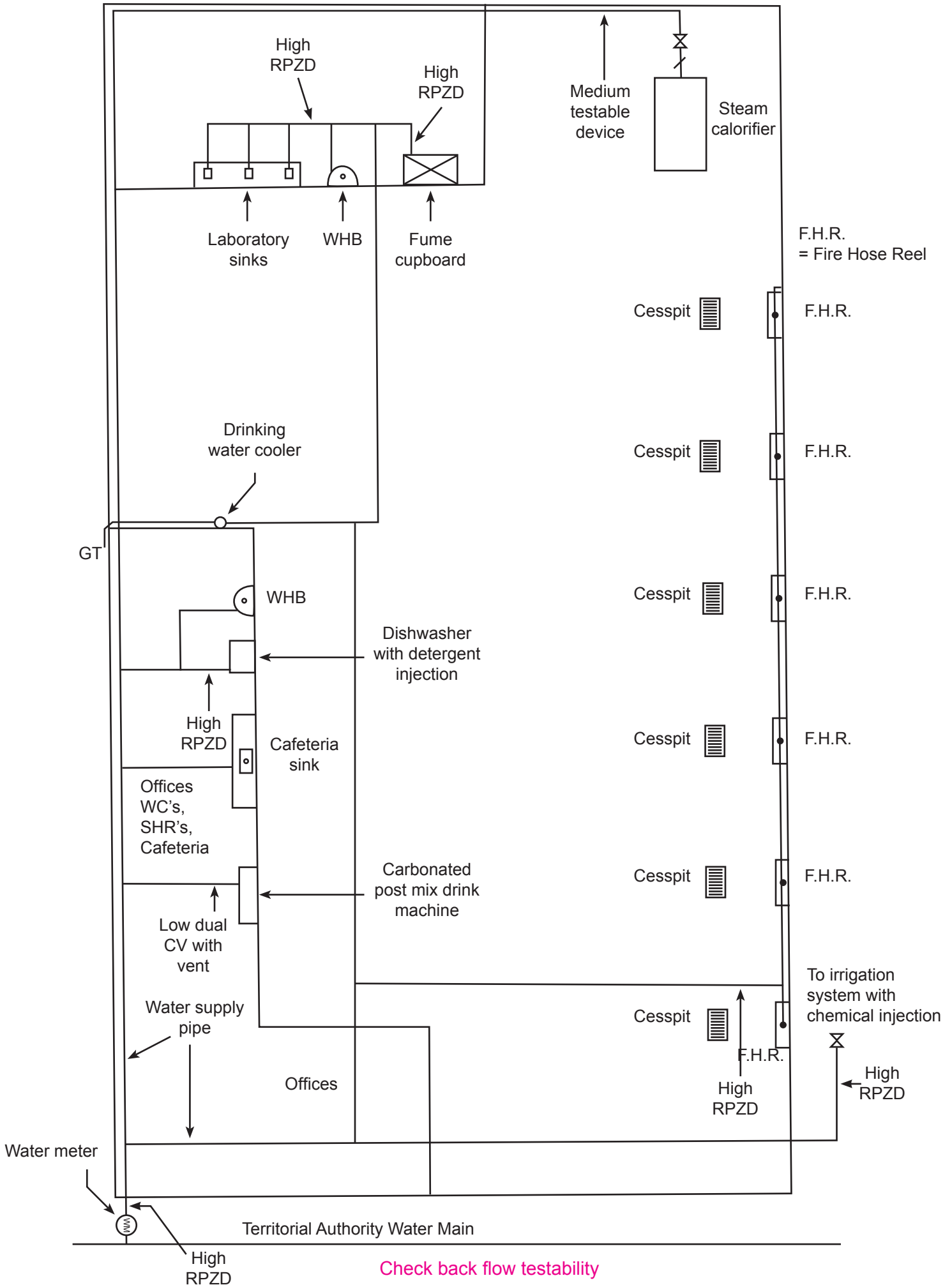
ANSWER 4



Scale 1 : 50

Start from 7 marks, deduct 1 for each mistake
(7 marks)

ANSWER 5

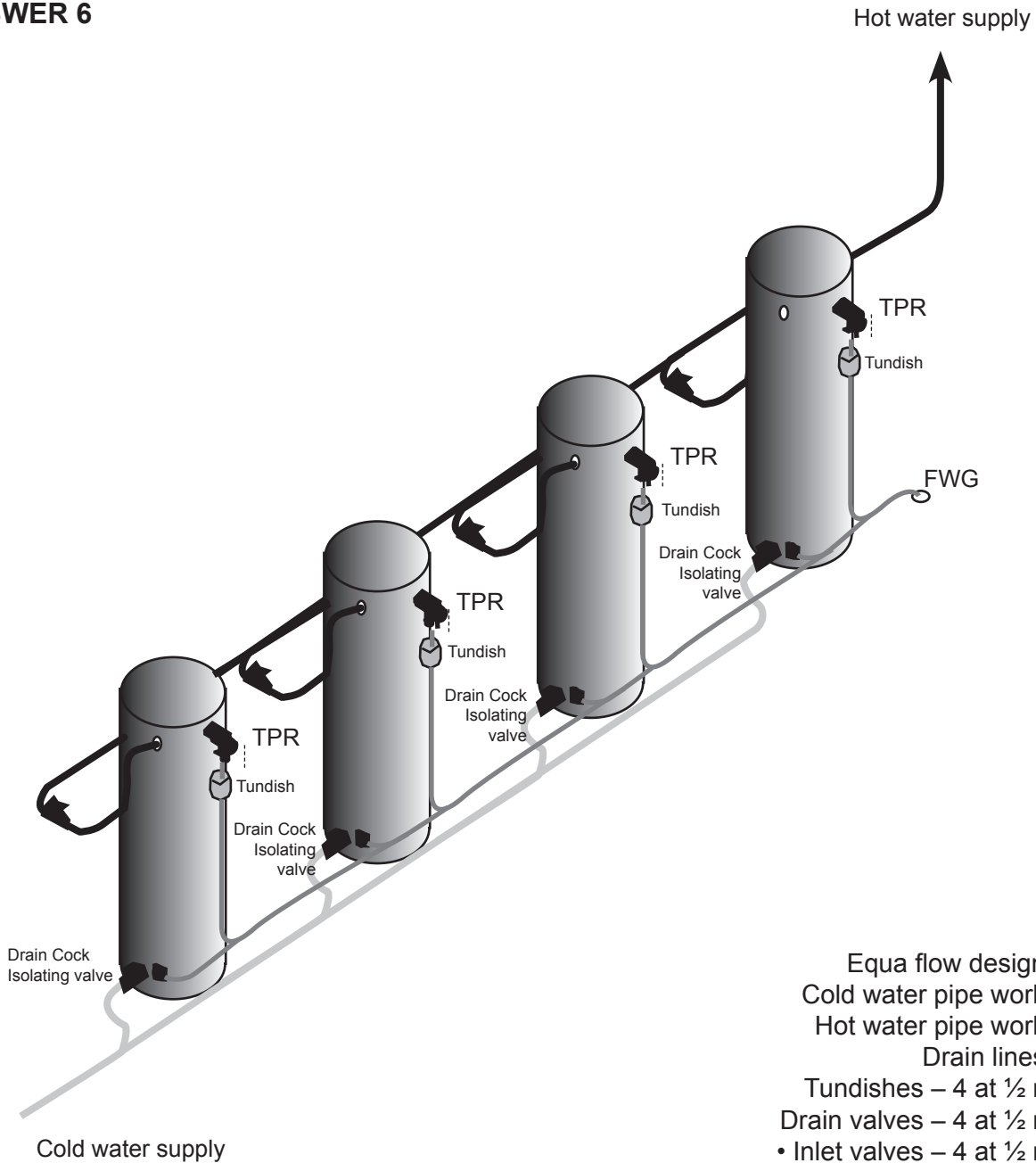


(d) To prevent any toxic substances or material or substance of any kind whatsoever that is likely to be injurious to health entering a potable public water supply system. The minimum air-gap is 25mm (or two times the inlet pipe diameter whichever is the greater) (2 marks)

(e) At least once a year.
The owner shall arrange the inspection. (2 marks)

Total 16 marks

ANSWER 6



- Equa flow design – 1 mark
- Cold water pipe work – 1 mark
- Hot water pipe work – 1 mark
- Drain lines – 1 mark
- Tundishes – 4 at ½ mark each
- Drain valves – 4 at ½ mark each
- Inlet valves – 4 at ½ mark each
- Outlet valves – 4 at ½ mark each

Total 12 marks

ANSWER 7

- (a) 300mm
- (b) The hot water in the cylinder would
- 1 Overheat beyond normal boiling point of 100 degrees Celsius
 - 2 Increase the pressure within the storage cylinder eventually causing it to rupture or explode
 - 3 On release of pressure, the water would flash into steam
- (1 mark each) (3 marks)
- (c) A calorifier is a cylinder that allows water to be heated indirectly by either hot water/steam from a boiler without the contamination of the water stored in the calorifier. (Mostly used in circulation hot water systems)

Total 6 marks

ANSWER 8

- (a) Mass of water = 450kg
 $t_2 - t_1 = 75 - 8 = 67^\circ\text{C}$
- Heat energy input per hour = 7.2kW
 $= 7.2 \times 3.6 \times 1000$
 $= 25920 \text{ kJ}$
- (1 mark)
- Thermal efficiency = 95%
- Time = $\frac{450 \times 4.2 \times 67}{25920 \times 0.95}$
- (1 mark)
- = $\frac{126630}{24624}$
- = 5.143 hours
- (1 mark)

$$(b) \quad \text{Litres of hot water required} = \frac{\text{Litres of warm water required} \times \text{Temperature rise from cold to mixed}}{\text{Temperature rise from cold to hot}}$$

$$= \frac{820 \times 43}{53}$$

(1 mark)

$$= \frac{35260}{53}$$

$$= 665.283 \text{ litres}$$

(1 mark)

(Total 2 marks)

(c) Formula Heat Input = Temperature difference x Mass x Specific heat capacity
(Working : Temp diff = 73 – 7 = 66C)

$$\text{Heat input} = 66 \times 360 \times 4.2$$

(1 mark)

$$= 99792 \text{ kJ}$$

$$\text{Heat in MJ} = 99792 \div 1000 = 99.792 \text{ MJ}$$

(1 mark)

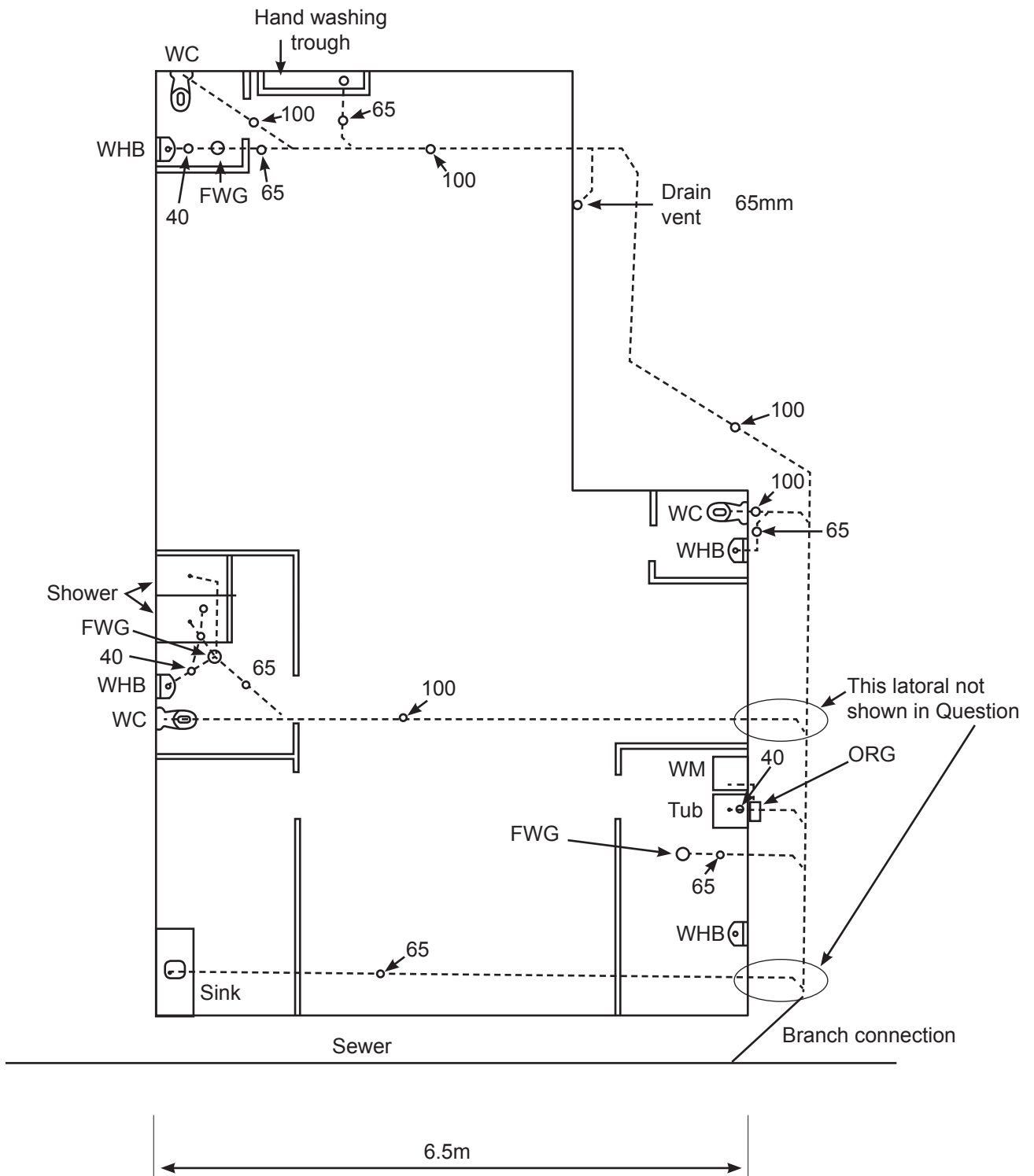
$$\text{Heat in kWh} = 99.792 \div 3.6 = 27.72 \text{ kWh}$$

(1 mark)

(Total 3 marks)

Total 7 marks

ANSWER 9



- (a) Design – 7 marks, deduct 1 mark for each error (layout, discharge points etc)
 Org – 1 mark
 Vent position – 1 mark
- (b) Sizing – 6 marks, deduct 1 mark for each sizing fittings incorrect

Total 15 marks

ANSWER 10

(a) $6.5 \times 26.5 \times 0.012 \times 4 = 8.268\text{m}^3$ (1 mark)

(or 8268 litres)

(or 8.268 cubic metres) (1 mark)

(2 marks)

(b) Roof area = $26.5 \times 6.5 = 172.25\text{m}^2$

Therefore: gutter cross sectional area = 16000mm^2 (Accept 16000 – 17000)

(2 marks)

(c) 150mm Diameter

(1 mark)

Total 5 marks

ANSWER 11

Able to increase the number of discharge units

Able to serve more floors without increase in diameter

Allows for more flexibility in the layout of fittings

It is more economical

Total 3 marks