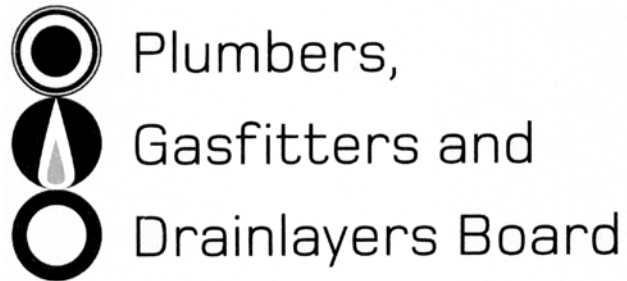


No. 9198



REGISTRATION EXAMINATION, NOVEMBER 2021
CERTIFYING DRAINLAYER

ANSWER SCHEDULE

ANSWER 1

- (a) Any TWO (1 mark each)
- The underground service may not be metallic and the locator cannot detect them.
 - Hum detectors only pick up live electricity cables that have a current flowing through them.
 - The locator may not be able to distinguish between two services running closely together and indicate them as a single service.
 - There could be interference from other metallic objects in the area.
 - The surface area of the service may not be large enough for the locator to detect.
 - The locators often do not accurately indicate the depth of the service.
 - The locator may detect a different service to the service required. (2 marks)
- (b)
- Plans.
 - Hand digging until services are positively located. (2 marks)
- (c)
- A 300 mm.
B 100 mm.
C 600 mm. (3 marks)

Total 7 marks

ANSWER 2

- (a) (i) • To prevent the water entering the soak pit from scouring the base and undermining the chamber. (1 mark)
- (ii) • Holes 40 – 80 mm dia.
• Surround by filter cloth.
• Large enough to avoid overflowing.
• Removable lid. (2 marks)
- (b) • Soakage or percolation test. (1 mark)
- (c) • Bore test holes of 100 mm to 150 mm diameter to the depth of the proposed soak pit.
• Fill the hole with water and soak for at least 4 hours.
• Record the drop in water level against time, plot the drop in water level against time on a graph. (3 marks)
- (d) • The steeper the gradient of the site the quicker the water will run down, leaving less time for any surface water to soak in to the site. (2 marks)
- (e) • $0.85 + 0.05 = 0.90$ (1 mark)

Total 10 marks

ANSWER 3

- (a) (i) • Waste that cannot be discharged to a Network Utility Operator's sewer system. (1 mark)
- (ii) • Waste that must be treated before it can be disposed of to the network utility operator's system. (1 mark)
- (iii) • Waste that does not require treatment and can be disposed of directly to the network utility operator's system. (1 mark)
- (b) Any FOUR (1 mark each)
- Harmful solids and material which can combine with water to form a cemented mass.
 - Asbestos.
 - Flammable or explosive material.
 - Genetic wastes.
 - Medical wastes.
 - Highly radioactive material.
 - Metal compounds e.g. arsenic.
 - Chlorine pesticides. (4 marks)
- (c) • Store the waste in a holding tank for future disposal at a suitable site.
- Treat the waste until it reaches a standard acceptable to be discharged to the sewer or water course. (2 marks)
- (d) Any TWO (1 mark each)
- G14 – Industrial Liquid Waste.
 - F3 – Hazardous Substances and Processes.
 - B2 – Durability. (2 marks)
- (e) • Oil / petrol trap. (1 mark)

Total 12 marks

ANSWER 4

- (a) Drawing to show:
- Baffle
 - Inlet and outlet
 - Cascade
 - Lid
- (4 marks)
- (b) Drawing to show:
- Gully dish (or similar) at discharge from building.
 - 3 m maximum distance between gully dish and grease trap.
 - Pipe from grease trap to drain.
 - Inspections immediately before and immediately after the grease trap, and before the access to the drain.
- (4 marks)
- (c) • Minimum per person (5 litres) for whom seating is provided but with an overall minimum (100 litres).
- (2 marks)

Total 10 marks

ANSWER 5

- (a) Any FOUR (½ mark each)
- Sewer gas.
 - Carbon monoxide or exhaust fumes.
 - Fuel gas.
 - Dust.
 - Carbon dioxide.
 - Trench collapse.
 - Ground gases.
- (2 marks)
- (b) Any THREE (1 mark each)
- Contact with dangerous underground services – gas pipe/electricity cables.
 - Exposure to falling objects from above the excavation.
 - Falling into the excavation.
 - Trench collapse.
- (3 marks)
- (c) Any FOUR (1 mark each)
- Keep spoil and machinery away from the edge of the trench.
 - Use shoring/trench shield etc.
 - Use a ladder to access and exit the trench.
 - Put up barricades around the perimeter of the trench to prevent objects and people falling into the trench.
 - Monitor the air quality in the trench.
 - Check the soil moisture levels regularly – too dry or too wet can cause trench collapse.
 - Dewater the trench.
 - Have a safe slope on the trench.
- (4 marks)

Total 9 marks

ANSWER 6

- (a) Any FOUR (4 marks)
- Oxygen level.
 - Possible toxic fumes.
 - Possible flammable contaminants.
 - Temperature within the chamber.
 - Rainfall in catchment area.
 - Tidal movements if the drain is discharging to the sea. (4 marks)
- (b) Any TWO (4 marks)
- A co-worker on lookout above.
 - Communication method.
 - Harness with retrieval rope, with co-workers to operate.
 - Adequate oxygen supply.
 - Gas detector. (2 marks)
- (c)
- Rinse in clean water to dilute waste.
 - Leave to soak in a solution containing disinfectant.
 - Lay out in the sun to dry – UV and drying will kill a large amount of bacteria.
 - Store in a container with drainage holes so that any fluid that escapes the rods will dry.
 - Store away from other tools and equipment to prevent contamination. (½ mark each, 2 marks)
- Total 8 marks**

ANSWER 7

- (a)
- Air diffusers or jet aerators – pumping air via a spreader into the aeration chamber.
 - An aspirated propeller – a rotating shaft that causes a vacuum to pull air down to the base of the tank.
 - Rotating biological contactor – rotating the biofilter where the bacteria live so that it raises out of the liquid and bacteria can access oxygen above the fluid level. (6 marks)
- (b) Any THREE (1 mark each)
- The effluent produced by an aerated system is of a higher quality.
 - Less likelihood of waterways and soil being contaminated with untreated or partially treated sewage.
 - More flexibility in disposal field construction.
 - Less dependent on good quality, well-draining soil. (3 marks)
- (c) Any THREE (1 mark each)
- Requires electricity to introduce oxygen and to pump the treated effluent to the disposal field.
 - Has mechanical parts that will require maintenance.
 - Has less tolerance to overloading or underloading than a septic system.
 - Aerated systems are not recommended for holiday homes that are only used for short periods at a time. This will effectively starve the aerobic bacteria and it will take some weeks for the colonies to grow to a size where they can digest and treat the sudden increase in discharged waste.
 - May release more nitrates into the soil and ground water than a septic system. (3 marks)
- Total 12 marks**

ANSWER 8

- (a) Correct connections (2) (1 mark)
 Inspection openings 90° bends (2) (1 mark)
 Inspection openings at WC (1 mark)
 Inspection openings at wastewater fixtures (1 mark)
 Vents correct (2 marks)
 Surface water (2 marks)
- (b) Scale/length correct 46 – 50 m (1 mark)
 Gradient correct 763 – 850 mm (1 mark)
 Depth correct +500 mm (1 mark)

Total 11 marks

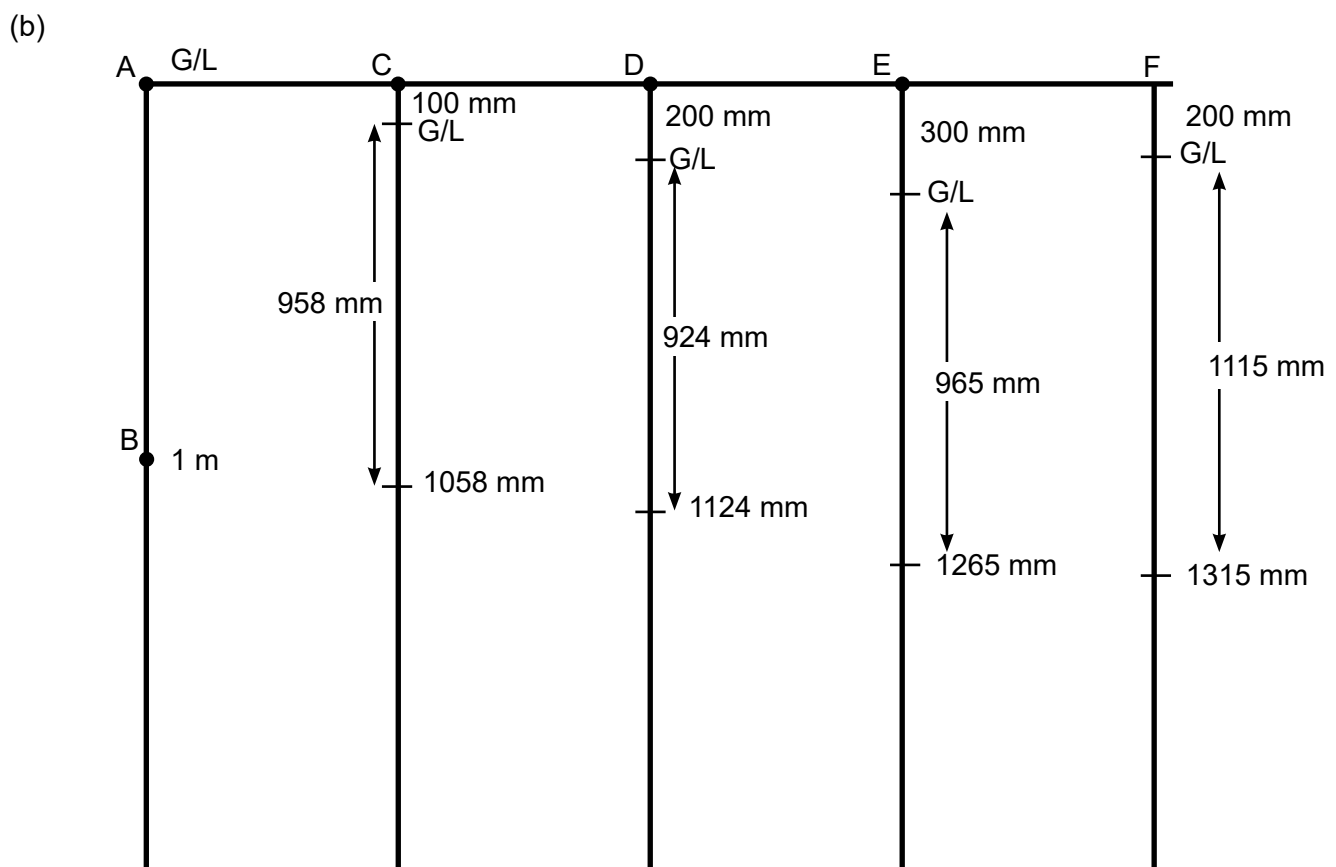
ANSWER 9

(a)

Section	Fall (mm)
B – C	58.3
C – D	66.6
D – E	141.6
E – F	50

Point	Depth below datum (mm)
A	Ground level
C	1058
D	1124
E	1265
F	1315

(8 marks)



(3 marks)

Total 11 marks

SECTION B

1. B 175 mm
2. D 2.0 m
3. B WorkSafe New Zealand.
4. C Hydrogen sulphide.
5. E 2.500 m
6. D 6.0 m
7. A 1.43 m.
8. C 30 minutes.
9. D 500 mm.
10. E Drip line irrigation system.

Total 10 marks