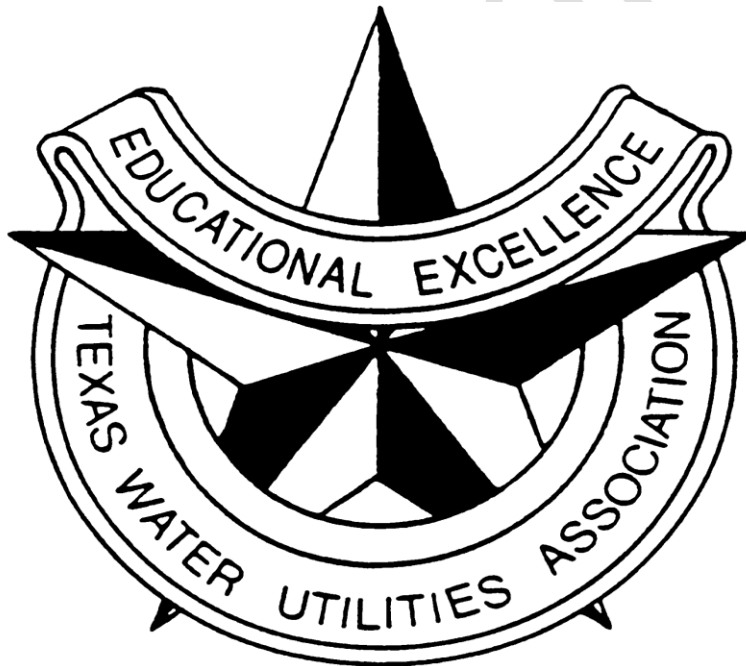


Water Operator

Study Material

Distribution



The following study questions were developed to assist the operator in the preparation process for taking a state licensing exam.

While we feel the questions provide a broad sample of the type of questions one might expect on the state exam. TWUA and staff in no way implies, guarantees, or suggests that an operator who uses, studies, or knows the following material will pass the state exam. The following is only intended to offer an additional study tool.

While TWUA and staff have proofed the questions and answers. It is possible that some of the answers could be found in conflict with written materials. If you doubt or question the answer key PLEASE refer to written materials and use the answer that YOU feel best fits the question.

We hope that you will find this study guide useful and we wish you the best of luck on your state exam.

The following is information that is representative of the Distribution Exam.

These ARE NOT actual test questions.

WATER DISTRIBUTION

1. Water Distribution Systems are composed of -
 - a. Mains, Valves, Service lines, Fire Hydrants, Storage, Pumps, Motors, & Meters
 - b. Mains, Valves, Service lines, Bar Screens, Fire Hydrants, Storage, Pumps & Motors
 - c. Mains, Valves, Service lines, Wells, Fire Hydrants, Storage, Pumps, Motors, & Meters
 - d. Mains, Valves, Service lines, Fire Hydrants, Pumps, Motors, Meters, & Automatic controls

2. The most difficult function of the distribution system is –
 - a. The repair of main breaks
 - b. The detection of unauthorized water taps
 - c. The continuous delivery of water
 - d. The upkeep of customer meters
 - e. The employment of qualified operators for maintenance

3. The most important factor affecting pressure requirements in the distribution system is –
 - a. Pump size
 - b. Motor size
 - c. Looping of Main Lines
 - d. Fire protection
 - e. Elevated storage

4. TCEQ rules require that water systems maintain a minimum of ____ psi throughout the distribution system under normal operating conditions and shall not be less than ____ in emergencies
 - a. 20 psi / 20 psi
 - b. 35 psi / 20 psi
 - c. 35 psi / 30 psi
 - d. 35 psi / 10 psi
 - e. None of the above

5. Palatable water means the water is –
 - a. Aesthetically pleasing
 - b. Safe for human consumption
 - c. Unsafe for human consumption
 - d. Has adequate disinfection
 - e. Aged and should be flushed

6. Potable water means the water is –
 - a. Aesthetically pleasing
 - b. Safe for human consumption
 - c. Unsafe for human consumption
 - d. Has adequate disinfection
 - e. Aged and should be flushed

7. Maintaining the minimum operating pressure in the distribution system helps to prevent –
 - a. Cross connections
 - b. Customer complaints
 - c. Water born diseases
 - d. Backflow contamination
 - e. Air in the distribution system

8. The Distribution System must –
 - a. Make available the allocation of water at satisfactory pressure.
 - b. Provide continuous delivery of sufficient volume of potable and palatable water at adequate pressure.
 - c. Provide delivery of tolerable volume of potable and palatable water at adequate pressure.
 - d. Provide continuous delivery of sufficient volume of potable and palatable water at adequate pressure – 85 % of the time.
 - e. Provide continuous delivery of sufficient volume of potable and palatable water at adequate pressure – 95 % of the time.

9. The purpose of water mains is –
 - a. To transport water throughout the system
 - b. To provide water for fire protection
 - c. To reduce the number of private wells within a providers service area
 - d. To insure customers have a water source
 - e. All the above

10. Water mains must be sized to meet the –
 - a. Demand of average flow, fire flow, & sell of water to surrounding systems
 - b. Demand of fire flow, commercial use,& industrial use
 - c. Demand of peak flow, average flow, future growth & fire flow
 - d. Specifications of design engineers & AWWA specifications
 - e. Size requirement of the provider as specified in the Article of Incorporation

11. In the absence of actual consumption records the best way to estimate systems demand is to use the estimate of ____ gallons per person per day –
- 80 gallons per person per day
 - 100 gallons per person per day
 - 120 gallons per person per day
 - 130 gallons per person per day
 - 160 gallons per person per day
12. When an operator is referring to a “water hammer” he / she is referring to –
- A device used to plug a main line when the tap breaks off
 - A device use to install a temporary plug or cap in new line construction
 - The gradual change in pressure as customer use or demand increases
 - A device used in the process of making new service taps
 - The sudden change in velocity or direction of water flow
13. The most common type of pipe joints in use today are –
- Push-on joints & Threaded joints
 - Push-on joints & Bell and Spigot joints
 - Push-on joints & Mechanical joints
 - Bell and Spigot joints & Mechanical joints
 - Mechanical joints & Welded joints
14. PVC pipe is becoming a common product used in distribution systems; however, one of the things that weaken PVC pipe is –
- Freezing temperatures
 - Prolonged exposure to natural sunlight
 - Coagulants and Polymers used in surface water treatment
 - Soils high in natural minerals
 - Source waters that are naturally low in pH
15. When an operator is referring to a “service line” he / she is referring to –
- The line used to transport water throughout the distribution system
 - The line installed as a “temporary service” while transmission lines are repaired
 - The line used to transport water from the source to any treatment facilities
 - The line used to transport water from the main to the customers meter
 - The customers property line or the point at which a meter is installed

16. When an operator is referring to a “corporation stop” he / she is referring to a device typically found –
- Immediately after the customer meter so service can be interrupted by the customer
 - At the curb or customer property line so the meter can be isolated
 - At the main line
 - In-line used to isolate backflow devices on sprinkler systems
 - In-line immediately in front of Fire Hydrants
17. When an operator is referring to a “curb stop” he / she is referring to a device typically found –
- Immediately after the customer meter so service can be interrupted by the customer
 - At the curb or customer property line so the meter can be isolated
 - At the main line
 - In-line used to isolate backflow devices on sprinkler systems
 - In-line immediately in front of Fire Hydrants
18. The most common type of valve found in the distribution system for isolation purposes is –
- Check Valve
 - Butterfly Valve
 - Ball Valve
 - Gate Valve
 - Globe Valve
19. An operator would typically expect a single family residential service line to be –
- $\frac{1}{2}$ to $\frac{3}{4}$ inch in diameter
 - $\frac{3}{4}$ to 1 inch in diameter
 - 1 to 2 inch in diameter
 - 2 inch or larger
 - None of the above
20. The most common type of valve found on customer service lines are –
- Ball Valve
 - Check Valve
 - Butterfly Valve
 - Gate Valve
 - Globe Valve
21. It is recommended that all underground main line valves be operated at least –
- Monthly
 - Quarterly
 - Yearly
 - As Directed
 - There is no industry standard or set recommendation

22. If a system had two overhead storage tanks with different overflow elevations, the levels in the two tanks could be controlled with a –
- Altitude Valve
 - Needle Valve
 - Check Valve
 - Elevation Adjustment Valve
 - Butterfly Valve
23. On the discharge side of a centrifugal pump which pumps into the distribution system; the operator would expect to find a _____ valve.
- Altitude Valve
 - Needle Valve
 - Check Valve
 - Resilient Wedge Gate Valve
 - Butterfly Valve
24. The primary purpose of a fire hydrant is –
- To provide an effective means for flushing main lines
 - To provide an effective means for gathering samples
 - To provide a water supply for fire fighting
 - To reduce the liability of the water provider
 - To provide a source for tanker trucks to fill when needed
25. A fire hydrant should NOT be placed on main lines smaller than –
- 3 inch in diameter
 - 4 inch in diameter
 - 6 inch in diameter
 - 8 inch in diameter
 - No rule or industry standard
26. Your next job task is the installation of three and one half miles of 8 inch PVC main line. The pipe will be supplied in 20 foot sections – how many sections of pipe will you install ?
- 264
 - 396
 - 792
 - 810
 - 924

27. Using the same scenario of three and one half miles of 8 inch PVC main line – and assuming the ditch is 2 feet wide and 4 feet deep - how many cubic yards of soil will be displaced in this project? (Hint: L X W X D divided by ?)
- 1,037
 - 4,928
 - 5,475
 - 5,866
 - 6,010
28. Using this same scenario of three and one half miles of 8 inch PVC main line – the line will need to be disinfected with chlorine and the appropriate number of bacteriological samples collected. How many total samples must be collected and submitted for testing?
- 1
 - 4
 - 18
 - 28
 - No current rule requiring new lines to be tested before placing into service
29. TCEQ requires that all ground storage, elevated storage, & pressure tanks be inspected –
- Quarterly
 - Yearly
 - Every 2 years
 - Every 5 years
 - Every 10 years
30. The most common and widely used pump found in the distribution system is the –
- Centrifugal pump
 - Diaphragm pump
 - Screw pump
 - Submersible pump
 - Vertical Turbine pump
31. If an operator enters a well house and hears a noise coming from the pump that sounds like pinging or gravel being pumped; more than likely the pump is –
- Operating correctly
 - Operating below recommended line voltage
 - Cavitating
 - At the end of life expectancy and ready for replacement
 - In need of lubrication

32. If a system has a 250,000 gallon ground storage tank and has a production well that pumps at 800 gallons per minute. Assuming the ground storage tank is empty; how many hours will it take to completely fill the tank?
- 3.1 hours
 - 4.1 hours
 - 5.2 hours
 - 6.2 hours
 - Not enough information to compute
33. TCEQ rules indicate the preferred method for backflow / back siphon prevention is –
- Physical Air Gap
 - Testable Double Check Valve
 - Testable Reduced Pressure Zone Valve
 - Testable Isolation Valve
 - Testable Atmospheric Breaker Valve
34. The connection of any known safe water supply to any unknown water supply is considered –
- A Temporary Connection Until Lab Confirmation
 - Acceptable Only In Emergency Situations
 - Standard Operating Procedure
 - A Cross Connection
 - Against EPA & AWWA Rule 390.124(a)
35. One of the simplest and most common electric motors found in the distribution system is the –
- Squirrel – Cage Synchronous Motor
 - Squirrel – Cage Induction Motor
 - Squirrel – Cage Magnetic Motor
 - Batwing - Incased Synchronous Motor
 - Batwing – Incased Induction Motor
36. One psi will cause water to rise in a column of pipe –
- .231 feet
 - .433 feet
 - 2.31 feet
 - 4.33 feet
 - 8.34 feet

37. The most common types of residential water meters found in distribution systems are –
- Positive Displacement & Turbine
 - Positive Displacement & Multi-Jet
 - Positive Displacement & Compound
 - Positive Displacement & Venturi
 - Positive Displacement & Magnetic
38. All water systems will have some unaccounted for water loss; however, this unaccounted for water loss should be less than –
- 5 %
 - 10 %
 - 12%
 - 15%
 - 20%
39. All new main lines installed shall be no less than _____ inches in diameter –
- 2 inch
 - 3 inch
 - 4 inch
 - 6 inch
 - 8 inch
40. When water lines are installed, they shall be installed no closer than _____ feet in all directions to any wastewater lines or facilities –
- 4 feet
 - 5 feet
 - 6 feet
 - 9 feet
 - 10 feet
41. Because of the design of Fire Hydrants, they must not be installed within _____ feet of any wastewater line –
- 5 feet
 - 7 feet
 - 9 feet
 - 10 feet
 - 12 feet

42. To protect against cave-ins any trench or excavation _____ feet deep or more requires OSHA approved shoring equipment –
- 3 feet
 - 4 feet
 - 5 feet
 - 6 feet
 - 10 feet
43. Most underground pipe failures are due to –
- Improper and Inadequate bedding
 - Improper materials used in backfill
 - Contractors and Crews not complying with TCEQ Rules
 - Failure to water pack the trench
 - Heavy Traffic Loads & Unstable ground
44. The term “pathogen” means –
- Bacteria Induced
 - Coliform Causing
 - Water Born Disease
 - Disease Causing
 - All the above
45. The presence of Fecal coliform or E. coli bacteria in a water sample indicates –
- Chlorine Residual Too High
 - Water Should Be Aerated Before Human Consumption
 - Lake or Reservoir Experience Algae Bloom
 - Nitrification Occurring In The Distribution System
 - Intestinal Waste In The Sample
46. Which of the following best describes examples of waterborne diseases –
- Typhoid, Chicken Pox, Cholera, Dysentery, Giardiasis, Hepatitis, Polio, Cryptosporidiosis
 - Typhoid, Paratyphoid, Cholera, Dysentery, Giardiasis, Hepatitis, Polio, Cryptosporidiosis
 - Typhoid, Mumps, Cholera, Dysentery, Giardiasis, Hepatitis, Polio, Cryptosporidiosis
 - Typhoid, Paratyphoid, Cholera, AIDS, Giardiasis, Hepatitis, Polio, Cryptosporidiosis
 - Typhoid, Paratyphoid, Cholera, Dysentery, Giardiasis, Hepatitis, Sickle Cell Anemia , Cryptosporidiosis

47. TCEQ rules require that all dead end main lines be flushed at least –
- Weekly
 - Monthly
 - Quarterly
 - Annually
 - Currently no TCEQ rule addressing this
48. As an operator you are collecting your required bacteriological samples and notice that when you test for chlorine, there is little or no chlorine residual in the water at the sample site. You should –
- Go ahead and collect the sample but notify your supervisor and have someone check chlorination equipment
 - Not collect the sample today but rather return tomorrow and if chlorine residual is okay collect and submit the sample
 - Not collect the sample and immediately check chlorination equipment and begin flushing the distribution system
 - Go ahead and collect the samples but notify the lab and make sure to note on the lab forms so that sample can be invalidated should it indicate positive.
 - Locate a different sample point that will insure TCEQ Compliance.
49. If bacteriological sample is reported as positive the operator has _____ hours to collect and submit repeat sample –
- 8 hours
 - 10 hours
 - 12 hours
 - 24 hours
 - 48 hours
50. Water Systems that submit more than one monthly bacteriological sample and receive notification that one of their samples tested positive – this system is required to collect and submit _____ repeat samples
- 2 repeat samples
 - 3 repeat samples
 - 4 repeat samples
 - 5 repeat samples
 - None of the above

51. A 300 mg/L chlorine dosage will require a contact time of only _____ minutes – but the highly chlorinated water must be discharged and not simply allowed to enter the distribution system.
- 5 minutes
 - 10 minutes
 - 15 minutes
 - 30 minutes
 - 45 minutes
52. An operator must keep bacteriological analysis results for _____ years.
- 3 years
 - 5 years
 - 7 years
 - 10 years
 - Until next TCEQ Compliance Inspection
53. Typically when one experiences “red water” it is an indication that _____ is occurring
- Oxidizing Iron (rust) is occurring
 - Excessive Mineral Coagulation is occurring
 - pH of water should be adjusted
 - Chlorine residual should be reduced
 - Main Line Valve is closed somewhere within the system
54. Rotten-egg or sewer gas smell in the water is typically related to –
- Methane Gas
 - Chlorine Gas
 - Hydrochloric Acid formation
 - Ammonia
 - Hydrogen Sulfide Gas
55. An operator must keep chemical analysis results for _____ years.
- 3 years
 - 5 years
 - 7 years
 - 10 years
 - Until next TCEQ Compliance Inspection
56. Convert 800 Gallons Per Minute (GPM) to Million Gallons Per Day (MGD) –
- 1.15 MGD
 - 1.92 MGD
 - 4.80 MGD
 - 5.15 MGD
 - None of the above

57. At the base of an elevated storage tank the PSI gauge reads 63 PSI – what is the height of water in the elevated tank ? –
- 27 feet
 - 45 feet
 - 127 feet
 - 145 feet
 - Not enough information to compute
58. A system has an overhead storage tank that holds 150,000 gallons. What is the total weight of water in this vessel ?
- 125,100 pounds
 - 1,251,000 Pounds
 - 12, 510,000 pounds
 - 125, 100,000 pounds
59. If your master meter indicates that you have produced – 379,000 – 433,000 – 610,000 – 567,000 – 489,000 – 553,000 – 701,000 for the week – what is the average daily production for this well?
- 373,200 gallons
 - 533,142 gallons
 - 746,400 gallons
 - 3,732, 000 gallons
60. If your system has a population of 3,110 people, what would be the estimated gallons of water used per day?
- 248,800 gallons
 - 311,000 gallons
 - 388,750 gallons
 - 404,300 gallons
61. In your system you know the chlorine **demand** is 5.7 mg/L and the **residual** at the far reaches of the distribution system is 0.3 mg/L what is your **dosage**?
- 1.71 mg/L
 - 5.4 mg/L
 - 19 mg/L
 - 6.0 mg/L