

Registration form

**WATER MAINS AND SERVICE CONNECTIONS \$100.00
48 HOUR RUSH ORDER PROCESSING FEE ADDITIONAL \$50.00**

Start and finish dates: _____
You will have 90 days from this date in order to complete this course

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Please circle/check which certification you are applying the course CEU's.

Water Treatment _____ Distribution _____ Collection _____ Wastewater Treatment _____

Onsite Installer _____ Other _____

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You can obtain a printed version of the course manual from TLC for an additional \$59.95 plus shipping charges.

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I affirm that I personally completed the entire text of the course. I also affirm that I completed the exam without assistance from any outside source. I understand that it is my responsibility to file or maintain my certificate of completion as required by the state or by the designation organization.

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In order to maintain the integrity of our courses we do not distribute test scores, percentages or questions missed. Our exams are based upon pass/fail criteria with the benchmark for successful completion set at 70%. Once you pass the exam, your record will reflect a successful completion and a certificate will be issued to you.

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Water Mains Answer Key

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Please Circle, Bold, Underline or X, one answer per question.

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Water Mains CEU Training Course Assignment

The Assignment (Exam) is also available in Word on the Internet for your Convenience, please visit www.ABCTLC.com and download the assignment and e-mail it back to TLC.

You will have 90 days from the start of this course to complete in order to receive your Professional Development Hours (**PDHs**) or Continuing Education Unit (**CEU**). A score of 70 % is necessary to pass this course. We prefer if this exam is proctored. No intentional trick questions. If you should need any assistance, please email all concerns and the completed manual to info@tlch2o.com.

We would prefer that you utilize the enclosed answer sheet in the front, but if you are unable to do so, type out your own answer key. Please include your name and address on your manual and make copy for yourself. You can e-mail or fax your Answer Key along with the Registration Form to TLC. **(S) Means answer may be plural or singular. Multiple Choice Section, One answer per question and please use the answer key.**

Backflow/Cross-Connection Section

- The principal types of mechanical backflow preventers are the reduced-pressure principle assembly, the _____, and the double check valve assembly.
A. High hazard installations D. Backflow
B. Air gap E. Device or method
C. Vacuum breaker F. None of the Above
- Which of the following terms can occur when there is a stoppage of water supply due to nearby firefighting, a break in a water main?
A. Backflow D. Cross-connection
B. Backpressure E. Indirect connection
C. Backsiphonage F. None of the Above
- _____ is a form of backflow caused by a downstream pressure that is greater than the upstream or supply pressure in a public water system or consumer's potable water system.
A. Backflow D. Cross-connection
B. Backpressure E. Indirect connection
C. Backsiphonage F. None of the Above
- Backflow is the undesirable reversal of flow of nonpotable water or other substances through a _____ and into the piping of a public water system or consumer's potable water system.
A. Backflow D. Cross-connection
B. Backpressure E. Indirect connection
C. Backsiphonage F. None of the Above
- Which of the following terms can result from an increase in downstream pressure, a reduction in the potable water supply pressure, or a combination of both?
A. Backflow D. Cross-connection
B. Backpressure E. Indirect connection
C. Backsiphonage F. None of the Above

6. _____ is two forms-backpressure and backsiphonage.
- A. Backflow D. Cross-connection
 B. Backpressure E. Indirect connection
 C. Backsiphonage F. None of the Above
7. Which of the following terms is the means or mechanism to prevent backflow?
- A. High hazard installations D. Backflow
 B. Air gap E. Device or method
 C. Backflow preventer F. None of the Above
8. According to the text, basic means of preventing backflow is an _____, which either eliminates a cross-connection or provides a barrier to backflow.
- A. High hazard installations D. Backflow
 B. Air gap E. Device or method
 C. Backflow preventer F. None of the Above
9. _____ is any temporary or permanent connection between a public water system or consumer's potable water system and any source or system containing nonpotable water or other substances.
- A. Backflow D. Cross-connection
 B. Backpressure E. Indirect connection
 C. Backsiphonage F. None of the Above
10. Which of the following terms is backflow caused by a negative pressure (i.e., a vacuum or partial vacuum) in a public water system or consumer's potable water system?
- A. Backflow D. Cross-connection
 B. Backpressure E. Indirect connection
 C. Backsiphonage F. None of the Above

Types of Backflow Prevention Methods and Assemblies

11. _____ must either be physically disconnected or have an approved backflow prevention device installed to protect the public water system.
- A. Backflow D. Cross-connection
 B. Backpressure E. Indirect connection
 C. Backsiphonage F. None of the Above
12. The type of device selected for a particular installation depends on several factors.
- A. True B. False
13. When the airflow is restricted, such as the case of an air gap located near a wall, the _____ separation must be increased.
- A. Open receiving vessel D. Air gap
 B. Backflow preventer E. Air break
 C. Barrier to backflow F. None of the Above
14. An air gap is a physical disconnection between the free flowing discharge end of a potable water pipeline and the top of an?
- A. Open receiving vessel D. Air gap
 B. Backflow preventer E. Air break
 C. Barrier to backflow F. None of the Above

15. Which of the following terms must be at least two times the diameter of the supply pipe and not less than one inch?

- A. Open receiving vessel
- B. Backflow preventer
- C. Barrier to backflow
- D. Air gap
- E. Air break
- F. None of the Above

16. According to the text, an air break is a physical separation between the free flowing discharge end of a potable water supply pipeline, and the overflow rim of an open or non-pressure receiving vessel.

- A. True
- B. False

17. According to the text, air gap separations must be vertically orientated a distance of at least twice the inside diameter of the supply, but never less than?

- A. 1 inch
- B. 2 inches
- C. 3 inches
- D. Backflow
- E. Depends
- F. None of the Above

18. An obstruction around or near an _____ may restrict the flow of air into the outlet pipe and nullify the effectiveness of the air gap to prevent backsiphonage.

- A. High hazard installations
- B. Backflow preventer
- C. Barrier to backflow
- D. Air gap
- E. Air break
- F. None of the Above

19. An air gap is acceptable for _____ and is theoretically the most effective protection.

- A. High hazard installations
- B. Backflow preventer
- C. Barrier to backflow
- D. Low polluttional hazards
- E. High polluttional concerns
- F. None of the Above

20. _____ can have two types: atmospheric and pressure.

- A. Downstream piping
- B. Atmospheric vacuum breakers
- C. Vacuum breaker(s)
- D. Hazard application(s)
- E. Backflow preventor(s)
- F. None of the Above

21. Both vacuum breakers devices primary purpose is to protect the water system from cross connections due to submerged inlets, such as irrigation systems and tank applications.

- A. True
- B. False

22. The difference between the two types them is that the pressure vacuum breaker is spring loaded to assist the device's opening.

- A. True
- B. False

23. Both vacuum breakers devices open the pipeline to atmosphere in the event of backsiphonage only.

- A. True
- B. False

24. Both vacuum breakers devices are approved for backpressure conditions.

- A. True
- B. False

25. Both vacuum breakers devices are only suitable for?

- A. High hazard installations
- B. Backflow preventer
- C. Barrier to backflow
- D. Low hazard conditions
- E. High polluttional concerns
- F. None of the Above

26. Which of the following terms may not be installed downstream of atmospheric vacuum breakers but are allowed on pressure vacuum breakers?

- A. Valve assembly
- B. Test cocks
- C. Air inlet valve
- D. Internally weighted
- E. Shut offs
- F. None of the Above

27. The devices must be installed above the highest_____.

- A. Downstream piping
- B. Atmospheric vacuum breakers
- C. Vacuum breakers
- D. Hazard applications
- E. Mountain
- F. None of the Above

28. Which of the following terms are designed to prevent backflow caused by backsiphonage only from low health hazards?

- A. Downstream piping
- B. Atmospheric vacuum breakers
- C. RPs
- D. Hazard application(s)
- E. Backflow preventor(s)
- F. None of the Above

29. Atmospheric vacuum breakers Uses: Irrigation systems, commercial dishwasher and laundry equipment, chemical tanks and laboratory sinks.

- A. True
- B. False

30. Pressure Vacuum Breaker Assembly (PVB) consists of a weighted check valve, an independently operating relief valve, two resilient seated shutoff valves, and two properly located resilient seated test cocks.

- A. True
- B. False

31. _____contains a float check, a check seat, and an air inlet port?

- A. Double check
- B. Atmospheric vacuum breaker
- C. Breaker(s)
- D. RP
- E. Backflow preventor(s)
- F. None of the Above

32. The Atmospheric vacuum breaker allows air to enter the water line when the line pressure is reduced to a gauge pressure of zero or below.

- A. True
- B. False

33. Which of the following terms is not internally loaded?

- A. Air inlet valve
- B. Check valve
- C. Device
- D. Test cock
- E. Atmospheric vacuum breakers
- F. None of the Above

34. To prevent the Air inlet from sticking open, the device must not be installed on the pressure side of a shutoff valve, or wherever it may be under constant pressure more than 2 hours during a 12-hour period.

- A. True
- B. False

35. The PVB needs to be installed 12 inches above the service or supply line to work correctly.

- A. True
- B. False

36. Double Check Valve Assembly (DC) consists of two internally loaded check valves, either spring loaded or internally weighted, two resilient seated full ported shutoff valves, and four properly located resilient seated test cocks

- A. True B. False

37. The double check valve assembly is designed to prevent backflow caused by backpressure and backsiphonage from high health hazards.

- A. True B. False

38. The double check valve should be installed in an _____ and protected from freezing.

- A. Confined space D. In a pit
B. Accessible location E. Is maintained at a lower pressure
C. Above the ground F. None of the Above

39. The DC needs to be installed 12 inches _____ for testing purposes only.

- A. In a Confined space D. In a pit
B. Accessible location E. Above the highest downstream outlet
C. Above the ground F. None of the Above

Water Distribution Section System Elements

40. Booster stations are used to _____ from storage tanks for low-pressure mains.

- A. Increase water pressure D. Boost flow
B. Equalize E. Provide a reserve pressure
C. Complete gridiron system F. None of the Above

41. Valves control the flow of water in the distribution system by isolating areas for repair or by?

- A. Increase water pressure D. Main line isolation
B. Bypasses E. Regulating system flow or pressure.
C. Complete gridiron system F. None of the Above

42. According to the text, gate valves should be used in the _____ for main line isolation.

- A. Increase water pressure D. Distribution system
B. Distribution tree E. Arterial system
C. Complete gridiron system F. None of the Above

43. Distribution mains function is to carry water from the water source or treatment works to users, these are the pipelines that make up the?

- A. Increase water pressure D. Distribution system
B. Distribution tree E. Arterial system
C. Complete gridiron system F. None of the Above

44. Arterial mains are interconnected with smaller distribution mains to form a complete gridiron system and are for?

- A. Increasing water pressure D. Distribution mains of large size
B. Tree system E. Fire protection
C. Complete gridiron system F. None of the Above

45. Storage reservoirs are structures used to store water and _____ the supply or pressure in the distribution system.

- A. Increase water pressure
- B. Equalize
- C. Complete gridiron system
- D. Main line isolation
- E. Provide a reserve pressure
- F. None of the Above

46. Butterfly valves are rotary type of valves usually found on large transmission lines, and may also have an additional valve beside it known as a _____ to prevent water hammer.

- A. Regulator
- B. Bypass
- C. Complete gridiron system
- D. Main line isolation
- E. PRV
- F. None of the Above

Water Distribution Valves

47. One purpose of installing shutoff valves in water mains at various locations within the distribution system is to allow sections of the system to be _____ or provide maintenance without significantly curtailing service over large areas.

- A. Feeders as practical
- B. Adjust the pressure
- C. Open or close the valve
- D. Curtail the service
- E. Taken out of service for repairs
- F. None of the Above

48. According to the text, at intersections of distribution mains, the number of valves required is normally one less than the number of _____.

- A. Ties
- B. Depends
- C. Radiating mains
- D. Throttling purposes
- E. Standardizes
- F. None of the Above

49. All buried small- and medium-sized valves should be installed in the sidewalk.

- A. True
- B. False

50. For large shutoff valves, it may be necessary to surround the valve operator or entire valve within a vault or manhole to allow _____.

- A. Principally
- B. Dependability
- C. Repair or replacement
- D. Minimum flow restriction
- E. Stops or allows
- F. None of the Above

Gate Valves

51. In the distribution system, gate valves are used when a straight-line flow of fluid and?

- A. Principally
- B. Dependability
- C. Repair or replacement
- D. Minimum flow restriction
- E. Stops or allows
- F. None of the Above

52. In the distribution system, or on a residential job, gate valves are so-named because the part that either _____ flow through the valve acts somewhat like a gate.

- A. Fully drawn up
- B. Dependability
- C. Repair or replacement
- D. Minimum flow restriction
- E. Stops or allows
- F. None of the Above

53. If the valve is wide open, the gate is _____ into the valve bonnet.

- A. Fully drawn up
- B. Dependable
- C. Repair or replacement
- D. Minimum flow restriction
- E. Stops or allows
- F. None of the Above

54. Gate valves are not suitable for?
 A. Copper lines D. Throttling purposes
 B. Dependability E. Pressure drops
 C. PRV F. None of the Above
55. The control of flow is easy because of the gate valve's design.
 A. True B. False
56. Most ball valves require only a 180-degree turn to either completely open or close the valve.
 A. True B. False
57. According to the text, some ball valves are operated by planetary gears.
 A. True B. False
58. Valve exercising should be done to locate inoperable due to freezing or build-up of rust or corrosion and done once per year to detect _____ and to prevent valves from becoming _____
 A. Malfunctioning valves D. Minimum flow restriction
 B. Dependability E. Stops or allows
 C. Repair or replacement F. None of the Above
59. A valve inspection should include drawing valve location maps to show distances to the _____ from specific reference.
 A. Valve(s) D. House
 B. Stoneline E. Telephone pole
 C. Monument F. None of the Above
60. Service connections are used to _____ or other plumbing systems to the distribution system mains.
 A. Be isolated D. Limits the expansion
 B. Connect individual buildings E. Decreases in size
 C. By laying out F. None of the Above
61. One cause of a valve failing to open are variations in the temperature and/or pressure of the?
 A. High pressure side D. Valve sealing surfaces
 B. Working fluid E. Length of exposure
 C. Closing torque applied F. None of the Above
62. Depending on the seat and wedge material, _____ and closing torque applied, thermal binding can also occur in high temperature situations.
 A. High pressure side D. Valve sealing surfaces
 B. Working fluid E. Length of exposure
 C. Closing torque applied F. None of the Above
63. Over-pressurization is when a valve can _____ when high pressure enters the cavity and has no way to escape.
 A. Over-pressurization D. Lock in the open position
 B. Positive pressure differential E. Break
 C. Lock in the closed position F. None of the Above

64. According to the text, a single direction sealing gate valve has a nameplate on the side of the valve that has a relief hole or pressure equalizer.

- A. True B. False

65. Tuberculation corrosion is caused by chemical changes produced by _____.

- A. Closed position D. Electricity or electrolysis
B. Hard water E. Positive pressure differential
C. Chemical changes F. None of the Above

66. Corrosion will increase the C-factor and the carrying capacity in a pipe.

- A. True B. False

67. Most Globes have compact OS & Y type, bolted bonnet, rising stems, with renewable seat rings.

- A. True B. False

68. According to the text, Globe valves should usually be installed with the inlet below the bonnet.

- A. True B. False

69. For light throttling service, the valve may be installed so that the flow enters over the bottom of the seat and goes up through it.

- A. True B. False

70. The globe valve may be installed in other orientations, but any deviation from vertical is a compromise.

- A. True B. False

System Layouts Tree System

71. Newer water systems are frequently expanded with planning and developed into a tree-like system.

- A. True B. False

72. The Tree system consists of a single main that _____ as it leaves the source and progresses through the area originally served.

- A. Be isolated D. Limits the expansion
B. Connect individual buildings E. Decreases in size
C. By laying out F. None of the Above

73. Smaller pipelines _____ the main and divide again, much like the trunk and branches of a tree.

- A. Branch off D. Limit the expansion
B. Are manifolded to E. Decrease
C. Connect F. None of the Above

74. According to the text, there are several advantages gained by laying out water mains in a loop or grid, with feeder and distributor mains interconnecting at roadway intersections and other regular intervals.

- A. True B. False

Friction Loss

75. The damaged section can be isolated and the remainder of the system will still carry pressure, water will not be distributed if a single section fails.

- A. True B. False

76. During periods of peak fire flow demand, there will be less impact from _____ in water mains as the velocity within any given section of main.
- A. Carrying capacity
 - B. Friction loss
 - C. Pressure
 - D. Static pressure
 - E. Total pressure
 - F. None of the Above

Types of Pipes Used in the Water Distribution Field

Plastic Pipe (PVC)

77. Plastic pipe has seen extensive use available in different lengths and sizes; it is lighter than steel or copper and requires no special tools to install.

- A. True
- B. False

78. Plastic pipe has complete resistance to corrosion; and, in addition, it can be installed aboveground or below ground, has several advantages over metal pipe: it is flexible; it has superior resistance to?

- A. Ease of installation
- B. An excellent combination
- C. Chemical resistance
- D. Rupture from freezing
- E. Complete resistance to corrosion
- F. None of the Above

79. PVC pipes are made of tough, strong thermoplastic material that has _____ of physical and chemical properties.

- A. Ease of installation
- B. An excellent combination
- C. Chemical resistance
- D. Array
- E. Complete resistance to corrosion
- F. None of the Above

80. PVC's chemical resistance and _____ make it an excellent material for application in various mechanical systems.

- A. Ease of installation
- B. Greater resistance
- C. Chemical resistance
- D. Design strength
- E. Complete resistance to corrosion
- F. None of the Above

81. According to the text, often polyvinyl chloride is chlorinated to obtain a stiffer design, a higher level of impact resistance, and a _____ to extremes of temperature.

- A. Ease of installation
- B. Greater resistance
- C. Chemical resistance
- D. Design strength
- E. Complete resistance to corrosion
- F. None of the Above

82. A CPVC pipe can be used only in cold-water systems with temperatures up to 110°F.

- A. True
- B. False

83. _____ and economy makes plastic pipe popular for use in either water distribution and supply systems or sewer drainage systems.

- A. Ease of installation
- B. Working pressure
- C. Chemical resistance
- D. Stamped on the outside
- E. Complete resistance to corrosion
- F. None of the Above

84. You will want to date and collect coupons or tap cut-outs to determine the condition of the pipe or?

- A. Ease of installation
- B. Measure the corrosion
- C. Chemical resistance
- D. Measure the shock load
- E. Determine the C Factor
- F. None of the Above

85. CIP can be found in diameters from 3" to 48".
A. True B. False
86. Advantages of CIP are its long life, ability to withstand shock loads and to withstand working pressures up to 120 psi.
A. True B. False
87. DIP can be purchased in 4" to 45" diameters and lengths of 18' to 20'.
A. True B. False
88. DIP was developed to _____ associated with cast iron pipe.
A. Overcome the breakage problems D. Provide a High C Factor
B. Withstand shock loads E. Be nearly indestructible
C. Extend the life F. None of the Above
89. DIP's main advantage is that it is _____ by internal or external pressures.
A. Overcome the breakage problems D. Provide a High C Factor
B. Withstand shock loads E. Nearly indestructible
C. Extend the life F. None of the Above
90. DIP is sometimes protected from highly corrosive soils by wrapping the pipe in plastic sheeting prior to installation, this practice can greatly _____ of this type of pipe.
A. Overcome the breakage problems D. Provide a High C Factor
B. Withstand shock loads E. Be nearly indestructible
C. Extend the life F. None of the Above
91. Steel pipe is available in various diameters and in 20' or 21' lengths, its main advantage is the ability to form it into a variety of shapes.
A. True B. False
92. Steel pipe's advantage is that it is able withstand corrosion by both soil and water.
A. True B. False
93. Steel pipe is usually galvanized or dipped in coal-tar enamel and wrapped with coal-tar impregnated felt to reduce?
A. Corrosion problems D. Good yielding
B. Bending E. Confusion with other pipes
C. Costs F. None of the Above
94. From a health standpoint coal-tar products are undergoing scrutiny and it is recommended that the appropriate regulatory agencies be contacted prior to use of this material.
A. True B. False
95. ACP is available in diameters from 3" to 36" and in 13' lengths.
A. True B. False
96. ACP main advantages are its ability to _____ and its excellent hydraulic flow characteristics due to its smoothness.
A. Withstand corrosion D. Transfer less friction
B. Lower C factor E. Brittle and is easily broken
C. Withstand corrosion F. None of the Above

97. ACP main disadvantage is that it is _____ during construction or by shock loading.
 A. Very light weight D. Transfer less friction
 B. Lower C factor E. Brittle and is easily broken
 C. Unable to withstand corrosion F. None of the Above
98. According to the text, ACP has some concern regarding the possible release of asbestos fibers in corrosive water and there has much debate over the health effects of ingested asbestos.
 A. True B. False
99. Precautionary measures must be taken to protect water utility workers when cutting, tapping or otherwise handling this type of pipe.
 A. True B. False

Galvanized Pipe

100. Galvanized pipe is commonly used for the water distributing pipes inside a building to supply hot and cold water to _____.
 A. The fixtures D. To copper fittings
 B. Water distributing pipes E. The water heater
 C. Inside and outside F. None of the Above
101. Galvanized pipe is manufactured in 21-ft lengths and is coated with zinc the outside only.
 A. True B. False
102. Pipe sizes are based on nominal inside diameters, these diameters vary with the thickness of the pipe.
 A. True B. False
103. According to the text, outside pipe diameters remain constant so that pipe can be _____.
 A. Hooked to Cpex D. Soldered to copper fittings
 B. Flanged E. Threaded for standard fittings
 C. Connected to Sharkbites F. None of the Above
104. According to the text, copper is one of the least widely used materials for tubing, this is because it does not rust and is highly resistant to any bending.
 A. True B. False
105. K pipe has the thickest walls.
 A. True B. False
106. Copper pipe M has the thinnest walls.
 A. True B. False
107. Soldering allows all the tubing and fittings to be set in place before the joints are finished.
 A. True B. False
108. Type K copper tubing is available in either rigid or flexible and is primarily used for _____ in the water distribution systems.
 A. Exposed lines D. Straight lengths
 B. Underground service E. DVW
 C. Rigid (hard temper) F. None of the Above

109. Hard temper tubing is available in 40- or 60-ft coils, while soft tubing comes in 12- and 20-ft straight lengths.

- A. True B. False

110. Type L copper tubing is also available in either hard or soft temper and either in coils or?

- A. Exposed lines D. Straight lengths
B. Widely used E. Water distribution systems
C. Easier installation F. None of the Above

111. According to the text, soft temper tubing is often used as replacement plumbing because of the tube's flexibility, which allows?

- A. Exposed lines D. Straight lengths
B. Widely used E. Water distribution systems
C. Easier installation F. None of the Above

112. Type L copper tubing is widely used in_____.

- A. Exposed lines D. Straight lengths
B. Widely used E. Water distribution systems
C. Easier installation F. None of the Above

113. Type M copper tubing is made in hard temper only and is available in straight lengths of 12 and 20 ft. It has a thin wall and is used for?

- A. Branch supplies D. Straight lengths
B. Widely used E. Water distribution systems
C. Easier installation F. None of the Above

114. Type M copper tubing is also used for chilled water systems, for exposed lines in hot-water heating systems, and for?

- A. Branch supplies D. Straight lengths
B. Widely used E. Drainage piping
C. Easier installation F. None of the Above

Groundwater Production and Treatment System

Groundwater and Wells

115. According to the text, toxic material spilled or dumped near a well can leach into _____ and contaminate the groundwater drawn from that well?

- A. Unconfined aquifer(s) D. Well(s)
B. Groundwater E. Aquifer
C. Water table F. None of the Above

Contaminated Wells

116. Which of the following terms can be tested to see what chemicals may be in the well and if they are present in dangerous quantities?

- A. Wells D. Soil moisture
B. Drinking water E. Karst
C. Water table F. None of the Above

117. Groundwater is withdrawn from wells to provide water when water is pumped from the ground, which of the following terms change in response to this withdrawal?

- A. Dynamics of groundwater flow
- B. Groundwater
- C. Water table
- D. Well(s)
- E. Aquifer
- F. None of the Above

118. _____ flows slowly through water-bearing formations at different rates.

- A. Well
- B. Drinking water
- C. Water table
- D. Soil moisture
- E. Groundwater
- F. None of the Above

Aquifer

119. Many terms are used to describe the nature and extent of the groundwater resource, the level below which all the spaces are filled with water is called the _____.

- A. Unconfined aquifer(s)
- B. Groundwater
- C. Water table
- D. Well(s)
- E. Aquifer
- F. None of the Above

120. Above the water table lies the?

- A. Unsaturated zone
- B. Drinking water
- C. Water table
- D. Soil moisture
- E. Karst
- F. None of the Above

121. The entire region below the water table is called the saturated zone and water in this saturated zone is called _____.

- A. Unconfined aquifer(s)
- B. Groundwater
- C. Water table
- D. Well(s)
- E. Aquifer
- F. None of the Above

122. _____ are cracks, joints, or fractures in solid rock, through which groundwater moves.

- A. Fractured aquifer(s)
- B. Drinking water
- C. Water table
- D. Soil moisture
- E. Karst
- F. None of the Above

123. Limestone is often located in _____.

- A. Unconfined aquifer(s)
- B. Groundwater
- C. Water table
- D. Fractured aquifer(s)
- E. Aquifer
- F. None of the Above

124. Which of the following terms such as sandstone may become so highly cemented or recrystallized that all of the original space is filled. In this case, the rock is no longer a porous medium?

- A. Unconfined aquifer(s)
- B. Groundwater
- C. Porous media
- D. Fractured aquifer(s)
- E. Aquifer
- F. None of the Above

125. Clay has many spaces between its grains, but the spaces are not large enough to permit free movement of water.

- A. True
- B. False

126. Which of the following terms usually flows downhill with the slope of the water table?

- A. Well
- B. Drinking water
- C. Water table
- D. Soil moisture
- E. Groundwater
- F. None of the Above

127. Which of the following terms flow in the aquifers underlying springs or surface drainage basins, and does not always mirror the flow of water on the surface?

- A. Well
- B. Drinking water
- C. Water table
- D. Soil moisture
- E. Groundwater
- F. None of the Above

128. Which of the following terms may move in different directions below the ground than the water flowing on the surface?

- A. Well
- B. Drinking water
- C. Water table
- D. Soil moisture
- E. Groundwater
- F. None of the Above

129. Unconfined aquifers are those that are bounded by the water table. Some aquifers lie beneath layers of impermeable materials.

- A. True
- B. False

130. A well in such an aquifer is called an artesian well.

- A. True
- B. False

131. Which of the following terms is the level to which the water in an artesian aquifer will rise?

- A. Unconfined aquifer(s)
- B. Piezometric surface
- C. Water table
- D. Well(s)
- E. Aquifer
- F. None of the Above

Cone of Depression

132. When pumping begins, water begins to flow towards the well in contrast to the natural direction of groundwater movement.

- A. True
- B. False

133. The water level in the well falls below the water table in the?

- A. Water table
- B. Groundwater
- C. Surrounding aquifer
- D. Cone of depression
- E. Well
- F. None of the Above

134. The movement of water from this term into a well results in the formation of a cone of depression.

- A. Confined aquifer
- B. An aquifer
- C. Hydrologic cycle
- D. Water table
- E. Unconfined aquifer
- F. None of the Above

135. _____ describes a three-dimensional inverted cone surrounding the well that represents the volume of water removed as a result of pumping?

- A. Water table
- B. Groundwater
- C. Gravity
- D. Cone of depression
- E. Well
- F. None of the Above

136. Which of the following terms is the vertical drop in the height between the water level in the well prior to pumping and the water level in the well during pumping?

- A. Water table
- B. Groundwater
- C. Drawdown
- D. Cone of depression
- E. Well
- F. None of the Above

137. When a well is installed in _____, water moves from the aquifer into the well through small holes or slits in the well casing or, in some types of wells, through the open bottom of the well?

- A. Confined aquifer
- B. Aquifer(s)
- C. Hydrologic cycle
- D. Water table
- E. An unconfined aquifer
- F. None of the Above

Where Is Ground Water Stored?

138. Areas where ground water exists in sufficient quantities to supply wells or springs are called aquifers, a term that literally means?

- A. Water table
- B. Groundwater
- C. Water bearer
- D. Cone of depression
- E. Well
- F. None of the Above

139. Which of the following terms store water in the spaces between particles of sand, gravel, soil, and rock as well as cracks, pores, and channels in relatively solid rocks?

- A. Confined aquifer
- B. Aquifer(s)
- C. Hydrologic cycle
- D. Water table
- E. Unconfined aquifer
- F. None of the Above

140. Which of the following terms is controlled largely by its porosity, or the relative amount of open space present to hold water?

- A. Water table
- B. Groundwater
- C. An aquifer's storage capacity
- D. Cone of depression
- E. Well
- F. None of the Above

141. There are two kinds of aquifers: confined and unconfined.

- A. True
- B. False

142. If the aquifer is sandwiched between layers of relatively impermeable materials, it is called?

- A. Confined aquifer
- B. Aquifer(s)
- C. Hydrologic cycle
- D. Water table
- E. Unconfined aquifer
- F. None of the Above

143. Confined aquifers are not sandwiched between layers of relatively impermeable materials, and their upper boundaries are generally closer to the surface of the land.

- A. True
- B. False

144. Which of the following terms are frequently found at greater depths than unconfined aquifers?

- A. Confined aquifer(s)
- B. Aquifer(s)
- C. Hydrologic cycle
- D. Water table
- E. Unconfined aquifer
- F. None of the Above

Does Ground Water Move?

145. Ground water can move sideways as well as up or down. This movement is in response to gravity, differences in elevation, and?
- A. Synthetic organic chemical(s)
 - B. Differences in pressure
 - C. Permeable zones
 - D. Ground-water contamination
 - E. Septic tanks, cesspools, and privies
 - F. None of the Above

Ground-Water Quality

146. We know that some contaminants can pass through all of these filtering layers into this term to contaminate ground water.
- A. Contaminant(s)
 - B. Saturated zone
 - C. Karst aquifer(s)
 - D. Saturated zone
 - E. Water table
 - F. None of the Above

How Does Ground Water Become Contaminated?

147. Ground-water contamination can originate on the surface of the ground, in the ground above the water table, or in the ground below the?
- A. Synthetic organic chemical(s)
 - B. Ground water
 - C. Permeable zones
 - D. Ground-water contamination
 - E. Water table
 - F. None of the Above

148. If the contaminant is introduced directly into the area below this term, the primary process that can affect the impact of the contaminant is dilution by the surrounding ground water.
- A. Contaminant(s)
 - B. Saturated zone
 - C. Karst aquifer(s)
 - D. Saturated zone
 - E. Water table
 - F. None of the Above

What Kinds of Substances Can Contaminate Groundwater, and Where Do They Come from?

149. Substances that can contaminate this missing term can be divided into two basic categories: substances that occur naturally and substances produced or introduced by man's activities.
- A. Synthetic organic chemical(s)
 - B. Ground water
 - C. Permeable zones
 - D. Ground-water contamination
 - E. Septic tanks, cesspools, and privies
 - F. None of the Above

150. A significant number of today's ground-water contamination problems stem from man's activities and can be introduced into ground water from?
- A. Contaminant(s)
 - B. Saturated zone
 - C. A variety of sources
 - D. Iron, calcium, and selenium
 - E. Serious contamination source(s)
 - F. None of the Above

Waterborne Pathogens and Disease Section Water Sampling Terms, and Definitions- Microbes

151. Coliform bacteria are common in the environment and are considered harmful.
- A. True
 - B. False
152. The presence of these bacteria in drinking water indicates that the water may be contaminated with germs that can cause disease.
- A. True
 - B. False

153. Microbes in human wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms and are caused by_____.

- A. Fecal Coliform and E coli
- B. Giardia lamblia
- C. Microorganisms
- D. Cryptosporidiosis
- E. Coliform bacteria
- F. None of the Above

154. What is the bacteria whose presence indicates that the water may be contaminated with human or animal wastes?

- A. Fecal Coliform and E coli
- B. Protozoa
- C. Thermophilic
- D. Bac-T
- E. Coliform bacteria
- F. None of the Above

155. What is the parasite that enters lakes and rivers through sewage and animal waste? It causes cryptosporidiosis, a mild gastrointestinal disease.

- A. Fecal Coliform and E coli
- B. Giardia lamblia
- C. Microorganisms
- D. Cryptosporidiosis
- E. Cryptosporidium
- F. None of the Above

156. Giardia lamblia is a parasite that enters lakes and rivers through sewage and animal waste. It causes?

- A. Fecal Coliform and E coli
- B. Gastrointestinal illness
- C. Microorganisms
- D. Cryptosporidiosis
- E. Coliform bacteria
- F. None of the Above

Waterborne Pathogens

157. Bacteria, viruses and protozoan that cause disease are known as pathogens.

- A. True
- B. False

158. Most pathogens are generally associated with diseases that _____ and affect people in a relatively short amount of time, generally a few days to two weeks.

- A. Limits the treatment process
- B. Are mild in nature
- C. Cause intestinal illness
- D. Will cause fatalities
- E. Limit the travel of pathogens
- F. None of the Above

How Diseases are Transmitted.

159. Waterborne pathogens are primarily spread by_____.

- A. Fecal-oral, or feces-to-mouth, route
- B. Dermal to fecal route
- C. Oral to fecal route
- D. Influenza route
- E. Waterborne mishaps
- F. None of the Above

160. When infected humans or animals pass the bacteria, viruses, and _____ in their stool, pathogens may get into water and spread disease.

- A. Fecal Coliform and E coli
- B. Protozoa
- C. Macroorganisms
- D. Cryptosporidiosis
- E. Bioslime
- F. None of the Above

161. For another person to become infected, he or she must take the pathogen in through the mouth.

- A. True
- B. False

162. This term means that in nature, it is different from other types of pathogens such as the viruses that cause influenza (the flu) or the bacteria that cause tuberculosis.

- A. Fecal Coliform and E coli
- B. Giardia lamblia
- C. Microorganism(s)
- D. Waterborne Pathogen(s)
- E. Coliform bacteria
- F. None of the Above

163. According to the text, _____ are spread by secretions that are coughed or sneezed into the air by an infected person.

- A. Fecal Coliform and E coli
- B. Giardia lamblia
- C. Microorganisms
- D. Influenza virus and tuberculosis bacteria
- E. Coliform bacteria
- F. None of the Above

Protozoan Caused Diseases

164. _____ is larger than bacteria and viruses but still microscopic; they invade and inhabit the gastrointestinal tract.

- A. HIV infections
- B. Symptoms
- C. Giardiasis
- D. Hepatitis A
- E. Protozoan pathogens
- F. None of the Above

165. A few of the parasites enter the environment in a dormant form, with a protective cell wall, called a?

- A. Lamblia
- B. Shell
- C. Case
- D. Cyst
- E. Infection
- F. None of the Above

166. Which of the following terms can survive in the environment for long periods and is extremely resistant to conventional disinfectants such as chlorine?

- A. HIV
- B. Symptoms
- C. Infection
- D. Hepatitis A cyst
- E. Cyst
- F. None of the Above

167. _____ is a commonly reported protozoan-caused disease, it has also been referred to as backpacker's disease.

- A. Giardia lamblia
- B. Giardiasis
- C. Malaise
- D. Cryptosporidiosis
- E. Anti-water Infection
- F. None of the Above

168. The backpacker's disease incubation period is 5-25 days or longer, with an average of 7-10 days, many infections are _____ (no symptoms).

- A. Total
- B. Weak
- C. Strong
- D. Asymptomatic
- E. Unisymptomatic
- F. None of the Above

169. _____ occurs worldwide primarily because customers are receiving their drinking water from streams or rivers without adequate disinfection or a filtration system.

- A. HIV infections
- B. Symptoms
- C. Giardiasis
- D. Hepatitis A symptoms
- E. Cryptosporidiosis symptoms
- F. None of the Above

Giardia lamblia

170. _____ has been responsible for more community-wide outbreaks of disease in the U.S. than any other, drug treatment is not 100% effective.
- A. HIV infection
 - B. Giardia lamblia
 - C. Giardiasis
 - D. Hepatitis A
 - E. Cryptosporidiosis
 - F. None of the Above

Cryptosporidiosis

171. The mode of transmission of this bug is fecal-oral, either by person-to-person or animal-to-person, there is no specific treatment.
- A. HIV infection
 - B. Giardia lamblia
 - C. Giardiasis
 - D. Hepatitis A
 - E. Cryptosporidiosis
 - F. None of the Above
172. All of these diseases, with the exception of this bug, have one symptom in common: diarrhea. They also have the same mode of transmission, fecal-oral, whether through person-to-person or animal-to-person contact.
- A. HIV infection
 - B. Giardia lamblia
 - C. Giardiasis
 - D. Hepatitis A
 - E. Cryptosporidiosis
 - F. None of the Above

Bacteriological Monitoring Section

173. Which of the following are usually harmless, occur in high densities in their natural environment and are easily cultured in relatively simple bacteriological media?
- A. Indicator bacteria
 - B. Bacteria tests
 - C. Contaminate
 - D. Microbiological analysis
 - E. Presence of an indicator
 - F. None of the Above
174. Indicators in common use today for routine monitoring of drinking water include total coliforms, fecal coliforms, and?
- A. Sample container
 - B. Bacteria tests
 - C. Coliform bacteria
 - D. Escherichia coli (E. coli)
 - E. Iron bacteria
 - F. None of the Above
175. According to the text, the routine microbiological analysis of your water is for _____.
- A. Indicator bacteria
 - B. Bacteria tests
 - C. Contamination
 - D. Coliform bacteria
 - E. Presence of an indicator
 - F. None of the Above
176. Which of the following terms is used as an indicator organism to determine the biological quality of your water?
- A. Microbiological analysis
 - B. Bac-T
 - C. Coliform bacteria
 - D. Escherichia coli (E. coli)
 - E. Presence of an indicator
 - F. None of the Above
177. The presence of an indicator or _____ in your drinking water is an important health concern.
- A. Indicator bacteria
 - B. Pathogenic bacteria
 - C. Contaminate
 - D. Microbiological analysis
 - E. Presence of an indicator
 - F. None of the Above

178. _____ is used to signal possible fecal contamination, and therefore, the potential presence of pathogens.

- A. Indicator bacteria
- B. Pathogenic bacteria
- C. Contaminate
- D. Microbiological analysis
- E. Presence of an indicator
- F. None of the Above

Bacteria Sampling

179. Water samples for _____ must always be collected in a sterile container.

- A. Indicators
- B. Bacteria tests
- C. Contamination
- D. pH analysis
- E. Presence of an indicator
- F. None of the Above

180. Refrigerate the sample and transport it to the testing laboratory within eight hours (in an ice chest). Many labs will accept bacteria samples on Friday. Mailing Indicator bacteria is not recommended because laboratory analysis results are not as reliable.

- A. True
- B. False

181. Which bug forms an obvious slime on the inside of pipes and fixtures. A water test is not needed for identification. Check for a reddish-brown slime inside a toilet tank or where water stands for several days.

- A. Colonies
- B. Algae
- C. Coliform bacteria
- D. Escherichia coli (E. coli)
- E. Iron bacteria
- F. None of the Above

182. _____ are common in the environment and are generally not harmful, but the presence of these bacteria in drinking water is usually a result of a problem with the treatment system or the pipes which distribute water, and indicates that the water may be contaminated with germs that can cause disease.

- A. Diseases
- B. Germs
- C. Coliform bacteria
- D. Escherichia coli (E. coli)
- E. Iron bacteria
- F. None of the Above

Laboratory Procedures

183. The laboratory may perform the _____ in one of four methods approved by the U.S. EPA and your local environmental or health division.

- A. Colilert
- B. Coliform
- C. Sample time
- D. Total coliform analysis
- E. Pathogen test
- F. None of the Above

Methods

184. The MMO-MUG test, a product marketed as _____, is the most common. The sample results will be reported by the laboratories as simply coliforms present or absent.

- A. Colilert
- B. Coliform
- C. Sample stuff
- D. Total coliform analysis
- E. Pathogen media
- F. None of the Above

185. If coliforms are present, the laboratory will analyze the sample further to determine if these are _____ and _____ and report their presence or absence.

- A. Colilert, E. coli
- B. Coliforms, E. coli
- C. Fecal coliforms, E. coli
- D. Total coliform analysis, Pathogens
- E. Pathogens, Total coliform analysis
- F. None of the Above

Types of Water Samples

186. It is important to properly identify the type of _____ you are collecting.

- A. Colilert D. Total coliform analysis
- B. Coliforms E. Pathogens
- C. Sample F. None of the Above

The three (3) types of samples are:

187. Samples collected following a coliform present' routine sample. The number of repeat samples to be collected is based on the number of _____ samples you normally collect.

- A. Repeat D. Total coliform analysis
- B. Special E. Routine
- C. QA QC F. None of the Above

188. _____ is total coliform or fecal coliform present, a set of repeat samples must be collected within 24 hours after being notified by the laboratory.

- A. MCL compliance D. Original sampling location
- B. Distribution system E. Repeat sample(s)
- C. Routine sample F. None of the Above

189. For systems collecting two (2) or more routine samples per month, three (3) _____ must be collected.

- A. Compliance sample D. QA/QC Split
- B. Distribution sample E. Repeat sample(s)
- C. Routine sample F. None of the Above

190. Repeat samples must be collected from: Within five (5) service connections upstream from the?

- A. MCL compliance D. Original sampling location
- B. Distribution system E. Repeat sample(s)
- C. Routine sample F. None of the Above

191. Repeat samples must be collected from: Within five (5) service connections downstream from the?

- A. Special Sample D. Coliform present
- B. Routine sample E. Original sampling location
- C. Repeat sample(s) F. None of the Above

Sampling Procedures

192. This must be followed and all operating staff must be clear on how to follow the sampling plan.

- A. Seal individual samples D. Sample siting plan
- B. Chain of custody E. Positive for total coliform
- C. Distribution system F. None of the Above

193. Staff must be aware of how often sampling must be done, the _____ to be used for collecting the samples, and the proper procedures for identification, storage and transport of the samples to an approved laboratory.

- A. Multiple sources D. Proper procedures and sampling containers
- B. Sample siting plan E. Sampling containers
- C. Total coliform F. None of the Above

Maximum Contaminant Levels (MCLs)

194. This acronym generally expresses properties of the contaminants, risk assessments and factors, short-term (acute) exposure and long-term (chronic) exposure.

- A. Coliform bacteria
- B. MCLs
- C. Standards
- D. HPC
- E. CFU
- F. None of the Above

195. When you as the operator take samples to ensure your water is in compliance with the MCL, there are two types of _____ for coliform bacteria.

- A. Coliform bacteria
- B. MCLs
- C. Standards
- D. MCL violations
- E. CFU
- F. None of the Above

196. Which of the following terms is for total coliform; the second is an acute risk to health violation characterized by the confirmed presence of fecal coliform or E. coli?

- A. Coliform bacteria
- B. MCLs
- C. Standards
- D. MCL violations
- E. CFU
- F. None of the Above

Chain of Custody Procedures

197. Which of the following terms begins when the sample containers are obtained from the laboratory? From this point on, a chain of custody record will accompany the sample containers.

- A. Multiple sources
- B. Sample siting plan
- C. Total coliform
- D. Chain of custody record
- E. Sampling containers
- F. None of the Above

198. Each custody sample requires a _____ record and may require a seal. If you do not seal individual samples, then seal the containers in which the samples are shipped.

- A. Seal individual samples
- B. Chain of custody
- C. Distribution system
- D. Sample siting plan
- E. Positive for total coliform
- F. None of the Above

199. Because a sample is physical evidence, _____ procedures are used to maintain and document sample possession from the time the sample is collected until it is introduced as evidence.

- A. Multiple sources
- B. Sample siting plan
- C. Total coliform
- D. TCR
- E. Chain of custody
- F. None of the Above

200. If both parties involved in the transfer must sign, date and note the time on the chain of custody record, this is known as?

- A. Multiple sources
- B. Sample siting plan
- C. Total coliform
- D. Samples transfer possession
- E. Sampling containers
- F. None of the Above

201. The recipient will then attach the _____ showing the transfer dates and times to the custody sheets. If the samples are split and sent to more than one laboratory, prepare a separate chain of custody record for each sample.

- A. Seal individual samples
- B. Chain of custody
- C. Shipping invoices
- D. Sample siting plan
- E. Positive for total coliform
- F. None of the Above

202. If the samples are delivered to after-hours night drop-off boxes, the custody record should note such _____ and be locked with the sealed samples inside sealed boxes.

- A. Multiple sources
- B. Sample siting plan
- C. Total coliform
- D. TCR
- E. A transfer
- F. None of the Above

Positive or Coliform Present Results

203. According to the text, if you are notified of a positive test result you need to contact either the Drinking Water Program or your local county health department within 24 hours, or by the next business day after the?

- A. Results are reported to you
- B. Positive violation
- C. Repeat sampling immediately
- D. Sample violation
- E. MCL compliance violation
- F. None of the Above

204. Ideally speaking, your Drinking Water Program Agency should contract with health departments to provide _____ to water systems.

- A. Assistance
- B. Harassment
- C. Hostility
- D. Sample help
- E. Compliance calculation
- F. None of the Above

205. Hopefully after you have contacted an agency for assistance, you will be instructed as to the proper repeat sampling procedures and possible corrective measures for solving the problem. It is very important to initiate the _____ as the corrective measures will be based on those results.

- A. Storage and distribution
- B. Repeat sampling immediately
- C. Upgrading of the wellhead area
- D. Perform routine procedures
- E. Corrective measures
- F. None of the Above

Heterotrophic Plate Count HPC

206. Heterotrophic Plate Count (HPC) --- formerly known as the Standard plate count, is a procedure for estimating the number of live heterotrophic bacteria and measuring changes during water treatment and distribution in water or in swimming pools.

- A. True
- B. False

207. Colonies may arise from pairs, chains, clusters, or single cells, all of which are included in this term?

- A. Coliform bacteria units
- B. MCLs units
- C. Standards
- D. HPC units
- E. Colony-forming units
- F. None of the Above

Hydraulic Principles Section

208. Which of the following terms is an excellent example of deductive mathematical physics, and in which the predictions agree closely with experiment?

- A. Pressure
- B. Hydrostatics
- C. Hydrokinetics
- D. Hydraulics
- E. Flow
- F. None of the Above

209. Which of the following terms is usually stated that a fluid is a substance that cannot resist a shearing stress, so that pressures are normal to confining surfaces?

- A. Pressure
- B. Hydrostatics
- C. Hydrokinetics
- D. Hydraulics
- E. Flow
- F. None of the Above

210. According to the text, hydraulics may be the physical property that varies over the largest numerical range, competing with electrical resistivity.

- A. True
- B. False

211. Hydraulics can be divided into two areas, this term and hydrokinetics.

- A. Fluids
- B. Hydrostatics
- C. Hydrokinetics
- D. Mechanical properties of water
- E. Flow
- F. None of the Above

212. Which of the following terms includes the behavior of all liquids, although it is primarily concerned with the motion of liquids.

- A. Fluids
- B. Hydrostatics
- C. Hydrokinetics
- D. Hydraulics
- E. Flow
- F. None of the Above

213. _____ includes the manner in which liquids act in tanks and pipes, deals with their properties, and explores ways to take advantage of these properties.

- A. Pressure
- B. Hydrostatics
- C. Hydrokinetics
- D. Hydraulics
- E. Flow
- F. None of the Above

214. Which of the following terms includes the consideration of liquids at rest, involves problems of buoyancy and flotation?

- A. Pressure
- B. Hydrostatics
- C. Hydrokinetics
- D. Hydraulics
- E. Flow
- F. None of the Above

215. _____ includes the study of liquids in motion, is concerned with such matters as friction and turbulence generated in pipes by flowing liquids?

- A. Pressure
- B. Hydrostatics
- C. Hydrokinetics
- D. Hydraulics
- E. Flow
- F. None of the Above

216. Which of the following terms is about the pressures exerted by a fluid at rest?

- A. Pressure
- B. Hydrostatics
- C. Hydrokinetics
- D. Hydraulics
- E. Flow
- F. None of the Above

Barometric Loop

217. According to the text, the barometric loop, will provide protection against backsiphonage, is based upon the principle that a water column, at sea level pressure, will not rise above 33.9 feet. In general, barometric loops are locally fabricated, and are 35 feet high.

- A. True
- B. False

218. Which of the following terms could be measured an absolute scale, pounds per square inch absolute (psia), or gauge scale, (psiag).

- A. Static pressure
- B. Pressure
- C. Gauge pressure
- D. Sea level
- E. Atmospheric pressure
- F. None of the Above

230. The new standard uses performance criteria which provides employers with options when classifying soil and when selecting methods to protect the _____ from cave-ins.

- A. Competent person
- B. Employee
- C. Inspections
- D. Protective equipment, trench conditions
- E. Emergency
- F. None of the Above

231. Although the standard has been clarified and _____ have options when meeting some of the requirements, employers must realize that the employee must be protected at all times.

- A. Competent person
- B. Everyone
- C. Inspections
- D. Protective equipment, trench conditions
- E. Employers
- F. None of the Above

232. Which of the following terms means one who is capable of identifying existing hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees and has authorization to take prompt corrective measures to eliminate them?

- A. Competent person
- B. Everyone
- C. Inspection inspector
- D. Watchman
- E. Authorized person
- F. None of the Above

233. _____ for the purpose of this standard, one must have specific training in and be knowledgeable about soils analysis, the use of protective systems and the requirements of 29 CFR Part 1926.650-652 Subpart P.

- A. Competent person
- B. Everyone
- C. Inspection inspector
- D. Watchman
- E. Authorized person
- F. None of the Above

234. Which of the following terms are essential. Everyone is required to practice once a year. Yes, once a year.

- A. Competent person
- B. Rescue training exercises
- C. Inspections
- D. Protective equipment
- E. Emergency
- F. None of the Above

235. Which of the following terms shall be made prior to the start of work and as needed throughout the shift.

- A. Competent person
- B. Examinations
- C. Inspections
- D. Protective equipment
- E. Emergency contact methods
- F. None of the Above

236. _____ shall be made after every rainstorm or other hazard occurrence.

- A. Competent person
- B. Examinations
- C. Inspections
- D. Protective equipment
- E. Emergency contact methods
- F. None of the Above

237. Knowledge of _____, telephone or radio dispatch.

- A. Competent person
- B. Everything
- C. Inspections
- D. Protective equipment, trench conditions
- E. Emergency contact methods
- F. None of the Above

238. Removes employees and _____ from hazardous conditions and makes all changes necessary to ensure their safety.

- A. Competent person
- B. All other personnel
- C. Inspections
- D. Protective equipment, trench conditions
- E. Emergency contact methods
- F. None of the Above

239. _____ have to have proper protective equipment, hard-hats, reflective vests, steel-toed boots, harnesses, eye protection, hearing protection and drinking water?

- A. Competent person
- B. Everyone
- C. Inspections
- D. All employees
- E. Emergency contact methods
- F. None of the Above

240. During excavation work a competent person shall be on the job site at all times when personnel are working within or around the?

- A. Competent person
- B. Employees
- C. Inspections
- D. Ladder(s)
- E. Excavation
- F. None of the Above

241. _____ that reasonably may be expected to be encountered during excavation work, shall be determined prior to opening an excavation.

- A. Competent person
- B. Employees
- C. Inspections
- D. Any other underground installation
- E. Excavation work
- F. None of the Above

242. Which of the following safety terms shall be taken to protect employees working in excavations, against the hazards posed by water accumulation?

- A. Competent person
- B. Adequate precautions
- C. Inspections
- D. Ladder(s)
- E. Excavation work
- F. None of the Above

243. Employees shall be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations.

- A. True
- B. False

244. A stairway, ladder, or ramp shall be used as a _____ in trench excavations that are four (4') feet or more in depth.

- A. Competent person
- B. Means of access or egress
- C. Inspections
- D. Ladder(s)
- E. Excavation work
- F. None of the Above

245. The Ladder(s), stairway(s), or ramp shall be spaced so that no employee in the trench excavation is more than twenty-five feet from a means of egress. When ladder(s) are employed, the top of the ladder shall extend a minimum of three feet above the ground and shall be properly secured.

- A. True
- B. False

246. Which of the following safety terms are exposed to vehicular traffic, each employee shall wear a warning vest made with reflective material or highly visibility material?

- A. Competent person
- B. Employees
- C. Inspections
- D. Excavations
- E. Excavation work
- F. None of the Above

247. Employees shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by _____.

- A. Competent person
- B. Any spillage or falling materials
- C. Inspections
- D. Ladder(s)
- E. Excavation work
- F. None of the Above

248. In excavations where _____ exist, or could be reasonably expected to exist, air in the excavation shall be tested.

- A. Competent person
- B. Employees
- C. Inspections
- D. Oxygen deficiency
- E. Oxygen deficiency or gaseous conditions
- F. None of the Above

249. Which of the following safety terms exists, the area must be continuously ventilated until the oxygen levels are above 19.5 percent.

- A. Competent person
- B. Employees
- C. Inspections
- D. Oxygen deficiency
- E. Excavation(s)
- F. None of the Above

250. If _____ the area shall be ventilated until the flammable gas concentration is below 20 percent of the lower flammable limit.

- A. Competent person
- B. Gaseous condition exists
- C. Inspections
- D. Oxygen deficiency
- E. Excavation(s)
- F. None of the Above

251. Which of the following safety terms exist or could reasonably exist, the area shall be monitored continuously to assure that employees are protected?

- A. Competent person
- B. Oxygen deficiency or gaseous conditions
- C. Inspections
- D. Oxygen deficiency
- E. Excavation(s)
- F. None of the Above

252. Where the stability of adjoining buildings, walls or other structures are _____, support systems such as shoring, bracing, or underpinning shall be provided?

- A. Competent person
- B. Endangered by excavation operations
- C. Inspections
- D. Oxygen deficiency
- E. Excavation(s)
- F. None of the Above

253. Sidewalks, pavement and appurtenant structures shall not be undermined unless a support system such as shoring is provided to protect _____ from the possible collapse of such structures.

- A. Competent person
- B. Employees
- C. Inspections
- D. Oxygen deficiency
- E. Excavation(s)
- F. None of the Above

Personnel Protective Systems

254. Employees in _____ shall be protected from cave-ins by an adequate protective system, which shall be inspected by a competent person.

- A. Excavations
- B. Tabulated data
- C. Trench excavation
- D. Protective systems
- E. Cave-ins
- F. None of the Above

255. Which of the following safety terms is required for all excavations, in excess of five (5') feet, except when excavation is within stable rock.

- A. Table
- B. Tabulated data
- C. Trench excavation
- D. Protective systems
- E. Cave-ins
- F. None of the Above

256. The competent person shall determine the need for the use of protective systems when?

- A. Such conditions exist
- B. Tabulated data
- C. Trench excavation
- D. Protective systems
- E. Cave-ins
- F. None of the Above

257. When sloping, benching or protective systems are required, refer to?

- A. Table
- B. Tabulated data
- C. Trench excavation
- D. Protective systems
- E. Requirements in CFR 1926.652
- F. None of the Above

258. Whenever support systems, _____, or other protective systems are being used, a copy of the manufacturer's specifications, recommendations, and limitations sheet shall be in written form and maintained at the job site.

- A. Shield systems
- B. Tabulated data
- C. Trench excavation
- D. Protective systems
- E. Cave-ins
- F. None of the Above

Excavation Protection Systems

259. The three basic protective systems for excavations and trenches are?

- A. Table
- B. Tabulated data
- C. Trench excavation
- D. Protective systems
- E. Sloping and benching systems, shoring, and shields
- F. None of the Above

260. Every employee in an excavation shall be protected from _____ by an adequate protective system.

- A. Table
- B. Tabulated data
- C. Trench excavation
- D. Protective systems
- E. Cave-ins
- F. None of the Above

Sloping and Benching Systems

261. There are four options for _____.

- A. Sloping
- B. Tabulated data
- C. Trench excavation
- D. Protective systems
- E. Cave-ins
- F. None of the Above

262. The table provided in _____ of the standard may be used to determine the maximum allowable angle (after determining the soil type).

- A. Appendix B
- B. Tabulated data
- C. Trench excavation
- D. Protective systems
- E. Cave-ins
- F. None of the Above

263. Which of the following safety terms prepared by a registered professional engineer can be utilized?

- A. Table
- B. Tabulated data
- C. Trench excavation
- D. Protective systems
- E. Cave-ins
- F. None of the Above

264. A registered professional engineer can design a _____ for a specific job.

- A. Table
- B. Sloping plan
- C. Trench excavation
- D. Protective systems
- E. Cave-ins
- F. None of the Above

265. Which of the following safety terms for excavations five (5) to twenty (20) feet in depth must be constructed under the instruction of a designated competent person?

- A. Sloping and benching systems
- B. Tabulated data
- C. Trench excavation
- D. Protective systems
- E. Cave-ins
- F. None of the Above

266. Which of the following safety terms for excavations greater than twenty (20) feet must be designed and stamped by a registered professional engineer?

- A. Sloping and benching systems
- B. Tabulated data
- C. Trench excavation
- D. Protective systems
- E. Cave-ins
- F. None of the Above

Shoring Systems

267. Which of the following safety terms utilizes a framework of vertical members, horizontal members, and cross braces to support the sides of the excavation?

- A. Shoring
- B. Tabulated data
- C. Trench excavation
- D. Protective systems
- E. Cave-ins
- F. None of the Above

Shield Systems (Trench Boxes)

268. _____ is the third method of providing a safe workplace, unlike sloping and shoring, shielding does not prevent a cave-in.

- A. Shielding
- B. Tabulated data
- C. Trench excavation
- D. Protective systems
- E. Cave-ins
- F. None of the Above

269. _____ are designed to withstand the soil forces caused by a cave-in and protect the employees inside the structure?

- A. Shields
- B. Tabulated data
- C. Trench excavation
- D. Protective systems
- E. Cave-ins
- F. None of the Above

270. Which of the following safety terms is not covered in the OSHA Standards?

- A. Sloping and benching systems
- B. Tabulated data
- C. Trench excavation
- D. Protective systems
- E. Shielding design and construction
- F. None of the Above

Safety Precautions for Shield Systems

271. Which of the following safety terms must not have any lateral movement when installed?

- A. Sloping and benching systems
- B. Tabulated data
- C. Trench excavation
- D. Protective systems
- E. Shields
- F. None of the Above

272. Employees will be protected from cave-ins when entering and exiting the shield (examples - ladder within the _____ or a properly sloped ramp at the end).

- A. Sloping and benching systems
- B. Tabulated data
- C. Trench excavation
- D. Protective systems
- E. Shield
- F. None of the Above

273. According to the text, employees are not allowed in the _____, removal, or during any vertical movement.

- A. Sloping and benching systems
- B. Shield during installation
- C. Trench excavation
- D. Protective systems
- E. Cave-ins
- F. None of the Above

274. Which of the following safety terms can be 2 ft. above the bottom of an excavation if they are designed to resist loads?

- A. Sloping and benching systems
- B. Shields
- C. Trench excavation
- D. Protective systems
- E. Cave-ins
- F. None of the Above

275. Which of the following safety terms must extend at least 18 inches above the point where proper sloping begins (the height of the shield must be greater than the depth of the excavation)?

- A. Sloping and benching systems
- B. Shield
- C. Trench excavation
- D. Protective systems
- E. Cave-ins
- F. None of the Above

276. Which of the following safety terms must be protected from the exposed excavation wall?

- A. Sloping and benching systems
- B. Open end of the shield
- C. Trench excavation
- D. Protective systems
- E. Cave-ins
- F. None of the Above

Personal Protective Equipment

277. Which of the following safety terms are for you to wear a hard hat, safety glasses, and work boots on the jobsite?

- A. OSHA Standards
- B. It is OSHA policy
- C. Excavation
- D. Adequate protection systems
- E. Personal protective equipment
- F. None of the Above

Excavation & Trenching Guidelines

278. This section outlines procedures and guidelines for the protection of employees working in and around excavations and trenches. This section requires compliance with EPA standards.

- A. True
- B. False

279. Safety compliance is recommended to ensure employee protection when working in or around excavations. The competent person(s) may be trained in accordance with the OSHA Excavation Standard, and all other programs that may apply and must demonstrate a thorough understanding and knowledge of the programs and the hazards associated.

- A. True
- B. False

280. All other employees working in and around the excavation must be trained in the recognition of hazards associated with _____.

- A. OSHA Standards
- B. Trenching and excavating
- C. Excavation
- D. Adequate protection systems
- E. Personal protective equipment
- F. None of the Above

Hazard Controls

281. Before any work is performed and before any employees enter the excavation, a number of items must be checked and insured: Before any excavation, Underground installations must be determined. This can be accomplished by either contacting the local utility companies or the local "one-call" center for the area. All underground utility locations must be documented on the proper forms.

- A. True
- B. False

282. All overhead hazards (surface encumbrances) that create a hazard to employees must be removed or supported to?

- A. OSHA Standards
- B. Trenching and excavating
- C. Eliminate the hazard
- D. Adequate protection systems
- E. Personal protective equipment
- F. None of the Above

283. Which of the following terms if to be over 20 feet deep, it must be designed by a registered professional engineer?

- A. OSHA Standard
- B. Trench
- C. Excavation
- D. Adequate protection systems
- E. Personal protective equipment
- F. None of the Above

284. Which of the following terms will be utilized to protect employees, can be accomplished through sloping, shoring, or shielding?

- A. Adequate protective systems
- B. Soil classifications
- C. Competent person
- D. Trench or excavation
- E. Personal protective equipment
- F. None of the Above

285. The worksite must be analyzed in order to design _____ and prevent cave-ins.

- A. An excavation safety plan
- B. Adequate measures
- C. Protective systems
- D. Simplified Soil Classification Systems
- E. Adequate protection systems
- F. None of the Above

286. Workers must be supplied with, and wear, any _____ deemed necessary to assure their protection.

- A. Type A
- B. Soil classifications
- C. Competent person
- D. Trench or excavation
- E. Personal protective equipment
- F. None of the Above

287. Which of the following terms will be stored a minimum of two (2) feet from the sides of the excavation?

- A. An excavation safety plan
- B. Adequate measures
- C. Protective systems
- D. All spoil piles
- E. Means of egress
- F. None of the Above

288. If a trench or excavation is 4 feet or deeper, stairways, ramps, or ladders will be used as a safe means of access and egress. _____, the employee must not have to travel any more than 25 feet of lateral travel to reach the stairway, ramp, or ladder.

- A. For trenches
- B. Soil classifications
- C. Competent person
- D. Trench or excavation
- E. Personal protective equipment
- F. None of the Above

289. No employee will work in an excavation where _____ unless adequate measures are used to protect the employees.

- A. An excavation safety plan
- B. Adequate measures
- C. Protective systems
- D. Simplified Soil Classification Systems
- E. Water is accumulating
- F. None of the Above

290. A competent person will inspect all excavations and trenches daily, prior to employee exposure or entry, and after any rainfall, soil change, or any other time needed during the shift. The competent person must take?

- A. Type A
- B. Soil classifications
- C. Competent person
- D. Prompt measures to eliminate any and all hazards
- E. Personal protective equipment
- F. None of the Above

291. Excavations and trenches 4 feet or deeper that have the potential for toxic substances or _____ will be tested at least daily.

- A. An excavation safety plan
- B. Adequate measures
- C. Protective systems
- D. Hazardous atmospheres
- E. Means of egress
- F. None of the Above

292. Which of the following terms must be utilized to ensure the safety of employees, vehicular traffic, and pedestrians?

- A. Signs and barricades
- B. Soil classifications
- C. Competent person
- D. Trench or excavation
- E. Personal protective equipment
- F. None of the Above

Excavation Safety Plan

293. An excavation safety plan is required in written form. This plan is to be developed to the level necessary to insure complete compliance with the _____ and state and local safety standards.

- A. An excavation safety plan
- B. Adequate measures
- C. Protective systems
- D. Simplified Soil Classification Systems
- E. OSHA Excavation Safety Standard
- F. None of the Above

Soil Classification and Identification

294. Type A soil is defined as: _____ with an unconfined compressive strength of 1.5 tons per square foot (TSF) or greater.

- A. An excavation safety plan
- B. Adequate measures
- C. Protective systems
- D. Simplified Soil Classification Systems
- E. Cohesive soils
- F. None of the Above

295. _____ like caliche and hardpan are considered Type A.

- A. Cemented soils
- B. Soil classifications
- C. Competent person
- D. Trench or excavation
- E. Personal protective equipment
- F. None of the Above

Soil Test & Identification

296. The competent person will classify the _____ in accordance with the definitions in Appendix A.

- A. Shields
- B. Reputable manufacturers
- C. Cohesion tests
- D. Competent person
- E. Soil type
- F. None of the Above

297. These tests should be run on excavated samples from the excavation and are designed to determine stability based on a number of criteria: the uncohesiveness, the presence of fissures, the presence and amount of water, the confined compressive strength, and the duration of layering, prior excavation and vibration.

- A. True
- B. False

298. Clay, silt, and sand are _____, with clay being the smallest sized particles, silt intermediate and sand the largest.

- A. Shields
- B. Reputable manufacturers
- C. Cohesion tests
- D. Competent person
- E. Size classifications
- F. None of the Above

299. _____ and plasticity depend on the amounts of all three types and water.

- A. Compatibility
- B. Reputable manufacturers
- C. Cohesion tests
- D. Durability
- E. Degree of cohesiveness
- F. None of the Above

300. The competent person must also determine the level of protection based on what conditions exist at the time of the test, and _____.

- A. Shields
- B. Reputable manufacturers
- C. Cohesion tests
- D. Competent person
- E. Allow for changing conditions
- F. None of the Above