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Valve Operation and System Design CEU Training Course $150.00
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Wastewater Treatment_____ Other _____

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Valve Operation and System Design CEU Course Answer Key

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Please circle, underline, bold or X only one correct answer

A felt tipped pen works best.

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CEU TRAINING COURSE
CUSTOMER SERVICE RESPONSE CARD

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Valve Operation and System Design CEU Course Assignment

The Valve Operation and System Design CEU Assignment is 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. 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.

Multiple Choice, please select <u>only one answer</u> per question. There are no intentional trick questions.

Please write down any questions that cannot be found or has problems

Common Hydraulic Terms

1. Which of the following is the engineering science pertaining to liquid pressure and flow?
A. Hydrokinetics C. Pascal's Principal
B. Hydraulics D. None of the above

2. Which of the following is the engineering science pertaining to the energy of liquid flow and pressure?
A. Pressure, Absolute C. Hydrokinetics
B. Hydraulics D. None of the above

3. Which of the following is the pressure applied to a confined fluid at rest is transmitted with equal intensity throughout the fluid?
A. Pressure C. Pascal's Law
B. Hydraulics D. None of the above

4. Which of the following is the application of continuous force by one body upon another that it is touching; compression?
A. Pressure, Absolute C. Pressure
B. Hydraulics D. None of the above

5. Which of the following is the force per unit area, usually expressed in pounds per square inch?
A. Pressure, Absolute C. Pressure, Gauge
B. Pressure D. None of the above

6. Which of the following is the pressure differential above or below ambient atmospheric pressure?
A. Pressure, Absolute C. Pressure, Gauge
B. Pressure D. None of the above

7. Which of the following is height of a column or body of fluid above a given point expressed in linear units?
A. Head, Friction C. Head
B. Head, Static D. None of the above

8. Which of the following is the pressure in a fluid at rest?
A. Pressure, Atmospheric C. Pressure, Gauge
B. Pressure, Static D. None of the above

9. Which of the following is the height of a column or body of fluid above a given point?
A. Head, Friction C. Head
B. Head, static D. None of the above

10. Which of the following is the pressure exported by the atmosphere at any specific location?
A. Pressure, Atmospheric C. Pressure, Gauge
B. Pressure, Static D. None of the above

11. Which of the following is pressure above zone absolute, i.e. the sum of atmospheric and gauge pressure?
A. Pressure, Absolute C. Hydrokinetics
B. Pressure D. None of the above

12. Which of the following is used to indicate gauge pressure?
A. Head, Friction C. Head
B. Head, static D. None of the above

13. Which of the following is the pressure equal to the height times the density of the liquid?
A. Head, Friction C. Head
B. Head, static D. None of the above

14. Which of the following is required to overcome the friction at the interior surface of a conductor and between fluid particles in motion?
A. Head, Friction C. Head
B. Head, static D. None of the above

15. Which of the following varies with flow, size, type, and conditions of conductors and fittings, and the fluid characteristics?
A. Head, Friction C. Head
B. Head, static D. None of the above

16. Sea level pressure is approximately 2.31 pounds per square inch absolute,
1 bar = .433psi.
A. True B. False

Water Distribution System Design and Valves
System Elements
17. Booster stations are used to _____ from storage tanks for low-pressure mains.
A. Increase water pressure C. Boost flow
B. Equalize D. None of the above

18. Arterial main are interconnected with smaller distribution mains to form a complete gridiron system and are mains for?
A. Increasing water pressure C. Distribution mains of large size
B. Fire protection D. None of the above

19. Valves control the flow of water in the distribution system by isolating areas for repair or by?
A. Increasing water pressure C. Regulating system flow or pressure.
B. Completing gridiron system D. None of the above

20. According to the text, Gate valves should be used in the _____for main line isolation.
A. Distribution tree C. Distribution system
B. Arterial system D. None of the above

21. 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. Distribution tree C. Distribution system
B. Arterial system D. None of the above

22. Storage reservoirs are structures used to store water and _____ the supply or pressure in the distribution system.
A. Increase water pressure C. Main line isolation
B. Equalize D. None of the above

Butterfly Valve
23. 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 C. Main line isolator
B. Bypass D. None of the above

Water Distribution Valves
24. The purpose of installing shutoff valves in water mains at various locations within the distribution system is to allow sections of the system to be taken out of service for repairs or maintenance, without significantly curtailing service over large areas.
A. True B. False

25. According to the text, at intersections of distribution mains, the number of valves required is normally one less than the number of?
A. Ties C. Pressure drops
B. Radiating mains D. None of the above

26. All buried small- and medium-sized valves should be installed in the sidewalk.
A. True B. False

27. For large shutoff valves, it may be necessary to surround the valve operator or entire valve within a vault or manhole to allow?
A. Maximum flow C. Minimum flow restriction
B. Repair or replacement D. None of the above

Gate Valves
28. In the distribution system, gate valves are used when a straight-line flow of fluid and?
A. Maximum flow C. Minimum flow restriction
B. Repair or replacement D. None of the above

29. 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 C. Minimum flow restriction
B. Stops or allows D. None of the above

30. If the valve is wide open, the gate is _____ into the valve bonnet.
A. Fully drawn up C. Fully drawn down
B. Dependable D. None of the above

31. There is little pressure drop or flow restriction through the valve. Gate valves are not suitable for?
A. Throttling purposes C. Pressure drops
B. Dependability D. None of the above

32. The control of flow is easy because of the valve's design, and the flow of fluid
A. True B. False

Ball Valves
33. Most ball valves require only a 180-degree turn to either completely open or close the valve.
A. True B. False

34. According to the text, some ball valves are operated by planetary gears.
A. True B. False

35. Ball valves should be either fully-on or fully-off, some ball valves also contain a swing check located within the ball to give the valve a check valve feature.
A. True B. False

Valve Exercising
36. 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 C. Minimum flow restriction
B. Leaks D. None of the above

37. A valve inspection should include drawing valve location maps to show distances to the _____ from specific reference.
A. Valve(s) C. House
B. Monument D. None of the above

38. Service connections are used to _____ or other plumbing systems to the distribution system mains.
A. Be isolated C. Connect individual buildings
B. By laying out D. None of the above

If Excessive Torque is Needed to Work the Valve
39. One cause of a valve failing to open are variations in the temperature and/or pressure of the?
A. Working fluid C. Length of exposure
B. Closing torque D. None of the above

40. Depending on the seat and wedge material, _____ and closing torque applied, thermal binding can occur in high temperature situations.
A. High pressure side C. Valve sealing surfaces
B. Length of exposure D. None of the above

41. Over-pressurization is when a valve can _____ when high pressure enters the cavity and has no way to escape.
A. Over-pressurization C. Lock in the open position
B. Lock in the closed position D. None of the above

42. Tuberculation corrosion is caused by chemical changes produced by?
A. Closed position C. Electricity or electrolysis
B. Chemical changes D. None of the above

43. Corrosion will increase the C-Factor and the carrying capacity in a pipe.
A. True B. False

Knife Gate Valve
44. Install the Knife Gate valve so that the arrows on both sides of the body are in the direction of?
A. Positive pressure differential C. Negative pressure differential
B. Handwheel pointing up D. None of the above

Common Rotary Valves
45. Globe valve, a rotary valve is rare to find in most distribution systems, but can be found at treatment plants.
A. True B. False

46. Most Globes have compact OS & Y type, bolted bonnet, rising stems, with renewable seat rings.
A. True B. False

47. According to the text, Globe valves should usually be installed with the inlet below the bonnet.
A. True B. False

48. 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

49. The globe valve may be installed in other orientations, but any deviation from vertical is a compromise.
A. True B. False

Valve Glossary
50. Air and Vacuum relief valve: Both of these functions are in one valve.
A. True B. False

51. Which of the following valves are used to deliver water from a high pressure to a low-pressure system?
A. Check valve C. Pressure regulating valve
B. Gate valve D. None of the above

52. Which of the following valves is the simplest type of surge pressure relief is a pressure relief valve?
A. Pressure relief C. Pressure sustaining valve
B. Gate valve D. None of the above

53. Which of the following valves respond to pressure variations at their inlets?
A. Pressure relief C. Pressure sustaining valve
B. Gate valve D. None of the above

54. Distribution system water quality can be adversely affected by improperly constructed or poorly located blowoffs of vacuum?
A. Air relief valves C. Altitude-Control Valve
B. Butterfly valve D. None of the above

55. Which of the following are used on supply lines to elevated tanks or standpipes?
A. Air relief valves C. Altitude Valve
B. Butterfly valve D. None of the above

56. Which of the following valves close automatically when the tank is full and open when the pressure on the inlet side is less than that on the tank side of the valve?
A. Air relief valves C. Altitude-Control Valve
B. Butterfly valve D. None of the above

57. According to the text, which of the following valves are often used on the discharge side of pumps to prevent backflow?
A. Check valve C. Automatic flow-control valve
B. Gate valve D. None of the above

58. To prevent water contamination this valve in the distribution system lines must be placed in locations that cannot be flooded.
A. Air relief valves C. Altitude-Control Valve
B. Butterfly valve D. None of the above

59. The common complaint of milky water is sometimes solved by the installation of?
A. Air relief valves C. Altitude-Control Valve
B. Butterfly valve D. None of the above

60. Which of the following valves is a linear valve used to isolate sections of the water main, to permit emergency repairs without interruption of water service to customers?
A. Pressure relief C. Pressure sustaining valve
B. Gate valve D. None of the above

61. Which of the following valves control the high water level and prevent overflow?
A. Air relief valves C. Altitude-Control Valve
B. Air and Vacuum relief valve D. None of the above

62. Which of the following valves is designed to, 1. Prevent overflows from the storage tank or reservoir?
A. Air relief valves C. Altitude-Control Valve
B. Air and Vacuum relief valve D. None of the above

63. Which of the following valves is to maintain a constant water level as long as water pressure in the distribution system is adequate?
A. Air relief valves C. Altitude-Control Valve
B. Butterfly valve D. None of the above

64. Which of the following valves has a movable disc as large as the full-bore opening of the valve?
A. Butterfly valve C. PRVs
B. Air and Vacuum relief valve D. None of the above

65. Which of the following valves maintains constant downstream pressure regardless of fluctuating demand?
A. Pressure relief C. Pressure sustaining valve
B. Gate valve D. None of the above

66. Which of the following valves controls water pressure by restricting flows, the pressure downstream of the valve regulates the amount of flow?
A. Check valve C. Pressure regulating valve
B. Gate valve D. None of the above

67. Which of the following valves are of the globe valve design?
A. Check valve C. Pressure regulating valve
B. Gate valve D. None of the above

68. Which of the following valves control water pressure and operate by restricting flows.
A. Check valve C. Pressure regulating valve
B. Gate valve D. None of the above

Hydraulics
69. Hydraulics is a branch of engineering concerned mainly with moving liquids.
A. True B. False

70. Hydrostatics is based on the Greek word for water, and originally covered the study of the physical behavior of water at rest and in motion.
A. True B. False

71. Hydraulics can be divided into two areas, this term and hydrokinetics.
A. Fluids C. Mechanical properties of water
B. Hydrostatics D. None of the above

72. Which of the following includes the behavior of all liquids, although it is primarily concerned with the motion of liquids?
A. Fluids C. Hydraulics
B. Hydrostatics D. None of the above

73. Which of the following 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 C. Hydraulics
B. Hydrokinetics D. None of the above

74. Which of the following includes the consideration of liquids at rest, involves problems of buoyancy and flotation?
A. Hydrostatics C. Flow
B. Hydrokinetics D. None of the above

75. Hydraulics is applied commonly to the study of the _____, other liquids, and even gases when the effects of compressibility are small.
A. Fluids C. Mechanical properties of water
B. Flow D. None of the above

76. Which of the following includes the study of liquids in motion, is concerned with such matters as friction and turbulence generated in pipes by flowing liquids?
A. Pressure C. Hydraulics
B. Hydrokinetics D. None of the above

77. Which of the following is about the pressures exerted by a fluid at rest?
A. Hydrostatics C. Flow
B. Hydrokinetics D. None of the above

78. Which of the following is an excellent example of deductive mathematical physics, and in which the predictions agree closely with experiment?
A. Hydrostatics C. Flow
B. Hydrokinetics D. None of the above

79. Which of the following is usually stated that a fluid is a substance that cannot resist a shearing stress, so that pressures are normal to confining surfaces?
A. Hydrostatics C. Flow
B. Hydrokinetics D. None of the above

80. 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

Atmospheric Pressure

81. The atmosphere is the entire mass of air that surrounds the earth.
A. True B. False

82. At sea level and at a temperature of 0° Celsius (C), the height of the mercury column is approximately 30 inches, or 76 centimeters. This represents a pressure of approximately 14.7 psi.
A. True B. False

83. According the text, if a column of air 1-inch square extending all the way to the "atmosphere", this column of air would weigh approximately 2.31 pounds at sea level.
A. True B. False

84. If you were to ascend, the atmospheric pressure increases by approximately 1.0 psi for every 2,343 feet.
A. True B. False

85. Which of the following is the layer that extends upward for about 500 miles, the section of primary interest is the portion that rests on the earth's surface and extends upward for about 7 1/2 miles?
A. Column C. Sea level
B. Troposphere D. None of the above

86. Which of the following at sea level is approximately 14.7 psi?
A. Pressure C. Atmospheric pressure
B. Gauge pressure D. None of the above

87. Which of the following if you could be below, in excavations and depressions, atmospheric pressure increases?
A. Static pressure C. Sea level
B. Gauge pressure D. None of the above

88. Pressures under water differ from those under air only because the weight of the water must be added to the?
A. Pressure(s) of the air C. Sea Level
B. Height D. None of the above

89. Which of the following can be measured by any of several methods, one method is the mercury column barometer?
A. Pressure C. Atmospheric pressure
B. Gauge pressure D. None of the above

90. Which of the following could be measured with the aneroid Barometer?
A. Pressure C. Atmospheric pressure
B. Gauge pressure D. None of the above

91. The atmospheric pressure does not vary uniformly with?
A. Barometer C. Altitude
B. Weight D. None of the above

92. Atmospheric pressure is defined as the force per unit area exerted against a surface by the _____ of the air above that surface.
A. Barometer C. Altitude
B. Weight D. None of the above

Barometric Loop
93. 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

94. Absolute pressure is equal to gauge pressure plus the atmospheric pressure.
A. True B. False

95. The barometric loop consists of a continuous section of supply piping that abruptly rises to a height of approximately 233 feet and then returns back down to the originating level.
A. True B. False

96. The barometric loop is a loop in the piping system that effectively protects against backpressure.
A. True B. False

97. The barometric loop may not be used to protect against backsiphonage.
A. True B. False

98. Gauge pressure is simply the pressure read on the gauge. If there is no pressure on the gauge other than atmospheric, the gauge will read zero.
A. True B. False

99. Which of the following could be measured an absolute scale, pounds per square inch absolute (psia), or gauge scale, (psiag).
A. Pressure C. Atmospheric pressure
B. Gauge pressure D. None of the above

100. According to the text, absolute pressure and gauge pressure?
A. Are the same C. That effectively protects
B. Are related D. None of the above

101. Which of the following at sea level is 14.7 psai?
A. Pressure C. Atmospheric pressure
B. Gauge pressure D. None of the above

102. Which of the following is the total pressure?
A. Absolute pressure C. Atmospheric pressure
B. Gauge pressure D. None of the above

103. Which of the following would be equal to 14.7 psi, which is the atmospheric pressure?
A. Absolute pressure C. Atmospheric pressure
B. Gauge pressure D. None of the above

Pressure

104. Which of the following that if a certain volume of fluid were somehow made solid, the equilibrium of forces would not be disturbed?
A. Axiom C. Displaced fluid
B. Pressure D. None of the above

105. Which of the following is an example of a body force that disturbs the equality of pressure in a fluid?
A. Gravitational body force C. Gravitation
B. Pressure D. None of the above

106. We call this relation the barometric equation, for when this equation is integrated, we find the variation of pressure with?
A. Gravitational body force C. Gravitation
B. Pressure D. None of the above

107. Both air and water are considered to be?
A. Absolute pressure C. Volume
B. Fluid(s) D. None of the above

108. Which of the following does water possess and air does not?
A. Absolute pressure C. Volume
B. Fluid(s) D. None of the above

109. Water is incompressible, while air is very compressible.
A. True B. False

110. A fluid is a substance that cannot exert any permanent forces tangential to a boundary and any force that it exerts on a boundary must be normal to the boundary.
A. True B. False

111. According to the text, a force is proportional to the_____, and is called a pressure.
A. Hydrostatics C. Area on which it is exerted
B. Acting on the body of the fluid D. None of the above

112. In order for the fluid to be in equilibrium, the pressure must be the same in all directions (or the element would move in the direction of least pressure), and if no other forces are?
A. Hydrostatics C. Area on which it is exerted
B. Acting on the body of the fluid D. None of the above

113. Which of the following does water and air have; that is, layers of them slide very easily on one another?
A. Low viscosity C. Volume
B. Fluid(s) D. None of the above

114. Molasses and other like fluids may have high viscosity and take a long time to come to equilibrium, but they are no less?
A. Absolute pressure C. Volume
B. Fluid(s) D. None of the above

115. The coefficient of viscosity is the ratio of this term to the velocity gradient.
A. Atmospheric pressure C. Shearing force
B. Fluid(s) D. None of the above

116. Which of the following deals with permanent, time-independent states of fluids, so viscosity does not appear?
A. Hydrostatics C. Area on which it is exerted
B. Acting on the body of the fluid D. None of the above

117. Therefore, in this case the pressure will be the same throughout the fluid, and the same in any direction at a point?
A. Pascal's Principle C. Permanent forces tangential
B. Hydrostatics D. None of the above

Free Surface Perpendicular to Gravity
118. Archimedes' Principle says that the buoyant force is equal to the weight of the displaced fluid, and passes through the center of mass of?
A. Axiom C. Displaced fluid
B. Pressure D. None of the above

Standard Atmospheric Pressure
119. Which of the following is a practice that is convenient to measure pressure differences by measuring the height of liquid columns?
A. Total vacuum C. Manometer
B. Capillarity D. None of the above

120. Which of the following uses a partially evacuated chamber of thin metal that expands and contracts according to the external pressure?
A. Aneroid barometer C. Partial vacuum
B. Capillarity tube D. None of the above

Vacuum
121. The term vacuum indicates that the absolute pressure is less than the atmospheric pressure and that the _____ is negative.
A. Static pressure C. Total vacuum
B. Gauge pressure D. None of the above

122. Which of the following would mean a pressure of 0 psia or –14.7 psig?
A. Static pressure C. Total vacuum
B. Gauge pressure D. None of the above

123. Which of the following the pressure would range from slightly less than 14.7 psia to slightly greater than 0 psia?
A. Static pressure C. Total vacuum
B. Partial vacuum D. None of the above

124. Backsiphonage results from _____ exerted on a liquid, forcing it toward a supply system that is under a vacuum.
A. Static pressure C. Atmospheric pressure
B. Gauge pressure D. None of the above

125. According to the text, it is impossible to produce a partial vacuum.
A. True B. False

Water Pressure
126. The weight of a cubic foot of water is 62.4 pounds per square foot. The base can be subdivided into 144-square inches with each subdivision being subjected to a pressure of 0.433 psig. This is one of our key foundation for backflow prevention.
A. True B. False

127. Which of the following are very frequently stated in terms of the height of a fluid?
A. Weight C. Depth
B. Pressure(s) D. None of the above

128. Water with a pressure head of 10 ft can provide the same _____as an equal amount of water raised by 10 ft.
A. Friction C. Energy
B. Pressure(s) D. None of the above

129. Water flowing in a pipe is subject to head loss because of?
A. Friction C. Siphon
B. Pressure(s) D. None of the above

130. The name is Greek for the tube and is another application of pressure is the?
A. Epihydro C. Siphon
B. Water bearer D. None of the above

131. When a siphon goes below the free water levels, it is called an?
A. Epihydro C. Hydrostat
B. Inverted siphon D. None of the above

132. Which of the following can be made by filling the tube, closing the ends, and then putting the ends under the surface on both sides?
A. Water bearer C. Inverted siphon
B. Siphon D. None of the above

Pressure and Force
133. Which of the following is the force that pushes water through pipes?
A. Pressure C. Shearing force
B. Fluid(s) D. None of the above

134. Which of the following and force are used extensively in the study of fluid power?
A. Force C. Volume
B. Fluid(s) D. None of the above

135. Which of the following means a total push or pull. It is the push or pull exerted against the total area of a particular surface?
A. Pressure C. Force
B. Fluid(s) D. None of the above

136. Which of the following means the amount of push or pull applied to each unit area of the surface?
A. Pressure C. Force
B. Fluid(s) D. None of the above

137. Which of the following maybe exerted in one direction, in several directions, or in all directions?
A. Pressure C. Force
B. Fluid(s) D. None of the above

138. Water pressure determines the flow of water from the tap.
A. True B. False

Computing Force, Pressure, and Area
139. A formula is used in computing force, volume, and area in fluid power systems. In this formula, P refers to pressure, F indicates volume, and A represents area.
A. True B. False

Development of Hydraulics
140. According to the text, valves, pumps, actuating cylinders, and motors have been developed and refined to make hydraulics one of the leading methods of transmitting power.
A. True B. False

141. One characteristic of a liquid is the tendency to keep its free surface level.
A. True B. False

142. Liquids will flow in the direction that will tend to make the surface level, if the surface is not level.
A. True B. False

143. Daniel Bernoulli conducted experiments to study the elements of force in the discharge of water through small openings in the sides of tanks and through short pipes.
A. True B. False

144. The mercury column was held up by the pressure by horror vacui as Aristotle had supposed.
A. True B. False

145. Which of the following to be made effective for practical applications, it was necessary to have a piston that "fit exactly?"
A. Pascal's law C. Aristotle' law
B. Archimedes' law D. None of the above

146. During the same period, Blaise Pascal, a French scientist, discovered the fundamental law for the science of?
A. Experiments C. Physics
B. Hydraulics D. None of the above

147. Which of the following states that increase in pressure on the surface of a confined fluid is transmitted undiminished throughout the confining vessel or system?
A. Pascal's law C. Aristotle' law
B. Evangelista Torricelli D. None of the above

148. Which of the following scientists had a barometer carried up the 1465 m high Puy de Dôme, an extinct volcano in the Auvergne just west of his home of Clermont-Ferrand in 1648 by Périer, his brother-in-law?
A. Aristotle C. Blaise Pascal
B. Evangelista Torricelli D. None of the above

149. Which of the following scientists making the first vacuum pump, which he used in vivid demonstrations of the pressure of the atmosphere?
A. Aristotle C. Blaise Pascal
B. Otto von Guericke D. None of the above

150. Air, which is by no means incompressible. As we rise in the atmosphere and the pressure decreases, the air also expands.
A. True B. False

151. Which of the following is by no means isothermal close to the ground?
A. Stratosphere C. Atmospheric pressure
B. Atmosphere D. None of the above

Meteorology
152. Which of the following is of great importance in meteorology, since it determines the winds?
A. Stratosphere C. Atmospheric pressure
B. Atmosphere D. None of the above

153. Certain typical weather patterns are associated with relatively high and relatively low _____, and how they vary with time.
A. Stratosphere C. Pressures
B. Tropopause D. None of the above

Pascal's Law
154. Pascal discovered that pressure in a fluid acts equally in some directions.
A. True B. False

155. According to the text, pressure acts at right angles to the containing surfaces.
A. True B. False

156. If a pressure gauge, with an exposed face, is placed beneath the surface of a liquid at a specific depth and pointed in different directions, the pressure will read the same.
A. True B. False

157. Pressure in a _____of direction.
A. Liquid at a specific depth C. Height of a liquid
B. Liquid is independent D. None of the above

158. Pressure due to the _____, at any level, depends on the depth of the fluid from the surface.
A. Modern hydraulics C. Weight of a liquid
B. Liquid at a specific depth D. None of the above

159. If the exposed face of the pressure gauges is moved closer to the surface of the liquid, the indicated?
A. Depth is doubled C. Column is tripled
B. Pressure will be less D. None of the above

160. The indicated pressure is doubled, when the?
A. Depth is doubled C. Column is tripled
B. Pressure of a liquid D. None of the above

161. The pressure at any depth in this missing term of the column of liquid at that depth divided by the cross-sectional area of the column at that depth.
A. Depth is doubled C. Liquid is equal to the weight
B. Pressure will be less D. None of the above

162. Which of the following produces the pressure is referred to as the fluid head of the liquid?
A. Depth is doubled C. Volume of a liquid
B. Pressure of a liquid D. None of the above

163. Which of the following is due to its fluid head is also dependent on the density of the liquid?
A. Depth is doubled C. Volume of a liquid
B. Pressure of a liquid D. None of the above

Static Pressure
164. Static pressure exists in addition to Gravity that may also be present at the same time.
A. True B. False

165. Pascal's law states that a pressure set up in a fluid acts equally in all directions and at right angles to the containing surfaces.
A. True B. False

166. Pascal's law covers the situation only for fluids at rest or practically at rest. It is true only for the factors making up _____.
A. Velocity of flow C. Static head
B. Volume of a liquid D. None of the above

167. When velocity becomes a factor it must have a direction, the force related to the velocity must also have a direction, so that Pascal's law alone does not apply to the dynamic factors of?
A. Pressure drop C. Fluid power
B. Volume of a liquid D. None of the above

168. The dynamic factors of inertia and friction are related to the static factors. Velocity head and _____ are obtained at the expense of static head.
A. Friction head C. Static head
B. Volume of a liquid D. None of the above

169. Which of the following can be produced by pressure or head when dealing with fluids?
A. Velocity of flow C. Static head
B. Force D. None of the above

Volume and Velocity of Flow

170. Which of the following flow terms is passing a point in a given time is known as its volume of flow or flow rate?
A. Pressure drop C. Velocity of flow
B. Volume of a liquid D. None of the above

171. Which of the following flow terms is usually expressed in gallons per minute (gpm) and is associated with relative pressures of the liquid, such as 5 gpm at 40 psi?
A. Volume of flow C. Velocity of flow
B. Volume of a liquid D. None of the above

172. Which of the following flow terms is defined as the average speed at which the fluid moves past a given point? It is usually expressed in feet per second (fps) or feet per minute (fpm).
A. Volume of flow C. Velocity of flow
B. Volume of a liquid D. None of the above

173. Which of the following flow terms is an important consideration in sizing the hydraulic lines?
A. Pressure drop C. Velocity of flow
B. Volume of a liquid D. None of the above

174. Volume and friction head are often considered together, that is, with volume of input unchanged—the velocity of flow increases as the cross section or size of the pipe decreases.
A. True B. False

Bernoulli's Principle

175. Bernoulli's principle thus says that a rise (or fall) in pressure in a flowing fluid must always be accompanied by a decrease (or increase) in the speed, and conversely, if an increase (decrease) in, the speed of the fluid results in a decrease (or increase) in the pressure.
A. True B. False

176. Bernoulli’s principle is responsible for the fact that a shower curtain gets “sucked inwards'' when the water is first turned on. What happens is that the increased water / air velocity inside the curtain (relative to the still air on the other side) causes a pressure drop.
A. True B. False

177. Which of the following explains the difference between the outside and inside causes a net force on the shower curtain that sucks it inward?
A. Pressure C. Velocity of flow
B. Friction head D. None of the above

178. Squeezing the bulb over the fluid creates a low _____ area due to the higher speed of the air, which subsequently draws the fluid up.
A. Pressure C. Velocity of flow
B. Volume of a liquid D. None of the above

179. Which of the following explains why windows tend to explode, rather than implode in hurricanes: the very high speed of the air just outside the window causes the pressure just outside to be much less than the pressure inside, where the air is still?
A. Venturi effect C. Conservation of energy
B. Bernoulli's principle D. None of the above

180. Another example of _____at work is in the lift of aircraft wings and the motion of “curve balls'' in baseball. In both cases the design is such as to create a speed differential of the flowing air past the object on the top and the bottom.
A. Venturi C. Velocity changes
B. Bernoulli's principle D. None of the above

Understanding the Venturi
181. It is not easy to understand the reason low pressure occurs in the small diameter area of the venturi.
A. True B. False

182. In the Venturi, the velocity is slower in the small portion of the tube.
A. True B. False

183. In the Venturi, if velocity increases the pressure energy must decrease.
A. True B. False

Backflow Introduction
184. Cross-Connection was addressed by passage of the "Federal Safe Drinking Water Act" as developed by the Environmental Protection Agency (E.P.A.).
A. True B. False

185. The SDWA tasked each state with primary enforcement responsibility for a program to assure access to safe drinking water by all citizens.
A. True B. False

186. Which of the following rules are required to be at least as stringent as the federal regulations as developed and enforced by the E.P.A.?
A. Enforcement responsibility C. Cross-Connection Control
B. State program regulations D. None of the above

187. Which of the following definition terms is "the link or channel connecting a source of pollution with a potable water supply?"
A. Direct piping C. Cross-Connection
B. Direct connection D. None of the above

188. Which of the following definition terms, also referred to as Cross-Connection Control, addresses a serious health issue?
A. Backflow prevention C. Water purveyor rules
B. Direct connection D. None of the above

189. The first level of the law is protection of the _____of persons subject to such risks involving service to a single customer.
A. Internal or external piping C. General public and the second is protection
B. Certainly not usually intentional D. None of the above

190. Sources of pollution which may result in a danger to health are not always obvious and such cross-connections are?
A. Certainly not usually intentional C. Certainly intentional
B. Internal or external piping D. None of the above

191. Within a business environment, the pollutant source may involve the unintentional cross-connection of this condition with chemical processes or a heating boiler.
A. Direct piping C. Internal or external piping
B. Direct connection D. None of the above

192. Which of the following may be an improper cross-connection with a landscape sprinkler system or reserve tank fire protection system?
A. Internal or external piping C. Residential environment the pollutant source
B. Indirect connection D. None of the above

193. As far as a cross-connection, another potential hazard source within any environment may be a cross-connection of piping?
A. With an air gap C. Involving a water well located on the property.
B. Without a direct connection D. None of the above

194. The proper control of cross-connections is possible but?
A. Is always the pollutant source C. Only through knowledge and vigilance
B. Certainly not usually intentional D. None of the Above

195. The following could be a cause of a cross-connection: A Situation as simple as leaving a garden hose nozzle submerged in a bucket of liquid or attached to a chemical sprayer.
A. True B. False

196. According to the text, public education is not essential, for many that are educated in piping and plumbing installations are able to recognize cross-connection dangers.
A. True B. False

What is backflow? Reverse flow condition

197. 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 C. Cross-connection
B. Backsiphonage D. None of the above

198. Which of the following can occur when there is a stoppage of water supply due to nearby firefighting, a break in a water main?

A. Backpressure C. Indirect connection
B. Backsiphonage D. None of the above

199. Which of the following is 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. Backpressure C. Indirect connection
B. Backsiphonage D. None of the above

200. Which of the following can result from an increase in downstream pressure, a reduction in the potable water supply pressure, or a combination of both?

A. Backpressure C. Indirect connection
B. Backsiphonage D. None of the above

201. Which of the following is there two forms-backpressure and backsiphonage?

A. Backflow C. Device or method
B. High hazard installations D. None of the above

202. The basic mechanism for preventing backflow is a mechanical _____, which provides a physical barrier to backflow.

A. Air gap C. Device or method
B. Backflow preventer D. None of the above

203. The principal types of mechanical backflow preventer are the reduced-pressure principle assembly, the _____, and the double check valve assembly.

A. High hazard installations C. Indirect connection
B. Vacuum breaker D. None of the above

204. Which of the following 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 C. Cross-connection
B. Indirect connection D. None of the above

205. Which of the following 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. Backpressure C. Indirect connection
B. Backsiphonage D. None of the above

206. Which of the following can occur whenever the amount of water being used exceeds the amount of water being supplied, such as during water line flushing, firefighting, or breaks in water mains?
A. Backpressure C. Reduction
B. Backsiphonage D. None of the above

207. Which of the following is a means or mechanism to prevent backflow?
A. Air gap C. Device or method
B. Backflow preventer D. None of the above

208. 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 C. Indirect connection
B. Air gap D. None of the above

Types of Backflow Prevention Methods and Assemblies
209. Which of the following must either be physically disconnected or have an approved backflow prevention device installed to protect the public water system?
A. Barrier to backflow C. Cross-connection
B. Indirect connection D. None of the above

210. When the air flow is restricted, such as the case of an air gap located near a wall, the _____ separation must be increased.
A. Open receiving vessel C. Air gap
B. Barrier to backflow D. None of the above

211. 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 C. Air gap
B. Barrier to backflow D. None of the above

212. Which of the following must be at least two times the diameter of the supply pipe and not less than one inch?
A. Open receiving vessel C. Air gap
B. Backflow preventer D. None of the above

213. 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 C. 3 inches
B. 2 inches D. None of the above

214. 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 C. Air gap
B. Air break D. None of the above

215. An air gap is acceptable for _____ and is theoretically the most effective protection.
A. High hazard installations C. Low pollutional hazards
B. Barrier to backflow D. None of the above

216. 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

217. The type of device selected for a particular installation depends on several factors.
A. True B. False

New EPA Rules for Distribution
Reduction of Lead in Drinking Water Act
218. The Reduction of Lead in Drinking Water Act means municipalities, water districts and developers who work with and pay for water infrastructure need to be preparing.
A. True B. False

219. Lead, a metal found in natural deposits, is commonly used in household plumbing materials and water service lines.
A. True B. False

220. Lead in drinking water can also cause a variety of adverse health effects. In babies and children, exposure in drinking water above the action level can result in delays in physical and mental development, along with slight deficits in attention span and learning abilities. In adults, it can cause increases in blood pressure.
A. True B. False

221. The most common problem is with brass or chrome-plated brass faucets and fixtures which can leach significant amounts of lead into the water, especially cold water.
A. True B. False

222. Homes built before 1999 are more likely to have lead pipes, fixtures and solder.
A. True B. False

223. New homes are also at risk: even legally “lead-free” plumbing may contain up to 8 percent lead.
A. True B. False

224. Reduction of Lead in Drinking Water Act is to amend the Safe Drinking Water Act regarding the use and introduction into commerce of lead pipes, plumbing fittings or fixtures, solder and flux.
A. True B. False

225. This lead reduction law was established a prospective effective date of January 4, 2014, which provided a three-year timeframe for affected parties to transition to the new requirements.
A. True B. False

Pervasive Environmental Contaminant
226. Lead can be ingested from various sources, including lead paint and house dust contaminated by lead paint, as well as soil, drinking water, and food.
A. True B. False

227. Because lead accumulates in the body, all sources of lead should be controlled or eliminated to prevent childhood lead poisoning.
A. True B. False

228. Beginning in the 1970s, lead concentrations in air, tap water, food, dust, and soil began to be substantially reduced, resulting in significantly reduced blood lead levels in children throughout the United States.
A. True B. False

229. Homes built before the 1978 homes might contain lead paint hazards, as well as drinking water service lines made from lead, or plumbing materials that contain lead.
A. True B. False

230. Which of the following control reduces the leaching of lead plumbing components or solder into drinking water?
A. Adequate corrosion C. Water infrastructure
B. Lead enforcement D. None of the above

Composite Meters
231. Composite meters are one example of a _____ alternative that is not susceptible to no-lead regulations.
A. Lead free C. Zero lead
B. New low-lead brass D. None of the above

232. Composite meters do not depend on metal pricing fluctuations and have zero lead as opposed to low lead or even _____meters.
A. Bronze C. “Friction feeling”
B. Zero lead D. None of the above

233. Which of the following does this type of meter boast longevity and resistance to corrosion from aggressive water?
A. Bronze C. Composite
B. Zero lead D. None of the above

234. Composite meters are constructed using a blend of plastic and?
A. Lead-free C. Fiberglass
B. Zero lead D. None of the above

235. Which of the following have been found to eliminate the “friction feeling” typically experienced with metal threads and metal couplings, facilitating easier installation?
A. Bronze C. Composite threads
B. Zero lead D. None of the above

236. With comprehensive testing, composite meters have demonstrated a burst pressure that is significantly greater than?
A. Bronze C. A blend of plastic and fiberglass
B. Zero lead D. None of the above

237. Which of the following or zero lead products on the market and it is critical that utilities consider all of their options when selecting a new fleet of meters?
A. Lead-free C. Bronze
B. Zero lead D. None of the above

238. Composite technology today allows for better, more environmentally friendly composite products that will last up to 10 years in residential applications.
A. True B. False

239. Everyone deserves access to safe, clean water.
A. True B. False

240. The regulations specify maximum sampling frequencies, sampling locations, testing procedures, methods of keeping records, and frequency of reporting to the State.
A. True B. False

241. According to the text, about half the distribution systems must provide periodic monitoring for microbiological contaminants and some chemical contaminants.
A. True B. False

242. The regulations also mandate special reporting procedures to be followed if a contaminant exceeds _____.
A. An MCL C. Continuous chlorine residual
B. Turbidity D. None of the above

243. According to the text, it is essential that manufacturers deliver products that meet the highest standards for safety, quality, reliability and accuracy to ensure availability to, and conservation of?
A. Their personal health C. This most precious resource
B. Water system customers D. None of the above

244. To ensure that drinking water supplied by all public water supply systems as defined by the EPA meet Federal and State requirements, water system operators are required to collect samples regularly and?
A. Frequency of sampling C. An adequate chlorine residual
B. Have the water tested D. None of the above

245. The frequency of sampling and the chemicals that must be tested for depend on the physical size of the water system, _____, and the history of analyses.
A. Frequency of sampling C. An adequate chlorine residual
B. The water source D. None of the above

General Disinfection Requirements

246. According to the text, disinfection is absolutely required for all water systems using surface water sources.
A. True B. False

247. The use of chlorine has almost completely eliminated occurrences of waterborne diseases in the United States.
A. True B. False

248. As the water enters the distribution system, it must carry a _____ that will be retained throughout the distribution system.
A. Disinfectant like UV C. Continuous chlorine residual
B. Byproduct of chlorine D. None of the above

249. Water samples from points on the distribution system must be analyzed periodically to make sure _____ is being maintained.
A. Frequency of sampling C. An adequate chlorine residual
B. Water system customers D. None of the above

250. The disinfection byproducts are formed when chlorine reacts with naturally occurring substances in raw water such as decaying vegetation containing?
A. An MCL C. Humic and fulvic acids
B. Turbidity D. None of the above

251. Which of the following was identified was trihalomethane a group of organic chemicals that are known carcinogens to some animals, so they are assumed also to be carcinogenic to humans?
A. HAAA5s C. Chlorine byproduct chemicals
B. Turbidity D. None of the above

252. Which of the following have been identified that may be harmful, and may cause some adverse health reactions.
A. Other byproducts of disinfection C. Continuous chlorine residual
B. Turbidity D. None of the above

Consumer Confidence Reports
253. Information on the source water and _____ must be furnished to the satellite system by the system selling the water.
A. Chemical analyses C. No concern for byproducts
B. Turbidity D. None of the above

254. One of the very significant provisions of the 1996 SDWA amendments is the addition of the consumer confidence report (CCR) requirement.
A. True B. False

255. According to the text, some States are preparing much of the information for their water systems, but the system operator still must add local information.
A. True B. False

256. Some States are preparing much of the information for their water systems, but the system operator still must add local information.
A. True B. False

257. The purpose of the CCR is to provide all water customers with basic facts regarding their drinking water so that individuals can make decisions about decisions based on their personal health.
A. True B. False

258. According to the text, water system operators should keep in mind that CCRs provide an opportunity to educate consumers about the?
A. Chemical analyses C. Sources and quality of their drinking water
B. Concern for byproducts D. None of the above

Distribution System Water Quality Problems
Turbidity
259. Turbidity is caused by particles suspended in water, these particles scatter or reflect light rays, making the water appear cloudy.
A. True B. False

260. At no time may the turbidity exceed 5 ntu.
A. True B. False

261. Increases in turbidity may be caused by changes in velocity or inadequate flushing following main replacement.
A. True B. False

262. Turbidity in water is significant from a public health standpoint because _____ could shelter microorganisms from the disinfectant and allow them to still be viable when they reach the customer.
A. Hardness C. Suspended particles
B. Turbidity D. None of the above

263. 2 part question - EPA regulations direct that, for most water systems, the turbidity of water entering the distribution system must be equal or less than _____ ntu in at least _____ percent of the measurements taken each month.
A. 0.5 – 95 C. 95 – 0.5
B. 0.2 - 80 D. None of the above

Hardness
264. Water hardness usually comes from water contacting rock formations, such as water from wells in?
A. Turbidity C. Concentration of calcium and magnesium
B. Limestone formations D. None of the above

265. Most surface water is of?
A. Hardness C. Soft hardness
B. Medium hardness D. None of the above

266. Water with 300 mg/L of hardness usually is considered soft.
A. True B. False

267. Hard water usually is quite corrosive, and may have to be treated to reduce the corrosivity.
A. True B. False

Iron

268. Ferrous iron (Fe2) is in a _____, and water containing ferrous iron is colorless.

A. Hardness C. Rust-colored
B. Dissolved state D. None of the above

269. Ferric iron (Fe3) has been oxidized, and water containing it is?

A. Hardness C. Rust-colored
B. Medium hardness D. None of the above

270. Gallionella can cause_____, tastes and odors, clogged pipes, and pump failure.

A. System failure C. Red water
B. Bacteria D. None of the above

271. Water samples show increased iron concentrations between the point where water enters the distribution system and the consumer's tap, either corrosion, Iron bacteria, or both are probably taking place.

A. True B. False

272. If the problem is caused by system pressure, flushing mains, shock chlorination, and carrying increased residual chlorine are alternatives to consider.

A. True B. False

Manganese

273. The NSDWR recommend a concentration not to exceed 0.05 mg/L to avoid?

A. Customer complaints C. Water system contamination
B. Pressure loss D. None of the above

Water Quality Safeguards

274. Which of the following are recommended above is absolutely necessary to prevent back siphonage and the entry of contaminants?

A. Static pressure C. Continuous positive pressure
B. Chlorine D. None of the above

275. Either water use must be restricted or the water system must be upgraded to be capable of supplying more water, if water demands are so great during peak demand periods that pressure declines in parts of the systems.

A. True B. False

276. Which of the following may be reduced during a main break because of the large amount of escaping water?

A. Bacteriological safety C. Cross connection
B. System pressure D. None of the above

Types of Joints

277. Caulked joints. Caulked joints for which of the following shall be firmly packed with oakum or hemp and filled with molten lead?

A. Brass or copper C. Cast iron hub-and-spigot pipe
B. Lead ring D. None of the above

278. Paint, varnish, or other coatings shall not be permitted on the jointing material until after a plumbing inspector has been given the opportunity to test and approve or disapprove the?
A. Joint C. Properly soldered together
B. Caulking ferrule D. None of the above

Threaded/Screwed Joints.
279. All burrs shall be removed; pipe ends shall be reamed or filed to size of the _____ shall be removed?
A. Bore and all chips C. Flange
B. Lead ring D. None of the above

280. Which of the following shall have exposed surface on each side of the joint at least ¾" and at least as thick as the material being joined.
A. A proper flaring tool C. Properly soldered together
B. Wiped joints D. None of the above

281. Wall or floor flange lead-wiped joints shall be made by using a lead ring or which of the following placed behind the joints at the wall or floor?
A. Bore and all chips C. Flange
B. Lead ring D. None of the above

282. Which of the following between lead pipe and cast iron, steel or wrought iron shall be made by means of a caulking ferrule, soldering nipple, or bushing?
A. Joints C. Properly soldered together
B. Wiped joints D. None of the above

Soldered Joints.
283. The joints shall be which of the following and made with approved lead free solder?
A. Bore and all chips C. Properly fluxed
B. Cleaned bright D. None of the above

284. Joints in copper water tubing shall be made with approved cast bronze or wrought copper pressure fittings?
A. A proper flaring tool C. Properly soldered together
B. Wiped joints D. None of the above

285. All solders or flux containing more than 0.2% lead shall bear a warning label which states that the solder or?
A. Brass or copper C. Flux
B. Lead ring D. None of the above

Flared Joints.
286. Which of the following for plastic pipe and tubing and soft copper water tubing shall be made with approved fittings?
A. Approved fitting(s) C. Are prohibited
B. Flared joints D. None of the above

Plastic Pipe Joints

287. Every joint in plastic piping shall be made with approved fittings by either solvent welded or fusion welded connections, compression fittings, approved insert fittings, metal clamps and screws of corrosion resistant material, or?

A. Adaptor fittings
B. Solvent welded
C. Threaded joints
D. None of the above

Joints and Fittings in Plastic Pipe.

288. Which of the following and joints shall be in accordance with the manufacturer's recommendations?

A. Potable water piping fittings
B. Slip joints
C. Threaded or flanged joints
D. None of the above

289. Polyethylene (PE) pipe shall be installed only with compression fittings, insert and clamp type fittings or?

A. Compression fittings
B. Solvent welded
C. Thermal welded joints and fittings
D. None of the above

290. Which of the following shall be of corrosion resistant material, the inside diameter of any insert fitting shall not be less than the minimum allowable size for water service/distribution piping?

A. Clamps
B. Slip joints
C. Ground joint connections
D. None of the above

291. Polyvinyl chloride (PVC) pipe shall be installed with which of the following joints only?

A. Adaptor fittings
B. Solvent welded
C. Solvent welded or flanged
D. None of the above

292. The primer and solvent cement used shall be in accordance with the manufacturer's recommendation for?

A. Polyvinyl chloride piping
B. Slip joints
C. Ground joint connections
D. None of the above

293. Polybutylene (PB) pipe shall be installed only with insert and clamp type fittings, compression type, flanged type, or?

A. Compression fittings
B. Solvent welded
C. Thermal welded joints and fittings
D. None of the above

Plastic Pipe.

294. Joints between plastic pipe and which of the following shall be made only with an appropriate type adaptor?

A. Proper adaptor fittings
B. Non-plastic material
C. Neoprene gasket and stainless steel bands
D. None of the above

Plastic-Commingling.

295. There shall be no commingling of which of the following within the same plumbing system except through the use of proper adaptors?

A. Proper adaptors
B. Stainless steel bands
C. Plastic materials
D. None of the above

296. Plastic pipe shall not be installed in which of the following or chase that contains uninsulated hot water?
A. Proper adaptor fittings C. Any tunnel
B. Appropriate type adaptor D. None of the above

Unions
297. Which of the following may be used in the drainage and venting system when accessibly located above ground?
A. Proper adaptors C. Stop box connections
B. Unions D. None of the above

298. Which of the following shall be installed in a water supply system within 5 feet of regulating equipment, water heaters, water conditioning tanks, water-conditioning equipment, pumps?
A. Proper adaptors C. Stop box connections
B. Unions D. None of the above

Water Supply System.
299. Unions in the water supply system shall be metal to metal with ground seats, except that plastic to metal unions may utilize durable, non-toxic, impervious?
A. Proper adaptors C. Stainless steel bands
B. Gaskets D. None of the above

300. Unions between copper pipe/tubing and dissimilar metals shall either be made with a brass converter fitting or be?
A. Wiped joints C. Stainless steel bands
B. A dielectric type union D. None of the above