

Registration form

**BASIC PLUMBING CEU Training Course \$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

Name _____ **Signature** _____
I have read and understood the disclaimer notice on page 2. Digitally sign XXX

Address: _____

City _____ **State** _____ **Zip** _____

Email _____ **Fax (_____)** _____

Phone:
Home (_____) _____ **Work (_____)** _____

Operator ID # _____ **Exp. Date** _____

Your certificate will be mailed to you in about two weeks.

Please circle/check which certification you are applying the course CEU's.
Water Treatment _____ Distribution _____ Collection _____ Wastewater Treatment _____
Onsite Installer _____ Other _____

Technical Learning College
PO Box 420, Payson AZ 85547-0420
Telephone (928) 468-0665 Primary Fax (928) 272-0747 Back-up Fax (928) 468-0675
Toll Free (866) 557-1746
info@tlch2o.com

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American Express
Visa or MasterCard # _____ **Exp. Date** _____

If you've paid on the Internet, Please write your customer# _____

Please invoice me PO # _____

We will stop mailing the certificate of completion so we need either your fax number or e-mail address. We will e-mail the certificate to you, if no e-mail address; we will fax it to you.

DISCLAIMER NOTICE

I understand that it is my responsibility to ensure that this CEU course is either approved or accepted in my State for CEU credit. I understand State laws and rules change on a frequent basis and I believe this course is currently accepted in my State for CEU or contact hour credit, if it is not, I will not hold Technical Learning College responsible. I also understand that this type of study program deals with dangerous conditions and that I will not hold Technical Learning College, Technical Learning Consultants, Inc. (TLC) liable for any errors or omissions or advice contained in this CEU education training course or for any violation or injury caused by this CEU education training course material. I will call or contact TLC if I need help or assistance and double-check to ensure my registration page and assignment has been received and graded.

State Approval Listing Link, check to see if your State accepts or has pre-approved this course. Not all States are listed. Not all courses are listed. If the course is not accepted for CEU credit, we will give you the course free if you ask your State to accept it for credit.

Professional Engineers; Most states will accept our courses for credit but we do not officially list the States or Agencies. Please check your State for approval.

State Approval Listing URL...

<http://www.tlch2o.com/PDF/CEU%20State%20Approvals.pdf>

You can obtain a printed version of the course manual from TLC for an additional \$79.95 plus shipping charges.

AFFIDAVIT OF EXAM COMPLETION

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.

Grading Information

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.

For security purposes, please fax or e-mail a copy of your driver's license and always call us to confirm we've received your assignment and to confirm your identity.

Basic Plumbing Answer Key

Name _____

Phone # _____

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

- | | | |
|---------------|---------------|----------------|
| 1. A B C D E | 42. A B C D E | 83. A B C D E |
| 2. A B C D E | 43. A B C D E | 84. A B C D E |
| 3. A B C D E | 44. A B C D E | 85. A B C D E |
| 4. A B C D E | 45. A B C D E | 86. A B C D E |
| 5. A B C D E | 46. A B C D E | 87. A B C D E |
| 6. A B C D E | 47. A B C D E | 88. A B C D E |
| 7. A B C D E | 48. A B C D E | 89. A B C D E |
| 8. A B C D E | 49. A B C D E | 90. A B C D E |
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| 17. A B C D E | 58. A B C D E | 99. A B C D E |
| 18. A B C D E | 59. A B C D E | 100. A B C D E |
| 19. A B C D E | 60. A B C D E | 101. A B C D E |
| 20. A B C D E | 61. A B C D E | 102. A B C D E |
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| 22. A B C D E | 63. A B C D E | 104. A B C D E |
| 23. A B C D E | 64. A B C D E | 105. A B C D E |
| 24. A B C D E | 65. A B C D E | 106. A B C D E |
| 25. A B C D E | 66. A B C D E | 107. A B C D E |
| 26. A B C D E | 67. A B C D E | 108. A B C D E |
| 27. A B C D E | 68. A B C D E | 109. A B C D E |
| 28. A B C D E | 69. A B C D E | 110. A B C D E |
| 29. A B C D E | 70. A B C D E | 111. A B C D E |
| 30. A B C D E | 71. A B C D E | 112. A B C D E |
| 31. A B C D E | 72. A B C D E | 113. A B C D E |
| 32. A B C D E | 73. A B C D E | 114. A B C D E |
| 33. A B C D E | 74. A B C D E | 115. A B C D E |
| 34. A B C D E | 75. A B C D E | 116. A B C D E |
| 35. A B C D E | 76. A B C D E | 117. A B C D E |
| 36. A B C D E | 77. A B C D E | 118. A B C D E |
| 37. A B C D E | 78. A B C D E | 119. A B C D E |
| 38. A B C D E | 79. A B C D E | 120. A B C D E |
| 39. A B C D E | 80. A B C D E | 121. A B C D E |
| 40. A B C D E | 81. A B C D E | 122. A B C D E |
| 41. A B C D E | 82. A B C D E | 123. A B C D E |

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| 124. A B C D E | 150. A B C D E | 176. A B C D E |
| 125. A B C D E | 151. A B C D E | 177. A B C D E |
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| 133. A B C D E | 159. A B C D E | 185. A B C D E |
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| 136. A B C D E | 162. A B C D E | 188. A B C D E |
| 137. A B C D E | 163. A B C D E | 189. A B C D E |
| 138. A B C D E | 164. A B C D E | 190. A B C D E |
| 139. A B C D E | 165. A B C D E | 191. A B C D E |
| 140. A B C D E | 166. A B C D E | 192. A B C D E |
| 141. A B C D E | 167. A B C D E | 193. A B C D E |
| 142. A B C D E | 168. A B C D E | 194. A B C D E |
| 143. A B C D E | 169. A B C D E | 195. A B C D E |
| 144. A B C D E | 170. A B C D E | 196. A B C D E |
| 145. A B C D E | 171. A B C D E | 197. A B C D E |
| 146. A B C D E | 172. A B C D E | 198. A B C D E |
| 147. A B C D E | 173. A B C D E | 199. A B C D E |
| 148. A B C D E | 174. A B C D E | 200. A B C D E |
| 149. A B C D E | 175. A B C D E | |

**Please fax the answer key to TLC Western Campus Fax (928) 272-0747
Backup Fax (928) 468-0675**

Always call us after faxing the paperwork to ensure that we've received it.

Rush Grading Service

If you need this assignment graded and the results mailed to you within a 48-hour period, prepare to pay an additional rush service handling fee of \$50.00. This fee may not cover postage costs. If you need this service, simply write RUSH on the top of your Registration Form. We will place you in the front of the grading and processing line. Thank you...

Please e-mail or fax this survey along with your final exam

**BASIC PLUMBING CEU COURSE
CUSTOMER SERVICE RESPONSE CARD**

NAME: _____

E-MAIL _____ PHONE _____

PLEASE COMPLETE THIS FORM BY CIRCLING THE NUMBER OF THE APPROPRIATE ANSWER IN THE AREA BELOW.

1. Please rate the difficulty of your course.
Very Easy 0 1 2 3 4 5 Very Difficult

2. Please rate the difficulty of the testing process.
Very Easy 0 1 2 3 4 5 Very Difficult

3. Please rate the subject matter on the exam to your actual field or work.
Very Similar 0 1 2 3 4 5 Very Different

4. How did you hear about this Course? _____

5. What would you do to improve the Course?

How about the price of the course?

Poor _____ Fair _____ Average _____ Good _____ Great _____

How was your customer service?

Poor _____ Fair _____ Average _____ Good _____ Great _____

Any other concerns or comments.

BASIC PLUMBING CEU Training Course Assignment

The Basic Plumbing CEU course assignment is available in Word on the Internet for your convenience, please visit www.ABCTLIC.com and download the assignment and e-mail it back to TLC.

You will have 90 days from receipt of this manual to complete it in order to receive your Professional Development Hours (PDHs) or Continuing Education Unit (CEU). A score of 70 % or better is necessary to pass this course. If you should need any assistance, please email or fax all concerns and the completed **ANSWER KEY** to info@tlch2o.com.

Select one answer per question.

Backflow Prevention and Cross-Connection Principles Atmospheric Pressure

1. The _____ is the entire mass of air that surrounds the earth.
A. Troposphere
B. Atmosphere
C. Mercury column barometer
D. Pressures
E. None of the Above
2. It 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. This layer is called the _____.
A. Troposphere
B. Atmosphere
C. Mercury column barometer
D. Pressures
E. None of the Above
3. If a column of air 1-inch square extending all the way to the "top" of the _____ could be weighed, this column of air would weigh approximately 14.7 pounds at sea level.
A. Troposphere
B. Atmosphere
C. Mercury column barometer
D. Pressures
E. None of the Above
4. _____ at sea level is approximately 14.7 psi.
A. Troposphere
B. Atmospheric pressure
C. Mercury column barometer
D. Pressures
E. None of the Above
5. As one ascends the _____ decreases by approximately 1.0 psi for every 2,343 feet.
A. Troposphere
B. Atmospheric pressure
C. Mercury column barometer
D. Pressures
E. None of the Above

6. Below sea level, in excavations and depressions, _____ increases.
- Troposphere
 - Atmospheric pressure
 - Mercury column barometer
 - Pressures
 - None of the Above
7. _____ under water differ from those under air only because the weight of the water must be added to the pressure of the air.
- Troposphere
 - Atmospheric pressure
 - Mercury column barometer
 - Pressures
 - None of the Above
8. Atmospheric pressure can be measured by any of several methods. The common laboratory method uses the _____.
- Troposphere
 - Atmospheric pressure
 - Mercury column barometer
 - Pressure of the air
 - None of the Above
9. The height of the _____ serves as an indicator of atmospheric pressure.
- Troposphere
 - Atmospheric pressure
 - Mercury column
 - Pressure of the air
 - None of the Above
10. At sea level and at a temperature of 0° Celsius (C), the height of the _____ is approximately 30 inches, or 76 centimeters. This represents a pressure of approximately 14.7 psi. The 30-inch column is used as a reference standard.
- Sea level
 - Atmospheric pressure
 - Mercury column
 - Aneroid barometer
 - None of the Above
11. Another device used to measure atmospheric pressure is the _____.
- Sea level
 - Atmospheric pressure
 - Mercury column barometer
 - Aneroid barometer
 - None of the Above
12. The _____ uses the change in shape of an evacuated metal cell to measure variations in atmospheric pressure.
- Sea level
 - Atmospheric pressure
 - Mercury column barometer
 - Aneroid barometer
 - None of the Above

13. The _____ does not vary uniformly with altitude.
- A. Sea level
 - B. Atmospheric pressure
 - C. Mercury column barometer
 - D. Aneroid barometer
 - E. None of the Above
14. _____ changes are more rapid. Atmospheric pressure is defined as the force per unit area exerted against a surface by the weight of the air above that surface.
- A. Sea level
 - B. Atmospheric pressure
 - C. Mercury column barometer
 - D. Aneroid barometer
 - E. None of the Above
15. _____ may be referred to using an absolute scale, pounds per square inch absolute (psia), or gauge scale, (psiag).
- A. Absolute
 - B. Pressure
 - C. Gauge
 - D. Vacuum
 - E. None of the Above
16. Absolute pressure and gauge pressure are related. Absolute pressure is equal to _____ pressure plus the atmospheric pressure. At sea level, the atmospheric pressure is 14.7 psia.
- A. Absolute
 - B. Pressure
 - C. Gauge
 - D. Vacuum
 - E. None of the Above
17. Absolute pressure is the _____.
- A. Absolute
 - B. Pressure
 - C. Gauge
 - D. Vacuum
 - E. None of the Above
18. _____ 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. Then the absolute pressure would be equal to 14.7 psi, which is the atmospheric pressure.
- A. Absolute
 - B. Pressure
 - C. Gauge
 - D. Vacuum
 - E. None of the Above
19. The term vacuum indicates that the absolute pressure is less than the atmospheric pressure and that the _____ pressure is negative.
- A. Absolute
 - B. Pressure
 - C. Gauge
 - D. Vacuum
 - E. None of the Above

20. A complete or total _____ would mean a pressure of 0 psia or -14.7 psig.
- A. Absolute
 - B. Pressure
 - C. Gauge
 - D. Vacuum
 - E. None of the Above
21. Since it is impossible to produce a total vacuum, the term vacuum, will mean all degrees of _____ vacuum.
- A. Absolute
 - B. Pressure
 - C. Gauge
 - D. Vacuum
 - E. None of the Above
22. In a _____ vacuum, the pressure would range from slightly less than 14.7 psia (0 psig) to slightly greater than 0 psia (-14.7 psig).
- A. Absolute
 - B. Pressure
 - C. Gauge
 - D. Vacuum
 - E. None of the Above
23. Backsiphonage results from atmospheric pressure exerted on a liquid forcing it toward a supply system that is under a _____.
- A. Absolute
 - B. Pressure
 - C. Gauge
 - D. Vacuum
 - E. None of the Above
24. 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 _____ of 0.433 psig.
- A. Absolute
 - B. Pressure
 - C. Gauge
 - D. Vacuum
 - E. None of the Above
25. The word _____ 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. Hydrodynamics
 - B. Hydraulics
 - C. Hydrostatics
 - D. Pascal's law
 - E. None of the Above
26. Use of the word _____ has broadened its meaning to include the behavior of all liquids, although it is primarily concerned with the motion of liquids.
- A. Hydrodynamics
 - B. Hydraulics
 - C. Hydrostatics
 - D. Pascal's law
 - E. None of the Above

27. _____ 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. Hydrodynamics
 - B. Hydraulics
 - C. Hydrostatics
 - D. Pascal's law
 - E. None of the Above
28. _____ is a branch of engineering concerned mainly with moving liquids. The term is applied commonly to the study of the mechanical properties of water, other liquids, and even gases when the effects of compressibility are small.
- A. Hydrodynamics
 - B. Hydraulics
 - C. Hydrostatics
 - D. Pascal's law
 - E. None of the Above
29. Hydraulics can be divided into two areas, _____ and hydrokinetics.
- A. Hydrodynamics
 - B. Hydraulics
 - C. Hydrostatics
 - D. Pascal's law
 - E. None of the Above
30. Hydrostatics, the consideration of liquids at rest, involves problems of buoyancy and flotation, pressure on dams and submerged devices, and _____ presses.
- A. Hydrodynamics
 - B. Hydraulic
 - C. Hydrostatics
 - D. Pascal's law
 - E. None of the Above
31. _____, the study of liquids in motion, is concerned with such matters as friction and turbulence generated in pipes by flowing liquids, the flow of water over weirs and through nozzles, and the use of hydraulic pressure in machinery.
- A. Hydrodynamics
 - B. Hydraulics
 - C. Hydrostatics
 - D. Pascal's law
 - E. None of the Above
32. _____ states that increase in pressure on the surface of a confined fluid is transmitted undiminished throughout the confining vessel or system.
- A. Hydrodynamics
 - B. Hydraulics
 - C. Hydrostatics
 - D. Pascal's law
 - E. None of the Above
33. For Pascal's law to be made effective for practical applications, it was necessary to have a piston that "fit exactly." It was not until the latter part of the eighteenth century that methods were found to make these snugly fitted parts required in _____ systems.
- A. Hydrodynamics
 - B. Hydraulic
 - C. Hydrostatics
 - D. None of the Above

34. Components such as valves, pumps, actuating cylinders, and motors have been developed and refined to make _____ one of the leading methods of transmitting power.

- A. Fluids
- B. Hydraulics
- C. Liquids
- D. Water
- E. None of the Above

35. _____ are almost incompressible.

- A. Fluids
- B. Hydraulics
- C. Liquids
- D. Water
- E. None of the Above

36. If a pressure of 100 pounds per square inch (psi) is applied to a given volume of water that is at atmospheric pressure, the volume will decrease by only 0.03 percent. It would take a force of approximately 32 tons to reduce its volume by 10 percent; however, when this _____ is removed, the water immediately returns to its original volume.

- A. Force
- B. Hydraulics
- C. Liquids
- D. Water
- E. None of the Above

37. Other _____ behave in about the same manner as water.

- A. Fluids
- B. Hydraulics
- C. Liquids
- D. Water
- E. None of the Above

38. Another characteristic of a _____ is the tendency to keep its free surface level. If the surface is not level, liquids will flow in the direction which will tend to make the surface level.

- A. Fluids
- B. Hydraulics
- C. Liquid
- D. Water
- E. None of the Above

39. In studying _____ at rest, we are concerned with the transmission of force and the factors which affect the forces in liquids. Additionally, pressure in and on liquids and factors affecting pressure are of great importance.

- A. Fluids
- B. Hydraulics
- C. Liquids
- D. Water
- E. None of the Above

40. Pressure is the _____ that pushes water through pipes.

- A. Volume
- B. Pressure
- C. Force
- D. Fluid acts
- E. None of the Above

41. Water _____ determines the flow of water from the tap. If pressure is not sufficient then the flow can reduce to a trickle and it will take a long time to fill a kettle or a cistern.
- A. Volume
 - B. Pressure
 - C. Force
 - D. Fluid acts
 - E. None of the Above
42. The terms force and pressure are used extensively in the study of _____ power.
- A. Volume
 - B. Pressure
 - C. Force
 - D. Fluid
 - E. None of the Above
43. _____ means a total push or pull. It is the push or pull exerted against the total area of a particular surface and is expressed in pounds or grams.
- A. Volume
 - B. Pressure
 - C. Force
 - D. Fluid acts
 - E. None of the Above
44. _____ means the amount of push or pull (force) applied to each unit area of the surface and is expressed in pounds per square inch (lb/in^2) or grams per square centimeter (gm/cm^2).
- A. Volume
 - B. Pressure
 - C. Force
 - D. Fluid acts
 - E. None of the Above
45. _____ maybe exerted in one direction, in several directions, or in all directions.
- A. Volume
 - B. Pressure
 - C. Force
 - D. Fluid acts
46. The foundation of modern hydraulics was established when Pascal discovered that pressure in a _____ equally in all directions.
- A. Volume
 - B. Pressure
 - C. Force
 - D. Fluid acts
 - E. None of the Above
47. Pressure due to the _____ of a liquid, at any level, depends on the depth of the fluid from the surface. If the exposed faces of the pressure gauges are moved closer to the surface of the liquid, the indicated pressure will be less.
- A. Volume
 - B. Pressure
 - C. Force
 - D. Fluid acts
 - E. None of the Above

48. When the depth is doubled, the indicated _____ is doubled.
- A. Volume
 - B. Pressure
 - C. Force
 - D. Fluid acts
 - E. None of the Above
49. The pressure in a liquid is directly _____ to the depth.
- A. Volume
 - B. Pressure
 - C. Force
 - D. Fluid acts
 - E. None of the Above
50. Consider a container with vertical sides that is 1 foot long and 1 foot wide. Let it be filled with water 1 foot deep, providing 1 cubic foot of water. 1 cubic foot of water _____ 62.4 pounds.
- A. Volume
 - B. Pressure
 - C. Force
 - D. Fluid acts
 - E. None of the Above
51. Using this information and the equation, $P = F/A$, we can calculate the _____ on the bottom of the container.
- A. Volume
 - B. Pressure
 - C. Force
 - D. Fluid acts
 - E. None of the Above
52. The volume of flow is usually expressed in gallons per minute (gpm) and is associated with relative _____ of the liquid, such as 5 gpm at 40 psi.
- A. Velocity
 - B. Volume
 - C. Force
 - D. Pressures
 - E. None of the Above
53. The _____ of flow or velocity of the fluid 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. Velocity
 - B. Volume
 - C. Force
 - D. Pressure
 - E. None of the Above
54. _____ of flow is an important consideration in sizing the hydraulic lines.
- A. Velocity
 - B. Volume
 - C. Force
 - D. Pressure
 - E. None of the Above

55. Volume and _____ of flow are often considered together.
- Velocity
 - Volume
 - Force
 - Pressure
 - None of the Above
56. The _____ of flow increases as the cross section or size of the pipe decreases, and the velocity of flow decreases as the cross section increases.
- Velocity
 - Volume
 - Force
 - Pressure
 - None of the Above
57. The _____ of flow is slow at wide parts of a stream and rapid at narrow parts, yet the volume of water passing each part of the stream is the same.
- Velocity
 - Volume
 - Force
 - Pressure
 - None of the Above
58. Bernoulli's principle thus says that a rise (fall) in _____ in a flowing fluid must always be accompanied by a decrease (increase) in the speed, and conversely, an increase (decrease) in the speed of the fluid results in a decrease (increase) in the pressure.
- Velocity
 - Volume
 - Force
 - Pressure
 - None of the Above
59. _____ is responsible for the fact that a shower curtain gets "sucked inwards" when the water is first turned on.
- Velocity
 - Volume
 - Force
 - Pressure
 - None of the Above
60. A _____ is any temporary or permanent connection between a public water system or consumer's potable (i.e., drinking) water system and any source or system containing nonpotable water or other substances.
- Backsiphonage
 - Backpressure
 - Control contamination
 - Cross-connection
 - None of the Above
61. 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.
- Backsiphonage
 - Backpressure
 - Control contamination
 - Cross-connection
 - None of the Above

62. There are two types of _____--backpressure and backsiphonage.
- A. Backsiphonage
 - B. Backpressure
 - C. Control contamination
 - D. Cross-connection
 - E. None of the Above
63. _____ 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. Backsiphonage
 - B. Backpressure
 - C. Control contamination
 - D. Cross-connection
 - E. None of the Above
64. _____ can occur when there is a stoppage of water supply due to nearby fire fighting, a break in a water main, etc.
- A. Backsiphonage
 - B. Backpressure
 - C. Control contamination
 - D. Cross-connection
 - E. None of the Above
65. _____ 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. Backsiphonage
 - B. Backpressure
 - C. Control contamination
 - D. Cross-connection
 - E. None of the Above

Water Supply System

66. A house's water supply may come from a private well or a _____ that connects to a city water main. In most cases, either water source is located in the basement/crawlspace.
- A. Hot water heater
 - B. City water main
 - C. City-owned lines
 - D. Service pipe
 - E. None of the Above
67. A house with a _____ utilizes a pump to push water up into a pressure tank where it is stored for use. When the tank empties, the pump is reactivated to fill the tank,
- A. Hot water heater
 - B. Private well
 - C. City-owned lines
 - D. Incoming line
 - E. None of the Above
68. A house with city water has a "live" water supply line that's connected to a water main and a water meter. The _____ is usually the dividing point between the city-owned lines and the homeowner's lines.
- A. Meter
 - B. City water main
 - C. City-owned lines
 - D. None of the Above

69. Both systems usually have a 1/2" or larger copper pipe that enters through the basement floor or wall. The line has a _____ located near the beginning of the incoming line so the water supply can be stopped in case of repairs or an emergency.

- A. Hot water heater
- B. City water main
- C. Shut-off valve
- D. Incoming line
- E. None of the Above

70. _____ are made of copper, CPVC (chlorinated polyvinyl chloride) plastic, or in older homes possibly galvanized steel.

- A. Hot water heater
- B. City water main
- C. City-owned lines
- D. Water supply lines
- E. None of the Above

71. Cold water lines branch out from the _____, while hot water lines originate from the hot water heater.

- A. Hot water heater
- B. Main pipe
- C. City-owned lines
- D. Incoming line
- E. None of the Above

System Elements

The elements of a water distribution system include distribution mains, arterial mains, storage reservoirs, and system accessories. These elements and accessories are described as follows:

72. Distribution mains are the pipelines that make up the _____. Their function is to carry water from the water source or treatment works to users.

- A. Increase water pressure
- B. Open or close
- C. Complete gridiron system
- D. Distribution system
- E. None of the Above

73. Arterial mains are _____. They are interconnected with smaller distribution mains to form a complete gridiron system.

- A. Increase water pressure
- B. Open or close
- C. Complete gridiron system
- D. Distribution mains of large size
- E. None of the Above

74. Storage reservoirs are structures used to store water. They also _____ the supply or pressure in the distribution system. A common example of a storage reservoir is an aboveground water storage tank.

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

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

- A. Increase water pressure
- B. Open or close
- C. Complete gridiron system
- D. Main line isolation
- E. None of the Above

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

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

77. Gate valves should be used in the _____ for main line isolation.

- A. Increase water pressure
- B. Distribution system
- C. Complete gridiron system
- D. Main line isolation
- E. None of the Above

Butterfly Valve

78. These are rotary type of valves usually found on large transmission lines. They may also have an additional valve beside it known as a "_____ " to prevent water hammer.

- A. Increase water pressure
- B. Bypass
- C. Complete gridiron system
- D. Main line isolation
- E. None of the Above

79. Some of these valves can require 300-600 turns to _____.

- A. Increase water pressure
- B. Open or close
- C. Complete gridiron system
- D. Main line isolation
- E. None of the Above

80. Most Valvemen will use a machine to open or close a Butterfly Valve, the machine will count the turns required to _____.

- A. Feeders as practical
- B. Turns required
- C. Open or close the valve
- D. Curtailing service
- E. None of the Above

81. Crenothrix bacteria or _____ will live in the bioslime in of tuberculation.

- A. Feeders as practical
- B. Turns required
- C. Will live
- D. Curtailing service
- E. None of the Above

Water Distribution Valves

82. 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 _____ or maintenance without significantly curtailing service over large areas.

- A. Feeders as practical
- B. Turns required
- C. Taken out of service for repairs
- D. Curtailing service
- E. None of the Above

83. Valves should be installed at intervals not greater than 5,000 feet in long supply lines and 1,500 foot in main distribution _____.

- A. Feeders as practical
- B. Turns required
- C. Loops or feeders
- D. Curtailing service
- E. None of the Above

84. All branch mains connecting to feeder mains or feeder loops should have valves installed as close to the feeders as practical. In this way, branch mains can be taken out of service without _____ to other locations.

- A. Feeders as practical
- B. Interrupting the supply
- C. Will live
- D. None of the Above

85. In the areas of greatest water demand or when the dependability of the distribution system is particularly important, valve spacing of 500 feet may be _____.

- A. Principally
- B. Dependability
- C. Necessary
- D. Appropriate
- E. None of the Above

86. At intersections of distribution mains, the number of valves required is normally one less than the number of _____.

- A. Principally
- B. Dependability
- C. Radiating mains
- D. Throttling purposes
- E. None of the Above

87. The valve omitted from the line is usually the one that principally _____ to the intersection.

- A. Supplies flow
- B. Dependability
- C. Necessary
- D. Throttling purposes
- E. None of the Above

88. Shutoff valves should be installed in _____ locations (that is, the northeast corner of intersections or a certain distance from the center line of streets), so they can be easily found in emergencies. All buried small- and medium-sized valves should be installed in valve boxes.

- A. Principally
- B. Dependability
- C. Necessary
- D. Standardized
- E. None of the Above

89. For large shutoff valves (about 30 inches in diameter and larger), 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. None of the Above

Gate Valves

90. Gate valves are used when a straight-line flow of fluid and _____ are needed.

- A. Minimum flow restriction
- B. Dependability
- C. Necessary
- D. Throttling purposes
- E. None of the Above

91. Gate valves are so-named because the part that either _____ flow through the valve acts somewhat like a gate.

- A. Stops or allows
- B. Dependability
- C. Necessary
- D. Throttling purposes
- E. None of the Above

92. The gate is usually wedge-shaped. When the valve is wide open the gate is _____ into the valve bonnet. This leaves an opening for flow through the valve the same size as the pipe in which the valve is installed.

- A. Principally
- B. Dependability
- C. Fully drawn up
- D. Throttling purposes
- E. None of the Above

93. There is little pressure drop or flow restriction through the valve. Gate valves are not suitable for _____.

- A. Principally
- B. Dependability
- C. Necessary
- D. Throttling purposes
- E. None of the Above

94. The control of flow is difficult because of the valve's design, and the flow of fluid slapping against a partially open gate can cause extensive damage to the valve. Except as specifically authorized, gate valves should not be used for _____.

- A. Throttling
- B. Ball
- C. Gate
- D. None of the Above

Ball Valves

95. Most ball valves are the _____. They require only a 90-degree turn to either completely open or close the valve.

- A. Hydrants
- B. Ball
- C. Gate
- D. Planetary gears
- E. None of the Above

96. Many are operated by planetary gears. This type of gearing allows the use of a relatively small Ball _____ and operating force to operate a fairly large valve. The gearing does, however, increase the operating time for the valve.

- A. Handwheel
- B. Ball
- C. Gate
- D. Planetary gears
- E. None of the Above

97. Some _____ valves also contain a swing check located within the ball to give the valve a check valve feature. Ball valves should be either fully-on or fully-off.

- A. Hydrants
- B. Ball
- C. Gate
- D. Planetary gears
- E. None of the Above

Valve Exercising

98. Valve exercising should be done once per year (especially main line valves) to detect _____ and to prevent valves from becoming inoperable due to freezing or build-up of rust or corrosion.

- A. Hydrants
- B. Ball
- C. Malfunctioning valves
- D. Planetary gears
- E. None of the Above

99. A valve inspection should include drawing valve location maps to show distances (ties) to the _____ from specific reference points (telephone poles, stonelines, etc.).

- A. Valves
- B. Ball
- C. Gate
- D. Planetary gears
- E. None of the Above

100. _____ are designed to allow water from the distribution system to be used for fire-fighting purposes.

- A. Hydrants
- B. Ball
- C. Gate
- D. Planetary gears
- E. None of the Above

101. Service connections are used to _____ or other plumbing systems to the distribution system mains.

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

Tree System

102. Older water systems frequently were expanded without planning and developed into a tree-like system. This consists of a single main that _____ as it leaves the source and progresses through the area originally served.

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

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

- A. Be isolated
- B. Friction loss
- C. Branch off
- D. Limits the expansion
- E. None of the Above

104. A tree-like system is not desirable because the size of the old main limits the expansion of the system needed to meet _____. In addition, there are many dead ends in the system where water remains for long periods, causing undesirable tastes and odors in nearby service lines.

- A. Be isolated
- B. Friction loss
- C. Increasing demands
- D. Limits the expansion
- E. None of the Above

105. The most reliable means to provide water for fire-fighting is by _____ into the system. 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. Be isolated
- B. Designing redundancy
- C. By laying out
- D. Limits the expansion
- E. None of the Above

Friction Loss

106. Water will still be distributed through the system if a single section fails. The damaged section can be isolated and the remainder of the system will still _____.

- A. Be isolated
- B. Carry water
- C. By laying out
- D. Limits the expansion
- E. None of the Above

107. Water supplied to fire hydrants will feed from multiple directions. Thus during periods of peak fire flow demand, there will be _____ from "friction loss" in water mains as the velocity within any given section of main will be less since several mains will be sharing the supply.

- A. Be isolated
- B. Friction loss
- C. By laying out
- D. Less impact
- E. None of the Above

Types of Pipes Used in the Water Distribution Field

Several types of pipe are used in water distribution systems, but only the most common types used by plumbers and operators will be discussed. These piping materials include copper, plastic, galvanized steel, and cast iron.

Plastic Pipe (PVC)

108. Plastic pipe has seen extensive use in _____. Available in different lengths and sizes, it is lighter than steel or copper and requires no special tools to install.

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

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

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

110. One of the most versatile plastic and polyvinyl resin pipes is the polyvinyl chloride (PVC).

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

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

111. Its chemical resistance and _____ make it an excellent material for application in various mechanical systems.

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

112. Sometimes polyvinyl chloride is further chlorinated to obtain a stiffer design, a higher level of impact resistance, and a _____ to extremes of temperature.

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

113. A CPVC pipe (a chlorinated blend of PVC) can be used _____, but also in hot-water systems with temperatures up to 210°F.

- A. Ease of installation
- B. Not only in cold-water systems
- C. Chemical resistance
- D. Stamped on the outside
- E. None of the Above

114. Economy and _____ make plastic pipe popular for use in either water distribution and supply systems or sewer drainage systems.

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

115. Various types and sizes of coupons or tap cut-outs. You will want to date and collect these cut-outs to determine the condition of the pipe or _____.

- A. Ease of installation
- B. Measure the corrosion
- C. Chemical resistance
- D. None of the Above

Plastic Pipe (PVC)

116. This is currently the most common type of pipe used in distribution systems. It is available in diameters of 1/2" and larger, and in lengths of 10', 20', and 40'. A main advantage is its light weight, allowing for _____.

- A. Long life
- B. Withstand shock loads
- C. Easy installation
- D. Highest C Factor
- E. None of the Above

117. A disadvantage is its inability to withstand shock loads. Since it is _____, a tracer wire must be installed with the PVC water main so that it can be located after burial.

- A. Long life
- B. Non-metallic
- C. Been in use for a long time
- D. Highest C Factor
- E. None of the Above

118. The National Sanitation Foundation (NSF) currently lists most brands of PVC pipe as being acceptable for potable water use. This information should be stamped on the outside of the pipe, along with _____ and temperature, diameter and pipe manufacturer.

- A. Long life
- B. Withstand shock loads
- C. Working pressure
- D. Highest C Factor
- E. None of the Above

119. PVC pipe will have the highest C Factor of all the above pipes. The higher the C factor the _____.

- A. Long life
- B. Withstand shock loads
- C. Been in use for a long time
- D. Smoother the pipe
- E. None of the Above

Cast Iron (CIP)

120. This is another type of piping material that has been in use for a _____. It is found in diameters from 3" to 48".

- A. Long life
- B. Withstand shock loads
- C. Been in use for a long time
- D. Highest C Factor
- E. None of the Above

121. Advantages of this material are its long life, _____ to withstand working pressures up to 350 psi.

- A. Long life
- B. Withstand shock loads
- C. Durability and ability
- D. Highest C Factor
- E. None of the Above

122. Disadvantages include the fact that it is heavy, difficult to install and does not withstand shock loading. Although it is _____ the material of choice, there is still a lot of it in the ground.

- A. Long life
- B. Not currently
- C. Been in use for a long time
- D. Highest C Factor
- E. None of the Above

Ductile Iron Pipe (DIP)

123. This was developed to _____ associated with cast iron pipe. It can be purchased in 4" to 45" diameters and lengths of 18' to 20'.

- A. Overcome the breakage problems
- B. Withstand shock loads
- C. Been in use for a long time
- D. Highest C Factor
- E. None of the Above

124. Its main advantage is that it is _____ by internal or external pressures. It is manufactured by injecting magnesium into molten cast iron.

- A. Nearly indestructible
- B. Withstand shock loads
- C. Been in use for a long time
- D. Highest C Factor
- E. None of the Above

125. It 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. Extend the life
- B. Withstand shock loads
- C. Been in use for a long time
- D. Highest C Factor
- E. None of the Above

Steel Pipe

126. This pipe is often used in water treatment plants and pump stations. It 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. It also exhibits good yielding and _____.

- A. Factory to resist corrosion
- B. Danger posed
- C. Withstand corrosion
- D. Shock resistance
- E. None of the Above

127. It has a smooth interior surface and can withstand pressures up to 250 psi. A disadvantage is that it is _____ by both soil and water.

- A. Factory to resist corrosion
- B. Danger posed
- C. Withstand corrosion
- D. Easily corroded
- E. None of the Above

128. To reduce _____, steel pipe is usually galvanized or dipped in coal-tar enamel and wrapped with coal-tar impregnated felt.

- A. Corrosion problems
- B. Danger posed
- C. Withstand corrosion
- D. Good yielding
- E. None of the Above

129. Coal-tar products are undergoing scrutiny from a health standpoint and it is recommended that the appropriate regulatory agencies be _____ to use of this material.

- A. Contacted prior
- B. Danger posed
- C. Withstand corrosion
- D. Good yielding
- E. None of the Above

Asbestos Cement Pipe (ACP)

130. This pipe is manufactured from Portland cement, _____ and silica. It is available in diameters from 3" to 36" and in 13' lengths.

- A. Factory to resist corrosion
- B. Danger posed
- C. Withstand corrosion
- D. Good yielding
- E. None of the Above

131. Its main advantages are its ability to _____ and its excellent hydraulic flow characteristics due to its smoothness.

- A. Withstand corrosion
- B. Danger posed
- C. Withstand corrosion
- D. Good yielding
- E. None of the Above

132. A major disadvantage is that it is _____ during construction or by shock loading.

- A. Factory to resist corrosion
- B. Brittle and is easily broken
- C. Withstand corrosion
- D. Good yielding
- E. None of the Above

133. There is some concern regarding the possible release of asbestos fibers in corrosive water and there has been _____ over the health effects of ingested asbestos.

- A. Factory to resist corrosion
- B. Danger posed
- C. Much debate
- D. Good yielding
- E. None of the Above

134. Of greater concern, however, is the _____ by inhalation of asbestos fibers.

- A. Factory to resist corrosion
- B. Danger posed
- C. Withstand corrosion
- D. Good yielding
- E. None of the Above

135. Asbestos is considered a hazardous material, and _____ must be taken to protect water utility workers when cutting, tapping or otherwise handling this type of pipe.

- A. Factory to resist corrosion
- B. Danger posed
- C. Precautionary measures
- D. Good yielding
- E. None of the Above

Galvanized Pipe

136. Galvanized pipe is commonly used for the water distributing pipes inside a building to supply hot and cold water to _____.

- A. The fixtures
- B. Water distributing pipes
- C. Inside and outside
- D. Soldered to copper fittings
- E. None of the Above

137. This type of pipe is manufactured in 21-ft lengths. It is galvanized (coated with zinc) both inside and outside at the _____.

- A. Thinnest walls
- B. Water distributing pipes
- C. Inside and outside
- D. Factory to resist corrosion
- E. None of the Above

138. Pipe sizes are based on nominal inside diameters. Inside diameters vary with the thickness of the pipe. Outside diameters remain constant so that pipe can be _____.

- A. Thinnest walls
- B. Threaded for standard fittings
- C. Inside and outside
- D. Soldered to copper fittings
- E. None of the Above

Copper

139. Copper is one of the most widely used materials for tubing. This is because it does not rust and is highly resistant to any _____.

- A. Thinnest walls
- B. Water distributing pipes
- C. Inside and outside
- D. Accumulation of scale particles in the pipe
- E. None of the Above

140. This tubing is available in three different types: _____

- A. Thinnest walls
- B. Water distributing pipes
- C. Inside and outside
- D. Soldered to copper fittings
- E. None of the Above

141. K has the thickest walls, and M, the thinnest walls, with L's _____.

- A. Thinnest walls
- B. Thickness in between the other two
- C. Inside and outside
- D. Soldered to copper fittings
- E. None of the Above

142. The thin walls of copper tubing are _____.

- A. Thinnest walls
- B. Water distributing pipes
- C. Inside and outside
- D. Soldered to copper fittings
- E. None of the Above

143. Soldering allows all the tubing and fittings to be _____ before the joints are finished.

- A. Set in place
- B. Widely used
- C. Rigid (hard temper)
- D. Straight lengths
- E. None of the Above

144. Type K copper tubing is available in either rigid (hard temper) or flexible (soft temper) and is primarily used for _____ in the water distribution systems.

- A. Exposed lines
- B. Underground service
- C. Rigid (hard temper)
- D. Straight lengths
- E. None of the Above

145. Soft temper tubing is available in 40- or 60-ft coils, while _____ tubing comes in 12- and 20-ft straight lengths.

- A. Exposed lines
- B. Widely used
- C. Hard temper
- D. Straight lengths
- E. None of the Above

146. Type L copper tubing is also available in either _____ or soft temper and either in coils or in straight lengths.

- A. Exposed lines
- B. Widely used
- C. Hard
- D. Straight lengths
- E. None of the Above

147. The soft temper tubing is often used as replacement plumbing because of the tube's flexibility, which allows _____.

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

148. Type L copper tubing is widely used in _____.

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

149. 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 _____ where water pressure is low, but it is NOT used for mains and risers.

- A. Exposed lines
- B. Widely used
- C. Branch supplies
- D. Straight lengths
- E. None of the Above

150. It is also used for chilled water systems, for exposed lines in hot-water heating systems, and for _____.

- A. Exposed lines
- B. Drainage piping
- C. Rigid (hard temper)
- D. Straight lengths
- E. None of the Above

151. Booster stations are used to increase water pressure from _____ for low-pressure mains.

- A. Gate valves
- B. Dead ends
- C. Booster stations
- D. Storage tanks
- E. None of the Above

152. Valves control the flow of water in the distribution system by isolating areas for repair or by regulating _____.

- A. Gate valves
- B. System flow or pressure
- C. Booster stations
- D. Treelike system
- E. None of the Above

153. Gate valves should be used in the _____ for main line isolation.

- A. Gate valves
- B. Distribution system
- C. Booster stations
- D. Treelike system
- E. None of the Above

Tree System

154. Older water systems frequently were expanded without planning and developed into a _____.

- A. Gate valves
- B. Dead ends
- C. Booster stations
- D. Treelike system
- E. None of the Above

155. This consists of a single _____ that decreases in size as it leaves the source and progresses through the area originally served.

- A. Main
- B. Dead ends
- C. Booster stations
- D. Treelike system
- E. None of the Above

156. Smaller pipelines branch off the _____ and divide again, much like the trunk and branches of a tree.

- A. Gate valves
- B. Main
- C. Booster stations
- D. Treelike system
- E. None of the Above

157. A _____ is not desirable because the size of the old main limits the expansion of the system needed to meet increasing demands.

- A. Gate valves
- B. Dead ends
- C. Booster stations
- D. Treelike system
- E. None of the Above

158. There are many dead ends in the system where water remains for long periods, causing undesirable _____ in nearby service lines.

- A. Gate valves
- B. Dead ends
- C. Booster stations
- D. Treelike system
- E. None of the Above

159. The most reliable means to _____ for fire fighting is by designing redundancy into the system.

- A. Provide water
- B. Dead ends
- C. Booster stations
- D. Treelike system
- E. None of the Above

160. There are several advantages gained by laying out _____ in a loop or grid, with feeder and distributor mains interconnecting at roadway intersections and other regular intervals.

- A. Gate valves
- B. Water mains
- C. Booster stations
- D. Treelike system
- E. None of the Above

Distribution Valves

161. The purpose of installing shutoff valves in water mains at various locations within the distribution system is to _____ to be taken out of service for repairs or maintenance, without significantly curtailing service over large areas.

- A. Dependability of the distribution system
- B. Allow sections of the system
- C. Certain distance
- D. None of the Above

162. Valves should be installed at intervals not greater than 5,000 feet in long supply lines, and 1,500 foot in _____.

- A. Dependability of the distribution system
- B. Branch mains
- C. Certain distance
- D. Main distribution loops or feeders
- E. None of the Above

163. All branch mains connecting to feeder mains or feeder loops should have valves installed as close to the _____.

- A. Feeders as practical
- B. Branch mains
- C. Certain distance
- D. Principally supplies flow
- E. None of the Above

164. In this way, branch mains can be taken out of service _____ the supply to other locations.

- A. Dependability of the distribution system
- B. Without interrupting
- C. Certain distance
- D. Principally supplies flow
- E. None of the Above

165. In the areas of greatest water demand or when the dependability of the distribution system is _____, valve spacing of 500 feet may be appropriate.

- A. Dependability of the distribution system
- B. Branch mains
- C. Particularly important
- D. Principally supplies flow
- E. None of the Above

166. At intersections of distribution mains, the number of valves required is normally one less than the number of _____.

- A. Dependability of the distribution system
- B. Branch mains
- C. Radiating mains
- D. Principally supplies flow
- E. None of the Above

167. The valve _____ is usually the one that principally supplies flow to the intersection.

- A. Dependability of the distribution system
- B. Omitted from the line
- C. Certain distance
- D. Principally supplies flow
- E. None of the Above

168. Shutoff valves should be _____ (that is, the northeast corner of intersections or a certain distance from the center line of streets), so they can be easily found in emergencies.

- A. Dependability of the distribution system
- B. Branch mains
- C. Certain distance
- D. Installed in standardized locations
- E. None of the Above

169. All buried small- and medium-sized valves should be _____.

- A. Installed in valve boxes
- B. Branch mains
- C. Certain distance
- D. Principally supplies flow
- E. None of the Above

170. For large shutoff valves (about 30 inches in diameter and larger), it may be necessary to surround the valve operator or entire valve within a vault or manhole to _____.

- A. Dependability of the distribution system
- B. Branch mains
- C. Allow repair or replacement
- D. Principally supplies flow
- E. None of the Above

Classification of Valves

171. There are _____ of water valves: Rotary and Linear. Linear is a fancy word for up and down or blade movement.

- A. Flow restriction
- B. Water valves
- C. Distribution system
- D. Gate valves
- E. None of the Above

172. Gate Valve Linear Valve The most common valve in the distribution system. Primarily used for main line _____. Should be exercised on annual basis.

- A. Flow restriction
- B. Water valves
- C. Shut downs
- D. Gate valves
- E. None of the Above

173. _____ are used when a straight-line flow of fluid and minimum flow restriction are needed.

- A. Flow restriction
- B. Water valves
- C. Distribution system
- D. Gate valves
- E. None of the Above

174. _____ are so-named because the part that either stops or allows flow through the valve acts somewhat like a gate.

- A. Flow restriction
- B. Water valves
- C. Distribution system
- D. Gate valves
- E. None of the Above

175. The gate is usually wedge-shaped. When the valve is wide open the gate is fully drawn up into the _____. This leaves an opening for flow through the valve the same size as the pipe in which the valve is installed.

- A. Flow restriction
- B. Water valves
- C. Valve bonnet
- D. Gate valves
- E. None of the Above

176. There is _____ or flow restriction through the valve.

- A. Flow restriction
- B. Water valves
- C. Little pressure drop
- D. Gate valves
- E. None of the Above

177 _____ are not suitable for throttling purposes.

- A. Flow restriction
- B. Water valves
- C. Distribution system
- D. Gate valves
- E. None of the Above

178 The control of flow is difficult because of the _____, and the flow of fluid slapping against a partially open gate can cause extensive damage to the valve.

- A. Flow restriction
- B. Water valves
- C. Valve's design
- D. Gate valves
- E. None of the Above

179 Except as specifically authorized, _____ should not be used for throttling.

- A. Flow restriction
- B. Water valves
- C. Distribution system
- D. Gate valves
- E. None of the Above

Valve Glossary

180. Air and Vacuum relief valve: Both of these functions are in one valve. These valves can combine three functions; they can allow large amounts of air to escape during the filling of a pipeline, permits air to enter a _____ that is being drained and allow entrained air to escape while a line is operating under pressure.

- A. Air relief valves
- B. Butterfly valve
- C. Air and Vacuum relief valve
- D. Altitude-Control Valve
- E. None of the Above

181. Distribution system water quality can be adversely affected by improperly constructed or poorly located blowoffs of vacuum/_____.

- A. Air relief valves
- B. Butterfly valve
- C. Air and Vacuum relief valve
- D. Altitude-Control Valve
- E. None of the Above

182. _____ in the distribution system lines must be placed in locations that cannot be flooded. This is to prevent water contamination.

- A. Air relief valves
- B. Butterfly valve
- C. Air and Vacuum relief valve
- D. Altitude-Control Valve
- E. None of the Above

183. The common customer complaint of Milky Water is sometimes solved by the installation of these _____.

- A. Air relief valves
- B. Butterfly valve
- C. Air and Vacuum relief valve
- D. Altitude-Control Valve
- E. None of the Above

184. _____: Are often used on supply lines to elevated tanks or standpipes. These 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. These valves control the high water level and prevent overflow.

- A. Air relief valves
- B. Butterfly valve
- C. Air and Vacuum relief valve
- D. Altitude Valve
- E. None of the Above

185. _____ is designed to, 1. Prevent overflows from the storage tank or reservoir, or 2. Maintain a constant water level as long as water pressure in the distribution system is adequate.

- A. Air relief valves
- B. Butterfly valve
- C. Air and Vacuum relief valve
- D. Altitude-Control Valve
- E. None of the Above

186. _____: Has a movable disc as large as the full bore opening of the valve.
- A. Air relief valves
 - B. Butterfly valve
 - C. Air and Vacuum relief valve
 - D. Altitude-Control Valve
 - E. None of the Above
187. _____: Are often used on the discharge side of pumps to prevent backflow.
- A. Pressure relief
 - B. Check valve
 - C. Gate valve
 - D. Pressure sustaining valve
 - E. None of the Above
188. _____: 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
 - B. Check valve
 - C. Gate valve
 - D. Pressure sustaining valve
 - E. None of the Above
189. _____: Maintains constant downstream pressure regardless of fluctuating demand.
- A. Pressure relief
 - B. Check valve
 - C. Gate valve
 - D. Pressure sustaining valve
 - E. None of the Above
190. The valve is usually a globe design controlled by a diaphragm with the diaphragm assembly being the only moving part in the valve. Can also be used as an _____.
- A. Pressure relief
 - B. Check valve
 - C. Automatic flow-control valve
 - D. Pressure sustaining valve
 - E. None of the Above
191. _____: A valve that controls water pressure by restricting flows. The pressure downstream of the valve regulates the amount of flow. Usually these valves are of the globe valve design.
- A. Pressure relief
 - B. Check valve
 - C. Pressure regulating valve
 - D. Pressure sustaining valve
 - E. None of the Above
192. _____ control water pressure and operate by restricting flows. They are used to deliver water from a high pressure to a low-pressure system.
- A. Pressure relief
 - B. Check valve
 - C. Gate valve
 - D. Pressure Regulation Valves
 - E. None of the Above

193. The pressure downstream from the valve regulates the amount of flow. Usually, these valves are of the globe design and have a _____ that sets the size of the opening.

- A. Pressure relief
- B. Check valve
- C. Gate valve
- D. Pressure sustaining valve
- E. None of the Above

194. _____: The simplest type of surge pressure relief is a pressure relief valve. These valves respond to pressure variations at their inlets.

- A. Pressure relief
- B. Check valve
- C. Gate valve
- D. Pressure sustaining valve
- E. None of the Above

The Singing Key

195. Dr. Rusty recommends that you listen to the Valve Key when shutting down a _____. You will easily hear it sing as you shut the water off or leak by.

- A. Gate valve
- B. Valve failing to open
- C. Opened valves
- D. Over-pressurization
- E. None of the Above

196. It is very easy to create a _____ when opening or closing a Gate valve. Always take your time when operating a Gate valve or any valve.

- A. Valve Key
- B. Water hammer
- C. Opened valves
- D. Over-pressurization
- E. None of the Above

Problems

Valve Jammed Open

197. Dr. Rusty recommends that opened valves should not be _____.

- A. Jammed-tight on the backseat
- B. Valve failing to open
- C. Opened valves
- D. Over-pressurization
- E. None of the Above

198. Always back the valve-off a _____ from the fully opened position.

- A. Quarter turn
- B. Valve failing to open
- C. Opened valves
- D. Over-pressurization
- E. None of the Above

199. Note that motor operated valves coast inevitably to the backseat by tripping on a limit switch. Valves should not be _____.

- A. Back seated on torque
- B. Valve failing to open
- C. Opened valves
- D. Over-pressurization
- E. None of the Above

Valve Jammed Closed

200. Thermal binding can occur in high temperature situations depending on the seat and wedge material, length of _____ torque applied.

- A. Exposure and closing
- B. Valve failing to open
- C. Opened valves
- D. Over-pressurization
- E. None of the Above

You are finished with the assignment. Please fax or e-mail the answer key and registration form to TLC. Always call and ensure we've received your paperwork. God bless and thank you.