

Registration form

**Valves and Fittings CEU Training Course \$150.00
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*

List number of hours worked on assignment must match State Requirement. _____

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 _____

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

Water Treatment _____ Distribution _____ Collection _____

Wastewater Treatment _____ Other _____

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

Technical Learning College TLC PO Box 3060, Chino Valley, AZ 86323
Toll Free (866) 557-1746 Fax (928) 272-0747 info@tlch2o.com

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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.

Additional certificate for another Agency – additional fee \$50

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 fully understand that this type of study program deals with dangerous, changing conditions and various laws and that I will not hold Technical Learning College, Technical Learning Consultants, Inc. (TLC) liable in any fashion for any errors, omissions, advice, suggestions or neglect contained in this CEU education training course or for any violation or injury, death, neglect, damage or loss of your license or certification caused in any fashion by this CEU education training or course material suggestion or error or my lack of submitting paperwork.

It is my responsibility to 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. It is my responsibility to ensure all information is correct and to abide with all rules and regulations.

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.

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

Do not solely depend on TLC's Approval list for it may be outdated.

Some States and many employers require the final exam to be proctored.

<http://www.abctlc.com/downloads/PDF/PROCTORFORM.pdf>

A second certificate of completion for a second State Agency \$50 processing fee.

All downloads are electronically tracked and monitored for security purposes.

No refunds.

Valves and Fittings CEU Course Answer Key

Name _____ Telephone # _____

You are solely responsible to ensure this course is acceptable for credit by your State. **No refunds.** Did you check with your State agency to ensure this course is accepted for credit?

Method of Course acceptance confirmation. Please fill this section

Website __ Telephone Call__ Email____ Spoke to_____

Did you receive the approval number if Applicable? _____

What is the approval number if Applicable? _____

Florida Students are required to pay an addition fee of \$65 for TREEO credit.

Please use Adobe Acrobat DC to complete this answer Key

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

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Additional certificate for another Agency – additional fee \$50

**Please fax the answer key to TLC
(928) 272-0747**

Always call to confirm that we've received the paperwork.

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

**VALVES AND FITTINGS CEU TRAINING 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.**

Please rate the difficulty of your course.

Very Easy 0 1 2 3 4 5 Very Difficult

Please rate the difficulty of the testing process.

Very Easy 0 1 2 3 4 5 Very Difficult

Please rate the subject matter on the exam to your actual field or work.

Very Similar 0 1 2 3 4 5 Very Different

How did you hear about this Course? _____

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.

Valves and Fittings CEU Course Assignment

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

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

New EPA Rules for Distribution Reduction of Lead in Drinking Water Act

1. The most common problem is with brass or chrome-plated brass faucets and fixtures. These devices can leach significant amounts of lead into the water, especially cold water.
A. True B. False
2. Homes built before 1999 are more likely to have lead pipes, fixtures and solder.
A. True B. False
3. New homes are also at risk: even legally “lead-free” plumbing may contain up to 8 percent lead.
A. True B. False
4. 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
5. This lead reduction law was established back in January 4, 2014, which provided a three-year timeframe for affected parties to transition to the new requirements.
A. True B. False
6. 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
7. Lead, a metal found in natural deposits, is commonly used in household plumbing materials and water service lines.
A. True B. False

8. 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

Pervasive Environmental Contaminant

9. 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

10. Because lead accumulates in the body, all sources of lead should be controlled or eliminated to prevent childhood lead poisoning.

- A. True B. False

11. 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

12. 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

13. Which of the following terms control reduces the leaching of lead plumbing components or solder into drinking water?

- A. Lead concentrations D. Water infrastructure
B. Adequate corrosion E. Safe Drinking Water Act (SDWA)
C. Lead enforcement F. None of the Above

Composite Meters

14. Composite meters are one example of a _____ alternative that is not susceptible to no-lead regulations.

- A. Lead free D. Zero lead
B. New lead-free law E. Lead-free alternative material
C. New low-lead brass F. None of the Above

15. Composite meters do not depend on metal pricing fluctuations and have zero lead as opposed to low lead or even _____ meters.

- A. Bronze D. "Friction feeling"
B. "Lead-free" E. A blend of plastic and fiberglass
C. Zero lead F. None of the Above

16. Which of the following terms does this type of meter boast longevity and resistance to corrosion from aggressive water?

- A. Bronze D. Composite
B. "Lead-free" E. A blend of plastic and fiberglass
C. Zero lead F. None of the Above

17. Composite meters are constructed using a blend of plastic and?
 A. Bronze D. "Friction feeling"
 B. "Lead-free" E. Fiberglass
 C. Zero lead F. None of the Above
18. Which of the following terms have been found to eliminate the "friction feeling" typically experienced with metal threads and metal couplings, facilitating easier installation?
 A. Bronze D. Composite threads
 B. "Lead-free" E. A blend of plastic and fiberglass
 C. Zero lead F. None of the Above
19. With comprehensive testing, composite meters have demonstrated a burst pressure that is significantly greater than?
 A. Bronze D. Composite
 B. "Lead-free" E. A blend of plastic and fiberglass
 C. Zero lead F. None of the Above
20. 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
21. Which of the following term 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. Bronze D. Friction
 B. Lead-free E. Plastic and fiberglass
 C. Zero lead F. None of the Above
22. Everyone deserves access to safe, clean water.
 A. True B. False
23. 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. Frequency of sampling D. An adequate chlorine residual
 B. Their personal health E. This most precious resource
 C. Water system customers F. None of the Above
24. 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 D. An adequate chlorine residual
 B. Their personal health E. Byproduct chemicals
 C. Have the water tested F. None of the Above
25. 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

26. The regulations also mandate special reporting procedures to be followed if a contaminant exceeds?

- A. An MCL
- B. Chemical analyses
- C. Turbidity
- D. Continuous chlorine residual
- E. No concern for byproducts
- F. None of the Above

27. According to the text, about half the distribution systems must provide periodic monitoring for microbiological contaminants and some chemical contaminants.

- A. True
- B. False

28. 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
- B. The water source
- C. Water system customers
- D. An adequate chlorine residual
- E. Byproduct chemicals
- F. None of the Above

General Disinfection Requirements

29. According to the text, disinfection is required for all water systems using surface water sources.

- A. True
- B. False

30. As the water enters the distribution system, it must carry a _____ that will be retained throughout the distribution system.

- A. Disinfectant like UV
- B. Chemical analyses
- C. Ozone
- D. Continuous chlorine residual
- E. Byproduct of chlorine
- F. None of the Above

31. Water samples from points on the distribution system must be analyzed periodically to make sure _____ is being maintained.

- A. Frequency of sampling
- B. Their personal health
- C. Water system customers
- D. An adequate chlorine residual
- E. Byproduct chemicals
- F. None of the Above

32. The use of chlorine has almost completely eliminated occurrences of waterborne diseases in the United States.

- A. True
- B. False

33. The disinfection byproducts are formed when chlorine reacts with naturally occurring substances in raw water such as decaying vegetation containing?

- A. An MCL
- B. Chemical analyses
- C. Turbidity
- D. Humic and fulvic acids
- E. No concern for byproducts
- F. None of the Above

34. Which of the following terms 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. MCLs
- B. HAAA5s
- C. Chloramines
- D. Chlorine residual
- E. Chlorine byproduct chemicals
- F. None of the Above

35. Which of the following terms have been identified that may be harmful, and may cause some adverse health reactions?

- A. Other byproducts of disinfection
- B. Chemical analyses
- C. Turbidity
- D. Continuous chlorine residual
- E. Chloramines
- F. None of the Above

Consumer Confidence Reports

36. One of the very significant provisions of the 1996 SDWA amendments is Continuous chlorine residual requirement.

- A. True
- B. False

37. Information on the source water and _____ must be furnished to the satellite system by the system selling the water.

- A. An MCL
- B. Chemical analyses
- C. Turbidity
- D. Continuous chlorine residual
- E. No concern for byproducts
- F. None of the Above

38. The reports must be prepared yearly by every community water supply system.

- A. True
- B. False

39. Water systems serving more than 10,000 people must mail the report to customers.

- A. True
- B. False

40. The consumer confidence report (CCR) is a requirement.

- A. True
- B. False

41. 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

42. According to the text, water system operators should keep in mind that CCRs provide an opportunity to educate consumers about the?

- A. MCL
- B. Chemical analyses
- C. Concern for byproducts
- D. Continuous chlorine residual
- E. Sources and quality of their drinking water
- F. None of the Above

Distribution System Water Quality Problems

Turbidity

43. Turbidity is caused by particles suspended in water; these particles scatter or reflect light rays, making the water appear cloudy.

- A. True
- B. False

44. 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. Germs
- B. Hardness
- C. Chlorine
- D. Turbidity
- E. Suspended particles
- F. None of the Above

45. EPA regulations direct that, for most water systems, the turbidity of water entering the distribution system must be equal or less than 0.5 ntu in at least 95 percent of the measurements taken each month; at no time may the turbidity exceed 5 ntu.

- A. True B. False

46. Increases in turbidity may be caused by changes in velocity or inadequate flushing following main replacement.

- A. True B. False

Hardness

47. Water hardness usually comes from water contacting rock formations, such as water from wells in?

- A. Turbidity D. Concentration of calcium and magnesium
B. Hard and soft water E. Limestone formations
C. Ferrous iron F. None of the Above

48. Most surface water is of?

- A. Hard hardness D. Hard and soft water
B. Hardness E. Soft hardness
C. Medium hardness F. None of the Above

49. Water with 300 mg/L of hardness usually is considered soft.

- A. True B. False

50. Hard water usually is quite corrosive, and may have to be treated to reduce the corrosivity.

- A. True B. False

Iron

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

- A. Corrosivity D. Turbidity
B. Hardness E. Rust-colored
C. Dissolved state F. None of the Above

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

- A. Corrosivity D. Turbidity
B. Hardness E. Rust-colored
C. Medium hardness F. None of the Above

53. Gallionella can cause _____, tastes and odors, clogged pipes, and pump failure.

- A. Bacteriological safety D. Entry of contaminants
B. System failure E. Red water
C. Bacteria F. None of the Above

54. 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

55. 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

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

- A. Corrosion
- B. Customer complaints
- C. Pressure loss
- D. Harmful effects on humans
- E. Water system contamination
- F. None of the Above

Water Quality Safeguards

57. Which of the following terms are necessary to prevent backsiphonage and the entry of contaminants?

- A. Bacteriological safety
- B. Static pressure
- C. Chlorine
- D. Monitoring
- E. Continuous positive pressure
- F. None of the Above

58. 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

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

- A. Bacteriological safety
- B. System pressure
- C. Backpressure
- D. Cross connection
- E. Backflow
- F. None of the Above

Water Hammer

60. Water hammer is a pressure surge or wave caused by the static energy of a fluid in motion when it is forced to stop or change direction suddenly.

- A. True
- B. False

61. Moving water in a pipe has kinetic energy proportional to the mass of the water in a given volume times the square of the velocity of the water.

- A. True
- B. False

System Layouts

Tree System

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

- A. True
- B. False

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

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

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

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

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

Friction Loss

66. The damaged section can be isolated and the remainder of the system will still carry pressure, water will not be distributed if a single section fails.
A. True B. False
67. During periods of peak fire flow demand, there will be less impact from _____ in water mains as the velocity within any given section of main.
A. Carrying capacity D. Static pressure
B. Friction loss E. Total pressure
C. Pressure F. None of the Above

Types of Pipes Used in the Distribution Field

Plastic Pipe (PVC)

68. Plastic pipe has seen extensive use available in different lengths and sizes, it is lighter than steel or copper and requires no special tools to install.
A. True B. False
69. Plastic pipe has complete resistance to corrosion; and, in addition, it can be installed aboveground or below ground, has several advantages over metal pipe: it is flexible; it has superior resistance to?
A. Ease of installation D. Rupture from freezing
B. An excellent combination E. Complete resistance to corrosion
C. Chemical resistance F. None of the Above
70. PVC pipes are made of tough, strong thermoplastic material that has _____ of physical and chemical properties.
A. Ease of installation D. Array
B. An excellent combination E. Complete resistance to corrosion
C. Chemical resistance F. None of the Above
71. PVC's chemical resistance and _____ make it an excellent material for application in various mechanical systems.
A. Ease of installation D. Design strength
B. Greater resistance E. Complete resistance to corrosion
C. Chemical resistance F. None of the Above
72. According to the text, often 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 D. Design strength
B. Greater resistance E. Complete resistance to corrosion
C. Chemical resistance F. None of the Above
73. A CPVC pipe can be used only in cold-water systems with temperatures up to 110°F.
A. True B. False

74. Which of the following terms and economy makes plastic pipe popular for use in either water distribution and supply systems or sewer drainage systems?

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

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

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

Plastic Pipe (PVC)

76. A main advantage of PVC piping is its lightweight, allowing for?

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

77. Since PVC is non-metallic, a tracer wire must be installed with the PVC water main so that it can be located after burial.

- A. True
- B. False

78. The National Sanitation Foundation 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. Ease of installation
- B. Working pressure
- C. Chemical resistance
- D. Date and time
- E. Expiration
- F. None of the Above

79. PVC pipe will have the highest C Factor of all the above pipes, the higher the C factor the?

- A. Long life
- B. Rougher the interior
- C. Been in use for a long time
- D. Smoother the pipe
- E. Ability to withstand shock loads
- F. None of the Above

Cast Iron (CIP)

80. CIP can be found in diameters from 3" to 48".

- A. True
- B. False

81. Advantages of CIP are its long life, ability to withstand shock loads and to withstand working pressures up to 120 psi.

- A. True
- B. False

Ductile Iron Pipe (DIP)

82. DIP can be purchased in 4" to 45" diameters and lengths of 18' to 20'.

- A. True
- B. False

83. DIP was developed to _____ associated with cast iron pipe.

- A. Overcome the breakage problems
- B. Withstand shock loads
- C. Extend the life
- D. Provide a High C Factor
- E. Be nearly indestructible
- F. None of the Above

84. DIP's main advantage is that it is _____ by internal or external pressures.
A. Overcome the breakage problems D. Provide a High C Factor
B. Withstand shock loads E. Nearly indestructible
C. Extend the life F. None of the Above

85. 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. Overcome the breakage problems D. Provide a High C Factor
B. Withstand shock loads E. Be nearly indestructible
C. Extend the life F. None of the Above

Steel Pipe

86. Steel pipe is available in various diameters and in 20' or 21' lengths; its main advantage is the ability to form it into a variety of shapes.
A. True B. False

87. Steel pipe's advantage is that it is able withstand corrosion by both soil and water.
A. True B. False

88. Steel pipe is usually galvanized or dipped in coal-tar enamel and wrapped with coal-tar impregnated felt to reduce?
A. Corrosion problems D. Good yielding
B. Bending E. Confusion with other pipes
C. Costs F. None of the Above

89. From a health standpoint coal-tar products are undergoing scrutiny and it is recommended that the appropriate regulatory agencies be contacted prior to use of this material.
A. True B. False

Asbestos Cement Pipe (ACP)

90. ACP is available in diameters from 3" to 36" and in 13' lengths.
A. True B. False

91. ACP main advantages are its ability to _____ and its excellent hydraulic flow characteristics due to its smoothness.
A. Withstand corrosion D. Transfer less friction
B. Lower C factor E. Brittle and is easily broken
C. Withstand corrosion F. None of the Above

92. ACP main disadvantage is that it is _____ during construction or by shock loading.
A. Very light weight D. Transfer less friction
B. Lower C factor E. Brittle and is easily broken
C. Unable to withstand corrosion F. None of the Above

93. According to the text, ACP has some concern regarding the possible release of asbestos fibers in corrosive water and there has much debate over the health effects of ingested asbestos.
A. True B. False

94. Precautionary measures must be taken to protect water utility workers when cutting, tapping or otherwise handling this type of pipe.
A. True B. False

Galvanized Pipe

95. Galvanized pipe is commonly used for the water distributing pipes inside a building to supply hot and cold water to?
A. The fixtures D. To copper fittings
B. Water distributing pipes E. The water heater
C. Inside and outside F. None of the Above

96. Galvanized pipe is manufactured in 21-ft lengths and is coated with zinc the outside only.
A. True B. False

97. Pipe sizes are based on nominal inside diameters, these diameters vary with the thickness of the pipe.
A. True B. False

98. According to the text, outside pipe diameters remain constant so that pipe can be?
A. Hooked to Cpex D. Soldered to copper fittings
B. Flanged E. Threaded for standard fittings
C. Connected to Sharkbites F. None of the Above

Copper

99. According to the text, copper is one of the least widely used materials for tubing, this is because it does not rust and is highly resistant to any bending.
A. True B. False

100. K pipe has the thickest walls.
A. True B. False

101. Copper pipe M has the thinnest walls.
A. True B. False

102. Soldering allows all the tubing and fittings to be set in place before the joints are finished.
A. True B. False

103. Type K copper tubing is available in either rigid or flexible and is primarily used for _____ in the water distribution systems.
A. Exposed lines D. Straight lengths
B. Underground service E. DVW
C. Rigid (hard temper) F. None of the Above

104. Hard temper tubing is available in 40- or 60-ft coils, while soft tubing comes in 12- and 20-ft straight lengths.
A. True B. False

105. Type L copper tubing is also available in either hard or soft temper and either in coils or?
A. Exposed lines D. Straight lengths
B. Widely used E. Water distribution systems
C. Easier installation F. None of the Above

106. According to the text, 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. Water distribution systems
- F. None of the Above

107. Type L copper tubing is widely used in?

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

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

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

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

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

Water Service Pipe Installation

110. Underground Water Service.

Water service pipe shall be installed outside the?

- A. Contamination
- B. Water service pipe
- C. Foundation wall
- D. Maximum frost penetration of the local area
- E. Center of the sanitary sewer
- F. None of the Above

111. Water service and building drain or building sewer may be installed in which of the following terms with a minimum of 10 feet horizontal separation?

- A. An exterior wall
- B. Same trench
- C. Separate trenches
- D. Beneath a sanitary sewer or drain
- E. An underground potable water pipe
- F. None of the Above

112. According to the text, the water service and the building drain or building sewer may be installed in the same trench provided that the water service is placed on which of the following terms a minimum of 18 inches above the building drain or building sewer?

- A. A solid shelf
- B. Same trench
- C. Separate trenches
- D. Beneath a sanitary sewer or drain
- E. An underground potable water pipe
- F. None of the Above

113. The minimum depth for any water service pipe shall be at least 36 inches or the maximum frost penetration of the which of the following terms, whichever is of greater depth?

- A. Local area
- B. Water service pipe
- C. Foundation wall
- D. Maximum frost penetration of the local area
- E. Center of the sanitary sewer
- F. None of the Above

114. No water service pipe shall be installed or permitted outside of a building or in which of the following terms unless provisions are made to protect such pipe from freezing?

- A. An exterior wall
- B. Same trench
- C. Soil or waste lines
- D. Beneath a sanitary sewer or drain
- E. An underground potable water pipe
- F. None of the Above

115. Potable Water Piping and Sanitary Sewer Crossing Installation Requirements.

Where it is necessary for the potable water piping to pass above or below a sanitary sewer, such piping shall be installed with which of the following terms for a distance of 10 feet on either side from the center of the sanitary sewer?

- A. Contamination
- B. Water service pipe
- C. Foundation wall
- D. Maximum frost penetration of the local area
- E. Minimum vertical separation of 18 inches
- F. None of the Above

116. Where it is necessary for the potable water piping to pass beneath a which of the following terms, the sanitary sewer or drain shall be constructed of materials as specified in Approved Building Drainage/Vent Pipe for building drains, and shall extend on each side of the crossing to a distance of at least 10 feet as measured at right angles to the water line.

- A. An exterior wall
- B. Same trench
- C. Soil or waste lines
- D. Sanitary sewer or drain
- E. An underground potable water pipe
- F. None of the Above

Wet/Dry Bore:

117. When it is not possible to comply with subsection (b)(1) or (2), a pressure rated pipe approved for building drain material shall encase the water service pipe. Which of the following terms shall be sealed with a casing seal and extend 10 feet on either side of the center of the sanitary sewer pipe?

- A. Stop-and-waste valves
- B. Potability of the water
- C. Air gap
- D. Supply outlet
- E. Auxiliary pressure (booster) system
- F. None of the Above

Stop-And-Waste Valve

118. Frost free hydrants and fire hydrants shall not be considered?

- A. Stop-and-waste valves
- B. Potability of the water
- C. Air gap
- D. Supply outlet
- E. Auxiliary pressure (booster) system
- F. None of the Above

Potable Water Pumping and Storage Equipment

119. Potable water pumps, tanks, filters, and all other appliances and devices shall be protected against?

- A. Relief valve
- B. Contamination
- C. Deep seal
- D. Maximum allowable working pressure
- E. Outside atmosphere
- F. None of the Above

Water Supply Tanks.

120. Which of the following terms shall be properly covered to prevent contamination of the water supply?

- A. Stop-and-waste valves
- B. Potability of the water
- C. Potable water supply tanks
- D. Supply outlet
- E. Auxiliary pressure (booster) system
- F. None of the Above

Cleaning, Painting, Repairing Water Tanks.

121. A potable water supply tank used for which of the following terms shall not be lined, painted or repaired with any material which affects either the taste or the potability of the water?

- A. Domestic purposes
- B. Potability of the water
- C. An air gap
- D. The supply outlet
- E. Auxiliary pressure (booster) system
- F. None of the Above

122. Tanks shall be disconnected from the system during such operations to prevent any which of the following terms from entering the system?

- A. Foreign substance
- B. No restrictions
- C. An air gap
- D. Auxiliary pressure systems
- E. An area of at least twice the size of the supply pipe
- F. None of the Above

Potable Water Supply Tanks and Auxiliary Pressure Tanks

123. When the water pressure from which of the following terms is insufficient during periods of peak flow or due to the building height to supply all fixtures, the rate of supply shall be supplemented by a gravity tank or auxiliary pressure system?

- A. Public water supply main
- B. Potability of the water
- C. An air gap
- D. Supply outlet
- E. Auxiliary pressure (booster) system
- F. None of the Above

124. Which of the following terms shall not substitute for adequate sizing of water distribution piping within the building?

- A. Vacuum relief valve
- B. No restrictions
- C. An air gap
- D. Auxiliary pressure systems
- E. An area of at least twice the size of the supply pipe
- F. None of the Above

Tank Supply Inlet and Outlet.

125. Which of the following terms to the tank shall have a minimum air gap of at least six (6) inches?

- A. Water supply inlet
- B. Potability of the water
- C. Gravity tank(s)
- D. Supply outlet
- E. Auxiliary pressure (booster) system
- F. None of the Above

Overflow For Water Supply Tanks.

126. Overflow pipes for which of the following terms shall be indirectly connected to the drainage system with an air gap of at least six (6) inches?

- A. Water supply inlet
- B. Potability of the water
- C. Gravity tank(s)
- D. Supply outlet
- E. Auxiliary pressure (booster) system
- F. None of the Above

127. Which of the following terms shall be full sized, unrestricted and screened with 24-mesh per inch stainless steel or bronze screen?

- A. Overflow pipes
- B. Potability of the water
- C. An air gap
- D. The supply outlet
- E. Auxiliary pressure (booster) system
- F. None of the Above

Size of Overflow.

128. Overflow drains for gravity water supply tanks shall have an area of at least twice the size of which of the following terms?

- A. Vacuum relief valve
- B. Restrictions
- C. Air gap
- D. Auxiliary pressure systems
- E. Supply pipe
- F. None of the Above

Drains.

129. Water supply tanks shall be provided with which of the following terms located at their lowest point and discharge through an indirect waste with an air gap of twice the diameter of the drain line?

- A. Full sized
- B. Valved drain lines
- C. An air gap
- D. The supply outlet
- E. Auxiliary pressure (booster) system
- F. None of the Above

130. Which of the following terms shall have no restrictions and need not exceed two (2) inches in diameter?

- A. Vacuum relief valve
- B. No restrictions
- C. An air gap
- D. Auxiliary pressure systems
- E. Drain line and valve
- F. None of the Above

Gravity and Suction Tanks.

131. Which of the following terms used for potable water supply or to supply fire-fighting equipment only shall be equipped with tight, overlapping covers?

- A. Tanks
- B. Water service
- C. Water meter
- D. A common shut-off valve
- E. The water supply system
- F. None of the Above

Pressure Tanks.

132. Pressure tanks used for supplying water to the water distribution system, or to supply standpipes for fire equipment only, shall be equipped with a vacuum relief valve located on?

- A. Vacuum relief valve
- B. Top of the tank
- C. An air gap
- D. Auxiliary pressure systems
- E. An area of at least twice the size of the supply pipe
- F. None of the Above

Water Supply Control Valves and Meter

133. A full-port shut-off valve shall be located near the curb or property line and immediately inside the building, either on the inlet or outlet side of the water meter, when underground, this valve shall be located in a?

- A. Shut-off valve
- B. Each individual fixture
- C. Water supply system
- D. Stop box or meter vault
- E. A full-port valve
- F. None of the Above

134. The meter shall have unions on which of the following terms, but is not required to have a shut-off valve on the inlet side of the meter if it is inside a building?

- A. Gravity tank(s) Means plural or singular
- B. Water service
- C. Inlet/outlet openings
- D. A common shut-off valve
- E. The water supply system
- F. None of the Above

135. Which of the following terms with an open area at least that of the water service shall be provided for all meters?

- A. A shut-off valve
- B. Each individual fixture
- C. Water supply system
- D. Stop box or meter vault
- E. A full-port valve
- F. None of the Above

Tank Controls.

136. Supply lines taken from which of the following terms shall be valved at or near their source?

- A. Gravity tank(s) Means plural or singular
- B. Water service
- C. Pressure or gravity tanks
- D. A common shut-off valve
- E. The water supply system
- F. None of the Above

Water Heating Equipment.

137. A shut-off valve shall be provided in the cold-water branch line within 5 feet of each water storage tank or each?

- A. Water heater
- B. Each individual fixture
- C. Water supply system
- D. Stop box or meter vault
- E. A full-port valve
- F. None of the Above

Separate Controls for Each Family Unit.

138. In multiple family dwellings, the water service or water distribution pipe to each family unit shall be controlled by an arrangement of shut-off valves which permits each group of fixtures and which of the following terms to be shut off without interference with the water supply to any other family unit or portion of the building?

- A. Gravity tank(s) Means plural or singular
- B. Each individual fixture
- C. Water meter
- D. A common shut-off valve
- E. The water supply system
- F. None of the Above

Buildings Other Than Dwellings.

139. Shut-off valves shall be installed to permit the water supply to all equipment and/or fixtures in each separate room to be shut off without interfering with which of the following terms to any other room or portion of the building?

- A. A shut-off valve
- B. Each individual fixture
- C. Water supply system
- D. Stop box or meter vault
- E. Water supply
- F. None of the Above

140. For plumbing equipment or fixtures that are installed back-to-back in adjacent rooms, e.g., in adjacent restrooms, a common shut-off valve may be used to shut off which of the following terms to the back-to-back fixtures in no more than 2 adjacent rooms?

- A. Water supply
- B. Water service
- C. Water meter
- D. A common shut-off valve
- E. Supply system
- F. None of the Above

Health Care Facilities.

141. In the residence rooms of health care facilities which of the following terms to each resident unit or back-to-back rooms shall be controlled by an arrangement of line valves that permits each group of fixtures?

- A. Water supply
- B. Water service
- C. Water meter
- D. Water distribution pipe
- E. Supply system
- F. None of the Above

Flushing/Disinfection of Potable Water System

142. If the potable water supply serving the water supply system is chlorinated, e.g., a community water system, which of the following terms or appropriate repaired portion, shall be flushed with clean, potable water until no dirty water appears at the point of outlet.

- A. Water supply system
- B. Chlorine solution
- C. Water
- D. Water sample
- E. Potable water
- F. None of the Above

Non-Chlorinated Water Supply.

143. The pipe system shall be flushed with clean, potable water until which of the following terms appears at the point of outlet?

- A. No dirty water
- B. Chlorine solution
- C. The water
- D. Water sample
- E. Potable water
- F. None of the Above

144. The system shall be filled with which of the following terms containing at least 50 parts per million of chlorine, shall be valved off and allowed to stand for 24 hours?

- A. Water supply system
- B. A chlorine solution
- C. The water
- D. Water sample
- E. Potable water
- F. None of the Above

145. Following the required contact time, the system shall be flushed with clean, potable water until the chlorine level in the water discharging from the system is within acceptable limits for potable water, i.e., generally until the water has?

- A. Water supply system
- B. Chlorine solution
- C. No detectable chlorine odor
- D. Water sample
- E. Potable water
- F. None of the Above

146. To ensure that the water supplied by the water system is safe for drinking, a which of the following terms taken from the water supply system shall be secured?

- A. Water supply sample
- B. Chlorine solution sample
- C. Test
- D. Water sample
- E. Potable water sample
- F. None of the Above

Water Service Sizing

147. If flushometers or other devices requiring a high rate of water flow are used, which of the following terms shall be designed and installed to provide this additional flow?

- A. Peak demand
- B. Water service pipe
- C. An air chamber
- D. Dead ends
- E. Water system
- F. None of the Above

Demand Load.

148. The calculation of the _____ for a building shall be based on the total number and types of fixtures installed in the building.

- A. Water service demand load
- B. Peak use
- C. Any plumbing fixture
- D. Discharge side of the water meter
- E. Satisfactory operation
- F. None of the Above

149. _____ or water distribution piping ("dead ends"), where the water in the piping may become stagnant, are prohibited. A developed length of more than 2 feet shall be considered a dead end.

- A. Peak demand
- B. Freezing
- C. An air chamber
- D. Unused sections of water service
- E. Water system
- F. None of the Above

Design of a Building Water Distribution System

150. Design and Installation. The design and installation of the hot and cold water building distribution systems shall provide a volume of water at the required rates and pressures to ensure the safe, efficient and satisfactory operation of fixtures, fittings, appliances and other connected devices during periods of?

- A. Water service demand load
- B. Peak use
- C. Any plumbing fixture
- D. Discharge side of the water meter
- E. Satisfactory operation
- F. None of the Above

151. No distribution pipe or pipes shall be installed or which of the following terms or in an exterior wall unless provisions are made to protect such pipe from freezing?

- A. An exterior wall
- B. Same trench
- C. Soil or waste lines
- D. Sanitary sewer or drain
- E. Permitted outside of a building
- F. None of the Above

Minimum Water Pressure.

152. The minimum constant water service pressure on which of the following terms shall be (at least) 20 p.s.i.?

- A. Air chamber(s)
- B. An auxiliary pressure system
- C. Any plumbing fixture
- D. The discharge side of the water meter
- E. Satisfactory operation
- F. None of the Above

Auxiliary Pressure. Supplementary Tank.

153. If the pressure in the system is below the minimum 8 p.s.i. at the highest water outlet when the flow in the system is at peak demand, an automatically controlled pressure tank or gravity tank of a capacity to supply sections of the building installation which are too high to be supplied directly from?

- A. Peak demand
- B. Freezing
- C. An air chamber
- D. The public water main
- E. Water system
- F. None of the Above

Low Pressure Cut-Off.

154. When a booster pump except those used for fire protection is used on an auxiliary pressure system, there shall be installed a _____ on the booster pump to prevent the creation of pressures less than 5 p.s.i. on the suction side of the pump.

- A. Air chamber(s)
- B. An auxiliary pressure system
- C. Any plumbing fixture
- D. Discharge side of the water meter
- E. Low-pressure cut-off switch
- F. None of the Above

155. A shut-off valve shall be installed on the suction side of the water system and within 5 feet from the pump suction inlet, and _____ shall be installed between the shut-off valve and pump?

- A. Pressure relief valve(s)
- B. Energy cut-off devices
- C. A check valve or shut-off valve
- D. Pressure gauge
- E. Temperature sensing element
- F. None of the Above

Water Hammer.

156. All building water supply systems shall be provided with _____ or approved mechanical devices or water hammer arrestors to absorb high pressures.

- A. Air chamber(s)
- B. An auxiliary pressure system
- C. Any plumbing fixture
- D. Discharge side of the water meter
- E. Satisfactory operation
- F. None of the Above

Air Chambers.

157. Which of the following terms with a volume equivalent to one with the dimension listed above may also be used?

- A. Pressure relief valve(s)
- B. Energy cut-off devices
- C. An air chamber
- D. Combination pressure-temperature relief valve
- E. Temperature sensing element
- F. None of the Above

Excessive Static Water Pressure.

158. When water main pressure exceeds 80 p.s.i., a pressure reducing valve and a strainer with a by-pass relief valve shall be installed in the water service pipe near the entrance to the building to reduce the water pressure to 80 p.s.i. or lower, except where the water service pipe supplies water directly to a?

- A. Atmosphere
- B. Water main
- C. Potable water
- D. Full water main pressure
- E. Water pressure booster system
- F. None of the Above

159. When the water pressure exceeds 80 p.s.i. at any plumbing fixture, a pressure reducing valve, pressure gauge and a strainer with a?

- A. By-pass relief valve
- B. Potable water side
- C. Heat exchanger
- D. A hydropneumatic or elevated water supply tank system
- E. The applicable standard
- F. None of the Above

Variable Street Pressures.

160. Which of the following terms has a wide fluctuation in pressure, the water distribution system shall be designed for minimum pressure available at the main?

- A. Atmosphere
- B. Water main
- C. Potable water
- D. Full water main pressure
- E. A pressure relief valve
- F. None of the Above

Hot Water Supply and Distribution

161. Which of the following terms used for heating and storage of hot water shall bear the marking of an approved testing agency?

- A. All equipment
- B. Water main
- C. Potable water
- D. Full water main pressure
- E. A pressure relief valve
- F. None of the Above

162. Which of the following terms shall use a double-walled heat exchanger that is exposed or vented to the atmosphere between the walls?

- A. A solar-heated system
- B. Water main
- C. Potable water
- D. Full water main pressure
- E. A pressure relief valve
- F. None of the Above

163. Heat exchangers may be of single wall construction if a non-toxic transfer fluid with no conditioning chemicals in the system is used, or if which of the following terms is installed to isolate the heat exchanger from the potable water system?

- A. Cold water line
- B. Hot water
- C. Water heater
- D. A pressure gradient monitor system
- E. Water heater's cold water supply
- F. None of the Above

164. If pressure on the which of the following terms reaches a pressure less than 10 p.s.i. above the toxic transfer fluid pressure, an audible alarm shall be activated?

- A. Atmosphere
- B. Water main
- C. Potable water side
- D. Full water main pressure
- E. A pressure relief valve
- F. None of the Above

165. Heat exchangers using a _____ or having conditioning chemicals in the system shall be separated from the potable water by double wall construction?

- A. Toxic transfer fluid
- B. Potable water side
- C. Heat exchanger
- D. Hydropneumatic or elevated water supply tank system
- E. Standard
- F. None of the Above

Direct Fired Instantaneous Heaters.

166. A properly sized temperature and pressure relief valve, based upon the energy input rating of the heater, shall be installed on the tempered line with the temperature sensing element immersed in the tempered water line as close as possible to the?

- A. Mixing valve
- B. Water main
- C. Potable water
- D. Full water main pressure
- E. Pressure relief valve
- F. None of the Above

Water Heaters Used for Space Heating.

167. Any water heater to be used for space heating, in addition to which of the following terms, must conform to ANSI Z21.10.1a-1991?

- A. Cold water line
- B. Hot water supply
- C. Water heater
- D. Proper terminal heating device
- E. Water heater's cold water supply
- F. None of the Above

168. The mixing valve shall be set to prevent temperatures exceeding 120°F from reaching the?

- A. Cold water line
- B. Hot water
- C. Water heater
- D. Proper terminal heating device
- E. Plumbing fixtures
- F. None of the Above

169. A single check valve shall be installed in the cold water line supplying the?

- A. Cold water line
- B. Hot water
- C. Water heater
- D. Proper terminal heating device
- E. Water heater's cold water supply
- F. None of the Above

170. A properly sized and approved expansion tank shall be located on the outlet side of the check valve in the water heater's cold water supply with _____ between the heater and expansion tank?

- A. Cold water line
- B. No shut-off valve
- C. Water heater
- D. Proper terminal heating device
- E. Water heater's cold water supply
- F. None of the Above

171. Valves supplying hot water to the _____ for space heating shall have a minimum of a 1-inch orifice?

- A. Cold water line
- B. Hot water
- C. Heat transfer unit
- D. Proper terminal heating device
- E. Water heater's cold water supply
- F. None of the Above

172. The water heater instructions shall have a statement specifying that piping and components connected to the water heater for the space heating application shall be suitable for use with potable water, and _____ shall not exceed a developed length of more than 25 feet from the heating coil.

- A. Cold water line
- B. Hot water
- C. Water heater
- D. Proper terminal heating device
- E. Water heater's cold water supply
- F. None of the Above

Safety Devices

173. All equipment used for heating water or storing hot water shall be achieved by installing either a pressure relief valve and which of the following terms or by installing a combination pressure-temperature relief valve?

- A. Pressure relief valve(s)
- B. Energy cut-off devices
- C. Temperature relief valve
- D. Combination pressure-temperature relief valve
- E. Temperature sensing element
- F. None of the Above

Backflow Section

174. 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
- B. Federal laws
- C. State program regulations
- D. Cross-Connection Control
- E. Local level laws
- F. None of the Above

175. Which of the following definition terms is "the link or channel connecting a source of pollution with a potable water supply?"

- A. Direct piping
- B. Backflow
- C. Direct connection
- D. Cross-Connection
- E. Air break
- F. None of the Above

176. Which of the following definition terms, also referred to as Cross-Connection Control, addresses a serious health issue?

- A. Direct piping
- B. Backflow prevention
- C. Direct connection
- D. Cross-Connection
- E. Water purveyor rules
- F. None of the Above

177. Cross-Connection control 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

What is backflow? Reverse flow condition

178. 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
- B. Backpressure
- C. Backsiphonage
- D. Cross-connection
- E. Indirect connection
- F. None of the Above

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

- A. Backflow
- B. Backpressure
- C. Backsiphonage
- D. Cross-connection
- E. Indirect connection
- F. None of the Above

180. Which of the following terms is a type of backflow caused by a downstream pressure that is greater than the upstream or supply pressure in a public water system or consumer's potable water system?

- A. Backflow
- B. Backpressure
- C. Backsiphonage
- D. Cross-connection
- E. Indirect connection
- F. None of the Above

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

- A. Backflow
- B. Backpressure
- C. Backsiphonage
- D. Cross-connection
- E. Indirect connection
- F. None of the Above

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

- A. Backflow
- B. Backpressure
- C. Backsiphonage
- D. Cross-connection
- E. Indirect connection
- F. None of the Above

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

- A. High hazard installations
- B. Air gap
- C. Backflow preventer
- D. Backflow
- E. Device or method
- F. None of the Above

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

- A. High hazard installations
- B. Air gap
- C. Vacuum breaker
- D. Backflow
- E. Device or method
- F. None of the Above

185. Which of the following terms 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
- B. Backpressure
- C. Backsiphonage
- D. Cross-connection
- E. Indirect connection
- F. None of the Above

System Operation Section - System Elements

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

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

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

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

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

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

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

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

Hydraulic Principles Section - Hydraulics

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

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

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

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

192. 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

193. The atmosphere is the entire mass of air that surrounds the earth.

- A. True
- B. False

194. Which of the following terms 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
- B. Troposphere
- C. Sea level
- D. Mass
- E. Atmospheric pressure
- F. None of the Above

195. 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

196. Which of the following terms at sea level is approximately 14.7 psi?

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

197. If you were to ascend, the atmospheric pressure increases by approximately 1.0 psi for every 2,343 feet.

- A. True B. False

198. Which of the following terms if you could be below, an example could be in excavations and depressions, atmospheric pressure increases?

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

199. Pressures under water differ from those under air only because the weight of the water must be added to the?

- A. Barometer D. Altitude
B. Pressure(s) of the air E. Seal Level
C. Height F. None of the Above

200. Which of the following terms can be measured by any of several methods, one method is the mercury column barometer?

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

201. 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

202. Which of the following terms could be measured with the aneroid barometer?

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

203. The atmospheric pressure does not vary uniformly with?

- A. Barometer D. Altitude
B. Pressure(s) E. Equipment
C. Weight F. None of the Above

204. Atmospheric pressure is defined as the force per unit area exerted against a surface by the _____ of the air above that surface.

- A. Barometer D. Altitude
B. Pressure(s) E. Equipment
C. Weight F. None of the Above

Barometric Loop

205. 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

206. Which of the following terms could be measured on an absolute scale, psia, or psia?

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

207. Absolute pressure is equal to gauge pressure plus the atmospheric pressure.

- A. True B. False

208. 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

209. The barometric loop is a loop in the piping system that effectively protects against backpressure.

- A. True B. False

210. The barometric loop may not be used to protect against backsiphonage.

- A. True B. False

211. According to the text, absolute pressure and gauge pressure?

- A. Are the same D. That effectively protects
B. Referred to using pressure E. Permanent forces tangential
C. Are related F. None of the Above

212. Which of the following terms at sea level is 14.7 psia?

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

213. Which of the following terms is the total pressure?

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

214. 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

215. Which of the following terms would be equal to 14.7 psi, which is the atmospheric pressure?

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

Pressure

216. Water is incompressible, while air is very compressible.

- A. True B. False

217. Both air and water are considered to be?

- A. Absolute pressure D. Volume
B. Atmospheric pressure E. Shearing force
C. Fluid(s) F. None of the Above

218. Which of the following terms does water possess and air does not?

- A. Absolute pressure D. Volume
B. Atmospheric pressure E. Shearing force
C. Fluid(s) F. None of the Above

219. 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

220. According to the text, a force is proportional to the _____, and is called a pressure.

- A. Pascal's Principle D. Permanent forces tangential
B. Hydrostatics E. Area on which it is exerted
C. Acting on the body of the fluid F. None of the Above

221. In order for the fluid to be in equilibrium, the pressure must be the same in all directions and if no other forces are?

- A. Pascal's Principle D. Permanent forces tangential
B. Hydrostatics E. Area on which it is exerted
C. Acting on the body of the fluid F. None of the Above

222. Which of the following terms does water and air have; that is, layers of them slide very easily on one another?

- A. Low viscosity D. Volume
B. Atmospheric pressure E. Shearing force
C. Fluid(s) F. None of the Above

223. 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 D. Volume
B. Atmospheric pressure E. Shearing force
C. Fluid(s) F. None of the Above

224. The coefficient of viscosity is the ratio of this term to the velocity gradient.

- A. Absolute pressure D. Volume
B. Atmospheric pressure E. Shearing force
C. Fluid(s) F. None of the Above

225. Which of the following terms deals with permanent, time-independent states of fluids, so viscosity does not appear?

- A. Pascal's Principle
- B. Hydrostatics
- C. Acting on the body of the fluid
- D. Permanent forces tangential
- E. Area on which it is exerted
- F. None of the Above

226. 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
- B. Hydrostatics
- C. Acting on the body of the fluid
- D. Permanent forces tangential
- E. Area on which it is exerted
- F. None of the Above

227. Which of the following terms that if a certain volume of fluid were somehow made solid, the equilibrium of forces would not be disturbed?

- A. Axiom
- B. Gravitational body force
- C. Pressure
- D. Displaced fluid
- E. Gravitation
- F. None of the Above

228. Which of the following terms is an example of a body force that disturbs the equality of pressure in a fluid?

- A. Axiom
- B. Gravitational body force
- C. Pressure
- D. Displaced fluid
- E. Gravitation
- F. None of the Above

229. When the barometric equation, integrated, we find the variation of pressure with?

- A. Height or depth
- B. Gravitational body force
- C. Pressure
- D. Displaced fluid
- E. Gravitation
- F. None of the Above

Free Surface Perpendicular to Gravity

230. 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
- B. Gravitational body force
- C. Pressure
- D. Displaced fluid
- E. Gravitation
- F. None of the Above

Standard Atmospheric Pressure

231. Which of the following terms is a practice that is conveniently used to measure pressure differences by measuring the height of liquid columns?

- A. Barometer measurement
- B. Total vacuum
- C. Capillarity
- D. Partial vacuum measurement
- E. Manometer
- F. None of the Above

232. Which of the following terms uses a partially evacuated chamber of thin metal that expands and contracts according to the external pressure?

- A. Aneroid barometer
- B. Total vacuum
- C. Capillarity tube
- D. Partial vacuum
- E. Barometric loop
- F. None of the Above

Vacuum

233. The term vacuum indicates that the absolute pressure is less than the atmospheric pressure and that the _____ is negative.

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

234. Which of the following terms would mean a pressure of 0 psia or -14.7 psig?

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

235. According to the text, it is impossible to produce a partial vacuum.

- A. True
- B. False

236. Which of the following terms the pressure would range from slightly less than 14.7 psia to slightly greater than 0 psia?

- A. Static pressure
- B. Pressure
- C. Gauge pressure
- D. Total vacuum
- E. Partial vacuum
- F. None of the Above

237. Backsiphonage results from _____ exerted on a liquid, forcing it toward a supply system that is under a vacuum.

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

Water Pressure

238. 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

239. Which of the following terms are stated in terms of the height of a fluid?

- A. Friction
- B. Weight
- C. Pressure(s)
- D. Siphon
- E. Depth
- F. None of the Above

240. Water with a pressure head of 10 ft can provide the same _____ as an equal amount of water raised by 10 ft.

- A. Friction
- B. Weight
- C. Pressure(s)
- D. Siphon
- E. Energy
- F. None of the Above

241. Water flowing in a pipe is subject to head loss because of?

- A. Friction
- B. Weight
- C. Pressure(s)
- D. Siphon
- E. Energy
- F. None of the Above

242. The name is Greek for the tube and is another application of pressure is the?

- A. Epihydro
- B. Water bearer
- C. Siphon
- D. Hydrostat
- E. Hydraulic machine
- F. None of the Above

243. When a siphon goes below the free water levels, it is called an?

- A. Epihydro
- B. Water bearer
- C. Siphon
- D. Hydrostat
- E. Inverted siphon
- F. None of the Above

244. Which of the following terms can be made by filling the tube, closing the ends, and then putting the ends under the surface on both sides?

- A. Epihydro
- B. Water bearer
- C. Siphon
- D. Hydrostat
- E. Inverted siphon
- F. None of the Above

Pressure and Force

245. Which of the following terms is the force that pushes water through pipes?

- A. Absolute pressure
- B. Pressure
- C. Fluid(s)
- D. Volume
- E. Shearing force
- F. None of the Above

246. Water pressure determines the flow of water from the tap.

- A. True
- B. False

Development of Hydraulics

247. Which of the following terms to be made effective for practical applications, it was necessary to have a piston that "fit exactly?"

- A. Pascal's law
- B. Evangelista Torricelli
- C. Blaise Pascal
- D. Aristotle' law
- E. Archimedes' law
- F. None of the Above

248. 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

249. One characteristic of a liquid is the tendency to keep its free surface level.

- A. True
- B. False

250. During the same period, Blaise Pascal, a French scientist, discovered the fundamental law for the science of?

- A. Pressure
- B. Experiments
- C. Hydraulics
- D. Force
- E. Physics
- F. None of the Above

251. Which of the following terms 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
- B. Evangelista Torricelli
- C. Blaise Pascal
- D. Aristotle' law
- E. Archimedes' law
- F. None of the Above

252. The mercury column was held up by horror vacui as Aristotle had supposed.

- A. True B. False

253. 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 D. Blaise Pascal
B. Otto von Guericke E. Archimedes'
C. Evangelista Torricelli F. None of the Above

254. Which of the following scientists making the first vacuum pump, which he used in vivid demonstrations of the pressure of the atmosphere?

- A. Aristotle D. Blaise Pascal
B. Otto von Guericke E. Archimedes'
C. Evangelista Torricelli F. None of the Above

255. 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

256. Which of the following terms is by no means isothermal close to the ground?

- A. Stratosphere D. Atmospheric pressure
B. Tropopause E. Sea level
C. Atmosphere F. None of the Above

Meteorology

257. Which of the following terms is of great importance in meteorology, since it determines the winds?

- A. Stratosphere D. Atmospheric pressure
B. Tropopause E. Sea level
C. Atmosphere F. None of the Above

258. Certain typical weather patterns are associated with relatively high and relatively low _____, and how they vary with time.

- A. Stratosphere D. Pressures
B. Tropopause E. Sea level
C. Atmosphere F. None of the Above

Pascal's Law

259. Pascal discovered that pressure in a fluid acts equally in some directions.

- A. True B. False

260. According to the text, pressure acts at right angles to the containing surfaces.

- A. True B. False

261. 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

262. Pressure in a _____ of direction.
- A. Modern hydraulics
 - B. Liquid at a specific depth
 - C. Liquid is independent
 - D. Weight of a liquid
 - E. Height of a liquid
 - F. None of the Above

263. Pressure due to the _____, at any level, depends on the depth of the fluid from the surface.
- A. Modern hydraulics
 - B. Liquid at a specific depth
 - C. Liquid is independent
 - D. Weight of a liquid
 - E. Height of a liquid
 - F. None of the Above

264. If the exposed face of the pressure gauges are moved closer to the surface of the liquid, the indicated?
- A. Depth is doubled
 - B. Pressure will be less
 - C. Pressure of a liquid
 - D. Column is tripled
 - E. Is equal
 - F. None of the Above

265. The indicated pressure is doubled, when the?
- A. Depth is doubled
 - B. Pressure will be less
 - C. Pressure of a liquid
 - D. Column is tripled
 - E. Is equal
 - F. None of the Above

266. 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
 - B. Pressure will be less
 - C. Pressure of a liquid
 - D. Liquid is equal to the weight
 - E. Is equal
 - F. None of the Above

267. Which of the following terms produces the pressure is referred to as the fluid head of the liquid?
- A. Depth is doubled
 - B. Pressure will be less
 - C. Pressure of a liquid
 - D. Volume of a liquid
 - E. Is equal
 - F. None of the Above

268. Which of the following terms is due to its fluid head is also dependent on the density of the liquid?
- A. Depth is doubled
 - B. Pressure will be less
 - C. Pressure of a liquid
 - D. Volume of a liquid
 - E. Is equal
 - F. None of the Above

Static Pressure

269. Static pressure exists in addition to Gravity may be present at the same time.
- A. True
 - B. False

270. 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. Pressure drop
 - B. Velocity of flow
 - C. Volume of a liquid
 - D. Speed
 - E. Static head
 - F. None of the Above

271. 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
- B. Velocity of flow
- C. Volume of a liquid
- D. Fluid power
- E. Static head
- F. None of the Above

272. 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. Pressure drop
- B. Friction head
- C. Volume of a liquid
- D. Fluid power
- E. Static head
- F. None of the Above

273. Which of the following terms can be produced by pressure or head when dealing with fluids?

- A. Pressure drop
- B. Velocity of flow
- C. Force
- D. Fluid power
- E. Static head
- F. None of the Above

Volume and Velocity of Flow

274. 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
- B. Friction head
- C. Volume of a liquid
- D. Velocity of flow
- E. Volume of flow
- F. None of the Above

275. 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. Pressure drop
- B. Friction head
- C. Volume of a liquid
- D. Velocity of flow
- E. Volume of flow
- F. None of the Above

276. 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 fps or fpm?

- A. Pressure drop
- B. Friction head
- C. Volume of a liquid
- D. Velocity of flow
- E. Volume of flow
- F. None of the Above

277. Which of the following flow terms is an important consideration in sizing the hydraulic lines?

- A. Pressure drop
- B. Friction head
- C. Volume of a liquid
- D. Velocity of flow
- E. Volume of flow
- F. None of the Above

278. 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

Confined Space Safety Section

279. The Confined Space Entry Program is provided to protect authorized employees that will enter confined spaces and may be exposed to hazardous atmosphere, engulfment in materials, conditions which may trap or asphyxiate due to converging or sloping walls, or contains any other safety or health hazards.

- A. True B. False

Scope

280. According to the text, you are required to recognize _____ associated with confined spaces.

- A. An internal configuration D. Dangers and hazards
B. Hazardous atmosphere E. Atmospheric factors and physical agents
C. Permit-Required Confined Space F. None of the Above

Definitions

Confined space:

281. Is large enough or so configured that an employee can?

- A. Engulfing an entrant D. Recognized serious safety or health hazard
B. Bodily enter and perform work E. Continuous employee occupancy
C. An internal configuration F. None of the Above

282. Is not designed for?

- A. Engulfing an entrant D. Recognized serious safety or health hazard
B. Hazardous atmospheres E. Continuous employee occupancy
C. An internal configuration F. None of the Above

283. Permit required confined space is a confined space that has one or more of the following characteristics: Contains or has a potential to contain a?

- A. An internal configuration D. Entry or exit
B. Hazardous atmosphere E. Atmospheric factors and physical agents
C. Permit-Required Confined Space F. None of the Above

284. Has limited or restricted means for entry or exit i.e. tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have?

- A. An internal configuration D. Entry or exit
B. Hazardous atmosphere E. Atmospheric factors and physical agents
C. Limited means of entry F. None of the Above

285. Contains a material that has the?

- A. Engulfing an entrant D. Recognized serious safety or health hazard
B. Hazardous atmospheres E. Continuous employee occupancy
C. Potential for engulfing an entrant F. None of the Above

286. Has an internal configuration such that _____ could be trapped or asphyxiated by inwardly covering walls or by a floor that slopes downward and tapers to a smaller cross-section.

- A. An internal configuration D. An entrant
B. Hazardous atmosphere E. Atmospheric factors and physical agents
C. Permit-Required Confined Space F. None of the Above

287. Contains any other recognized serious safety or?
A. Engulfing an entrant D. Health hazard
B. Hazardous atmospheres E. Continuous employee occupancy
C. An internal configuration F. None of the Above

288. Which of the following terms -will be marked "Confined Space - Entry Permit Required"?
A. An internal configuration D. Entry or exit
B. Hazardous atmosphere E. Atmospheric factors and physical agents
C. Permit-Required Confined Space F. None of the Above

Confined Space Hazards

289. Fatalities and injuries constantly occur among construction workers who, during the course of their jobs, are required to enter?

- A. An internal configuration D. Entry or exit
B. Hazardous atmosphere E. Confined spaces
C. Ventilation ducts F. None of the Above

290. Throughout the construction jobsite, contractors and workers encounter both inherent and _____ within confined workspaces.

- A. An internal configuration D. Induced hazards
B. Hazardous atmosphere E. Atmospheric factors and physical agents
C. Permit-Required Confined Space F. None of the Above

Inherent Hazards

291. Which of the following terms such as electrical, thermal, chemical, mechanical, etc., are associated with specific types of equipment and the interactions among them?

- A. Inherent hazards D. Recognized serious safety or health hazard
B. Hazardous atmospheres E. Continuous employee occupancy
C. An internal configuration F. None of the Above

292. Inherent Hazards include high voltage, radiation generated by equipment, _____, omission of protective features, high or low temperatures, high noise levels, and high-pressure vessels and lines.

- A. An internal configuration D. Defective design
B. Hazardous atmosphere E. Atmospheric factors and physical agents
C. Permit-Required Confined Space F. None of the Above

293. Inherent hazards usually cannot be eliminated without degrading the system or equipment, or without making them inoperative. An emphasis must be placed on?

- A. Hazard control methods D. Recognized serious safety or health hazard
B. Hazardous atmospheres E. Continuous employee occupancy
C. An internal configuration F. None of the Above

Induced Hazards

294. Induced Hazards are: omission of protective features, physical arrangements that may cause unintentional worker contact with electrical energy sources, oxygen-deficient atmospheres created at the bottom of pits or shafts, lack of safety factors in structural strength, and?

- A. Common confined space D. An oxygen-deficient atmosphere
B. Hazard E. Flammable atmospheres
C. Vaults F. None of the Above

295. Which of the following terms arise, and are induced from, a multitude of incorrect decisions and actions that occur during the actual construction process?

- A. Induced hazards
- B. Below-grade location
- C. Vibration
- D. Build-up of explosive gases
- E. Oxygen-deficient atmospheres
- F. None of the Above

Typical Examples of Confined Workspaces

296. An examples of confined workspaces in construction which contain?

- A. Purging agents
- B. Below-grade location
- C. Vibration
- D. Both inherent and induced hazards
- E. Oxygen-deficient atmospheres
- F. None of the Above

Condenser Pits

297. According to the text, a common confined space found in the construction of nuclear power plants is the condenser pit, because of their large size, they are often overlooked as?

- A. Common confined spaces
- B. Hazards
- C. Vaults
- D. An oxygen-deficient atmospheres
- E. Potentially hazardous confined spaces
- F. None of the Above

298. Below-grade areas create large containment areas for the accumulation of toxic fumes, gases, and so forth, or for the creation of _____ when purging with argon, Freon, and other inert gases.

- A. Purging agents
- B. Below-grade location
- C. Vibration
- D. Build-up of explosive gases
- E. Oxygen-deficient atmospheres
- F. None of the Above

299. Which of the following terms - will be created by workers above dropping equipment, tools, and materials into the pit?

- A. Hazards
- B. Collection places
- C. Heat prostration
- D. Problem with the pumps
- E. Oxygen deficiencies
- F. None of the Above

300. Which of the following terms - are associated with manholes?

- A. Nitrogen purge or dry air
- B. Collection places
- C. A variety of hazards
- D. Problem with the pumps
- E. Oxygen deficiency exists
- F. None of the Above