Registration form

HYDRAULIC PRINCIPLES CEU TRAINING COURSE $100.00

48 HOUR RUSH ORDER PROCESSING FEE ADDITIONAL $50.00

Start Date: _____ Finish Date: _____
You will have 90 days from this date in order to complete this course

List 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# _____Class/Grade_____

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

Water Treatment _____ Distribution _____ Collection_____ Wastewater Treatment _____
Pump Installer_____ CSI_____ AWWA Backflow_____ Other _____

Technical Learning College PO Box 3060, Chino Valley, AZ 86323
Toll Free (866) 557-1746 Fax (928) 272-0747 e-mail 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.

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, death, neglect, damage caused by this CEU education training or course material suggestion or error.

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. 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. Check here to see if the course is was approved in your State, TLC does not guarantee if the course is accepted for credit because States change their rules. Look under Links for State Approval Listing

State Approval Listing URL…
http://www.abctlc.com/downloads/PDF/CEU%20State%20Approvals.pdf

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

All downloads are electronically tracked and monitored for security purposes.

You can obtain a printed version from TLC for an additional $89.95 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.

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.

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.

For Texas TCEQ Wastewater / Collections Operators

Rule Changes and Updates for Domestic Wastewater Systems
On Nov. 4, 2014, TCEQ commissioners adopted revisions to 30 Texas Administrative Code (TAC), Chapter 217, Design Criteria for Domestic Wastewater Systems, and "re-adopted" previously repealed rules in 30 TAC, Chapter 317, Design Criteria Prior to 2008.

Some of the changes to Chapter 217 include:

- Adding new definitions and clarifying existing definitions;
- Adding design criteria and approval requirements for rehabilitation of existing infrastructure;
- Adding design criteria for new technologies, including cloth filters and air lift pumps;
- Making changes to reflect modern practices, standards and trends;
- Modifying rule language to improve readability and enforceability; and
- Modifying the design organic loadings and flows for a new wastewater treatment facility.

SUBCHAPTER A: ADMINISTRATIVE REQUIREMENTS §§217.1 - 217.18
Effective December 4, 2015 §217.1. Applicability. (a) Applicability. (1) This chapter applies to the design, operation, and maintenance of: (A) domestic wastewater treatment facilities that are constructed with plans and specifications received and approved by the executive director after the effective date of the amendments to this chapter; (B) treatment units that are altered, constructed, or re-rated with plans and specifications received and approved by the executive director after the effective date of the amendments to this chapter; (C) collection systems that are constructed with plans and specifications received and approved by the executive director after the effective date of the amendments to this chapter; (D) collection system units that are altered, constructed, or re-rated with plans and specifications received and approved by the executive director after the effective date of the amendments to this chapter; (E) existing domestic wastewater treatment facilities that do not have a current Texas Pollutant Discharge Elimination System permit or a Texas Land Application Permit and are required to have an active wastewater permit; (F) existing wastewater treatment facilities and collection systems that never received approval for plans and specifications from the executive director; and (G) collection system rehabilitation projects covered in §217.56(c) and §217.69 of this title (relating to Trenchless Pipe Installation; and Maintenance, Inspection, and Rehabilitation of the Collection System). (2) Domestic wastewater treatment facilities, treatment units, collection systems, and collection system units with plans and specifications approved by the executive director that were received on or after August 28, 2008 and before the effective date of this chapter must comply with the rules in this chapter, as they existed immediately before the effective date of the amendments to this chapter.

The rules in Texas Commission on Environmental Quality Page 2 Chapter 217 - Design Criteria for Domestic Wastewater Systems effect immediately before the effective date of the amendments to this chapter are continued in effect for that purpose. (3) This chapter does not apply to: (A) the design, installation, operation, or maintenance of domestic wastewater treatment facilities, treatment units, collection systems, or collection system units with plans and specifications that were approved by the executive director on or before August 27, 2008, which are governed by Chapter 317 of this title (relating to Design Criteria Prior to 2008) or design criteria that preceded Chapter 317 of this title; and (B) systems regulated by Chapter 285 of this title (relating to On-Site Sewage Facilities); or collection systems or wastewater treatment

facilities that collect, transport, treat, or dispose of wastewater that does not have the characteristics of domestic wastewater, although the wastewater may contain domestic wastewater.

(b) The executive director may grant variances from new requirements added by the amendments of this chapter to a person who proposes to construct, alter, or re-rate a collection system or wastewater treatment facility if the plans and specifications for the project are submitted within 180 days after the date the amendments to this chapter are effective, provided the plans and specifications comply with the rules in effect immediately prior to the amendment. Adopted November 4, 2015 Effective December 4, 2015

The link to the rules is available on the TCEQ website at
https://www.tceq.texas.gov/rules/indxpdf.html

Please sign and date this notice

Printed Name

_____

Signature Date

_____

Texas Students Only

Acknowledgement of Notice of Potential Ineligibility for License

You are required to sign and return to TLC or your credit will not be reported.

Name:_____

Date of Birth:_____

Email Address: _____

By signing this form, I acknowledge that Technical Learning College notified me of the following:

- the potential ineligibility of an individual who has been convicted of an offense to be issued an occupational license by the Texas Commission on Environmental Quality (TCEQ) upon completion of the educational program;
- the current TCEQ Criminal Conviction Guidelines for Occupational Licensing, which describes the process by which the TCEQ's Executive Director determines whether a criminal conviction:
- renders a prospective applicant an unsuitable candidate for an occupational license;
- warrants the denial of a renewal application for an existing license; or
- warrants revocation or suspension of a license previously granted.
- the right to request a criminal history evaluation from the TCEQ under Texas Occupations Code Section 53.102; and
- that the TCEQ may consider an individual to have been convicted of an offense for the purpose of denying, suspending or revoking a license under circumstances described in Title 30 Texas Administrative Code Section 30.33.

Enrollee Signature: _____ Date: _____

Name of Training Provider/Organization: Technical Learning College

Contact Person: Melissa Durbin Role/Title: Dean

Special Notice to all Texas (TCEQ) Students

§ 344.51. SPECIFIC CONDITIONS AND CROSS-CONNECTION CONTROL.
(d) If an irrigation system is designed or installed on a property that is served by an on-site sewage facility, as defined in Chapter 285 of this title (relating to On-Site Sewage Facilities), then:

(1) all irrigation piping and valves must meet the separation distances from the On-Site Sewage Facilities system as required for a private water line in §285.91(10) of this title (relating to Minimum Required Separation Distances for On-Site Sewage Facilities);

(2) any connections using a private or public potable water source must be connected to the water source through a reduced pressure principle backflow prevention assembly as defined in §344.50 of this title (relating to Backflow Prevention Methods); and

(3) any water from the irrigation system that is applied to the surface of the area utilized by the On-Site Sewage Facility system must be controlled on a separate irrigation zone or zones so as to allow complete control of any irrigation to that area so that there will not be excess water that would prevent the On-Site Sewage Facilities system from operating effectively.

Texas TCEQ STUDENTS ONLY

All TCEQ Students will need to sign this and date this form as well. TCEQ students will also be given special assistance if you fail the examination. You will also have access to failed or wrong questions and/or the area or topic of the assignment to complete your learning experience.

Attention Texas TCEQ Operators, Irrigators, CSI and Backflow Testers…
NOTE: Any course cannot be taken for same credit in the same renewal period. Please call TCEQ and make sure that these courses are still accepted for credit before starting. Do not retake this course for credit in the same renewal period. TCEQ rules and decisions change frequently.

Signature _____

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

HYDRAULIC PRINCIPLES CEU Training Course
CUSTOMER SERVICE RESPONSE CARD

NAME: _____

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?_____

What would you do to improve the course?

_____

_____

Any other concerns or comments.

_____

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Please write down any questions you were not able to find the answers or that have errors.

Hydraulic Principles CEU Course Answer Key

Name_____

Phone _____

Did you check with your State agency to ensure this course is accepted for credit?

You are responsible 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 course approval number, if applicable? _____

You can electronically complete this assignment in Adobe Acrobat DC.

Please Circle, Bold, Underline or X, one answer per question. A **felt tipped pen** works best.

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HYDRAULIC PRINCIPLES CEU COURSE ASSIGNMENT

You may re-type or use this Word document to assist your assignment

You will have 90 days from receipt of this course to complete in order to receive your Continuing Education Units (**CEUs**) or Professional Development Hours (**PDHs**).

A score of 70 % or better is necessary to pass this course. If you should need any assistance, please email all concerns and the final test to info@tlch2o.com. You can find online assistance for this course on the in the Search function on Adobe Acrobat PDF to help find the answers.

Please include your name and address on your Answer Sheet.
Please write down any questions you were not able to find the answers or that have errors.

One answer per question.

Common Hydraulic Terms

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

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

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

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

5. Which of the following definitions is the pressure in a fluid at rest?
A. Head, Friction C. Head
B. Pressure, Static D. None of the above

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

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

8. Which of the following definitions is pressure above zero absolute, i.e. the sum of atmospheric and gauge pressure?
A. Pressure, Atmospheric C. Pressure, Gauge
B. Pressure, Static D. None of the above

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

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

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

12. Which of the following includes the manner in which liquids act in tanks and pipes, deals with their properties and explores ways to take advantage of these properties?
A. Pressure C. Hydraulics
B. Hydrostatics D. None of the above

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

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

15. Hydraulics can be divided into two areas, _____ and hydrokinetics.
A. Fluids C. Hydrokinetics
B. Hydrostatics D. None of the above

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

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

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

19. _____ is the layer called that spreads upward for about 300-500 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. Atmospheric pressure C. Sea level
B. Troposphere D. None of the above

20. 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

21. Which of the following terms at sea level is approximately 14.7 psi?
A. Atmospheric pressure C. Sea level
B. Pressure(s) of the air D. None of the above

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

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

24. Which of the following can be measured by several methods, one method is the mercury column barometer?
A. Static pressure C. Sea level
B. Atmospheric pressure D. None of the above

25. 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

26. Which of the following can be measured with the aneroid Barometer?
A. Static pressure C. Atmospheric pressure
B. Pressure D. None of the above

27. Atmospheric pressure does not vary consistently with?
A. Altitude C. Weight
B. Pressure(s) D. None of the above

28. Atmospheric pressure is demarcated as the force per unit area exerted against a surface by the _____ of the air above that surface.
A. Altitude C. Weight
B. Pressure(s) D. None of the above

Barometric Loop
29. 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

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

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

32. 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

33. According to the text, absolute pressure and gauge pressure?
A. Are the same C. Permanent forces tangential
B. Are related D. None of the above

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

35. Which of the following terms is the total pressure?
A. Static pressure C. Gauge pressure
B. Absolute pressure D. None of the above

36. 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

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

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

39. Both air and water are considered to be?
A. Fluid(s) C. Volume
B. Shearing force(s) D. None of the above

40. Which of the following terms does water possess and air does not?
A. Fluid(s) C. Volume
B. Shearing force(s) D. None of the above

41. 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

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

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

44. The coefficient of viscosity is the ratio of this term to the velocity gradient.
A. Absolute pressure C. Volume
B. Shearing force D. None of the above

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

46. Which of the following terms is an example of a body force that disturbs the equality of pressure in a fluid?
A. Axiom C. Displaced fluid
B. Gravitation D. None of the above

47. In relation to the barometric equation, for when this equation is integrated, we find the variation of pressure with?
A. Axiom C. Displaced fluid
B. Gravitation D. None of the above

Free Surface Perpendicular to Gravity
48. 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. Pressure C. Displaced fluid
B. Gravitational body force D. None of the above

Standard Atmospheric Pressure
49. Which of the following terms is a practice that is convenient to measure pressure differences by measuring the height of liquid columns?
A. Aneroid barometer C. Partial vacuum
B. Manometer D. None of the above

50. 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 C. Partial vacuum
B. Manometer D. None of the above

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

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

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

54. In the _____, the pressure would range from slightly less than 14.7 psia to slightly greater than 0 psia?
A. Total vacuum C. Atmospheric pressure
B. Partial vacuum D. None of the above

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

Water Pressure
56. 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

57. Which of the following are defined in terms of the height of a fluid.
A. Friction C. Pressure(s)
B. Depth D. None of the above

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

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

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

Pressure and Force
61. Which of the following terms is the force that pushes water through pipes?
A. Absolute pressure C. Volume
B. Pressure D. None of the above

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

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

64. Which of the following terms represents the amount of push or pull applied to each unit area of the surface?
A. Force C. Volume
B. Pressure D. None of the above

65. Which of the following represents a total push or pull. It is the push or pull exerted against the total area of a particular surface?
A. Force C. Volume
B. Pressure D. None of the above

66. Which of the following terms maybe exerted in one direction, in several directions, or in all directions?
A. Force C. Volume
B. Pressure D. None of the above

Development of Hydraulics

67. 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

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

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

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

71. Blaise Pascal, a French scientist, discovered the fundamental law for the science of?
A. Pressure C. Hydraulics
B. Hydrostatics D. None of the above

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

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

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

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

76. Which of the terms is by no means isothermal close to the ground?
A. Stratosphere C. Atmosphere
B. Tropopause D. None of the above

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

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

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

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

81. 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 always read the same.
A. True B. False

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

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

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

85. The indicated pressure is doubled, when the?
A. Depth is doubled C. Column is tripled
B. Pressure will be less D. None of the above

86. The pressure at any depth in _____ of the column of liquid at that depth divided by the cross-sectional area of the column at that depth.
A. Volume of a liquid C. Liquid is equal to the weight
B. Pressure of a liquid D. None of the above

87. Which of the following produces the pressure is referred to as the fluid head of the liquid?
A. Volume of a liquid C. Liquid is equal to the weight
B. Pressure of a liquid D. None of the above

88. _____ is due to its fluid head is also dependent on the density of the liquid.
A. Volume of a liquid C. Liquid is equal to the weight
B. Pressure of a liquid D. None of the above

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

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

91. 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 C. Fluid power
B. Static head D. None of the above

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

93. The dynamic factors of inertia and friction are related to the static factors. Velocity head and _____ are obtained at the expense of static head.
A. Friction head C. Fluid power
B. Static head D. None of the above

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

95. 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 C. Volume of flow
B. Volume of a liquid D. None of the above

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

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

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

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

100. Which of the following explains the difference between the outside and inside causes a net force on the shower curtain which sucks it inward?
A. Pressure C. Volume of a liquid
B. Friction head D. None of the above

What is Backflow?
101. Backflow is the undesirable reversal of flow of nonpotable water or other substances through a _____and into the piping of a public water system or consumer's potable water system.
A. Backflow C. Cross-connection
B. Indirect connection D. None of the above

102. Which of the following can occur when there is a stoppage of water supply due to nearby firefighting, a break in a water main?
A. Backsiphonage C. Cross-connection
B. Backpressure D. None of the above

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

104. Which of the following can result from an increase in downstream pressure, a reduction in the potable water supply pressure, or a combination of both?
A. Backflow C. Backsiphonage
B. Backpressure D. None of the above

105. Which of the following can have two forms-backpressure and backsiphonage?
A. Backflow C. Cross-connection
B. Backpressure D. None of the above

106. The basic mechanism for preventing backflow is a mechanical _____, which provides a physical barrier to backflow.
A. Air gap C. Backflow
B. Backflow preventer D. None of the above

107. The principal types of mechanical backflow preventer are the reduced-pressure principle assembly, the _____, and the double check valve assembly.
A. Vacuum breaker C. Backflow check
B. Air gaper D. None of the above

108. Which of the following is a means or mechanism to prevent backflow?
A. Check device or method C. Backflow check valve
B. Backflow preventer D. None of the above

109. According to the text, basic means of preventing backflow is a(n) _____, which either eliminates a cross-connection or provides a barrier to backflow.
A. Vacuum breaker C. Backflow check
B. Air gap D. None of the above

110. Which of the following is any temporary or permanent connection between a public water system or consumer's potable water system and any source or system containing nonpotable water or other substances?
A. Indirect connection C. Cross-connection
B. Jumper D. None of the above

111. Which of the following is a type of 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 C. Cross-connection
B. Backpressure D. None of the above

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

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

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

115. When the _____is restricted, such as the case of an air gap located near a wall, the air gap separation must be increased.
A. Air break C. Airflow
B. Barrier to backflow D. None of the above

116. An air gap is a physical disconnection between the free flowing discharge end of a potable water pipeline and the top of a(n)?
A. Open receiving vessel C. Barrier to backflow
B. Air break D. None of the above

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

118. An air break is a physical separation between the free flowing discharge end of a potable water supply pipeline, and the overflow rim of an open or non pressure receiving vessel.
A. True B. False

119. According to the text, air gap separations must be vertically orientated a distance of at least twice the inside diameter of the supply, but never less than?
A. 1 inch C. 12 inches
B. 2 inches D. None of the above

120. An obstruction around or near an _____ may restrict the flow of air into the outlet pipe and nullify the effectiveness of the air gap to prevent backsiphonage.
A. Open receiving vessel C. Air gap
B. Air break D. None of the above

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

Vacuum Breakers
122. Which of the following devices can have two primary types: atmospheric and pressure.
A. Vacuum breaker(s) C. Hazard application(s)
B. Atmospheric vacuum breakers D. None of the above

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

124. Both vacuum breakers devices open the pipeline to atmosphere in the event of backsiphonage only.
A. True B. False

125. Both vacuum breakers devices are approved for backpressure conditions.
A. True B. False

126. Both vacuum breakers devices are only suitable for?
A. High hazard installations C. Low hazard conditions
B. High pollutional concerns D. None of the above

127. Which of the following may not be installed downstream of atmospheric vacuum breakers but are allowed on pressure vacuum breakers?
A. Valve assembly C. Air inlet valve
B. Shut offs D. None of the above

128. The devices must be installed above the highest?
A. Downstream piping C. Hazard applications
B. Vacuum breakers D. None of the above

129. Which of the following contains a float check, a check seat, and an air inlet port?
A. Double check C. RP
B. Atmospheric vacuum breaker D. None of the above

130. Atmospheric vacuum breakers Uses: Irrigation systems, commercial dishwasher and laundry equipment, chemical tanks and laboratory sinks.
A. True B. False

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

132. The PVB needs to be installed 12 inches above the service or supply line to work correctly.
A. True B. False

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

134. The double check valve assembly is designed to prevent backflow caused by backpressure and backsiphonage from high health hazards.
A. True B. False

135. The double check valve should be installed in an _____and protected from freezing.
A. Confined space C. Above the ground
B. Accessible location D. None of the above

136. The DC needs to be installed 12 inches _____for testing purposes only.
A. In a Confined space D. In a pit
B. Accessible location E. above the highest downstream outlet
C. Above the ground F. None of the above

137. Reduced Pressure Backflow Assembly (RP) consists of two independently acting spring loaded check valves separated by a Spring loaded differential pressure relief valve, two resilient seated full ported shutoff valves, and four properly located resilient seated test cocks.
A. True B. False

138. During normal operation, the pressure between the two check valves, referred to as the air inlet zone, is maintained at a higher pressure than the supply pressure.
A. True B. False

139. If either reduced pressure backflow assembly check valve leaks, the differential pressure relief valve maintains a differential pressure of at least two (2) psi between the supply pressure and the zone between the two check valves by discharging water to atmosphere.
A. True B. False

140. The reduced pressure backflow assembly or RP is designed to prevent backflow caused by backpressure and backsiphonage from low to high health hazards.
A. True B. False

141. The RP needs to installed 12 inches above the ground for testing purposes only.
A. True B. False

142. The reduced pressure backflow assembly can be used for high hazard situations under backpressure only. Under normal conditions, the second check valve should never close.
A. True B. False

143. According to the text, if the second check valve fails or becomes fouled and backflow into the reduced pressure zone occurs, the relief port vents the backflow to atmosphere.
A. True B. False

144. According to the text, the reduced pressure zone port opens anytime pressure in the zone comes within 2 psi of the supply pressure.
A. True B. False

General Pumping Fundamentals
145. Here are the important points to consider about suction piping when the liquid being pumped is below the level of the pump: Sometimes suction lift is also referred to as ‘positive suction head’.
A. True B. False

146. According to the text, suction lift is when the level of water to be pumped is below the?
A. Impeller C. Centerline of the pump
B. Suction D. None of the above

Pumps
147. Pumps are excellent examples of?
A. Hydrostatics C. Multi-stage pumps
B. Quasi-static devices D. None of the above

148. Positive displacement pumps have a piston (or equivalent) moving in a closely-fitting cylinder and forces are exerted on the fluid by motion of the piston.
A. True B. False

149. More complicated pumps have valves check valves that open to allow _____, and close automatically to prevent reverse flow.
A. Pistons C. Passage in one direction
B. Diaphragms D. None of the above

150. According to the text, the force pump has _____in the cylinder, one for supply and the other for delivery.
A. Two check valves C. Rotors
B. Diaphragms D. None of the above

151. Ina positive displacement pump, supply valve opens when the cylinder _____, the delivery valve when the cylinder volume decreases.
A. Volume increases C. Air space increases
B. Volume decreases D. None of the above

152. Diaphragm pumps are force pumps in which the oscillating diaphragm takes the place of the piston.
A. True B. False

Pump Categories
153. The key to understanding a pump's operation is that a pump is to move water and generate the _____ we call pressure.
A. Delivery force C. Diaphragm pressure
B. Impeller force D. None of the above

154. With a centrifugal pump the pressure is not referred to in pounds per square inch but rather as the equivalent in elevation, called?
A. Inward force C. Delivery force
B. Head D. None of the above

155. According to the text, pumps may be classified based on the application they serve.
A. True B. False

Basic Water Pump
156. The centrifugal pumps work by spinning water around in a circle inside a?
A. Vortex C. Cylindrical pump housing
B. Cylinder D. None of the above

157. As the water slows down and its kinetic energy decreases, that water's pressure potential energy increases.
A. True B. False

158. As the water spins, the pressure near the outer edge of the pump housing becomes much lower than near the center of the impeller.
A. True B. False

159. The impeller blades cause the water to move faster and faster.
A. True B. False

160. The impellers may be of either a semi-open or closed type.
A. True B. False

161. According to the text, without an inward force, an object will travel in a straight line and will not complete the?
A. Circle C. Center
B. Distance D. None of the above

162. In a centrifugal pump, the inward force is provided by high-pressure water near the outer edge of the?
A. Pump housing C. Base
B. Impeller blade(s) D. None of the above

163. In the operation of the pump, the water at the edge of the _____ inward on the water between the impeller blades and makes it possible for that water to travel in a circle.
A. Inward force C. Center of the impeller
B. Pump pushes D. None of the above

Venturi (Bernoulli's law):
164. A venturi is a pipe that has a gradual restriction that opens up into a gradual enlargement.
A. True B. False

Types of Water Pumps
165. The water production well industry almost exclusively uses Turbine pumps, which are a type of centrifugal pump.
A. True B. False

166. The most common type of water pumps used for municipal and domestic water supplies are?
A. Axial flow C. Rotary pumps
B. Variable displacement pumps D. None of the above

167. Which of the following will produce at different rates relative to the amount of pressure or lift the pump is working against?
A. Pump's lifting capacity C. Variable displacement pump
B. Atmospheric pressure D. None of the above

168. Impellers are rotated by the pump motor, which provides the _____ needed to overcome the pumping head.
A. Pump's lifting capacity C. Horsepower
B. Atmospheric pressure D. None of the above

169. The size and number of stages, horsepower of the motor and _____are the key components relating to the pump's lifting capacity.
A. Pumping head C. Horsepower
B. Atmospheric pressure D. None of the above

170. Which of the following terms are variable displacement pumps that are by far used the most?
A. Axial flow C. Turbine pumps
B. Centrifugal pumps D. None of the above

171. According to the text, the turbine pump utilizes impellers enclosed in single or multiple bowls or stages to?
A. Pump head C. Horsepower
B. Lift water D. None of the above

172. Vertical turbine pumps are commonly used in groundwater wells. These pumps are driven by a shaft rotated by a motor on the surface.
A. True B. False

173. The shaft turns the impellers within the pump housing while the?
A. Desired pumping rate is obtained C. Water moves up the column
B. Horsepower turns the shaft D. None of the above

174. The rotating shaft in a line shaft turbine is actually housed within the column pipe that delivers the water to the surface.
A. True B. False

175. The size of the _____are selected based on the desired pumping rate and lift requirements.
A. Impeller(s) C. Column, impeller, and bowls
B. Lantern ring D. None of the above

176. According to the text, column pipe sections can be threaded or coupled together while the drive shaft is coupled and suspended within the column by?
A. Column pipe C. Lantern ring
B. Spider bearings D. None of the above

177. The water passing through the column pipe serves as the lubricant for the bearings.
A. True B. False

178. Which of the following terms, provide both a seal at the column pipe joints and keep the shaft aligned within the column?
A. Column pipe C. Lantern ring
B. Spider bearings D. None of the above

179. The oil tube is suspended within the column by_____, while the line shaft is supported within the oil tube by brass or redwood bearings.
A. Column pipe C. Spider flanges
B. Spider bearings D. None of the above

180. A continuous supply of _____ lubricates the drive shaft as it proceeds downward through the oil tube.
A. Grease C. Water
B. Oil D. None of the above

There are three main types of diaphragm pumps:
181. In the first type, the _____with one side in the fluid to be pumped, and the other in air or hydraulic fluid.
A. Vapor bubbles C. Diaphragm is sealed
B. Chamber pressure D. None of the above

182. The diaphragm is flexed, causing the volume of the pump chamber to increase and decrease.
A. True B. False

183. A pair of _____prevents reverse flow of the fluid.
A. Return valves C. Non-return check valves
B. Diaphragms D. None of the above

184. The second type of diaphragm pump works with volumetric positive displacement, but differs in that the prime mover of the diaphragm is neither oil nor air; but is?
A. Electro-mechanical C. Volumetric positive displacement
B. Chamber pressure D. None of the above

185. The third type of diaphragm pump has one or more springs with the fluid to be pumped on both sides.
A. True B. False

186. When the volume of a chamber of either type of pump is increased (the diaphragm moving up), the pressure decreases, and fluid is drawn into the?
A. Chamber C. Keyway
B. Diaphragm D. None of the above

187. Which of the following moving up once again draws fluid into the Chamber, completing the cycle?
A. Spring C. Time delay or ratchet assembly
B. Diaphragm D. None of the above

Water Storage Introduction
188. Which of the following prevents contamination of water as it travels to the customer, finished water storage facilities are an important component of the protective distribution system?
A. Cathodic protection C. Barrier
B. Corrosion protection D. None of the above

Storage and Distribution
189. Proper construction is important in maintaining system integrity and the distribution system must also protect?
A. Cathodic protection C. Water quality
B. Corrosion protection D. None of the above

Water Storage Facilities
190. Water storage facilities and tanks vary in different types that are used in the water distribution systems, such as stand pipes, elevated tanks and reservoirs, hydropneumatic tanks and?
A. Surge tanks C. Storage reservoirs
B. Water distribution systems D. None of the above

191. Which of the following can be converted to pressure potential energy or kinetic energy for delivery to homes?
A. Hydrostatic power C. Hydraulic power
B. Stored energy D. None of the above

Storage Reservoirs

192. The text recommends that _____ be located at a high enough elevation to allow the water to flow by gravity to the distribution system.

A. Storage reservoirs C. Tree systems
B. Levelers D. None of the above

Steel Reservoirs

193. Steel reservoirs or tanks generally have higher construction and installation costs than concrete, and require less maintenance.

A. True B. False

194. Steel tanks should be inspected once a year and repainted every 5-7 years.

A. True B. False

Water Use or Demand

195. Water system demand comes from many sources including residential, commercial, industrial and public consumers as well as waste and some?

A. Pressure C. Unavoidable loss
B. System integrity D. None of the above

196. The combination of storage reservoirs and distribution lines must be capable of meeting consumers' needs for pressure at all times.

A. True B. False

197. The quantity of water used in any community varies from 100 to 200 gallons per person per day.

A. True B. False

198. Which of the following is highly desired and represents a rather significant demand upon the system?

A. Fire protection C. Surge protection
B. Cavitation protection D. None of the above

199. A common design usage assumption is to plan for the usage of 100 to 150 gallons per person per day for average domestic use.

A. True B. False

200. Which of the following is usually encountered during the summer months and can vary widely depending on irrigation practices?

A. Maximum daily use C. Unavoidable loss and waste
B. Minimum daily use D. None of the above