Registration form

Distribution Primer 5 Training Course $100.00

48 HOUR RUSH ORDER PROCESSING FEE ADDITIONAL $50.00

Start and Finish Dates: _____

You will have 90 days from this date in order to complete this course

Name_____Signature_____

I have read and understood the disclaimer notice on page 2. Digitally sign XXX

Address_____

City_____State_____Zip_____

Email_____ Fax (____) _____

Phone:
Home (____) _____ Work (____) _____

Operator ID #_____Exp. Date_____

List hours worked on assignment must match State Requirement. _____

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

Water Treatment _____ Distribution_____ Other _____

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

Technical Learning College 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.

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.

State Approval Listing Link, check to see if your State accepts or has pre-approved this course. Not all States are listed. Not all courses are listed.

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

State Approval Listing URL…

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

You can obtain a printed version from TLC for an additional $69.95 plus shipping charges.

AFFIDAVIT OF EXAM COMPLETION

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

Grading Information

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

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

Thank you…

All downloads are electronically tracked and monitored for security purposes.

Distribution Primer 5 Answer Key

Name_____

Phone _____

You are solely responsible in ensuring that this course is accepted for credit by your State. 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? _____

You are responsible to ensure that TLC receives the Assignment and Registration Key. Please call us to ensure that we received it.

You can use Adobe Acrobat DC Program to complete the assignment.

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

1. A B C D E F	11. A B C D E F	21. A B C D E F
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147. A B C D E F
148. A B C D E F
149. A B C D E F
150. A B C D E F

Please fax the answer key to TLC Western Campus Fax (928) 272-0747.
Always call us after faxing the paperwork to ensure that we've received it.

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

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.

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

DISTRIBUTION PRIMER 5 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.

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.
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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? _____

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Distribution Primer 5 CEU Training Course Assignment

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

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

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

Well Dilling/Pumping Section

1. Basically, a well is a hole drilled into?

A. Consolidated or rock wells
B. An unconfined water source
C. An aquifer
D. Unconsolidated or sand wells
E. Water Table
F. None of the Above

Three Basic Types of Wells

2. Bored or shallow wells are usually bored into _____, generally found at depths of 100 feet or less.

A. Consolidated or rock wells
B. An unconfined water source
C. Aquifer
D. Unconsolidated or sand wells
E. Water Table
F. None of the Above

3. Which of the following terms - are drilled into a formation consisting entirely of a natural rock formation that contains no soil and does not collapse?

A. Unconfined aquifers
B. Aquifer(s)
C. Saturated zone
D. Unconsolidated or sand wells
E. Consolidated or rock wells
F. None of the Above

4. Which of the following terms are drilled into a formation consisting of soil, sand, gravel, or clay material that collapses upon itself?

A. Unconfined aquifers
B. Aquifer(s)
C. Saturated zone
D. Unconsolidated or sand wells
E. Consolidated or rock wells
F. None of the Above

Selection of Pumping Equipment

5. The proper selection of pumping equipment for a well is of great importance. The primary factors that must be considered before selecting the well pump are:_____, line pressure, pumping lift, power requirements, and size of piping.

A. Head
B. Flow rate
C. Total vertical distance
D. Total dynamic head
E. Total static head
F. None of the Above

Pumping Lift and Total Dynamic or Discharge Head

6. The most important components in selecting the correct pump for your application are: total pumping lift and?

A. Head
B. Total head
C. Total vertical distance
D. Total dynamic head
E. Total dynamic or discharge head
F. None of the Above

Basic Pump Operating Characteristics

7. "Head" is a term commonly used with pumps. _____ refers to the height of a vertical column of water.

A. Head
B. Total head
C. Total vertical distance
D. Total dynamic head
E. Total static head
F. None of the Above

8. Which of the following terms of a pump is composed of several types of head that help define the pump's operating characteristics?

A. Head
B. Total head
C. Total vertical distance
D. Total dynamic head
E. Total static head
F. None of the Above

Total Dynamic Head

9. The total dynamic head of a pump is the sum of the _____, the pressure head, the friction head, and the velocity head.

A. Head
B. Total head
C. Total vertical distance
D. Total dynamic head
E. Total static head
F. None of the Above

Total Static Head

10. Which of the following terms is the total vertical distance the pump must lift the water?

A. Head
B. Total head
C. Total vertical distance
D. Total dynamic head
E. Total static head
F. None of the Above

11. When pumping from an open water surface, it would be the _____ from the water surface to the discharge point.

A. Head
B. Total head
C. Total vertical distance
D. Total dynamic head
E. Total static head
F. None of the Above

Friction Head

12. Which of the following terms is the energy loss or pressure decrease due to friction when water flows through pipe networks?

A. Head
B. Friction
C. Cavitation
D. Friction head
E. Suction head
F. None of the Above

13. Which of the following terms of the water has a significant effect on friction loss?

A. Head
B. Friction
C. Cavitation
D. Velocity
E. Suction head
F. None of the Above

14. Values for these losses can be calculated or obtained from friction loss tables. The friction head for a piping system is the sum of all the _____ losses.
A. Head D. Velocity
B. Friction E. Suction head
C. Cavitation F. None of the Above

Velocity Head
15. Which of the following terms is the energy of the water due to its velocity?
A. Head D. Velocity
B. Friction E. Suction head
C. Velocity head F. None of the Above

Suction Head
16. The suction head includes not only the vertical suction lift, but also the _____ losses through the pipe, elbows, foot valves, and other fittings on the suction side of the pump.
A. Head D. Velocity
B. Friction E. Suction head
C. Cavitation F. None of the Above

17. There is an allowable limit to the _____ on a pump and the net positive suction head of a pump sets that limit.
A. Head D. Velocity
B. Friction E. Suction head
C. Cavitation F. None of the Above

18. The theoretical maximum height that water can be lifted using suction is 33 feet. Through controlled laboratory tests, manufacturers determine the _____ for their pumps.
A. Head D. Velocity
B. Friction E. Suction head
C. Cavitation F. None of the Above

19. The NPSH curve will increase with increasing _____through the pump.
A. Head D. Velocity
B. Friction E. Suction head
C. Flow rate F. None of the Above

20. To minimize the suction pipeline _____ losses, the suction pipe should have a larger diameter than the discharge pipe.
A. Head D. Velocity
B. Friction E. Suction head
C. Cavitation F. None of the Above

21. Operating a pump with _____greater than it was designed for, or under conditions with excessive vacuum at some point in the impeller, may cause cavitation.
A. Head D. Velocity
B. Friction E. Suction head
C. Suction lift F. None of the Above

22. Which of the following terms is the implosion of bubbles of air and water vapor and makes a very distinct noise like gravel in the pump?
A. Head D. Velocity
B. Friction E. Suction head
C. Cavitation F. None of the Above

Pump Efficiency
23. Manufacturers determine by tests the operating characteristics of their pumps and publish the results in pump performance charts commonly called?
A. Pump curve(s) D. TDH relationship (S) MEANS PLURAL OR SINGUAL
B. Peak efficiency E. Friction loss is almost negligible
C. Cavitation F. None of the Above

24. All pump curves are plotted with the flow rate on the horizontal axis and the TDH on the vertical axis. The curves in a _____ are for a centrifugal pump tested at different RPM.
A. Pump curve(s) D. TDH relationship (S) MEANS PLURAL OR SINGUAL
B. Peak efficiency E. Friction loss is almost negligible
C. Cavitation F. None of the Above

25. Each curve indicates the GPM versus _____ at the tested RPM. In addition, pump efficiency lines have been added and wherever the efficiency line crosses the pump curve lines that number is what the efficiency is at that point.
A. Pump curve(s) D. TDH relationship
B. Peak efficiency E. Friction loss is almost negligible
C. Cavitation F. None of the Above

26. Brake horsepower curves have also been added; they slant down from left to right. The BHP curves are calculated using the values from the?
A. Efficiency lines D. TDH relationship
B. Peak efficiency E. Friction loss is almost negligible
C. Cavitation F. None of the Above

Reading a Pump Curve
27. When the desired flow rate and TDH are known, these curves are used to select a pump. The pump curve shows that a pump will operate over a wide range of conditions. However, it will operate at peak efficiency only in a narrow range of flow rate and?
A. Pump curve(s) D. TDH
B. Peak efficiency E. Friction loss is almost negligible
C. Cavitation F. None of the Above

Determining Friction Losses
28. There are numerous _____ tables with values of equivalent feet of head for given flow rates and types and diameters of pipe available.
A. Pump curve(s) D. TDH relationship
B. Peak efficiency E. Friction loss
C. Cavitation F. None of the Above

29. The lift requirements for the pump primarily include the height to which the pump must deliver the water from the wellhead, plus the distance from the _____to the land surface.
A. Pump curve(s) D. TDH relationship
B. Peak efficiency E. Friction loss
C. Pumping level F. None of the Above

The Well Head Assembly

30. When the well is completed with pumping equipment a _____ is also required.
A. Frost protection D. Well vent
B. Variance permit E. Approved well casing material
C. Well manifold F. None of the Above

31. Which of the following terms should be at least ½ inch in diameter, 8 inches above the finished grade, and be turned down, with the opening screened with a minimum 24-mesh durable screen to prevent entry of insects?
A. Frost protection D. Well vent pipe
B. Variance permit E. Approved well casing material
C. Well manifold F. None of the Above

32. Any pressure, vent, and electric lines to and from the pump should enter the casing only through a?
A. Watertight seal D. Well vent pipe
B. Variance permit E. Approved well casing material
C. Well manifold F. None of the Above

33. Wells should not be located within vaults or pits, except with a?
A. Frost protection D. Well vent pipe
B. Variance permit E. Approved well casing material
C. Well manifold F. None of the Above

34. If the pump discharge line passes through the _____underground, an approved pitless adapter should be installed.
A. Well casing D. Well vent pipe
B. Variance permit E. Approved well casing material
C. Well manifold F. None of the Above

35. Which of the following terms should include an air relief valve, flow meter, sample port, isolation valve, and a check valve?
A. Frost protection D. Well vent pipe
B. Variance permit E. Approved well casing material
C. Well manifold F. None of the Above

Water Use or Demand

36. Water system _____ comes from a number of sources including residential, commercial, industrial and public consumers as well as some unavoidable loss and waste.
A. Leakage D. Some unavoidable loss and waste
B. Minimum use E. Demand
C. Maximum daily use F. None of the Above

37. If fire protection is desired, that could also represent a rather significant (although not continuous)?
A. Leakage D. Some unavoidable loss and waste
B. Minimum use E. Demand upon the system
C. Maximum daily use F. None of the Above

38. The quantity of water used in any community varies from _____ per person per day.
A. 500 gallons D. Some unavoidable loss and waste
B. 100 to 150 gallons E. Demand
C. Maximum daily use F. None of the Above

39. A common design assumption is to use from _____ per person per day for average domestic use.
A. 500 gallons D. Some unavoidable loss and waste
B. 100 to 150 gallons E. Demand
C. Maximum daily use F. None of the Above

40. Which of the following terms is usually encountered during the summer months and can vary widely depending on irrigation practices?
A. Leakage D. Some unavoidable loss and waste
B. Minimum use E. Demand upon the system
C. Maximum daily use F. None of the Above

Water Pressure
41. For ordinary domestic use, water pressure should be between _____ psi.
A. 20 D. 75
B. 25 and 45 E. .433
C. 2.31 F. None of the Above

42. A minimum of 60 psi at a fire hydrant is usually adequate, since that allows for up to _____ psi pressure drop in fire hoses.
A. 20 D. 75
B. 25 and 45 E. .433
C. 2.31 and 45 F. None of the Above

43. In commercial and industrial districts, it may be common to have _____ psi or higher.
A. 20 D. 75
B. 25 and 45 E. .433
C. 2.31 F. None of the Above

44. Which of the following terms is provided by the direct force of the water, or by the height of the water?
A. Leakage D. Pressure
B. Minimum use E. Demand upon the system
C. Maximum daily use F. None of the Above

45. 2.31 feet of water is equal to _____ is equal to about a half a pound (.433 pounds to be exact).
A. 20 D. 75
B. 25 and 45 E. .433
C. 2.31 F. None of the Above

Storage and Distribution

46. The cost of supplying water to the users of any water system includes the installation of?

A. Stand pipes
B. An elevated tank
C. Tower
D. Water storage
E. Storage and distribution facilities
F. None of the Above

47. The distribution system must also protect water quality between the source and the customer's tap. Proper construction is important in maintaining?

A. A turbulence
B. Shock waves
C. No foreign material
D. System integrity
E. Gravity
F. None of the Above

48. Pipe ends should be covered at the end of the work day or during?

A. A turbulence
B. Shock waves
C. No foreign material
D. System integrity
E. Interruptions of construction
F. None of the Above

Water Storage Facilities

49. Which of the following terms and tanks vary in size, shape, and application?

A. Stand pipes
B. An elevated tank
C. Tower
D. Water storage facilities
E. Storage and distribution facilities
F. None of the Above

Surge Tanks

50. Shock waves are created when hydrants, valves, or pumps are opened and closed quickly, trapping the _____ of moving water within the confined space of a piping system.

A. Turbulence
B. Shock waves
C. No foreign material
D. System integrity
E. Kinetic energy
F. None of the Above

51. Which of the following terms can create a turbulence that travels at the speed of sound, seeking a point of release?

A. Turbulence
B. Shock waves
C. No foreign material
D. System integrity
E. Gravity
F. None of the Above

52. The release the surge usually finds is an elevated tank, but the surge doesn't always find this release quickly enough. Something has to give, and oftentimes, it's your pipe fittings. Distribution operators are aware of this phenomenon! It's called?

A. Turbulence
B. Shock waves
C. Foreign shock
D. Break dance
E. Vortex
F. None of the Above

53. A Surge tank should not be used for?

A. Vortex storage
B. Shock waves
C. Water storage
D. System integrity
E. Gravity storage
F. None of the Above

54. The goal of the water tower or _____ is to store water high in the air, where it has lots of gravitational potential energy.

A. Stand pipe
B. An elevated tank
C. Tower
D. Water storage
E. Storage facility
F. None of the Above

55. Since height is everything, building _____is inefficient. Most of the water is then near the ground. By making the tower wider near the top, it puts most of its water high up.

A. Stand pipe
B. An elevated tank
C. A cylindrical water tower
D. Time warp continuum
E. Storage facility
F. None of the Above

Storage Reservoirs

56. It is recommended that the volume of _____be equal to from one to three days of the system's average daily use.

A. Detention basins
B. Steel reservoirs or tanks
C. Storage
D. Some storage for fire protection
E. System's average daily use
F. None of the Above

57. It is also recommended that storage reservoirs be located at a _____to allow the water to flow by gravity to the distribution system.

A. Detention basin
B. Steel reservoir or tank
C. High enough elevation
D. Some storage for fire protection
E. System's average daily use
F. None of the Above

58. This, coupled with restricted usage on the part of the consumers, should provide an uninterrupted water supply in the event of pump failure, loss of power or an acute contamination event or cross-connection. Also, if applicable, _____ should be provided.

A. Detention basins
B. Steel reservoirs or tanks
C. Storage
D. Some storage for fire protection
E. System's average daily use
F. None of the Above

59. Reservoirs are also used as _____ to provide the required chlorine contact time necessary to ensure the adequacy of disinfection.

A. Detention basins
B. Steel reservoirs or tanks
C. Steel tanks
D. Some storage for fire protection
E. System's average daily use
F. None of the Above

60. Also, _____ inside the reservoir (walls, curtains, or spirals) increase the contact time by preventing the water from leaving the reservoir too quickly (known as "short-circuiting").

A. Detention basins
B. Steel reservoirs or tanks
C. Steel tank
D. Vortex storage
E. Time warp continuum
F. None of the Above

Steel Reservoirs

61. Which of the following terms or tanks generally have lower construction and installation costs than concrete, but require more maintenance?

A. Detention basins
B. Steel reservoirs
C. Steel tank
D. Some storage for fire protection
E. System's average daily use
F. None of the Above

62. To protect against corrosion, the exterior should be kept cleaned and painted. Interiors of _____ are commonly coated with an epoxy or enamel-type finish.

A. Detention basins
B. Steel reservoirs
C. Steel tank
D. Some storage for fire protection
E. System's average daily use
F. None of the Above

63. Which of the following terms are usually welded or bolted together and are manufactured in a variety of sizes?

A. Detention basins
B. Steel reservoirs
C. Steel tank
D. Some storage for fire protection
E. System's average daily use
F. None of the Above

64. Which of the following terms should be inspected once a year and repainted every 5-7 years?

A. Detention basins
B. Steel reservoirs or tanks
C. Steel tanks
D. Storage for fire protection
E. System's average daily use
F. None of the Above

65. Which of the following terms should also have cathodic protection and be screened to keep birds and insects out?

A. Detention basins
B. Steel reservoirs or tanks
C. Steel tank
D. Some storage for fire protection
E. System's average daily use
F. None of the Above

66. Cleaning and disinfection prior to placing the _____ back in service is necessary.

A. Detention basin
B. Reservoir or tank
C. Steel tank
D. Storage for fire protection
E. System's average daily use
F. None of the Above

Hydropneumatic Tank Section
Effects on the Water Supply

67. Whenever a tank must be taken out of service for _____, the operator should insure that the water pressure is maintained by other back-up tanks in the system.

A. Maintenance
B. A problem
C. Corrective action
D. Particular area
E. Troubleshooting of problems
. None of the Above

68. If this is not possible, customers should be given as much advance notice as possible, maintenance should be conducted during periods of low water demand, and the _____ should be conducted as quickly as possible to reduce the time without water service.

A. Maintenance
B. A problem
C. Corrective action
D. Particular area
E. Troubleshooting of problems
F. None of the Above

Troubleshooting Hydropneumatic Tank Problems

69. The purpose of a hydropneumatic tank is to provide air for the water system. It is the responsibility of the operator to perform _____ in hydropneumatic tank systems.

A. Maintenance
B. A problem
C. Corrective action
D. Particular area
E. Troubleshooting of problems
F. None of the Above

70. The operator has to decide, based on his/her own training and capability when a problem requires _____from another operator or an outside expert.
A. Maintenance D. Assistance
B. A problem E. Troubleshooting of problems
C. Corrective action F. None of the Above

71. Operators should not hesitate to seek _____ if they are uncomfortable with a particular problem or situation.
A. Maintenance D. Assistance
B. A problem E. Troubleshooting of problems
C. Corrective action F. None of the Above

72. Which of the following terms should only be performed by individuals who are trained and skilled in that particular area?
A. Maintenance D. Particular area
B. A problem E. Troubleshooting of problems
C. Corrective action F. None of the Above

Contaminated Wells
73. Which of the following terms used for drinking water are especially dangerous?
A. An artesian aquifer D. Fractured aquifers
B. An artesian well E. Unsaturated zone
C. Contaminated wells F. None of the Above

74. Groundwater is withdrawn from _____ to provide water for everything from drinking water for the home and business to water to irrigate crops to industrial processing water.
A. Saturated zone D. Karst
B. Water table E. Dynamics of groundwater flow
C. Fractured aquifers F. None of the Above

75. Groundwater flows slowly through _____at different rates.
A. An artesian aquifer D. Fractured aquifers
B. An artesian well E. Water-bearing formations (aquifers)
C. Groundwater flow F. None of the Above

Aquifer
76. Many terms are used to describe the nature and extent of the groundwater resource. The level below which all the spaces are filled with water is called the?
A. Saturated zone D. Karst
B. Water table E. Dynamics of groundwater flow
C. Fractured aquifers F. None of the Above

77. Above the water table lies the unsaturated zone. Here the spaces in the rock and soil contain both air and water. Water in this zone is called?
A. An artesian aquifer D. Fractured aquifers
B. An artesian well E. Unsaturated zone
C. Soil moisture F. None of the Above

78. The entire region below the water table is called the _____ and water in this saturated zone is called groundwater.
A. Saturated zone D. Karst
B. Water table E. Dynamics of groundwater flow
C. Fractured aquifers F. None of the Above

79. Which of the following terms are cracks, joints, or fractures in solid rock, through which groundwater moves?
A. An artesian aquifer D. Fractured aquifers
B. An artesian well E. Unsaturated zone
C. Groundwater flow F. None of the Above

80. Limestones are often _____, but here the cracks and fractures may be enlarged by solution, forming large channels or even caverns.
A. Saturated zone D. Karst
B. Water table E. Dynamics of groundwater flow
C. Fractured aquifers F. None of the Above

81. Limestone terrain where solution has been very active is termed?
A. An artesian aquifer D. Fractured aquifers
B. An artesian well E. Unsaturated zone
C. Karst F. None of the Above

82. Porous media such as sandstone may become so highly cemented or recrystalized that all of the original space is filled. In this case, the rock is no longer a porous medium. However, if it contains cracks it can still act as a?
A. Saturated zone D. Karst
B. Water table E. Dynamics of groundwater flow
C. Fractured aquifer F. None of the Above

83. Some very porous materials are not permeable. _____, for instance, has many spaces between its grains, but the spaces are not large enough to permit free movement of water.
A. An artesian aquifer D. Fractured aquifers
B. An artesian well E. Unsaturated zone
C. Groundwater flow F. None of the Above

84. Which of the following terms usually flows downhill with the slope of the water table. Like surface water, groundwater flows toward, and eventually drains into, streams, rivers, lakes and the oceans?
A. Saturated zone D. Karst
B. Water table E. Dynamics of groundwater flow
C. Groundwater F. None of the Above

85. Groundwater flow in the _____underlying springs or surface drainage basins, however, does not always mirror the flow of water on the surface.
A. Aquifers D. Fractured aquifers
B. An artesian well E. Unsaturated zone
C. Groundwater flow F. None of the Above

86. Which of the following terms may move in different directions below the ground than the water flowing on the surface?
A. Saturated zone D. Groundwater
B. Water table E. Dynamics of groundwater flow
C. Fractured aquifers F. None of the Above

87. Unconfined aquifers are those that are bounded by the water table. Some aquifers, however, lie beneath layers of impermeable materials. These are called_____, or sometimes artesian aquifers.
A. An artesian aquifer D. Fractured aquifers
B. An artesian well E. Unsaturated zone
C. Confined aquifers F. None of the Above

88. The water in these wells rises higher than the top of the aquifer because of confining pressure. If the water level rises above the ground surface a _____occurs.
A. Saturated zone D. Flowing artesian well
B. Water table E. Dynamics of groundwater flow
C. Fractured aquifers F. None of the Above

89. The piezometric surface is the level to which the water in _____ will rise.
A. An artesian aquifer D. Fractured aquifers
B. An artesian well E. Unsaturated zone
C. Groundwater flow F. None of the Above

Cone of Depression
90. When pumping begins, water begins to flow towards the well in contrast to the natural direction of groundwater movement. The water level in the well falls below the _____ in the surrounding aquifer.
A. Cone of depression D. Groundwater
B. Water table E. An unconfined aquifer
C. Aquifer F. None of the Above

91. As a result, water begins to move from the _____ into the well.
A. Cone of depression D. Groundwater
B. Water table E. An unconfined aquifer
C. Aquifer F. None of the Above

92. The movement of water from an aquifer into a well results in the formation of a?
A. Cone of depression D. Groundwater
B. Water table E. An unconfined aquifer
C. Vortex time warp F. None of the Above

93. Which of the following terms is the vertical drop in the height between the water level in the well prior to pumping and the water level in the well during pumping?
A. Cone of depression D. Groundwater
B. Water table E. An unconfined aquifer
C. Drawdown F. None of the Above

94. When a well is installed in an unconfined aquifer, water moves from the _____ into the well through small holes or slits in the well casing or, in some types of wells, through the open bottom of the well.
A. Cone of depression D. Groundwater
B. Water table E. An unconfined aquifer
C. Aquifer F. None of the Above

95. The level of the water in the well is the same as the water level in the?
A. Cone of depression D. Groundwater
B. Water table E. An unconfined aquifer
C. Aquifer F. None of the Above

Groundwater Section
96. Ground water also is used for about half of the nation's agricultural irrigation and nearly one-third of the industrial water needs. This makes ground water a vitally important?
A. Spring D. Underground sources of water
B. Water table E. National resource
C. Hydrologic cycle F. None of the Above

What Is Groundwater and Where Does It Come From?
97. Actually ground water occurs as part of what can be called the oldest recycling program -the?
A. Unconfined aquifers D. Unsaturated zone
B. Aquifers E. Hydrologic cycle
C. Saturated zone F. None of the Above

98. Which of the following terms involves the continual movement of water between the earth and the atmosphere through evaporation and precipitation?
A. Springs D. Underground sources of water
B. Water table E. Confined aquifer
C. The hydrologic cycle F. None of the Above

99. As rain and snow fall to the earth, some of the water runs off the surface into lakes, rivers, streams, and the oceans; some evaporates; and some is absorbed by plant roots. The rest of the water soaks through the ground's surface and moves downward through the unsaturated zone, where the open spaces in rocks and soil are filled with a mixture of air and water, until it reaches the?
A. Unconfined aquifers D. Unsaturated zone
B. Water table E. Hydrologic cycle
C. Saturated zone F. None of the Above

100. The water table is the top of the_____, or the area in which all interconnected spaces in rocks and soil are filled with water.
A. Springs D. Underground sources of water
B. Water table E. Confined aquifer
C. Saturated zone F. None of the Above

101. The water in the _____is called ground water. In areas where the water table occurs at the ground's surface, the ground water discharges into marshes, lakes, springs.
A. Unconfined aquifers D. Unsaturated zone
B. Aquifer(s) E. Saturated zone
C. Saturated ground F. None of the Above

Where Is Ground Water Stored?

102. Ground water is stored under many types of geologic conditions. Areas where ground water exists in sufficient quantities to supply wells or springs are called _____, a term that literally means "water bearer."

A. Springs
B. Water table
C. The hydrologic cycle
D. Underground sources of water
E. Confined aquifer
F. None of the Above

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

A. Unconfined aquifers
B. Aquifers
C. Saturated zone
D. Unsaturated zone
E. Hydrologic cycle
F. None of the Above

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

A. Unconfined aquifers storage capacity
B. An aquifer's storage capacity
C. Saturated zone storage capacity
D. Unsaturated zone storage capacity
E. Hydrologic cycle storage capacity
F. None of the Above

105. If the aquifer is between layers of relatively impermeable materials, it's called a?

A. Springs
B. Water table
C. The hydrologic cycle
D. Underground sources of water
E. Confined aquifer
F. None of the Above

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

A. Unconfined aquifers
B. Aquifers
C. Saturated zone
D. Unsaturated zone
E. Confined aquifers
F. None of the Above

Does Ground Water Move?

107. Ground water can move sideways as well as up or down. This movement is in response to gravity, differences in elevation, and?

A. Differences in Unconfined aquifers
B. Differences in Aquifers
C. Differences in Saturated zone
D. Differences in Unsaturated zone
E. Differences in pressure
F. None of the Above

108. The movement is usually quite slow, frequently as little as a few feet per year, although it can move as much as several feet per day in?

A. Unconfined aquifers
B. Aquifers
C. Saturated zone
D. Unsaturated zone
E. More permeable zones
F. None of the Above

109. Ground water can move even more rapidly in_____, which are areas in water soluble limestone and similar rocks where fractures or cracks have been widened by the action of the ground water to form sinkholes, tunnels, or even caves.

A. Saturated zone
B. Water table
C. Fractured aquifers
D. Karst aquifers
E. Dynamics of groundwater flow
F. None of the Above

Water Well Reports and Hydrogeology
Depth to the Aquifer

110. It is necessary to identify which geologic unit is the _____; i.e., the porous and permeable rock or sediment that contains ground water.

A. Aquifer
B. Hydraulic head
C. Head
D. Top of the aquifer
E. Ground water
F. None of the Above

Nature of the Aquifer

111. Which of the following terms can be described as either unconfined or confined?

A. An aquifer
B. Hydraulic head
C. An unconfined aquifer
D. A confined aquifer
E. The nature of the aquifer
F. None of the Above

112. Which of the following terms has the water table as its upper surface; there are no significant low-permeability layers between the water table and the surface?

A. An aquifer
B. Hydraulic head
C. An unconfined aquifer
D. A confined aquifer
E. Either unconfined or confined
F. None of the Above

113. The top of the aquifer, the_____, can rise or fall depending on water use and amount of recharge to the aquifer.

A. Aquifer is under pressure
B. Hydraulic head
C. Head
D. Water table
E. Ground water
F. None of the Above

114. A confined aquifer has a low-permeability geologic formation as its upper boundary; the ground water in the aquifer is under pressure; _____is separated from the surface by the confining layer and generally is recharged at some distance from the well.

A. The aquifer
B. Hydraulic head
C. An unconfined aquifer
D. A confined aquifer
E. Either unconfined or confined
F. None of the Above

Hydraulic Head (h)

115. Which of the following terms is a measure of the energy that the water at a certain depth possesses because of its elevation and the pressure exerted through the weight of the water above it.

A. Aquifer is under pressure
B. Hydraulic head
C. Head
D. Top of the aquifer
E. Ground water
F. None of the Above

116. Which of the following terms has units of feet, and generally corresponds to the elevation of water in the well?

A. An aquifer
B. Hydraulic head
C. An unconfined aquifer
D. A confined aquifer
E. Either unconfined or confined
F. None of the Above

117. Which of the following terms is the driving force for ground water movement either in a horizontal or vertical direction?

A. Aquifer is under pressure
B. Hydraulic head
C. Head
D. Top of the aquifer
E. Ground water
F. None of the Above

118. Ground water moves from where the head is higher to where the head is lower. If we have enough hydraulic head data for _____ over a given area, we can contour the head elevation just like the ground elevation is contoured on a topographic map.
A. An aquifer D. A confined aquifer
B. Hydraulic head E. Either unconfined or confined
C. An unconfined aquifer F. None of the Above

119. Ground water will move from _____to low head areas and will generally flow in a direction that crosses the contours at a 90º angle.
A. Aquifer is under pressure D. Top of the aquifer
B. Hydraulic head E. Ground water
C. High head areas F. None of the Above

How Wells are Drilled
120. In these modern times, wells can be drilled much faster and safer using?
A. A drill string D. The kelly
B. A rotating bit E. A sub
C. Drilling fluids F. None of the Above

121. Some examples of today's more common well drilling methods include rotary, auger, and _____with many variations of each.
A. Drag bits D. Cable tool
B. A sub E. A top drive
C. The drill collar F. None of the Above

122. Which of the following terms stabilize the hole and aid in the removal of cuttings?
A. A drill string D. The kelly
B. A rotating bit E. A sub
C. Drilling fluids F. None of the Above

123. Air rotary with downhole hammer is particularly suited for hard rock drilling, while _____is better suited for drilling in sediment.
A. Drag bits D. A kelly
B. A sub E. A top drive
C. Mud rotary F. None of the Above

Basic Rotary Drilling Methods
124. Rotary drilling utilizes a drilling rig with a rotating bit and _____ to penetrate into the aquifer. It is the most common type of drilling method used today.
A. A drill string D. The kelly
B. A rotating bit E. Circulating drilling fluid
C. Drilling fluids F. None of the Above

125. Common variations of this method include: direct and reverse mud rotary, _____, and drill through casing driver methods.
A. Drag bits D. A kelly
B. A sub E. Direct air rotary
C. The drill collar F. None of the Above

The Rotary Drill String

126. Rotary drilling methods use_____, which typically consists of a bit, collar, drill pipe and a kelly (if table driven).

A. A drill string D. The kelly
B. A rotating bit E. A sub
C. Drilling fluids F. None of the Above

127. Which of the following terms is a section of heavy walled pipe that can be hexagonal, square, or rounded with grooves?

A. Drag bits D. A kelly
B. A sub E. A top drive
C. The drill collar F. None of the Above

128. The kelly is several feet longer than the drill pipe being used and fits into _____much like the splines on an automobile's drive shaft fit into a transmission.

A. Drag bits D. The table drive
B. A sub E. A top drive
C. The drill collar F. None of the Above

129. Which of the following terms turns the kelly and the rest of the drill string connected below as it slips down through the table?

A. A drill string D. The table drive
B. A rotating bit E. A sub
C. Drilling fluids F. None of the Above

130. Which of the following terms is free to move up and down the mast of the rig while rotating the drill string?

A. A drill string D. The kelly
B. A rotating bit E. A top drive
C. Drilling fluids F. None of the Above

131. Drill pipe makes up a majority of the overall length of _____and is used in various diameters and wall thicknesses for added strength.

A. Drag bits D. A kelly
B. A drill string E. A top drive
C. The drill collar F. None of the Above

132. Which of the following terms can be used in various lengths but are typically 20-foot sections and may be connected to the drive unit with a sub?

A. A drill string D. The kelly
B. A rotating bit E. Drill pipe
C. Drilling fluids F. None of the Above

133. A sub is a length of pipe used to connect pipes and/or act as shock absorber between the drill pipes and?

A. Drag bits D. Drive unit
B. A sub E. A top drive
C. The drill collar F. None of the Above

134. At the end of the drill pipe is?
A. A drill string D. The kelly
B. A rotating bit E. A sub
C. The drill collar F. None of the Above

135. Which of the following terms aids in maintaining a consistent borehole diameter and primarily helps to prevent borehole deviation?
A. Drag bits D. A kelly
B. A sub E. A top drive
C. The drill collar F. None of the Above

136. At the end of the collar is?
A. Drag bits D. The rotary bit
B. A sub E. A top drive
C. The drill collar F. None of the Above

137. Which of the following terms are typically used in unconsolidated to semi-consolidated sand, silt, and clay-rich formations?
A. Drag bits D. A kelly
B. A sub E. A top drive
C. The drill collar F. None of the Above

138. Which of the following terms come in many shapes and sizes and cut with a shearing action aided by the jetting of drilling fluids from nozzles or jets in the bit?
A. Drag bits D. A kelly
B. A sub E. A top drive
C. The drill collar F. None of the Above

139. _____, such as the common tri-cone bit, typically utilize interlocking teeth or buttons on individual rotating cones to cut, crush, or chip through the formation.
A. Reamer(s) D. Roller bits
B. Drill string E. Projection of cutting blades
C. Drilling fluid F. None of the Above

140. Which of the following terms are also aided by the jetting of drilling fluids from nozzles or jets in the bit?
A. Roller bits D. Under reamers
B. Drilling fluid E. Roller button bits
C. A rotating bit F. None of the Above

141. These bits can be used in consolidated formations and even hard rock applications if equipped with carbide buttons. These types of bits are often referred to as?
A. Mud D. Under reamers
B. Drilling fluid E. Roller button bits
C. A rotating bit F. None of the Above

142. Often an initial borehole needs to be reamed or made larger. _____ are bits that can be used to enlarge, straighten, or clean an existing borehole.
A. Reamer(s) D. Common tri-cone bit
B. Drill string E. Projection of cutting blades
C. Drilling fluid F. None of the Above

143. Which of the following terms are used to enlarge deeper sections of an existing borehole without requiring the enlargement of the entire upper well bore?
A. Reamer(s) D. Common tri-cone bit
B. Drill string E. Projection of cutting blades
C. Under reamers F. None of the Above

144. Under reaming involves the projection of _____beneath permanently installed casing in loosely consolidated sediments.
A. Reamer(s) D. Common tri-cone bit
B. Drill string E. Projection of cutting blades
C. Cutting blades F. None of the Above

Direct Rotary Method
145. Direct rotary drilling methods utilize a rotating bit at the end of a drilling string with _____ that is circulated from the rig through the drill pipe and jets in the bit.
A. Mud D. Under reamers
B. Drilling fluid E. Roller button bits
C. A rotating bit F. None of the Above

146. Down-force exerted by the drilling rig and/or the weight of the _____ itself is used along with rotating action to force the bit downwards, cutting through the sediment or rock.
A. Reamer(s) D. Common tri-cone bit
B. Drill string E. Projection of cutting blades
C. Drilling fluid F. None of the Above

147. Which of the following terms that is pumped by the rig's mud pump and/or air compressor is jetted out of ports in the bit?
A. Mud D. Under reamers
B. Drilling fluid E. Roller button bits
C. Rotating bit F. None of the Above

148. Which of the following terms carries cuttings up the annular space between the drill pipe and formation and into mud pits or containment recirculating systems on the surface?
A. Reamer(s) D. Common tri-cone bit
B. Drill string E. Projection of cutting blades
C. Drilling fluid F. None of the Above

Direct Mud Rotary Method
149. Which of the following terms use various types of mud or drilling fluid to drill into the ground?
A. Direct Mud rotary drilling rigs D. Under reamers
B. Drilling fluid E. Roller button bits
C. A rotating bit F. None of the Above

150. The process of building up a film of mud on the borehole walls is important to mud rotary drilling and is called?
A. Mud caking D. Bentonite clay
B. Drilling fluid E. Drilling polymers or gels
C. Mud drilling fluids F. None of the Above

You are finished with your assignment. Please emai or fax your answer key and registration form to us and call later to confirm we received the paperwork.