Registration form

GROUNDWATER PRODUCTION $200.00
48 HOUR RUSH ORDER PROCESSING FEE ADDITIONAL $50.00

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

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

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

Address_____

City_____State_____Zip_____

Email_____ Fax (_____) _____

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

Operator ID #_____Exp. Date_____

Class/Grade_____
Your certificate will be emailed to you in about two weeks.

Please circle/check which certification you are applying the course CEU's.
Pump Installer ___ Water Distribution ___ Other _____

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

If you've paid on the Internet, please write your Customer#_____

Please invoice me, my PO#_____

Please pay with your credit card on our website under Bookstore or Buy Now. Or call us and provide your credit card information.

We will stop mailing the certificate of completion we need your e-mail address. We will e-mail the certificate to you, if no e-mail address; we will mail 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.

You can obtain a printed version of the course manual 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.

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.

Do not solely depend on TLC's Approval list for it may be outdated.

Some States and many employers require the final exam to be proctored.
http://www.abctlc.com/downloads/PDF/PROCTORFORM.pdf

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

All downloads are electronically tracked and monitored for security purposes.

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

Texas TCEQ Important Information Changes

Wastewater/Collections Rule Changes

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

For Texas Students Only….

Please visit the TCEQ website and download all these rule changes and read and conform that you have understood these rule changes.

Please sign and date this notice

Printed Name

_____

Signature Date

_____

Groundwater Production Answer Key

Name_____

Phone _____

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

Method of Course acceptance confirmation. Please fill this section

Website __ Telephone Call___ Email____ Spoke to_____

Did you receive the approval number, if applicable? _____

What is the course 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 also fill this assignment out electronically in Adobe Acrobat DC
Please Circle, Bold, Underline or X, one answer per question.

1. A B C D E F	18. A B C D E F	35. A B C D E F
2. A B C D E F	19. A B C D E F	36. A B C D E F
3. A B C D E F	20. A B C D E F	37. A B C D E F
4. A B C D E F	21. A B C D E F	38. A B C D E F
5. A B C D E F	22. A B C D E F	39. A B C D E F
6. A B C D E F	23. A B C D E F	40. A B C D E F
7. A B C D E F	24. A B C D E F	41. A B C D E F
8. A B C D E F	25. A B C D E F	42. A B C D E F
9. A B C D E F	26. A B C D E F	43. A B C D E F
10. A B C D E F	27. A B C D E F	44. A B C D E F
11. A B C D E F	28. A B C D E F	45. A B C D E F
12. A B C D E F	29. A B C D E F	46. A B C D E F
13. A B C D E F	30. A B C D E F	47. A B C D E F
14. A B C D E F	31. A B C D E F	48. A B C D E F
15. A B C D E F	32. A B C D E F	49. A B C D E F
16. A B C D E F	33. A B C D E F	50. A B C D E F
17. A B C D E F	34. A B C D E F	51. A B C D E F

52. A B C D E F
53. A B C D E F
54. A B C D E F
55. A B C D E F
56. A B C D E F
57. A B C D E F
58. A B C D E F
59. A B C D E F
60. A B C D E F
61. A B C D E F
62. A B C D E F
63. A B C D E F
64. A B C D E F
65. A B C D E F
66. A B C D E F
67. A B C D E F
68. A B C D E F
69. A B C D E F
70. A B C D E F
71. A B C D E F
72. A B C D E F
73. A B C D E F
74. A B C D E F
75. A B C D E F
76. A B C D E F
77. A B C D E F
78. A B C D E F
79. A B C D E F
80. A B C D E F
81. A B C D E F
82. A B C D E F
83. A B C D E F
84. A B C D E F
85. A B C D E F
86. A B C D E F
87. A B C D E F
88. A B C D E F
89. A B C D E F
90. A B C D E F
91. A B C D E F
92. A B C D E F
93. A B C D E F
94. A B C D E F
95. A B C D E F
96. A B C D E F
97. A B C D E F
98. A B C D E F
99. A B C D E F
100. A B C D E F
101. A B C D E F
102. A B C D E F
103. A B C D E F
104. A B C D E F
105. A B C D E F
106. A B C D E F
107. A B C D E F
108. A B C D E F
109. A B C D E F
110. A B C D E F
111. A B C D E F
112. A B C D E F
113. A B C D E F
114. A B C D E F
115. A B C D E F
116. A B C D E F
117. A B C D E F
118. A B C D E F
119. A B C D E F
120. A B C D E F
121. A B C D E F
122. A B C D E F
123. A B C D E F
124. A B C D E F
125. A B C D E F
126. A B C D E F
127. A B C D E F
128. A B C D E F
129. A B C D E F
130. A B C D E F
131. A B C D E F
132. A B C D E F
133. A B C D E F
134. A B C D E F
135. A B C D E F
136. A B C D E F
137. A B C D E F
138. A B C D E F
139. A B C D E F
140. A B C D E F
141. A B C D E F
142. A B C D E F
143. A B C D E F
144. A B C D E F
145. A B C D E F
146. A B C D E F
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

151. A B C D E F
152. A B C D E F
153. A B C D E F
154. A B C D E F
155. A B C D E F
156. A B C D E F
157. A B C D E F
158. A B C D E F
159. A B C D E F
160. A B C D E F
161. A B C D E F
162. A B C D E F
163. A B C D E F
164. A B C D E F
165. A B C D E F
166. A B C D E F
167. A B C D E F
168. A B C D E F
169. A B C D E F
170. A B C D E F
171. A B C D E F
172. A B C D E F
173. A B C D E F
174. A B C D E F
175. A B C D E F
176. A B C D E F
177. A B C D E F
178. A B C D E F
179. A B C D E F
180. A B C D E F
181. A B C D E F
182. A B C D E F
183. A B C D E F
184. A B C D E F
185. A B C D E F
186. A B C D E F
187. A B C D E F
188. A B C D E F
189. A B C D E F
190. A B C D E F
191. A B C D E F
192. A B C D E F
193. A B C D E F
194. A B C D E F
195. A B C D E F
196. A B C D E F
197. A B C D E F
198. A B C D E F
199. A B C D E F
200. A B C D E F

This course contains general EPA's SDWA federal rule requirements. Please be aware that each state implements water / sampling procedures/safety/ environmental / building regulations that may be more stringent than EPA's regulations. Check with your state environmental/health agency for more information. These rules change frequently and are often difficult to interpret and follow. Be careful to be in full-compliance and do not follow this course for proper compliance.

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

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

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

GROUNDWATER PRODUCTION CEU COURSE
CUSTOMER SERVICE RESPONSE CARD

NAME: _____

E-MAIL_____PHONE_____

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

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

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

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

4. How did you hear about this Course? _____

5. What would you do to improve the Course?

_____

_____

How about the price of the course?

Poor_____ Fair ____ Average ____ Good____ Great_____

How was your customer service?

Poor___ Fair ____ Average ____ Good _____ Great_____

Any other concerns or comments.

_____

_____

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

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

Groundwater Treatment/Production System Section Groundwater and Wells

1. According to the text, toxic material spilled or dumped near a well can leach into which of the following terms and contaminate the groundwater drawn from that well?

A. Unconfined aquifer(s) D. Well(s)
B. Groundwater E. Aquifer
C. Water table F. None of the Above

2. Which of the following terms flows slowly through water-bearing formations at different rates?

A. Well D. Soil moisture
B. Drinking water E. Groundwater
C. Water table F. None of the Above

3. Many terms are used to describe the nature and extent of the groundwater resource, the level below which all the spaces that are filled with water is called the?

A. Unconfined aquifer(s) D. Well(s)
B. Groundwater E. Aquifer
C. Water table F. None of the Above

4. Above the water table lies the_____ .

A. Unsaturated zone D. Soil moisture
B. Drinking water E. Karst
C. Water table F. None of the Above

5. The entire region below the water table is called the saturated zone and water in this saturated zone is called?

A. Unconfined aquifer(s) D. Well(s)
B. Groundwater E. Aquifer
C. Water table F. None of the Above

6. Which of the following terms are cracks, joints, or fractures in solid rock, through which groundwater moves?

A. Fractured aquifer(s) D. Soil moisture
B. Drinking water E. Karst
C. Water table F. None of the Above

7. Limestone is often located in which of the following terms?
A. Unconfined aquifer(s) D. Fractured aquifer(s)
B. Groundwater E. Aquifer
C. Water table F. None of the Above

8. Which of the following terms may move in different directions below the ground than the water flowing on the surface?
A. Well D. Soil moisture
B. Drinking water E. Groundwater
C. Water table F. None of the Above

9. Unconfined aquifers are those that are bounded by the water table. Some aquifers lie beneath layers of impermeable materials.
A. True B. False

10. A well in an aquifer is called an artesian well.
A. True B. False

11. Which of the following terms is the level to which the water in an artesian aquifer will rise?
A. Unconfined aquifer(s) D. Well(s)
B. Piezometric surface E. Aquifer
C. Water table F. None of the Above

12. Which of the following terms 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?
A. Unconfined aquifer(s) D. Fractured aquifer(s)
B. Groundwater E. Aquifer
C. Porous media F. None of the Above

13. Clay has many spaces between its grains, but the spaces are not large enough to permit free movement of water.
A. True B. False

14. Which of the following terms usually flows downhill with the slope of the water table?
A. Well D. Soil moisture
B. Drinking water E. Groundwater
C. Water table F. None of the Above

15. Which of the following terms flow in the aquifers underlying springs or surface drainage basins, and does not always mirror the flow of water on the surface?
A. Well D. Soil moisture
B. Drinking water E. Groundwater
C. Water table F. None of the Above

Cone of Depression
16. When pumping begins, water begins to flow towards the well in contrast to the natural direction of groundwater movement.
A. True B. False

17. The water level in the well falls below the water table in the?
A. Water table D. Cone of depression
B. Groundwater E. Well
C. Surrounding aquifer F. None of the Above

18. The movement of water from this term into a well results in the formation of a cone of depression.
A. Confined aquifer D. Water table
B. An aquifer E. Unconfined aquifer
C. Hydrologic cycle F. None of the Above

19. Which of the following terms describes a three-dimensional inverted cone surrounding the well that represents the volume of water removed as a result of pumping?
A. Water table D. Cone of depression
B. Groundwater E. Well
C. Gravity F. None of the Above

20. 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. Water table D. Cone of depression
B. Groundwater E. Well
C. Drawdown F. None of the Above

21. When a well is installed in _____, water moves from the aquifer 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. Confined aquifer D. Water table
B. Aquifer(s) E. An unconfined aquifer
C. Hydrologic cycle F. None of the Above

Where Is Ground Water Stored?
22. Areas where ground water exists in sufficient quantities to supply wells or springs are called aquifers, a term that literally means _____ .
A. Water table D. Cone of depression
B. Groundwater E. Well
C. Water bearer F. None of the Above

23. 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. Confined aquifer D. Water table
B. Aquifer(s) E. Unconfined aquifer
C. Hydrologic cycle F. None of the Above

24. Which of the following terms is controlled largely by its porosity, or the relative amount of open space present to hold water?
A. Water table D. Cone of depression
B. Groundwater E. Well
C. An aquifer's storage capacity F. None of the Above

25. There are two kinds of aquifers: confined and unconfined.
A. True B. False

26. If the aquifer is sandwiched between layers of relatively impermeable materials, it is called?
A. Confined aquifer D. Water table
B. Aquifer(s) E. Unconfined aquifer
C. Hydrologic cycle F. None of the Above

27. Confined aquifers are not sandwiched between layers of relatively impermeable materials, and their upper boundaries are generally closer to the surface of the land.
A. True B. False

28. Which of the following terms are frequently found at greater depths than unconfined aquifers?
A. Confined aquifer(s) D. Water table
B. Aquifer(s) E. Unconfined aquifer
C. Hydrologic cycle F. None of the Above

Does Ground Water Move?
29. Groundwater can move sideways as well as up or down. This movement is in response to gravity, differences in elevation, and?
A. Synthetic organic chemical(s) D. Ground-water contamination
B. Differences in pressure E. Septic tanks, cesspools, and privies
C. Permeable zones F. None of the Above

30. Groundwater can move even more rapidly in karst aquifers, which are areas in which missing term 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. Contaminant(s) D. Water soluble limestone
B. Saturated zone E. Serious contamination source(s)
C. Karst aquifer(s) F. None of the Above

Ground-Water Quality
31. The layers of soil and particles of sand, gravel, crushed rocks, and larger rocks were thought to act as filters, trapping contaminants before they could reach the ground water.
A. True B. False

32. We know that some contaminants can pass through all of these filtering layers into _____ to contaminate ground water.
A. Contaminant(s) D. Saturated zone
B. Saturated zone E. Water table
C. Karst aquifer(s) F. None of the Above

How Does Ground Water Become Contaminated?
33. Groundwater contamination can originate on the surface of the ground, in the ground above the water table, or in the ground below the?
A. Synthetic organic chemical(s) D. Ground-water contamination
B. Ground water E. Water table
C. Permeable zones F. None of the Above

34. If the contaminant is introduced directly into the area below this term, the primary process that can affect the impact of the contaminant is dilution by the surrounding ground water.
A. Contaminant(s) D. Saturated zone
B. Saturated zone E. Water table
C. Karst aquifer(s) F. None of the Above

What Kinds of Substances Can Contaminate Groundwater, and Where Do They Come from?

35. Substances that can contaminate this missing term can be divided into two basic categories: substances that occur naturally and substances produced or introduced by man's activities.

A. Synthetic organic chemical(s)
B. Ground water
C. Permeable zones
D. Ground-water contamination
E. Septic tanks, cesspools, and privies
F. None of the Above

36. A significant number of today's ground-water contamination problems stem from man's activities and can be introduced into ground water from?

A. Contaminant(s)
B. Saturated zone
C. A variety of sources
D. Iron, calcium, and selenium
E. Serious contamination source(s)
F. None of the Above

Abandoned Wells

37. Which of the following terms can be another source of groundwater contamination?

A. Contaminant(s)
B. Saturated zone
C. Karst aquifer(s)
D. Wells
E. Serious contamination source(s)
F. None of the Above

38. If which of the following terms is abandoned without being properly sealed, however, it can act as a direct channel for contaminants to reach groundwater?

A. Synthetic organic chemical(s)
B. Ground water
C. A well
D. Ground-water contamination
E. Septic tanks, cesspools, and privies
F. None of the Above

What Can Be Done After Contamination Has Occurred?

39. Rehabilitate the missing term by either immobilizing or detoxifying the contaminants while they are still in the aquifer.

A. Aquifer
B. Contamination
C. Toxic chemicals
D. Supplies of clean ground water
E. Wellhead protection program(s)
F. None of the Above

40. According to the text, abandon the use of the aquifer and find?

A. Aquifer
B. Contamination
C. Alternative sources of water
D. Ground water
E. Wellhead protection program(s)
F. None of the Above

Water Use or Demand

41. Water system demand comes from a number of sources including residential, commercial, industrial and public consumers as well as waste and some _____ .

A. Pressure
B. System integrity
C. Unavoidable loss
D. Unavoidable loss and waste
E. Maximum daily use
F. None of the Above

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

A. True B. False

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

A. True B. False

44. Which of the following terms could represent a rather significant demand upon the system?
A. Distribution system D. Hydropneumatic tanks and surge tanks
B. Water pressure E. Cavitation
C. Fire protection F. None of the Above

45. A common design assumption is to use from 100 to 150 gallons per person per day for average domestic use.
A. True B. False

46. The maximum daily use is approximately 3 to 5 times the average daily use.
A. True B. False

47. Which of the following terms is usually encountered during the summer months and can vary widely depending on irrigation practices?
A. Pressure D. Unavoidable loss and waste
B. System integrity E. Maximum daily use
C. Maximum daily use F. None of the Above

Water Pressure
48. 2.31 feet of water is equal to 1 psi, or 1 foot of water is equal to about a half a pound (.433 pounds to be exact).
A. True B. False

49. For ordinary domestic use, water pressure should be between 25 and 45 psi.
A. True B. False

50. 20 psi is considered the minimum required at any point in the water system, so that this missing term is prevented.
A. Distribution system D. Hydropneumatic tanks and surge tanks
B. Water pressure E. Cavitation
C. Backflow and infiltration F. None of the Above

51. Which of the following terms is provided by the direct force of the water, or by the height of the water?
A. Pressure D. Unavoidable loss and waste
B. System integrity E. Maximum daily use
C. Gravity F. None of the Above

Water Well Reports and Hydrogeology
Hydrogeologic Data
52. For hydrogeologists to make reliable assessments about the current and future status of ground water, they need to know where ground water occurs in the subsurface, what the properties are of the various geologic units below the surface, and how fast and in what direction ground water is moving.
A. True B. False

Nature of the Aquifer
53. An unconfined aquifer has which missing term as its upper surface; there are no significant low-permeability layers between the water table and the surface?
A. Hydraulic head D. Hydraulic conductivity
B. Water table E. Permeability, or hydraulic conductivity
C. A confined aquifer F. None of the Above

54. According to the text, the top of the aquifer, can rise or fall depending on water use and amount of recharge to the aquifer and is called?
A. Aquifer (porosity) D. Water table
B. Hydraulic head E. Ground water
C. Geologic materials F. None of the Above

55. Which of the following terms has a low-permeability geologic formation as its upper boundary?
A. Hydraulic head D. Hydraulic conductivity
B. An aquifer E. Permeability, or hydraulic conductivity
C. A confined aquifer F. None of the Above

Hydraulic Head (h)
56. According to the text, the hydraulic head is a measure of the water at a certain depth possesses because of its elevation and the pressure exerted through the weight of the water above it.
A. True B. False

57. Which of the following terms has units of feet, and generally corresponds to the elevation of water in the well?
A. Aquifer (porosity) D. Amount of recharge to the aquifer
B. Hydraulic head E. Ground water
C. Geologic materials F. None of the Above

Aquifer Porosity (n)
58. The volume of open space relative to the _____and the degree to which these pore spaces are interconnected controls the volume of water in the aquifer and the amount of water that can be reasonably withdrawn from the aquifer.
A. Total volume of the aquifer (porosity) D. Amount of recharge to the aquifer
B. Hydraulic head E. Ground water
C. Geologic materials F. None of the Above

Permeability of the Aquifer (K)
59. Which of the following terms or the permeability of the aquifer is a measure of how fast ground water can move through the aquifer?
A. Hydraulic head D. Conductivity
B. An aquifer E. Hydraulic conductivity
C. A confined aquifer F. None of the Above

60. Which of the following terms has units of distance/time, e.g., feet/day, although it does not represent an actual speed?
A. Hydraulic head D. Hydraulic conductivity
B. An aquifer E. Permeability
C. A confined aquifer F. None of the Above

In What Direction Is Groundwater Flowing?
61. The direction of ground water flow is from higher to lower?
A. Aquifer (porosity) D. Amount of recharge to the aquifer
B. Hydraulic head E. Ground water
C. Geologic materials F. None of the Above

62. Which of the following terms can be measured by lowering a probe through the observation port of a number of wells, all within the same relative time period?

A. Hydraulic head
B. An aquifer
C. A confined aquifer
D. Hydraulic conductivity
E. Permeability, or hydraulic conductivity
F. None of the Above

What Is the Drawdown Associated with Pumping of a Well?

63. There is a relation between the pumping rate of the well, the transmissivity of the aquifer, the distance between wells, this missing term, and the duration of the pumping event.

A. Aquifer (porosity)
B. Hydraulic head
C. Geologic materials
D. Amount of recharge to the aquifer
E. Storage coefficient of the aquifer
F. None of the Above

Depth to First Water-Bearing Zone

64. Some report the depth at which water is first encountered in?

A. The drill hole
B. SWL
C. The yield
D. Recharge and discharge zone(s)
E. Hydrogeologic investigation(s)
F. None of the Above

Static Water Level

65. The driving force for ground water movement is the hydraulic head, and the _____ is a measure of that force.

A. Static water level (SWL)
B. Data on the well report
C. Local ground water systems
D. Perforated portions of cased wells
E. Weak (fractured) zones
F. None of the Above

66. Identifying where one aquifer ends and another begins is key to identifying the source of the yield for individual wells. Although this often can be determined by careful review of the lithologic log provided by the well constructor, the transition from one aquifer to the next can be indicated by a marked change in the recharge and discharge zones

A. True B. False

67. Which of the following terms is a better indicator that a different aquifer has been encountered than the lithologic description?

A. Drill hole
B. SWL
C. The yield
D. Recharge and discharge zone(s)
E. Hydrogeologic investigation(s)
F. None of the Above

68. Which of the following terms have important implications in ground water protection and identifying the relation between area ground water and local streams?

A. Weak (fractured) zones
B. SWL
C. The yield
D. Recharge and discharge zone(s)
E. Hydrogeologic investigation(s)
F. None of the Above

Water-Bearing Zones

69. In some cases, the screened or perforated portions of cased wells provide a clue, but all too often, the screened interval is either significantly less than the actual static water level.

A. True B. False

70. Arriving at accurate estimates of aquifer parameters or calculating ground water velocity requires us to know the thickness of the?

A. Water-bearing zone(s)
B. SWL
C. Yield
D. Recharge and discharge zone(s)
E. Hydrogeologic investigation(s)
F. None of the Above

Lithologic Log

71. The well log portion of the well report describes what the driller encountered in the subsurface.

A. True B. False

Contributions of Well Constructors to Hydrogeology

72. This document stresses the importance of data that is recorded on well reports and how that data influences hydrogeologic investigations.

A. True B. False

73. Well constructors can provide important contributions to the science by making careful observations and measurements when recording that data on the?

A. Static water level
B. Well report
C. Local ground water systems
D. Perforated portions of cased wells
E. Weak (fractured) zones
F. None of the Above

How Wells Are Drilled

74. A few examples of today's more common well drilling methods include rotary, auger, and cable tool with?

A. Many variations of each
B. Typical drilling fluid(s)
C. Advanced methods
D. A highly trained and skilled driller
E. Today's more common well drilling methods
F. None of the Above

75. Drilling fluids are often used during drilling in order to keep the borehole open while drilling is done.

A. True B. False

76. Typical drilling fluids may be water, mud, air, chemical or natural additives, or combinations of each.

A. True B. False

Basic Rotary Drilling Methods

77. Rotary drilling utilizes two methods that include: direct and reverse mud rotary, direct air rotary, and?

A. Rotary drilling
B. Typical drilling fluid(s)
C. Advanced methods
D. Drill through casing driver methods
E. Today's more common well drilling methods
F. None of the Above

The Rotary Drill String

78. Rotary drilling methods use a drill string, which typically consists of a bit, collar, drill pipe and?

A. The drill collar
B. Drag bit(s)
C. Roller bit(s)
D. Shock absorber (floating sub)
E. A kelly
F. None of the Above

79. Which of the following terms is a section of heavy walled pipe that can be hexagonal, square, or rounded with grooves?
A. The flighting
B. The plug
C. The bucket
D. A kelly
E. The cutting head
F. None of the Above

80. Which of the following terms is several feet longer than the drill pipe being used and fits into the table drive much like the splines on a drive shaft fit into a transmission?
A. Drilling method
B. The Kelly
C. The table drive
D. A sub
E. Rotary bit
F. None of the Above

81. Some rotary rigs use a top drive to turn _____ and are like a drill press.
A. The drill collar
B. Drag bit(s)
C. Roller bit(s)
D. Shock absorber (floating sub)
E. The drill string
F. None of the Above

82. Drill pipe can be used in various lengths but are typically 20-foot sections and may be connected to the drive unit with?
A. Drilling method
B. The Kelly
C. The table drive
D. A sub
E. Rotary bit
F. None of the Above

83. A sub is a length of pipe used to connect pipes and/or act as shock absorber (between the drill pipes and drive unit, at the end of the drill pipe is?
A. The drill collar
B. Drag bit(s)
C. Roller bit(s)
D. Shock absorber
E. The kelly
F. None of the Above

84. Which of the following terms or stabilizer is typically very heavy and is often gauged close to the diameter of the bit being used?
A. Drilling method
B. The Kelly
C. The table drive
D. The drill collar
E. Rotary bit
F. None of the Above

85. Which of the following terms aids in maintaining a consistent borehole diameter and primarily helps to prevent borehole deviation?
A. The drill collar
B. Drag bit(s)
C. Roller bit(s)
D. Shock absorber (floating sub)
E. The kelly
F. None of the Above

86. Several types of bits may be used; such as drag bits or?
A. The flighting
B. The plug
C. Roller bits
D. A telescoping kelly
E. The cutting head
F. None of the Above

87. Which of the following terms are typically used in unconsolidated to semi-consolidated sand, silt, and clay-rich formations?
A. The drill collar
B. Drag bit(s)
C. Roller bit(s)
D. Shock absorber (floating sub)
E. The kelly
F. None of the Above

88. Drag bits come in many shapes and sizes and cut with a shearing action aided by the jetting of drilling fluids from?
A. The drill collar
B. Drag bit(s)
C. Nozzles or jets in the bit
D. Shock absorber (floating sub)
E. The kelly
F. None of the Above

89. Roller bits, such as this term, typically utilize interlocking teeth or buttons on individual rotating cones to cut, crush, or chip through the formation.
A. The flighting
B. The plug
C. The bucket
D. The common tri-cone bit
E. The cutting head
F. None of the Above

90. Roller 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. The drill collar
B. Drag bit(s)
C. Roller bit(s)
D. Shock absorber (floating sub)
E. Roller button bits
F. None of the Above

91. _____ are bits that can be used to enlarge, straighten, or clean an existing borehole.
A. Drilling method
B. The Kelly
C. The table drive
D. Reamers
E. Rotary bit
F. None of the Above

92. 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. The drill collar
B. Drag bit(s)
C. Roller bit(s)
D. Shock absorber (floating sub)
E. Under reamers
F. None of the Above

93. Under reaming involves the projection of this term beneath permanently installed casing in loosely consolidated sediments.
A. Cutting blades
B. The Kelly
C. The table drive
D. A sub
E. Rotary bit
F. None of the Above

Direct Rotary Method

94. Direct rotary drilling methods utilize a rotating bit at the end of a drilling string with drilling fluid that is circulated from the rig through the drill pipe and jets in the bit.
A. True B. False

95. The drilling fluid that is pumped by _____ and/or air compressor is jetted out of ports in the bit.
A. The flighting
B. The rig's mud pump
C. The bucket
D. A telescoping kelly
E. The cutting head
F. None of the Above

96. The drilling fluid carries cuttings up the annular space between the drill pipe and formation and into mud pits or containment recirculating systems on the surface.
A. True B. False

97. Which of the following terms pressurizes the borehole and helps to keep the hole open while removing cuttings?
A. Rotary drilling
B. Typical drilling fluid(s)
C. Advanced methods
D. A highly trained and skilled driller
E. The drilling fluid
F. None of the Above

98. Large drill rigs may utilize this term that separate the cuttings from the drilling fluid before a pickup pump recirculates the drilling fluid back down the borehole, where the process is then repeated.
A. The reverse method
B. Zone(s)
C. The mud drilling fluid
D. The cutting's containment systems
E. Direct Mud rotary drilling rig(s)
F. None of the Above

99. Mud pits may be dug into the ground adjacent to the rig in order to contain and settle out cuttings from _____ before recirculating.
A. The flighting
B. The plug
C. The bucket
D. The drilling fluid
E. The cutting head
F. None of the Above

Direct Mud Rotary Method

100. Mud is circulated down the drill string and through the bit at the bottom of the borehole and the mud then carries the cuttings generated by the bit up to the surface and into the mud recirculating system.
A. True B. False

Air Rotary Method

101. Air rotary methods utilize compressed air and derived drill cuttings and groundwater as the drilling fluid.
A. True B. False

102. Which of the following terms is kept in a pressured condition while drilling, in order to maintain the circulation of drilling fluid to the surface?
A. The flighting
B. The plug
C. The bucket
D. The borehole
E. The cutting head
F. None of the Above

103. Which of the following terms is often added while drilling with air in order to maintain sufficient hole pressurization so that cuttings may be lifted to the surface efficiently while maintaining hole stability?
A. The air rotary method
B. Soil or formation sample(s)
C. Air
D. Biodegradable foam or surfactant (soap)
E. Mud
F. None of the Above

104. According to the text, the air rotary method is particularly suitable to soft dirt drilling with a down hole air hammer.
A. True B. False

105. The air hammer utilizes compressed air to drive a piston up and down which makes this term move up and down while the drill string rotates.
A. The air rotary method
B. Soil or formation sample(s)
C. Air
D. The hammer bit
E. The total target depth
F. None of the Above

106. Which of the following terms action generates great rock breaking force and is very valuable for drilling through solid rock or consolidated formations?

A. Roller bit(s)
B. Drilling
C. The borehole
D. The mud rotary method
E. The combined rotating and hammering
F. None of the Above

107. Which of the following terms in hard rock or consolidated formations, may be used when drilling pressures are too high or borehole sizes are too large for the efficient operation of an air hammer?

A. The flighting
B. A roller button bit
C. The bucket
D. A telescoping kelly
E. The cutting head
F. None of the Above

Drill through Casing Driver Method

108. The drill through casing driver method drives casing into the borehole as the telescoping kelly advances.

A. True B. False

109. Which of the following terms is a specially designed hardened steel ring that is installed on the casing end?

A. Auger boring method(s)
B. Split spoon type sampler(s)
C. The solid stem auger boring method
D. The casing driver method
E. The cutting shoe
F. None of the Above

100. Which of the following terms is inserted into the casing and the casing is attached to the casing driver?

A. A hammer or roller bit
B. The drill string
C. A casing driver
D. The rig
E. The addition of casing and drill string
F. None of the Above

111. Which of the following terms penetrates into the overburden or formation, the casing driver hammers the casing down, following the drill string?

A. The drill string
B. Split spoon type sampler(s)
C. The solid stem auger boring method
D. The casing driver method
E. The bucket auger method
F. None of the Above

112. Which of the following terms may employ a hammer or roller bit?

A. The flighting
B. The plug
C. The bucket
D. The drill string
E. The cutting head
F. None of the Above

113. According to the text, cuttings rise to the surface with this term through the casing and exit through the casing driver.

A. The injected air
B. Split spoon type sampler(s)
C. The solid stem auger boring method
D. The casing driver method
E. The bucket auger method
F. None of the Above

114. According to the text, as the borehole is drilled, the cuttings are then collected near?

A. A hammer or roller bit
B. The drill string
C. A casing driver
D. The rig
E. The addition of casing and drill string
F. None of the Above

115. Which of the following terms can continue until competent formation is encountered?
A. A hammer or roller bit
B. The drill string
C. A casing driver
D. The rig
E. The addition of casing and drill string
F. None of the Above

116. Which of the following terms is often used to install temporary casing in order to permit the installation of a well in unstable aquifers?
A. Auger boring method(s)
B. Split spoon type sampler(s)
C. The solid stem auger boring method
D. The casing driver method
E. The bucket auger method
F. None of the Above

117. Which of the following terms may be used as a puller to remove the temporary casing following well construction?
A. The flighting
B. The plug
C. The bucket
D. The casing driver
E. The cutting head
F. None of the Above

Auger Boring Methods

118. Auger boring methods make use of _____, which may be attached to a pilot bit and cutter head.
A. Auger boring method(s)
B. Split spoon type sampler(s)
C. The solid stem auger boring method
D. A rotating blade or spiral flange
E. The bucket auger method
F. None of the Above

119. Which of the following terms along with the rotating action of the blade and cutting action of the pilot and/or cutter bits facilitates the boring process?
A. The flighting
B. The plug
C. The bucket
D. A telescoping kelly
E. Down-force applied by the rig
F. None of the Above

120. Soil samples may be collected as cuttings rise or are brought to the surface, or they may be collected with?
A. Auger boring method(s)
B. Split spoon type sampler(s)
C. The solid stem auger boring method
D. The casing driver method
E. The bucket auger method
F. None of the Above

121. Which of the following terms are capable of boring large diameter holes in excess of four feet in diameter?
A. Auger boring method(s)
B. Augers
C. The solid stem auger boring method
D. The casing driver method
E. The bucket auger method
F. None of the Above

122. According to the text, there are three primary types of this term: solid stem, bucket, and hollow stem.
A. Auger boring method(s)
B. Split spoon type sampler(s)
C. The solid stem auger boring method
D. The casing driver method
E. The bucket auger method
F. None of the Above

Solid Stem Auger Method

123. Which of the following terms method uses a spiral flanged drill pipe driven by either a kelly or rotary drive head, like those used on rotary rigs?

A. Auger boring method(s)
B. Split spoon type sampler(s)
C. The solid stem auger boring method
D. The casing driver method
E. The bucket auger method
F. None of the Above

What is a Significant Deficiency?

124. Significant deficiencies cause, or have the potential to cause, the introduction of contamination into water delivered to customers include defects in design, operation, or maintenance of?

A. Well screen
B. The aquifer
C. A pumping test
D. The amount of water production
E. The source, treatment or distribution systems
F. None of the Above

Selecting an Appropriate Well Site

125. Before a well can be drilled a permit is normally required. The permit helps to ensure that an appropriate location of the well is selected which reduces the possibility of contamination.

A. True B. False

126. The ideal well location has good drainage and is higher than_____ .

A. The quality of drinking water
B. The possibility of contamination
C. Surface drainage(s)
D. The surrounding ground surface
E. Preliminary aquifer parameters
F. None of the Above

127. Which of the following terms should be at a lower elevation than the well, and the distances to those contamination sources must be in accordance with the State or Local Water Well Construction Codes?

A. The quality of drinking water
B. The possibility of contamination
C. Surface drainage(s)
D. All possible sources of contamination
E. Preliminary aquifer parameters
F. None of the Above

Common Well Construction Specifications

128. Which of the following terms should always be located and constructed in such a manner that they yield safe water at all times and under all conditions?

A. Water wells
B. The aquifer
C. A pumping test
D. The amount of water production
E. The optimum pumping rate
F. None of the Above

Choice of Casing

129. According to the text, stainless steel casing and screen may be required for one situation, while PVC or low carbon steel may be acceptable in another.

A. True B. False

130. Which of the following terms needed is related to the type of aquifer, well depth, water quality, well use, and regulatory requirements?

A. The type of well casing
B. The inflatable packer
C. The louver(s)
D. The casing and screen specifications
E. Well screen(s)
F. None of the Above

131. According to the text, as with casing, the choice of well screen is as important as its placement, the size of the openings in the casing are dependent on the grain size of the filter or?
A. The anticipated flow rate
B. The well
C. Gravel pack
D. Unstable or non-productive areas
E. The upper borehole from the surface
F. None of the Above

Selecting an Optimum Pumping Rate
132. Specific capacities for each of the pumping steps are compared. The highest Sc observed is normally associated with?
A. The anticipated flow rate
B. The well
C. The optimum pumping rate
D. Unstable or non-productive areas
E. The upper borehole from the surface
F. None of the Above

Pump Selection Section
Three Basic Types of Wells
133. Which of the following terms are usually bored into an unconfined water source, generally found at depths of 100 feet or less?
A. Unconsolidated or sand well(s)
B. Bored or shallow well(s)
C. The proper selection
D. Total dynamic or discharge head
E. The most important components
F. None of the Above

134. 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. Consolidated or rock wells
B. Screen filter(s)
C. Power requirement(s)
D. Total equivalent feet of lift
E. The total friction head
F. None of the Above

135. Which of the following terms are drilled into a formation consisting of soil, sand, gravel, or clay material that collapses upon itself?
A. Unconsolidated or sand well(s)
B. Bored or shallow well(s)
C. The proper selection
D. Total dynamic or discharge head
E. The most important components
F. None of the Above

Selection of Pumping Equipment
136. The proper selection of pumping equipment for a well is of great importance.
A. True B. False

137. The primary factors that must be considered before selecting the well pump are: flow rate, line pressure, pumping lift, and this term and size of piping.
A. Power requirements (and limitations)
B. Screen filter(s)
C. Power requirement(s)
D. Total equivalent feet of lift
E. The total friction head
F. None of the Above

Pumping Lift and Total Dynamic or Discharge Head
138. The most important components in selecting the correct pump for your application are: total pumping lift and?
A. Cavitation
B. Suction head
C. Velocity head
D. Total dynamic or discharge head
E. Pressure head
F. None of the Above

139. Which of the following terms refers to the total equivalent feet of lift that the pump must overcome in order to deliver water to its destination, including frictional losses in the delivery system?
A. Total dynamic head D. Total equivalent feet of lift
B. Screen filter(s) E. The total friction head
C. Power requirement(s) F. None of the Above

Basic Pump Operating Characteristics
140. Pressure and head are interchangeable concepts in irrigation, because a column of water .433 feet high is equivalent to 2.31 pound per square inch of pressure.
A. True B. False

Total Dynamic Head
141. The total dynamic head of a pump is the sum of _____, the pressure head, the friction head, and the velocity head.
A. The total static head D. Total equivalent feet of lift
B. Screen filter(s) E. The total friction head
C. Power requirement(s) F. None of the Above

142. The total dynamic head is the sum of the total static head, _____ and the pressure head.
A. Cavitation D. Loss of head
B. Suction head E. Total friction head
C. Velocity head F. None of the Above

Total Static Head
143. The total static head is the total vertical distance the pump must lift the water.
A. True B. False

144. When pumping from a well, it would be the distance from the pumping water level in the well to the ground surface plus this term the water is lifted from the ground surface to the discharge point.
A. Friction head D. Total dynamic or discharge head
B. Total static head E. Loss of head
C. Vertical distance F. None of the Above

Pressure Head
145. Which of the following terms at any point where a pressure gauge is located can be converted from pounds per square inch to feet of head by multiplying by 2.31?
A. Cavitation D. Loss of head
B. Suction head E. Pressure head
C. Velocity head F. None of the Above

146. 20 PSI is equal to 20 times 2.31 or 46.2 feet of head.
A. True B. False

Friction Head
147. Friction head is the energy increase or pressure increase when water flows through pipe networks.
A. True B. False

148. The velocity of the water has a significant effect on?
A. Friction head
B. Friction loss
C. Pressure head
D. Total dynamic or discharge head
E. Loss of head
F. None of the Above

Velocity Head
149. Velocity head is the energy of the water due to?
A. Cavitation
B. Suction head
C. Velocity head
D. Loss of head
E. Its velocity
F. None of the Above

Suction Head
150. According to the text, the suction head includes not only the vertical suction lift, but also the friction losses through the pipe, elbows, foot valves, and other fittings on the suction side of the pump.
A. True B. False

151. According to the text, a pump operating above a water surface is working with?
A. Friction head
B. A suction head
C. Pressure head
D. Total dynamic or discharge head
E. Loss of head
F. None of the Above

Water Storage Introduction
152. According to the text, treated or pumped water is placed in _____in order for disinfection to take place.
A. Storage reservoirs
B. Water distribution systems
C. Steel reservoirs
D. A closed tank or reservoir
E. Repairing and replacing these facilities
F. None of the Above

153. Which of the following terms 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
B. Corrosion
C. System integrity
D. Barrier
E. Clearwells
F. None of the Above

Storage and Distribution
154. Proper construction is important in maintaining system integrity and the distribution system must also protect _____ .
A. Cathodic protection
B. Corrosion
C. Water quality
D. Protective distribution system “barrier”
E. Clearwells
F. None of the Above

Water Storage Facilities
155. Water storage facilities and tanks vary in different types of storage that are used in the water distribution systems, such as stand pipes, elevated tanks and reservoirs, hydropneumatic tanks and?
A. Storage reservoirs
B. Water distribution systems
C. Steel reservoirs
D. Adequate pressure
E. Surge tanks
F. None of the Above

156. According to the text, which of the following terms can be converted to pressure potential energy or kinetic energy for delivery to homes?

A. Hydrostatic
B. Static pressure
C. Pressure
D. Hydraulic power
E. Stored energy
F. None of the Above

Storage Reservoirs

157. It is recommended that _____ be located at a high enough elevation to allow the water to flow by gravity to the distribution system.

A. Storage reservoirs
B. Levelers
C. Tree systems
D. Adequate pressure
E. Pumps
F. None of the Above

Steel Reservoirs

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

A. True B. False

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

A. True B. False

160. The maintenance program for reservoir tanks should call for annual draining for a complete inspection of the interior.

A. True B. False

Pump, Motor and Hydraulic Section
Hydraulic Principles Section

161. Hydraulics can be divided into two areas, _____ and hydrokinetics.

A. Fluids
B. Hydrostatics
C. Hydrokinetics
D. Mechanical properties of water
E. Flow
F. None of the Above

162. Which of the following terms includes the behavior of all liquids, although it is primarily concerned with the motion of liquids?

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

163. Which of the following terms 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
B. Hydrostatics
C. Hydrokinetics
D. Hydraulics
E. Flow
F. None of the Above

164. Which of the following terms includes the consideration of liquids at rest, involves problems of buoyancy and flotation?

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

165. Which of the following terms includes the study of liquids in motion, is concerned with such matters as friction and turbulence generated in pipes by flowing liquids?
A. Pressure D. Hydraulics
B. Hydrostatics E. Flow
C. Hydrokinetics F. None of the Above

166. Which of the following terms is about the pressures exerted by a fluid at rest?
A. Pressure D. Hydraulics
B. Hydrostatics E. Flow
C. Hydrokinetics F. None of the Above

Pump Definitions
167. Which of the following definitions is a barrier that separates stages of a multi-stage pump?
A. Gasket D. Inter-stage diaphragm
B. Keyway E. Seal
C. Bearing F. None of the Above

168. Which of the following definitions is a flat material that is compressed between two flanges to form a seal?
A. Gasket D. Seal
B. Keyway E. Bond
C. Packing F. None of the Above

169. Which of the following definitions is a line that directs sealing fluid to the stuffing box?
A. Leak-off D. Lantern ring
B. Gland sealing line E. Gland follower
C. Horizontal line F. None of the Above

170. _____ is the part of the pump that increases the speed of the fluid being handled.
A. Packing D. Seal
B. Impeller E. Outboard
C. Inboard F. None of the Above

Pumps
171. Pumps are excellent examples of?
A. Hydrostatics D. Multi-stage pumps
B. Quasi-static E. Complicated part
C. Oscillating diaphragm F. None of the Above

172. Pumps are of two general types, _____ or positive displacement pumps, and pumps depending on dynamic forces, such as centrifugal pumps.
A. Hydrostatic D. Hydrostatic considerations
B. Quasi-static E. Complicated part
C. Oscillating diaphragm F. None of the Above

173. 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

174. More complicated pumps have valves check valves that open to allow _____, and close automatically to prevent reverse flow.
A. Pistons D. Passage in one direction
B. Diaphragms E. Lift pumps
C. Discharged fluid F. None of the Above

Pump Categories
175. The key to understanding a pumps operation is that a pump is to move water and generate the _____ we call pressure.
A. Centrifugal pump(s) D. Diaphragm pump(s)
B. Impeller blade(s) E. Cylindrical pump housing
C. Delivery force F. None of the Above

176. Pump operation like with a centrifugal pump — pressure is not referred to in pounds per square inch but rather as the equivalent in elevation, called?
A. Inward force D. Center of the impeller
B. Head E. Incompressible fluid
C. Viscous drag pump F. None of the Above

177. According to the text, pumps may be classified on the basis of the application they serve.
A. True B. False

178. According to the text, all pumps may be divided into two major categories: (1) dynamic and ?
A. Centrifugal D. Diaphragm
B. Impeller E. Rotary
C. Displacement F. None of the Above

Basic Water Pump
179. According to the text, the centrifugal pumps work by spinning water around in a circle inside a?
A. Vortex D. Center of the impeller
B. Cylinder E. Cylindrical pump housing
C. Viscous drag pump F. None of the Above

180. In a centrifugal pump, the inward force is provided by high-pressure water near the outer edge of the?
A. Centrifugal pump(s) D. Diaphragm pump(s)
B. Impeller blade(s) E. Cylindrical pump housing
C. Pump housing F. None of the Above

181. 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 D. Center of the impeller
B. Pump pushes E. Incompressible fluid
C. Viscous drag pump F. None of the Above

182. In the operation of the pump, when water is actively flowing through the pump, arriving through a hole near the center of the impeller and leaving through a _____ near the outer edge of the pump housing, the pressure rise between center and edge of the pump is not as large.
A. Centrifugal pump(s) D. Diaphragm pump(s)
B. Impeller blade(s) E. Cylindrical pump housing
C. Hole F. None of the Above

There are three main types of diaphragm pumps:

183. 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
B. Chamber pressure
C. Drive shaft
D. Volumetric positive displacement
E. Diaphragm is sealed
F. None of the Above

Centrifugal pumps are classified into three general categories:

184. Which of the following terms is a centrifugal pump in which the pressure is developed wholly by centrifugal force?

A. Cylinder
B. Chamber
C. Radial flow
D. Cavity
E. Positive Displacement Pump(s)
F. None of the Above

185. Which of the following terms is a centrifugal pump in which the pressure is developed partly by centrifugal force and partly by the lift of the vanes of the impeller on the liquid?

A. Plunger pump
B. Mixed flow
C. Dynamic
D. Discharge tube
E. Roots blower
F. None of the Above

186. _____ is a centrifugal pump in which the pressure is developed by the propelling or lifting action of the vanes of the impeller on the liquid.

A. Axial flow
B. Chamber
C. Radial flow
D. Cavity
E. Positive Displacement Pump(s)
F. None of the Above

Impeller

187. Which of the following terms is a rotating component of a centrifugal pump, which transfers energy from the motor that drives the pump to the fluid being pumped by accelerating the fluid outwards from the center of rotation?

A. Volute
B. Driver
C. Driveshaft
D. Propellers and pumps
E. Impeller
F. None of the Above

188. The velocity achieved by the impeller transfers into pressure when the outward movement of the fluid is confined by the pump casing.

A. True B. False

189. Impellers are usually short cylinders, vanes to push the fluid radically, and a splined center to accept a?

A. Cavitation
B. Turbulence
C. Driveshaft
D. Propellers and pumps
E. Center of rotation
F. None of the Above

Key Pump Words

190. Which of the following key terms is a measure of a liquid's resistance to flow. i.e.: how thick it is?

A. NPSH
B. Specific Speed
C. Viscosity
D. S.G.: Specific gravity
E. Vapor Pressure
F. None of the Above

191. _____ determines the type of pump used, the speed it can run at, and with gear pumps, the internal clearances required.
A. NPSH D. S.G.: Specific gravity
B. Specific Speed E. Vapor Pressure
C. Viscosity F. None of the Above

Submersible Pumps
192. Submersible pumps are in essence very similar to?
A. Cased wells D. Pump bowl assembly
B. Turbine pumps E. VHS or VSS motors
C. Pump's intake F. None of the Above

193. The pump shaft has a keyway in which the splined motor end shaft inserts, the motor is often bolted to the?
A. Motor D. Pump housing
B. Pump shrouds E. Number of stages
C. Canned configurations F. None of the Above

194. The pump's intake is located between the motor and the pump and is normally screened to prevent sediment from entering the pump and damaging the?
A. Impellers D. Pump bowl assembly
B. Shroud E. VHS or VSS motors
C. Pump's intake F. None of the Above

Understanding the Operation of a Vertical Turbine Pump
195. Which of the following terms are available in deep well, shallow well, or canned configurations?
A. Cased wells D. Pump bowl assembly
B. Shroud E. Vertical turbine pumps
C. Pump's intake F. None of the Above

196. Which of the following terms are also available, these pumps are also suitable industrial, municipal, commercial and agricultural applications?
A. Motor D. Submersible motors
B. Pump shrouds E. Number of stages
C. Canned configurations F. None of the Above

197. Deep well turbine pumps are adapted for use in cased wells or where the water surface is below the practical limits of a?
A. Cased wells D. Pump bowl assembly
B. Shroud E. Centrifugal pump
C. Pump's intake F. None of the Above

198. Which of the following terms are also used in surface water systems?
A. Turbine pumps D. Pump housing
B. Pump shrouds E. Number of stages
C. Canned configurations F. None of the Above

Stuffing Box Adjustment
199. On the initial starting, it is very important that the packing gland not be tightened too much.
A. True B. False

200. The nuts should only be tightened about ½ turn at a time at 20 to 30 minute intervals to allow the packing to_____ .

A. Run in
B. Stuffing box
C. Correct alignment
D. Any deviation in performance
E. Gravity flow system
F. None of the Above