Registration form

LAB ANALYST COURSE

48 HOUR RUSH ORDER PROCESSING FEE ADDITIONAL $50.00

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

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

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

Address_____

City_____State_____Zip_____

Email_____ Fax (_____) _____

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

Operator ID #_____Exp. Date_____

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

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

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

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

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

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

You can obtain a printed version of the course manual from TLC for an additional $149.95 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.

CERTIFICATION OF COURSE PROCTOR

Technical Learning College requires that our students who takes a correspondence or home study program course must pass a proctored course reading, quiz and final examination. The proctor must complete and provide to the school a certification form approved by the commission for each examination administered by the proctor.

Instructions. When a student completes the course work, fill out the blanks in this section and provide the form to the proctor with the examination.

Name of Course:_____

Name of Licensee:_____

Instructions to Proctor. After an examination is administered, complete and return this certification and examination to the school in a sealed exam packet or in pdf format.

I certify that:

1. I am a disinterested third party in the administration of this examination. I am not related by blood, marriage or any other relationship to the licensee which would influence me from properly administering the examination.
2. The licensee showed me positive photo identification prior to completing the examination.
3. The enclosed examination was administered under my supervision on _____. The licensee received no assistance and had no access to books, notes or reference material.
4. I have not permitted the examination to be compromised, copied, or recorded in any way or by any method.
5. Provide an estimate of the amount of time the student took to complete the assignment.

Time to complete the entire course and final exam. _____

Notation of any problem or concerns:

Name and Telephone of Proctor (please print):

_____

_____

Signature of Proctor

Lab Analyst Answer Key

Name_____

Phone _____

Did you check with your State agency to ensure this course is accepted for credit?
No refunds.
You are responsible to ensure this course is accepted for credit.
Method of Course acceptance confirmation. Please fill this section

Website __ Telephone Call___ Email____ Spoke to_____

Did you receive the approval number, if applicable? _____

What is the course approval number, if applicable? _____

You can electronically complete this assignment in Adobe Acrobat DC.

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

1. A B	19. A B	37. A B C D	55. A B C D
2. A B C D	20. A B C D	38. A B C D	56. A B C D
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6. A B C D	24. A B C D	42. A B C D	60. A B
7. A B C D	25. A B C D	43. A B C D	61. A B
8. A B C D	26. A B C D	44. A B C D	62. A B
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11. A B C D	29. A B	47. A B C D	65. A B C D
12. A B C D	30. A B	48. A B	66. A B C D
13. A B C D	31. A B C D	49. A B C D	67. A B C D
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337. A B	353. A B	369. A B	385. A B
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339. A B C D	355. A B	371. A B	387. A B
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342. A B C D	358. A B	374. A B C D	390. A B
343. A B C D	359. A B	375. A B C D	391. A B
344. A B C D	360. A B	376. A B C D	392. A B
345. A B C D	361. A B	377. A B C D	393. A B
346. A B C D	362. A B	378. A B C D	394. A B
347. A B	363. A B	379. A B C D	395. A B
348. A B C D	364. A B	380. A B C D	396. A B
349. A B C D	365. A B	381. A B C D	397. A B
350. A B C D	366. A B	382. A B C D	398. A B C D
351. A B C D	367. A B	383. A B	399. A B C D
352. A B C D	368. A B	384. A B	400. A B C D

I understand that I am 100 percent responsible to ensure that TLC receives the Assignment and Registration Key and that it is accepted for credit by my State or Providence. I understand that TLC has a zero tolerance towards not following their rules, cheating or hostility towards staff or instructors. I need to complete the entire assignment for credit. There is no credit for partial assignment completion. My exam was proctored. I will contact TLC if I do not hear back from them within 2 days of assignment submission. I will forfeit my purchase costs and will not receive credit or a refund if I do not abide with TLC's rules. I will not hold TLC liable for any errors, injury, death or non-compliance with rules. I will abide with all federal and state rules and rules found on page 2.

Please Sign that you understand and will abide with TLC's Rules.

_____

Signature

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

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

LAB ANALYST 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.

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

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

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

How did you hear about this Course? _____

What would you do to improve the Course?

_____

_____

Any other concerns or comments.

_____

_____

When Finished with Your Assignment

REQUIRED DOCUMENTS
Please scan the **Registration Page, Answer Key, Survey and Driver's License** and email these documents to info@TLCH2O.com.

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If you are unable to scan, take a photo of these documents with your **iPhone** and send these photos to TLC, info@TLCH2O.com.

FAX
If you are unable to scan and email, please fax these documents to TLC, if you fax, call to confirm that we received your paperwork. **(928) 468-0675**

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 course contains general EPA's SDWA federal rule requirements. Please be aware that each state implements water / sampling procedures/ safety / environmental / SDWA 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 compliance with your regulatory agencies and do not follow this course for any compliance concerns.

LAB ANALYST CEU Training Course Assignment

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

Select one answer per question. Please utilize the answer key. (s) on the answer will indicate either plural and singular tenses.

Hyperlink to the Glossary and Appendix
http://www.abctlc.com/downloads/PDF/WTGlossary.pdf

Water Quality Section
Surface (Raw) Water Introduction
1. Raw water contains varying amounts of dissolved minerals including calcium, magnesium, sodium, chlorides, sulfates and bicarbonates, depending on its source.
A. True B. False

2. Operators need to correctly treat surface water is never pure of_____, it. Most of the earth's water sources obtain their water supplies through precipitation.
A. Excess nutrients C. Pollution
B. Biological actions D. None of the above

3. Water passes runoffs and infiltrates the ground during precipitation; this runoff acquires a wide variety of _____that intensely alters its usefulness.
A. Excess nutrients C. Dissolved or suspended impurities
B. Biological actions D. None of the above

4. _____ enhancement and formation of policy measures (administrative and engineering) revolves around most effective types of treatment methods and/or chemicals.
A. Universal solvent C. Surface water
B. Water quality D. None of the above

Surface Water Properties
5. Water is accepted as the _____ because will dissolve most substances that comes in contact.
A. Universal solvent C. Surface water
B. Water quality D. None of the above

6. Runoff may produce mud, leaves, decayed vegetation, and human and animal refuse. The discharge from industry could increase_____. Some lakes and reservoirs may experience seasonal turnover.
A. Volatile organic compounds C. Excess nutrients
B. Water quality D. None of the above

7. Modifications in the dissolved oxygen, algae, temperature, suspended solids, turbidity, and carbon dioxide will change because of _____.
A. Excess nutrients C. Discharge
B. Biological actions D. None of the above

8. Depending on the region, some lakes and rivers receive _____ from sewer facilities or defective septic tanks.
A. Excess nutrients C. Discharge
B. Biological actions D. None of the above

Three Types of Public Water Systems
9. Approximately 52,000 systems serving the majority of the U.S. population
A. TNCWS C. NTNCWSs
B. CWSs D. None of the above

10. Approximately 18,000 water systems
A. TNCWS C. NTNCWSs
B. CWSs D. None of the above

11. Provides water to the same people at least six months a year, but not all year for example: schools, factories, churches, office buildings that have their own water system)
A. TNCWS C. NTNCWSs
B. CWSs D. None of the above

12. Approximately 85,000 systems.
A. TNCWS C. NTNCWSs
B. CWSs D. None of the above

13. Provides water where people do not remain for long periods for example: gas stations, campgrounds.
A. TNCWS C. NTNCWSs
B. CWSs D. None of the above

14. Provides water to the same population year-round for example: homes, apartment buildings.
A. TNCWS C. NTNCWSs
B. CWSs D. None of the above

Managing Water Quality at the Source
15. Contingent upon the region, source water may have several restrictions of use as part of a Water Shed Management Plan. In some areas, it may be restricted from recreational use, discharge or runoff from agriculture, or_____ .
A. Excess nutrients C. Industrial and wastewater discharge
B. Biological actions D. None of the above

16. Another characteristic of quality control is aquatic plants. The ecological equilibrium in lakes and reservoirs plays a natural part in purifying and sustaining the life of the lake. Certain vegetation removes the excess nutrients that would promote the growth of algae. Too much algae will imbalance the lake and kill fish.
A. True B. False

17. Algae growth is supplied by the energy of the sun. As algae absorbs this energy, it converts carbon dioxide to oxygen. Algae and rooted aquatic plants are essential in the food chain of fish and birds. Algae growth is the result of photosynthesis.
A. True B. False

18. The absence of dissolved oxygen in water is known as aerobic conditions.
A. True B. False

19. Most treatment plant upsets are such as taste and odor, color, and filter clogging is due to algae. The type of algae determines the problem it will cause, for instance slime, corrosion, color, and toxicity.
A. True B. False

20. Algae can be controlled in the water supply by using chemicals such as_____.
A. pH and alkalinity C. Powdered activated carbon and chlorine
B. Copper sulfate D. None of the above

21. Contingent upon federal regulations and the amount of copper found natural in water, operators have used_____ , powdered activated carbon and chlorine to control algae blooms.
A. pH and alkalinity C. Potassium permanganate
B. Metals, and non-metals D. None of the above

22. The _____ of the water will govern how these chemicals will react.
A. pH and alkalinity C. Powdered activated carbon and chlorine
B. Metals, and non-metals D. None of the above

Physical Characteristics of Water

23. _____ is a substance that can give up a hydrogen ion (H^+); a base is a substance that can accept H^+.
A. Acid C. Acidic or alkaline
B. Base D. None of the above

24. The more acidic a solution the greater the hydrogen ion concentration and the lower the pH; a pH of 7.0 indicates neutrality, a pH of less than 7 indicates acidity, and a pH of more than 7 indicates _____.
A. Acid C. Alkalinity
B. Base D. None of the above

25. Physical characteristics are the elements found that are considered alkali, metals, and non-metals such as carbonates, fluoride,_____. The consumer relates it to scaling of faucets or staining.
A. pH and alkalinity C. Powdered activated carbon and chlorine
B. Sulfides or acids D. None of the above

26. Total Dissolved Solids (TDS) is not a primary pollutant; it is a gauge of appealing water characteristics such as hardness and an indication of an assortment of chemical contaminants that might be present, such as?
A. Turbidity C. Arsenic
B. Colloids D. None of the above

27. pH is the negative logarithm of the hydrogen ion concentration, $[H^+]$, a measure of the degree to which a solution is_____ .
A. Alkalinity C. Hydrogen ion (H^+)
B. Acidic or alkaline D. None of the above

Alkalinity

28. _____ with an overabundance of alkaline earth metal concentrations is significant in determining the suitability of water for irrigation.

A. Alkalinity C. Hydrogen ion (H^+)
B. Acid D. None of the above

29. Alkalinity measurements are used in the interpretation and control of water and wastewater treatment processes

A. True B. False

30. Alkalinity of water is its acid-neutralizing capacity. It is the sum of all the titratable bases. The measured value may vary significantly with the end-point pH used.

A. True B. False

31. Alkalinity is a measure of _____and can be interpreted in terms of specific substances only when the chemical composition of the sample is known.

A. Hydrogen ion (H^+) C. An aggregate property of water
B. Alkaline earth metal D. None of the above

32. Alkalinity is substantial in many uses and treatments of natural waters and wastewaters. Because the alkalinity of many surface waters is primarily a function of carbonate, bicarbonate, and hydroxide content, it is taken as an indication of the concentration of these constituents. The measured values also may include contributions from borates, phosphates, silicates or other bases if these are present.

A. True B. False

Turbidity Introduction

33. When heavy rains transpire, runoff into streams, rivers, and reservoirs occurs, causing turbidity levels to increase. In most cases, the particle sizes are relatively large and settle relatively quickly in both the water treatment plant and the source of supply. However, in some instances, fine, colloidal material may be present in the supply, which may cause some difficulty in the coagulation process.

A. True B. False

34. Generally, higher turbidity levels require higher coagulant dosages. However, seldom is the relationship between turbidity level and _____linear.

A. Coagulant dosage C. Temperature
B. Total Dissolved Solids (TDS) D. None of the above

35. One physical feature of water is turbidity. A measure of the cloudiness of water caused by_____. The cloudy appearance of water caused by the presence of tiny particles.

A. Suspended particles C. Temperature fluctuation
B. Variations D. None of the above

36. High levels of turbidity may inhibit with proper water treatment and monitoring. If high quality raw water is low in turbidity, there will be a reduction in water treatment costs. Turbidity is unwanted because it causes health hazards.

A. True B. False

37. The turbidity in natural surface waters is composed of a large number of sizes of particles. The sizes of particles can be changing constantly, depending on precipitation and _____ factors.

A. MCL C. Temperature
B. Manmade D. None of the above

38. Usually, the extra coagulant required is relatively small when turbidities are much higher than normal due to higher collision probabilities of the _____during high turbidities.
A. Turbidity C. Total Dissolved Solids (TDS)
B. Colloids D. None of the above

39. Low _____waters can be very difficult to coagulate due to the difficulty in inducing collision between the colloids.
A. Turbidity C. Total Dissolved Solids (TDS)
B. Colloids D. None of the above

40. _____may be existing in a water supply due to pollution, and these colloids can be difficult to remove in the coagulation process. In this situation, higher coagulant dosages are generally required.
A. Turbidity C. Total Dissolved Solids (TDS)
B. Organic colloids D. None of the above

Turbidity MCL
41. The temperature variation of a sample, a scratched or unclean sample tube in the nephelometer and selecting an incorrect wavelength of a light path may be conditions caused by an inaccurate _____ measurement.
A. Conductivity C. Temperature
B. Turbidity D. None of the above

42. An MCL for turbidity established by the EPA because _____interferes with disinfection. This characteristic of water changes the most rapidly after a heavy rainfall.
A. Conductivity C. Temperature
B. Turbidity D. None of the above

Dissolved Oxygen
43. _____ is essential for the support of fish and other aquatic life and aids in the natural decomposition of organic matter.
A. Dissolved oxygen C. Solubility of oxygen
B. Thermal stratification D. None of the above

44. Thermal stratification is possible as water becomes less dense when heated; meaning water weighs less per unit volume. Therefore, warmer water will be lighter and colder water will be heavier. Due to this, there will always be a level of “self-induced” _____ in a water storage.
A. Saturation level(s) C. Permanent hardness
B. Thermal stratification D. None of the above

45. The level of dissolved oxygen in natural waters is often a direct indication of quality, since aquatic plants produce oxygen, while microorganisms generally consume it as they feed on _____.
A. Pollutants C. E. coli bacteria
B. Organic matter D. None of the above

46. At low temperatures, the _____is increased, so that in winter, concentrations as high as 20 ppm may be found in natural waters; during summer, saturation levels can be as low as 4 or 5 ppm.
A. Dissolved oxygen C. Solubility of oxygen
B. Thermal stratification D. None of the above

Secondary Standard

47. TDS is most often measured in parts per million (ppm) or milligrams per liter of water (mg/L). The normal TDS level ranges from _____

A. 50 ppm to 1,000 ppm C. 50 ppm to 100 ppm
B. 5 ppm to 10 ppm D. None of the above

48. The Environmental Protection Agency (EPA), which is responsible for drinking water regulations in the United States, has identified TDS as a secondary standard, meaning that it is a voluntary guideline. While the United States set legal standards for many harmful substances, TDS, along with other contaminants that cause aesthetic, cosmetic, and technical effects, has only a guideline.

A. True B. False

Langelier Saturation Index

49. The Langelier Saturation index (LSI) is an evenness scale derived from the theoretical concept of saturation and provides an indicator of the degree of saturation of water with respect to calcium carbonate. It can be shown that the Langelier saturation index (LSI) approximates the base 10 logarithm of the _____saturation level.

A. Magnesium carbonate C. Calcite
B. Calcium carbonate D. None of the above

50. The Langelier saturation level approaches the concept of saturation using pH as a main variable. The LSI can be interpreted as the pH change required to bring water to_____.

A. Saturation level(s) C. Equilibrium
B. Stratification D. None of the above

More on the Stage 2 DBP Rule

51. Which of the following rules focuses on public health protection by limiting exposure to DBPs, specifically total trihalomethanes and five haloacetic acids, which can form in water through disinfectants used to control microbial pathogens?

A. Stage 2 DBP rule C. Long Term 2 Enhanced Surface Water Treatment Rule
B. Stage 1 DBPR D. None of the above

52. Safe Drinking Water Act (SDWA) has been highly effective in protecting public health and has evolved to respond to new and emerging threats to safe drinking water.

A. True B. False

53. Which of the following is one of the major public health advances in the 20th century?

A. Disinfection of drinking water C. Amendments to the SDWA
B. Water distribution D. None of the above

54. There are specific microbial pathogens, such as_____, which can cause illness, and are highly resistant to traditional disinfection practices.

A. Cryptosporidium C. Protozoa
B. E. coli host culture D. None of the above

55. The Stage 1 Disinfectants and Disinfection Byproducts Rule and_____, promulgated in December 1998.

A. Stage 1 DBPR C. Interim Enhanced Surface Water Treatment Rule
B. Stage 2 DBPR D. None of the above

56. Which of the following rules will reduce potential cancer and reproductive and developmental health risks from disinfection byproducts?
A. Stage 1 DBPR
B. Stage 2 DBPR
C. Long Term 2 Enhanced Surface Water Rule
D. None of the above

What are Disinfection Byproducts (DBPs)?
57. Which of the following form when disinfectants used to treat drinking water react with naturally occurring materials in the water?
A. Chloramines
B. Humic and fulvic acids
C. Disinfection byproducts (DBPs)
D. None of the above

58. Total trihalomethanes and haloacetic acids are widely occurring _____ formed during disinfection with chlorine and chloramine.
A. Gases
B. Substances
C. Classes of DBPs
D. None of the above

Are THMs and HAAs the only disinfection byproducts?
59. The presence of TTHM and HAA5 is representative of the occurrence of many other chlorination DBPs; thus, an increase of TTHM and HAA5 generally indicates an increase of DBPs from chlorination.
A. True B. False

All disinfectants form DBPs in one of two reactions:
60. Chorine and chlorine-based compounds (halogens) react with organics in water causing the hydrogen atom to substitute other atoms, resulting in halogenated by-products.
A. True B. False

61. Secondary by-products are also formed when multiple disinfectants are used.
A. True B. False

62. The EPA Surface Water Treatment Rule (SWTR) requires systems using public water supplies from either surface water or groundwater under the direct influence of surface water to disinfect.
A. True B. False

Public Health Concerns
63. Results from toxicology studies have shown several DBPs (e.g., bromodichloromethane, bromoform, chloroform, dichloroacetic acid, and bromate) to be inert to laboratory animals.
A. True B. False

64. Other DBPs (e.g., chlorite, bromodichloromethane, and certain haloacetic acids) have also been shown to cause adverse mutations (extra chromosomes) in laboratory animals.
A. True B. False

Disinfection Byproduct Research and Regulations Summary
65. _____is unquestionably the most important step in the treatment of water for drinking water supplies.
A. DBP(s)
B. Turbidity (particle)
C. Disinfection
D. None of the above

66. The _____should not be compromised because of concern over the potential long-term effects of disinfectants and DBPs.
A. DBP(s)
B. Turbidity (particle)
C. Microbial quality of drinking water
D. None of the above

67. The risk of illness and death resulting from exposure to pathogens in drinking water is very much greater than the risks from_____.
A. Disinfectants and DBPs C. Natural organic matter precursors
B. Turbidity (particle) D. None of the above

Controlling Disinfection Byproducts
68. Treatment techniques are available that provide water suppliers the opportunity to maximize potable water safety and quality while minimizing the risk of _____.
A. DBP risks C. Disinfectants and DBPs
B. Turbidity (particle) D. None of the above

69. Generally, the best approach to reduce _____is to remove natural organic matter precursors prior to disinfection.
A. DBP(s) C. DBP formation
B. Turbidity (particle) D. None of the above

The EPA guidance discusses three processes to effectively remove natural organic matter prior to disinfection:
Coagulation and Clarification
70. Most treatment plants optimize their coagulation process for _____removal.
A. Inorganic coagulants C. Turbidity (particle)
B. Most contaminants D. None of the above

71. Coagulation processes can also be optimized for natural organic matter removal with higher doses of _____(such as alum or iron salts), and optimization of pH.
A. THMs and HAAs C. Natural organic matter
B. Inorganic coagulants D. None of the above

Absorption
72. Activated carbon can be used to absorb _____ that react with disinfectants to form byproducts.
A. Inorganic coagulants C. Soluble organics
B. Most contaminants D. None of the above

Membrane Technology
73. Membranes, used historically to desalinate brackish waters, have also demonstrated excellent removal of _____.
A. THMs and HAAs C. Natural organic matter
B. Optimization of pH D. None of the above

74. Membrane processes use hydraulic pressure to force water through a semi-permeable membrane that rejects most _____. Variations of this technology include reverse osmosis (RO), nanofiltration (low pressure RO), and microfiltration (comparable to conventional sand filtration).
A. Inorganic coagulants C. Insoluble organics
B. Contaminants D. None of the above

75. Other conventional methods of reducing DBP formation include changing the point of chlorination and using _____for residual disinfection.
A. Free residual disinfection C. Total residual disinfection
B. Chloramines D. None of the above

76. EPA predicted that most water systems will be able to achieve compliance with new DBP regulations through the use of one or more of these relatively low cost methods (EPA, 1998). Water system managers may also consider switching from chlorine to alternative disinfectants to reduce formation of _____.

A. THMs and HAAs C. Natural organic matter
B. Optimization of pH D. None of the above

Bacteriological Monitoring Section

Organisms Descriptors and Meanings

77. Auto means...

A. Without air C. Self (Inorganic carbon)
B. With air D. None of the above

78. Facultative means...

A. Without air C. Self (Inorganic carbon)
B. With air or without air D. None of the above

79. Photo means...

A. Feed or nourish C. Light
B. Other (Organic carbon) D. None of the above

80. Troph means...

A. Feed or nourish C. Light
B. Other (Organic carbon) D. None of the above

81. Litho means...

A. Rock C. Light
B. Organic D. None of the above

82. Organo means...

A. Rock C. Light
B. Organic D. None of the above

83. Aerobic means...

A. Without air C. Self (Inorganic carbon)
B. With air D. None of the above

84. Chemo means...

A. Rock C. Chemical
B. Organic D. None of the above

85. Hetero means...

A. Feed or nourish C. Light
B. Other (Organic carbon) D. None of the above

86. Anaerobic means...

A. Without air C. Self (Inorganic carbon)
B. With air D. None of the above

(S) Means the answer can be plural or singular in nature

Contaminants that may be present in sources of drinking water include:

87. Which of the following like salts and metals, which can be naturally occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming?

A. Radioactive contaminants C. Inorganic contaminants
B. Pesticides and herbicides D. Microbial contaminants

88. Which of the following may come from a variety of sources such as agriculture, urban stormwater run-off, and residential uses?

A. Radioactive contaminants C. Inorganic contaminants
B. Pesticides and herbicides D. Microbial contaminants

89. Which of the following, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife?

A. Microbial contaminants C. Inorganic contaminants
B. Pesticides and herbicides D. None of the above

90. Which of the following can be synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can come from gas stations, urban stormwater run-off, and septic systems?

A. Organic chemical contaminants C. Inorganic contaminants
B. Pesticides and herbicides D. Microbial contaminants

91. Which of the following can be naturally occurring or be the result of oil and gas production and mining activities?

A. Radioactive contaminants C. Inorganic contaminants
B. Pesticides and herbicides D. Microbial contaminants

Background

92. Coliform bacteria and chlorine residual are the only routine sampling and monitoring requirements for small ground water systems with chlorination. The coliform bacteriological sampling is governed by the Coliform Reduction amendment of the SDWA.

A. True B. False

TCR

93. The TCR recommends most of the Public Water Systems (PWS) to monitor their distribution system for bacteria according to the written sample sitting plan for that system.

A. True B. False

94. The sample sitting plan identifies sampling frequency and locations throughout the distribution system that are selected to be representative of conditions in the entire system.

A. True B. False

95. Coliform contamination may occur anywhere in the system, possibly due to problems such as; high-pressure conditions, line fluctuations, or wells, and therefore routine monitoring is required.

A. True B. False

Routine Sampling Requirements

96. Total coliform samples must be collected by PWSs at sites that are representative of water quality throughout the distribution system according to a written sample siting plan subject to state review and revision.

A. True B. False

97. For PWSs collecting more than one sample per month, collect total coliform samples at regular intervals throughout the month, except that ground water systems serving 4,900 or fewer people may collect all required samples on a single day if the samples are taken from different sites.
A. True B. False

98. Each total coliform-positive (TC+) routine sample must be tested for the presence of autotrophic bacteria.
A. True B. False

99. If any TC+ sample is also E. coli-positive (EC+), then the EC+ sample result must be reported to the state by the end of the month that the PWS is notified.
A. True B. False

100. If any routine sample is TC+, repeat samples are required. – PWSs on quarterly or annual monitoring must take a minimum of one additional routine samples (known as additional routine monitoring) the quarter following a TC+ routine or repeat sample.
A. True B. False

101. Reduced monitoring is general available for PWSs using only surface water and serving 1,000 or fewer persons that meet certain additional PWS criteria.
A. True B. False

Dangerous Waterborne Microbes
102. Which of the following is a parasite that enters lakes and rivers through sewage and animal waste?It causes cryptosporidiosis, a mild gastrointestinal disease. The disease can be severe or fatal for people with severely weakened immune systems.
A. Coliform Bacteria C. Giardia lamblia
B. Cryptosporidium D. None of the above

103. Which of the following are not necessarily agents of disease may indicate the presence of disease-carrying organisms?
A. Fecal coliform bacteria C. Shigella dysenteriae
B. Cryptosporidium D. None of the above

104. Which of the following is a parasite that enters lakes and rivers through sewage and animal waste. It causes gastrointestinal illness (e.g. diarrhea, vomiting, and cramps)?
A. Coliform Bacteria C. Protozoa
B. Cryptosporidium D. None of the above

105. Which of the following is a species of the rod-shaped bacterial genus Shigella?
A. Fecal coliform bacteria C. Shigella dysenteriae
B. Cryptosporidium D. None of the above

106. Which of the following can cause bacillary dysentery?
A. Fecal coliform bacteria C. Shigella
B. Cryptosporidium D. None of the above

107. Which of the following are Gram-negative, non-spore-forming, facultatively anaerobic, non-motile bacteria?
A. Fecal coliform bacteria C. Shigellae
B. Cryptosporidium D. None of the above

108. Which of the following are microscopic organisms that live in the intestines of warm-blooded animals? They also live in the waste material, or feces, excreted from the intestinal tract. When fecal coliform bacteria are present in high numbers in a water sample, it means that the water has received fecal matter from one source or another.
A. Fecal coliform bacteria C. Shigella dysenteriae
B. Cryptosporidium D. None of the above

109. Which of the following are common in the environment and are generally not harmful? However, the presence of these bacteria in drinking water are usually a result of a problem with the treatment system or the pipes which distribute water, and indicates that the water may be contaminated with germs that can cause disease.
A. Coliform Bacteria C. Giardia lamblia
B. Cryptosporidium D. None of the above

110. Which of the following are bacteria whose presence indicates that the water may be contaminated with human or animal wastes? Microbes in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms.
A. Fecal Coliform and E. coli C. Shigella dysenteriae
B. Cryptosporidium D. None of the above

Bacteriological Monitoring Introduction
111. Which of the following are usually harmless, occur in high densities in their natural environment and are easily cultured in relatively simple bacteriological media?
A. Indicator bacteria C. Viruses
B. Amoebas D. None of the above

112. Indicators in common use today for routine monitoring of drinking water include total coliforms, fecal coliforms, and?
A. Cryptosporidium C. Escherichia coli (E. coli)
B. Protozoa D. None of the above

113. According to the text, the routine microbiological analysis of your water is for?
A. Contamination C. Coliform bacteria
B. Colloids D. None of the above

Bacteria Sampling
114. Water samples for _____must always be collected in a sterile container.
A. Amoebas C. Viruses
B. Bacteria tests D. None of the above

Methods
115. The MMO-MUG test, a product marketed as _____, is the most common. The sample results will be reported by the laboratories as simply coliforms present or absent.
A. Colilert C. Total coliform analysis
B. Coliform D. None of the above

Microbial Regulations
116. One of the key regulations developed and implemented by the United States Environmental Protection Agency (USEPA) to counter pathogens in drinking water is the Surface Water Treatment Rule.
A. True B. False

117. Among Surface Water Treatment Rule provisions, the rule requires that a public water system, using surface water (or ground water under the direct influence of surface water) as its source, have sufficient treatment to reduce the source water concentration of protozoa and coliform bacteria by at least 99.9% and 99.99%, respectively.
A. True B. False

118. The Surface Water Treatment Rule suggests treatment criteria to assure that performance recommendations are met; these may include turbidity limits, disinfectant residual and disinfectant contact time conditions.
A. True B. False

Basic Types of Water Samples
119. It is important to properly identify the type of sample you are collecting.
A. True B. False

The three (3) primary types of samples are:
120. A PWS collecting fewer than 40 samples per month has 2 or more TC+ routine/ repeat samples in the same month.
A. Trigger: Level 1 Assessment C. All of the above
B. Trigger: Level 2 Assessment D. None of the above

121. A PWS collecting at least 40 samples per month has greater than 5.0 percent of the routine/repeat samples in the same month that are TC+.
A. Trigger: Level 1 Assessment C. All of the above
B. Trigger: Level 2 Assessment D. None of the above

122. A PWS has a second Level 1 Assessment within a rolling 12-month period.
A. Trigger: Level 1 Assessment C. All of the above
B. Trigger: Level 2 Assessment D. None of the above

123. A PWS on state-approved annual monitoring has a Level 1 Assessment trigger in 2 consecutive years.
A. Trigger: Level 1 Assessment C. All of the above
B. Trigger: Level 2 Assessment D. None of the above

124. Samples collected following a coliform present routine sample. The number of repeat samples to be collected is based on the number of _____ samples you normally collect.
A. Repeat C. Routine
B. Special D. None of the above

125. A PWS fails to take every required repeat sample after any single TC+ sample
A. Trigger: Level 1 Assessment C. All of the above
B. Trigger: Level 2 Assessment D. None of the above

126. A PWS incurs an E. coli MCL violation.
A. Trigger: Level 1 Assessment C. All of the above
B. Trigger: Level 2 Assessment D. None of the above

(S) Means the answer can be plural or singular in nature

127. Noncommunity and nontransient noncommunity public water systems will sample at the same frequency as a like sized community public water system if:
1. It has more than 1,000 daily population and has ground water as a source, or
2. It serves 25 or more daily population and utilizes surface water as a source or ground water under the direct influence of surface water as its source.
A. True B. False

128. Noncommunity and nontransient, noncommunity water systems with less than 10,000 daily population and groundwater as a source will sample on an annual basis.
A. True B. False

Maximum Contaminant Levels (MCLs)
129. There are two types of MCL violations for coliform bacteria. The first is for total coliform; the second is an acute risk to health violation characterized by the confirmed presence of fecal coliform or E. coli.
A. True B. False

130. State and federal laws establish standards for drinking water quality. Under normal circumstances when these standards are being met, the water is safe to drink with no threat to human health. These standards are known as maximum contaminant levels (MCL). When a particular contaminant exceeds its MCL a potential health threat may occur.
A. True B. False

131. The MCLs are based on extensive research on toxicological properties of the contaminants, risk assessments and factors, short-term (acute) exposure, and long-term (chronic) exposure. You conduct the monitoring to make sure your water is in compliance with the MCL.
A. True B. False

Positive or Coliform Present Results
132. If you are notified of a positive coliform test result you need to contact either the Drinking Water Program or your local county health department within 72 hours, or by the next business day after the MCL compliance violation
A. True B. False

133. With a positive total coliform sample, after you have contacted an agency for assistance, you will be instructed as to the proper repeat sampling procedures and possible corrective measures for solving the problem. It is very important to initiate the _____as the corrective measures will be based on those results.
A. Perform routine procedures C. Corrective measures
B. Repeat sampling immediately D. None of the above

Heterotrophic Plate Count HPC
134. Heterotrophic Plate Count (HPC) --- formerly known as the Bac-T plate, is a procedure for estimating the number of live heterotrophic bacteria and measuring changes during water treatment and distribution in water or in swimming pools.
A. True B. False

Heterotrophic Plate Count (Spread Plate Method)
135. Which of the following provides a technique to quantify the bacteriological activity of a sample?
A. Colonies C. Heterotrophic Plate Count
B. Agar D. None of the above

Total Coliforms

136. This MCL is based on the presence of total coliforms, and compliance is on a daily or weekly basis, depending on your water system type and state rule.
A. True B. False

137. For systems which collect fewer than _____ samples per month, no more than one sample per month may be positive. In other words, the second positive result (repeat or routine) in a month or quarter results in a MCL violation.
A. 40 C. 200
B. 100 D. None of the above

The following are acute violations:

138. Which determines a violation of nitrate?
A. Presence C. MCLG
B. MCL D. None of the above

Revised Total Coliform Rule (RTCR) Summary

139. EPA published the Revised Total Coliform Rule (RTCR) in the Federal Register (FR) on February 13, 2013 (78 FR 10269). It is the revision to the 1989 Total Coliform Rule (TCR).
A. True B. False

140. The RTCR upholds the purpose of the 1989 TCR to protect public health by ensuring the duplicity of the drinking water distribution system and monitoring for the absence of microbial contamination.
A. True B. False

141. The RTCR establishes criteria for systems to qualify for and stay on for special increased monitoring, which could reduce water system problems for better system operation.
A. True B. False

142. The water provider shall develop and follow a sample-siting plan that designates the PWS's collection schedule. This includes location of_____.
A. Routine and repeat water samples C. Microbial contamination
B. Reduced monitoring D. Repeat water samples

143. The water provider shall collect _____on a regular basis (monthly, quarterly, annually). Have samples tested for the presence of total coliforms by a state certified laboratory.
A. Routine water samples C. Microbial contamination
B. Reduced monitoring D. Repeat water samples

144. PN is required for violations incurred. Within required timeframes, the PWS must use the required health effects language and notify the public if they did not comply with certain requirements of the RTCR. The type of _____ depends on the severity of the violation.
A. CCR(s) C. MCL violation
B. PN D. TC+ routine or repeat sample

145. The RTCR requires public water systems that are vulnerable to microbial contamination to identify and fix problems.
A. True B. False

146. The water provider shall collect repeat samples (at least 3) for each TC+ positive routine sample.
A. True B. False

147. For PWSs on quarterly or annual routine sampling, collect additional routine samples (at least 3) in the month after a _____ .
A. CCR(s) C. Total coliform positive samples
B. PN D. TC+ routine or repeat sample

148. PWSs incur violations if they do not comply with the requirements of the RTCR. The violation types are essentially the same as under the TCR with few changes. The biggest change is no acute or monthly MCL violation for _____only.
A. CCR(s) C. Total coliform positive samples
B. PN D. TC+ routine or repeat sample

149. Community water systems (CWSs) must use specific language in their CCRs when they must conduct an assessment or if they incur_____.
A. CCR(s) C. An E. coli MCL violation
B. PN D. TC+ routine or repeat sample

150. The water provider shall analyze all _____ that are total coliform positive (TC+) for E. coli.
A. Routine or repeat water samples C. Microbial contamination
B. Reduced monitoring D. Repeat water samples

151. The RTCR requires public water systems (PWSs) to meet a legal limit for E. coli, as demonstrated by required monitoring.
A. True B. False

152. The RTCR suggests the frequency and timing of required microbial testing based on public water type and source water type.
A. True B. False

Disinfection Key
153. The RTCR requires 99.99% or 4 log inactivation of _____ .
A. Enteric viruses C. Giardia lamblia cysts
B. Crypto D. None of the above

154. The RTCR requires 99% or 2 log inactivation of _____ .
A. Enteric viruses C. Giardia lamblia cysts
B. Crypto D. None of the above

155. The RTCR requires 99.9% or 3 log inactivation of _____.
A. Enteric viruses C. Giardia lamblia cysts
B. Crypto D. None of the above

156. The RTCR requires the chlorine residual leaving the plant must be = or _____ mg/L and measurable throughout the system.
A. > 0.2 C. 0.2
B. 2.0 D. None of the above

Waterborne Pathogen Section
Pathogen Section
157. Most pathogens are generally associated with diseases that _____and affect people in a relatively short amount of time, generally a few days to two weeks.
A. Cause intestinal illness C. Will cause fatalities
B. Are mild in nature D. None of the above

How Diseases are Transmitted.

158. Waterborne pathogens are primarily spread by the?

A. Fecal-oral, or feces-to-mouth route
C. Oral to fecal route
B. Dermal to fecal route
D. None of the above

Protozoan Caused Diseases

159. Which of the following bugs is larger than bacteria and viruses but still microscopic; they invade and inhabit the gastrointestinal tract?

A. Hepatitis A
C. Protozoan pathogens
B. E.coli
D. None of the above

160. Some of the parasites enter the environment in a dormant form, with a protective cell wall, called a?

A. Lamblia
C. Cyst
B. Shell
D. None of the above

Giardia lamblia

161. Which of the following bugs has been responsible for more community-wide outbreaks of disease in the U.S. than any other, and drug treatment are not 100% effective?

A. Giardia lamblia
C. Giardiasis
B. Cryptosporidiosis
D. None of the above

162. All of these diseases, with the exception of _____, have one symptom in common: diarrhea. They also have the same mode of transmission, fecal-oral, whether through person-to-person or animal-to-person contact.

A. HIV infection
C. Hepatitis A
B. Giardiasis
D. None of the above

Primary Waterborne Diseases Section

163. Humans are the reservoir for the Salmonella typhi pathogen, which causes diarrheal illness, and also known as?

A. Campylobacter
C. Typhoid fever
B. Shigella dysenteriae
D. None of the above

164. Shigella species, in the United States two-thirds of the shigellosis in the U.S. is caused by Shigella dysenteriae and the remaining one-third is caused by Shigella Campylobacter.

A. True
B. False

165. Campylobacter, the basics. It's a bacterium. It causes diarrheal illness.

A. True
B. False

166. Campylobacter is primarily associated with poultry, animals, and humans.

A. True
B. False

167. Vibrio cholerae, the basics. It's a virus. It causes diarrheal illness, also known as cholera. It is typically associated with aquatic environments, shell stocks, and human. Vibrio cholerae has also been associated with ship ballast water.

A. True
B. False

168. Legionnaire's disease, which causes a severe pneumonia, and the second, _____, which is a non-pneumonia illness; it's typically an influenza-like illness, and it's less severe.

A. Pontiac fever
C. Typhoid fever
B. Yellow fever
D. None of the above

169. Legionella, prevention. Legionella in water systems. Hot water in tanks should be maintained between _____degrees Centigrade.
A. 81 to 100 C. 71 and 77
B. 110 to 210 D. None of the above

170. Which of the following is typically associated with soil and water?
A. Hepatitis A virus C. Pseudomonas
B. Legionella D. None of the above

171. Hepatitis A virus is resistant to combined chlorines, so it is important to have an adequate free chlorine residual. Fecal matter can shield Hepatitis A virus from chlorine.
A. True B. False

172. Humans are the reservoir for the Norovirus. Prevention strategies for this pathogen include?
A. Internal protection C. Containment protection
B. Source protection D. None of the above

173. Cryptosporidium is typically associated with animals and humans, and it can be acquired through consuming fecally contaminated food, contact with fecally contaminated soil and water.
A. True B. False

174. Cryptosporidium, prevention. Prevention strategies for this pathogen include source protection. A CT value of 50 is required when dealing with fecally accidents. CT equals a concentration, in parts per million, while time equals a contact time in minutes.
A. True B. False

175. Giardia prevention strategies for this pathogen include _____; filtration, coagulation, and halogenation of drinking water.
A. Internal protection C. Containment protection
B. Source protection D. None of the above

176. Schistosomatidae, the basics. It is a parasite. It is acquired through dermal contact, cercarial dermatitis. It is commonly known as?
A. Swimmer's itch C. Hemorrhagic colitis
B. Beaver fever D. None of the above

177. Schistosomatidae prevention strategies for this pathogen include Placing boric acid on berms or interrupting the life cycle of the parasite by treating birds with a lead.
A. True B. False

Waterborne Bacterial Diseases
178. Campylobacteriosis outbreaks have most often been associated with food, especially chicken and un-pasteurized milk, as well as un-chlorinated water. These organisms are also an important cause of “travelers’ diarrhea.” Medical treatment generally is not prescribed for campylobacteriosis because recovery is usually rapid.
A. True B. False

179. Cholera, Legionellosis, salmonellosis, shigellosis, yersiniosis, are other bacterial diseases that can be transmitted through water. All bacteria in water are readily killed or inactivated with chlorine or other disinfectants.
A. True B. False

180. Campylobacteriosis is the most common diarrheal illness caused by bacteria. Other symptoms include abdominal pain, malaise, fever, nausea and vomiting; and begin three to five days after exposure. The illness is frequently over within two to five days and usually lasts no more than 10 days.
A. True B. False

Viruses - Coronavirus
181. It looks like the COVID-19 coronavirus is not able to live in water.
A. True B. False

Chain of Custody Procedures
182. If both parties involved in the transfer must sign, date and note the time on the chain of custody record, this is known as?
A. TC Plan C. Samples transfer possession
B. Sample siting plan D. None of the above

183. The recipient will then attach the _____showing the transfer dates and times to the custody sheets. If the samples are split and sent to more than one laboratory, prepare a separate chain of custody record for each sample.
A. Shipping invoices C. Sample siting plan
B. Chain of custody release D. None of the above

Factors in Chlorine Disinfection: Concentration and Contact Time
184. Based on the work of several researchers, CXT values [final free chlorine concentration (mg/L) multiplied by minimum contact time (minutes)], offer water operators guidance in computing an effective combination of chlorine concentration and _____required to achieve disinfection of water at a given temperature.
A. Chlorine concentration C. Higher strength chlorine solutions
B. Chlorine contact time D. None of the above

185. The CXT formula demonstrates that if an operator chooses to decrease the chlorine concentration, the required _____must be lengthened.
A. Chlorine concentration C. Contact time
B. Temperature D. None of the above

186. As _____ are used, contact times may be reduced.
A. Chlorine concentration C. Higher strength chlorine solutions
B. Temperature D. None of the above

Water Microbiology Section

187. Who was the famous German scientist with the British surgeon Joseph Lister that developed techniques for growing cultures of single organisms that allowed the assignment of specific bacteria to specific diseases?
A. Louis Pasteur C. Robert Koch
B. Martinus Beijerinck D. None of the above

188. The first experimental transmission of a viral infection was accomplished by which German scientist when he demonstrated that extracts from infected tobacco leaves could transfer tobacco mosaic disease to a new plant, causing spots on the leaves?
A. Louis Pasteur C. Wendell Meredith Stanley
B. Adolf Mayer D. None of the above

189. _____ considered the idea that tobacco mosaic disease might be caused by a soluble agent, but he concluded incorrectly that a new type of bacteria was likely to be the cause.
A. Adolf Mayer C. Robert Koch
B. Martinus Beijerinck D. None of the above

190. Who was the Russian scientist that extended Mayer's observation and reported in 1892 that the tobacco mosaic agent was small enough to pass through a porcelain filter known to block the passage of bacteria?
A. Louis Pasteur C. Dimitri Ivanofsky
B. Martinus Beijerinck D. None of the above

191. Who was the French-Canadian scientist who discovered that viruses of bacteria, which he named bacteriophage, could make holes in a culture of bacteria?
A. Louis Pasteur C. Walter Reed
B. Félix H. d'Hérelle D. None of the above

192. Who is the American biochemist that crystallized tobacco mosaic virus to demonstrate that viruses had regular shapes, and in 1939 tobacco mosaic virus was first visualized using the electron microscope?
A. Louis Pasteur C. Wendell Meredith Stanley
B. Adolf Mayer D. None of the above

193. In 1898 the German bacteriologists Friedrich August Johannes Löffler and Paul F. Frosch (both trained by this famous scientist described foot-and-mouth disease virus as the first filterable agent of animals?
A. Adolf Mayer C. Robert Koch
B. Martinus Beijerinck D. None of the above

194. In 1900, the American bacteriologist _____ and colleagues recognized yellow fever virus as the first human filterable agent.
A. Walter Reed C. Louis Pasteur
B. Wendell Meredith Stanley D. None of the above

195. Viruses were once referred to as filterable agents, and gradually the term virus (Latin for "_____" or "poison") was employed strictly for this new class of infectious agents.
A. Slimy liquid C. Macroorganisms
B. Bacteriophages D. None of the above

196. Through the 1940s and 1950s, many critical discoveries were made about viruses through the study of _____because of the ease with which the bacteria they infect could be grown in the laboratory.
A. Cell culture systems C. Macroorganisms
B. Bacteriophages D. None of the above

197. Between 1948 and 1955, scientists at the National Institutes of Health (NIH) and at Johns Hopkins Medical Institutions revolutionized the study of animal viruses by developing _____ that permitted the growth and study of many animal viruses in laboratory dishes.
A. Cell culture systems C. Macroorganisms
B. Bacteriophages D. None of the above

198. Louis Pasteur along with which scientist developed the germ theory of disease that states that "a specific disease is caused by a specific type of microorganism?"
A. Robert Koch C. Rudolph Virchow
B. Matthias Schleiden D. None of the above

199. Who postulates not only proved the germ theory but also gave a tremendous boost to the development of microbiology by stressing a laboratory culture and identification of microorganisms?
A. Robert Koch C. Rudolph Virchow
B. Matthias Schleiden D. None of the above

200. Who observed small empty chambers in the structure of cork with the help of his crude microscope. He called them cells?
A. Robert Hooke C. Rudolph Virchow
B. Matthias Schleiden D. None of the above

201. Two German biologists _____ and Thedore Schwann proposed the "Cell theory' in 1838. According to this theory, all living things are composed of cells.
A. Robert Hooke C. Rudolph Virchow
B. Matthias Schleiden D. None of the above

202. _____ completed the cell theory with the idea that all cells must arise from preexisting cells.
A. Thedore Schwann C. Rudolph Virchow
B. Matthias Schleiden D. None of the above

203. In the world of bacteria, there is even a species of Deinococcus radiodurans—that can withstand blasts of radiation 10 times greater than would kill a human being.
A. True B. False

Bacteria
204. “Bacteria” is a plural word. The singular for this word is “bacterium” (bacter = rod, staff).
A. True B. False

205. Bacteria are prokaryotes (Kingdom Monera), which means that they have No true nucleus. They do have one chromosome of double-stranded DNA in a ring.
A. True B. False

206. There are some bacteria relatives that can do photosynthesis--they don’t have chloroplasts, but their _____and other needed chemicals are built into their cell membranes.
A. Chlorophyll C. Cellulose
B. An organelle D. None of the above

207. Bacteria consist of only_____?
A. A single cell C. Double-stranded DNA
B. An organelle D. None of the above

208. Pathogens have been found that can live in temperatures above the boiling point and in cold that would freeze your blood. They "eat" everything from sugar and starch to sunlight, sulfur and iron.
A. True B. False

Prokaryotes

209. The only prokaryotes are Bacteria and archaea all other life forms are _____creatures whose cells have nuclei.

A. Bacteria C. Eukaryotes
B. Microorganism D. None of the above

Early Origins

210. Bacteria, are basically one of three different shapes, some are rod - or stick-shaped and called Bacilli. Others are shaped like little balls and called cocci (cox-eye).

A. True B. False

211. Bacterial cells exist as cluster together to form pairs, chains, squares or other groupings.

A. True B. False

212. The mitochondria that make energy for your body cells is one example of?

A. Chloroplasts C. Chemical battery
B. Cellulose D. None of the above

213. A single teaspoon of topsoil may contain more than a billion (1,000,000,000) bacteria.

A. True B. False

Peptidoglycan

214. The amount and location of the _____are different in the two possible types of cell walls, depending on the species of bacterium.

A. Capsule C. Cytoplasmic granules
B. Peptidoglycan D. None of the above

215. Penicillin, inhibit the formation of the chemical cross linkages needed to make?

A. Bacteria C. Cytoplasmic granules
B. Peptidoglycan D. None of the above

216. If a person stops an antibiotic, any living bacteria could start making _____, grow, and reproduce.

A. Bacteria C. Cytoplasmic granules
B. Peptidoglycan D. None of the above

Gram Stain

217. Two possible types of _____may have more peptidoglycan than the other.

A. Bacteria C. Bacterial cell walls
B. Chemical cross linkages D. None of the above

218. In the Gram process, the amount of peptidoglycan in the cell walls of the bacteria under study will determine how those bacteria absorb the dyes with which they are stained; thus, bacterial cells can be $Gram^{+}$ or $Gram^{-}$.

A. True B. False

219. Which of the bacteria have less peptidoglycan, antibiotics like penicillin are less effective against them?

A. Aerobic C. $Gram^{+}$
B. $Gram^{-}$ D. None of the above

220. Pseudomonas aeruginosa is a strictly aerobic, oxidase positive, non-fermentative bacterium are?
A. Aerobic C. Gram^{+}
B. Gram $^{-}$ D. None of the above

221. With the Gram-stain, appearance is not particularly characteristic although rods are somewhat thinner than those seen for the?
A. Coliform bacteria C. Standard plate count
B. Enteric-like bacteria D. None of the above

222. Which type of bacteria have simpler cell walls with lots of peptidoglycan, and stain a dark purple color?
A. Aerobic C. Gram^{+}
B. Gram $^{-}$ D. None of the above

223. Which type of bacteria have more complex cell walls with less peptidoglycan, thus absorb less of the purple dye used and stain a pinkish color?
A. Aerobic C. Gram^{+}
B. Gram $^{-}$ D. None of the above

224. Which type of bacteria often incorporate toxic chemicals into their cell walls, and thus tend to cause worse reactions in our bodies?
A. Aerobic C. Gram^{+}
B. Gram $^{-}$ D. None of the above

Two types of cells- Prokaryotes and Eukaryotes
225. Which of the following exhibits all the characteristics of life but it lacks the complex system of membranes and organelles?
A. Prokaryotic cell C. Coliform bacteria
B. Enteric-like bacteria D. None of the above

Structure of a Eukaryotic Cell
226. Cell Membrane: The cell is enclosed and held intact by the cell membrane/plasma membrane/cytoplasmic membrane and is composed of large molecules of proteins and?
A. Cytoplasmic granules C. Phospholipids
B. Cell wall D. None of the above

227. Which of the following is selectively permeable?
A. Cytoplasmic granules C. Cellular membrane
B. DNA and proteins D. None of the above

Nucleus
228. Which of the following is enclosed in the nuclear membrane and contains chromosomes?
A. Chromosomes C. Macromolecular polymer-peptidoglycan
B. Nucleus D. None of the above

229. A single circular DNA molecule consists of many genes. A gene is a coiled unit made up of Cytoplasmic granules and proteins that code for or determine a particular characteristic of an individual organism.
A. True B. False

Cytoplasm

230. Cytoplasm is comprised of a semifluid gelatinous nutrient matrix and cytoplasmic organelles including endoplasmic reticulum, ribosomes, Golgi complex, mitochondria, _____, microtubules, lysosomes and vacoules.

A. Chromosomes C. Centrioles
B. Procaryotes D. None of the above

Cilia and Flagella

231. Which of the following reflect cells that possess relatively long and thin structures called Flagella?

A. Eukaryotic C. Prokaryotic
B. Paramecium D. None of the above

232. Which of the following are organs of locomotion but are shorter and more numerous?

A. Cytoplasmic granules C. Flagellin
B. Cilia D. None of the above

Structure of a Procaryotic Cell

233. All bacteria are prokaryotes and are simple cells and they divide by binary fission.

A. True B. False

Chromosome

234. The chromosome of a prokaryotic cell normally consists of a single circular _____ and serves as the control center of the bacterial cell.

A. Cytoplasmic granules C. Singular circular DNA molecule
B. DNA molecule D. None of the above

235. A characteristic bacterial chromosome contains approximately 10,000 genes.

A. True B. False

Cytoplasm

236. Which of the following is a semi-liquid that surrounds the chromosome and is contained within the plasma membrane?

A. Eukaryotic cell membrane C. Macromolecular polymer-peptidoglycan
B. Cytoplasm D. None of the above

Capsules

237. Some bacteria have a layer of material outside the?

A. Capsule C. Membrane/cytoplasmic membrane
B. Cell wall D. None of the above

238. Which of the following terms consist of complex sugars or polysaccharides combined with lipids and proteins?

A. Capsule C. Membrane/cytoplasmic membrane
B. Cell wall D. None of the above

Flagella

239. Flagella are _____that enable the bacteria to move.

A. Forming spores C. False feet
B. Cilia D. None of the above

240. Which term is motile while non-flagellated bacteria are generally non-motile?

A. Bacteria C. Flagellated bacteria
B. Peptidoglycan D. None of the above

241. Peritrichous bacteria- possess?
A. One flagellum C. Flagella over the entire surface
B. A single polar flagellum D. None of the above

242. Lophotrichous bacteria-possess at one or both ends?
A. One flagellum C. Flagella over the entire surface
B. Tuft of flagella D. None of the above

243. Amphitrichous bacteria-bacteria with _____.
A. One flagellum C. One flagellum at each end
B. A single polar flagellum D. None of the above

244. Monotrichous bacteria-bacteria with_____.
A. One flagellum C. Flagella over the entire surface
B. A single polar flagellum D. None of the above

Pili or Fimbriae

245. Pili or Fimbriae allow the bacteria to attach to other bacteria or to membrane surfaces such as intestinal linings or?
A. Chromosomes C. Pili or Fimbriae
B. RBC D. None of the above

246. Which of the following terms is used to transfer genetic material from one bacteria cell to another?
A. Chromosomes C. Pili or Fimbriae
B. RBC D. None of the above

Spores

247. Which of the following is enclosed in several protein coats that are resistant to heat, drying and most chemicals?
A. Spores C. Spore formation
B. Genetic material D. None of the above

248. Spore formation is related to the survival of bacterial cells, not reproduction.
A. True B. False

Bacterial Nutrition

249. Which of the following is needed in substantial quantities, but some seem to need it in trace amounts?
A. Iron, Zinc, Cobalt C. Calcium
B. Nitrogen D. None of the above

250. Which of the following terms all life requires in order to grow and reproduce?
A. Water C. Copper
B. Calcium D. None of the above

251. All life has the same basic nutritional requirements that include: Energy. This may be light or inorganic substances like sulfur, carbon monoxide or ammonia, or preformed organic matter like sugar, protein, fats etc.
A. True B. False

252. Which of the following may be in these forms- nitrogen gas, ammonia, nitrate/nitrite, or a nitrogenous organic compound like protein or Nucleic acid?
A. Nitrites C. Nitrates
B. Nitrogen D. None of the above

253. Which of the following may be in these forms- carbon dioxide, methane, carbon monoxide, or a complex organic material?
A. Nitrogen C. Oxygen
B. Carbon D. None of the above

Fastidious
254. Which of the following may synthesize every complex molecule they need from the basic minerals?
A. Viruses C. Centrioles
B. Bacteria D. None of the above

What in the World is an Eukaryote?
255. Which of the following terms represents animals, plants, and fungi, which are mostly multicellular, as well as various other groups called protists, many of which are unicellular?
A. Eukaryote(s) C. Prokaryote(s)
B. Bacteria D. None of the above

256. The eukaryotes share a common origin, and are treated formally as a super kingdom, empire, or domain.
A. True B. False

Eukaryotic Cells
257. According to the text, Eukaryotic cells are generally much larger than _____, typically with a thousand times their volumes.
A. Macroorganisms C. Prokaryote(s)
B. Bacteria D. None of the above

258. Many cells ingest food and other materials through a process of osmosis, where the outer membrane invaginates and then pinches off to form a Flagella.
A. True B. False

259. Which of the following is surrounded by a double membrane with pores that allow material to move in and out?
A. The nucleus C. Cilia
B. Flagella D. None of the above

260. Which of the following represents a variety of Internal membranes and structures, called organelles, and a cytoskeleton composed of microtubules and microfilaments?
A. Eukaryote(s) C. Prokaryote(s)
B. Bacteria D. None of the above

261. Which of the following represent DNA that is divided into several bundles called chromosomes, which are separated by a microtubular spindle during nuclear division?
A. Eukaryote(s) C. Prokaryote(s)
B. Bacteria D. None of the above

Protozoan Reservoirs of Disease

262. Which of the following represents the causative organism of Legionnaires' disease?
A. Amoebae C. Bacterium Legionella pneumophila
B. Viruses D. None of the above

263. The presence of bacteria in the cytoplasm of protozoa is well known, whereas that of viruses is less frequently reported. Most of these reports simply record the presence of bacteria or viruses and assume some sort of symbiotic relationship between them and the Protozoa.
A. True B. False

264. Which of the following were shown to not only survive but also to multiply in the cytoplasm of free-living, nonpathogenic protozoa?
A. Human pathogens C. Freshwater protozoan
B. Marine protozoa D. None of the above

265. Protozoa are the natural habitat for certain pathogenic bacteria.
A. True B. False

Symbionts

266. Which of the following terms inhabit the rumen and reticulum of ruminates and the cecum and colon of equids?
A. Ciliates C. Freshwater protozoan
B. Marine protozoa D. None of the above

Data on Protozoa

267. Most ecologists who include _____ in their studies of aquatic habitats do not identify them, even if they do count and measure them for biomass estimates.
A. Protozoa C. Freshwater protozoan
B. Marine protozoa D. None of the above

268. Which of the following terms represents an organism of humans, domestic animals, and wildlife are better known although no attempt has been made to compile this information into a single source?
A. Protozoa C. Parasitic protozoa
B. Marine protozoa D. None of the above

Ecological Role of Protozoa

269. Which of the following terms represents an organism that is frequently overlooked, these play an important role in many communities where they occupy a range of trophic levels?
A. Protozoa C. Parasitic protozoa
B. Marine protozoa D. None of the above

270. According to the text, these are predators of unicellular or filamentous algae, _____, and microfungi, protozoa play a role both as herbivores and as consumers in the decomposer link of the food chain.
A. Ciliates C. Freshwater protozoan
B. Bacteria D. None of the above

271. The ecological role of Foraminifera in the transfer of bacterial and algal production to successive trophic levels is important.
A. True B. False

Factors Affecting Growth and Distribution

272. Which of the following terms reproduce by cell division?
A. Most free-living protozoa C. Freshwater protozoan
B. Marine protozoa D. None of the above

Protozoa

273. When protozoa are in the form of _____, they actively feed and grow.
A. Cysts C. Apicomplexans
B. Trophozoites D. None of the above

274. According to the text, the process by which the protozoa takes its cyst form is called encystation, while the process of transforming back into _____ is called excystation.
A. Cysts C. Apicomplexans
B. Trophozoite D. None of the above

275. Protozoa occupy a range of trophic levels, as predators, they prey upon unicellular or filamentous algae, bacteria, and?
A. Microfungi C. Trophozoites and cysts
B. Parasites D. None of the above

276. Most protozoa exist in 5 stages of life which are in the form of _____.
A. Microinvertebrates C. Trophozoites and cysts
B. Malaria parasites D. None of the above

277. Which of the following can survive harsh conditions, such as exposure to extreme temperatures and harmful chemicals, or long periods without access to nutrients, water, or oxygen for a period of time.
A. Meiofauna C. Microinvertebrates
B. Protozoa D. None of the above

278. Which of the following play a role both as herbivores and as consumers in the decomposer link of the food chain?
A. Protozoa C. Trophozoites and cysts
B. Microinvertebrates D. None of the above

279. Which of the following are an important food source for microinvertebrates?
A. Meiofauna C. Microinvertebrates
B. Protozoa D. None of the above

280. An individual protozoan is?
A. Apicomplexans C. Hermaphroditic
B. Trophozoite D. None of the above

Classification

281. Protozoa were usually grouped in the kingdom of Protista together with the plant-like algae and fungus-like water molds and slime molds. In the 21st-century systematics, protozoans, along with ciliates, mastigophorans, and apicomplexans, are arranged as animal-like protists.
A. True B. False

282. Protozoans are neither Animalia nor Metazoa (with the possible exception of the enigmatic, moldy Myxozoa).
A. True B. False

283. Trophozoite usually have non-specific routes by which they are transmitted, and these routes may depend on the type of cells and tissue that a particular agent targets.
A. True B. False

284. Once in the air, the viruses can infect another person who is unlucky enough to inhale air containing the Virus particles.
A. True B. False

285. Agents differ greatly in their stability in the environment. Some viruses may survive for only a few minutes outside of a host, while some Apicomplexans are extremely durable and may survive in a dormant state for a week or more.
A. True B. False

Amoebas
286. Pseudopods are used to capture prey; they simply engulf the food. They can detect the kind of prey and use different?
A. Cells C. Engulfing tactics
B. Cytoplasma D. None of the above

Protozoa Information
287. Which of the following have been documented from almost every type of soil and in every kind of environment, from the peat-rich soil of bogs to the dry sands of deserts?
A. Soil-dwelling protozoa C. Soil-loving Amoeba
B. Protozoan fauna D. None of the above

288. In freshwater habitats, the foraminifera and radiolaria common in marine environments are absent or low in numbers while _____ exist in greater numbers.
A. Microsporidia C. Protozoan fauna
B. Testate amoebae D. None of the above

Environmental Quality Indicators
289. Polluted waters often have a rich and characteristic?
A. Microsporidia C. Protozoan fauna
B. Testate amoebae D. None of the above

Symbiotic Protozoa
Parasites
290. Which term means a unique group of obligate, intracellular parasitic protozoa?
A. Microsporidia C. Protozoan fauna
B. Testate amoebae D. None of the above

291. There are four different genera of microsporidia (Encephalitozoon, Nosema, Pleistophora, and_____).
A. Foraminifera C. Enterocytozoon
B. Protozoan fauna D. None of the above

292. The presence of bacteria in _____ is well known, whereas that of viruses is less frequently reported.
A. Foraminifera C. Cytoplasm of protozoa
B. Protozoan fauna D. None of the above

293. The presence of bacteria or viruses and assume some sort of symbiotic relationship between them and the?
A. Protozoa C. Free-living amoebae
B. Bacteria or viruses D. None of the above

294. Some human pathogens were shown to not only survive but also to multiply in the cytoplasm of free-living?
A. Beneficial symbionts C. Nonpathogenic protozoa
B. Organisms D. None of the above

295. To date, the focus of attention has been on the_____, the causative organism of Legionnaires' disease; these bacteria live and reproduce in the cytoplasm of some free-living amoebae.
A. Free-living amoebae C. Bacterium Legionella pneumophila
B. Bacteria or viruses D. None of the above

Symbionts
296. According to the text, which of these creatures are harmless or even beneficial symbionts?
A. Protozoa C. Bacterium Legionella pneumophila
B. Viruses D. None of the above

Contractile Vacuoles
297. Many protozoa have_____, which collect and expel excess water, and extrusomes, which expel material used to deflect predators or capture prey.
A. Flagella C. Vacuole or tonoplast
B. Contractile vacuoles D. None of the above

298. In higher plants, most of a cell's volume is taken up by a central vacuole or tonoplast, which maintains its?
A. Kinetosome or centriole C. Osmotic pressure
B. Vacuole or tonoplast D. None of the above

299. Which of the following have slender motile projections, usually called flagella when long and cilia when short?
A. Eukaryote(s) C. Prokaryote(s)
B. Bacteria D. None of the above

300. Which bug/creature/organism are entirely distinct from prokaryotic flagella?
A. Eukaryote(s) C. Prokaryote(s)
B. Bacteria D. None of the above

301. Flagella also may have hairs or mastigonemes, scales, connecting membranes, and internal rods, their interior is continuous with the?
A. Flagella C. Cell's cytoplasm
B. Haptonema D. None of the above

Centrioles
302. Centrioles are often present even in cells and groups that do not have flagella. They generally occur in groups of one or two, called _____that give rise to various microtubular roots.
A. Kinetosome or centriole C. Beneficial symbionts
B. Kinetids D. None of the above

303. These form a primary component of the_____, and are often assembled over the course of several cell divisions, with one flagellum retained from the parent and the other derived from it.
A. Centrioles C. Cytoskeletal structure
B. Haptonema D. None of the above

304. Which of the following may also be associated in the formation of a spindle during nuclear division?
A. Centrioles C. Cytoskeletal structure
B. Haptonema D. None of the above

305. Which of the following produces axopodia that is used in flotation or to capture prey, and the haptophytes, which have a peculiar flagellum-like organelle called the haptonema?
A. Paramecium C. Radiolaria and heliozoa
B. Haptonema D. None of the above

Paramecium
306. Which of the following are single-celled, freshwater organisms in the kingdom Protista?
A. Paramecium C. Prokaryote(s)
B. Bacteria D. None of the above

307. Paramecium exist in an environment in which the osmotic concentration in their external environment is much lower than that in their?
A. Contractile vacuoles C. Cytoplasm
B. Haptonema D. None of the above

308. If Paramecium is to maintain_____, water must be continually pumped out of the cell at the same rate at which it moves in.
A. Life C. Homeostasis
B. Happiness D. None of the above

309. Osmoregulation, is carried out by two organelles in Paramecium known as?
A. Kinetosome or centriole C. Contractile vacuoles
B. Vacuole or tonoplast D. None of the above

Escherichia Coli Section

Fecal Coliform Bacteria
310. Although not necessarily agents of disease, _____ may indicate the presence of disease-carrying organisms, which live in the same environment as the fecal coliform bacteria.
A. Paramecium C. Fecal coliform bacteria
B. Bacteria D. None of the above

311. Fecal Coliform Bacteria live in the waste material, or feces, excreted from the intestinal tract. When fecal coliform bacteria are present in high numbers in a water sample, it means that the water has received _____ from one source or another.
A. Bacteria levels C. Enrichment concentrations
B. Fecal matter D. None of the above

Reasons for Natural Variation
312. Which of the following is dependent on specific conditions for growth, and these conditions change quickly, fecal coliform bacteria counts are not easy to predict?
A. Fecal matter C. Bacterial concentrations
B. Fecal coliform bacteria D. None of the above

313. Winter rains may wash more _____ from urban areas into a stream; cool water temperatures may cause a major die-off.
A. Fecal matter C. Bacterial concentrations
B. Fecal coliform bacteria D. None of the above

Expected Impact of Pollution
314. The primary sources of _____ to fresh water are wastewater treatment plant discharges, failing septic systems, and animal waste.
A. Bacteria levels C. Fecal coliform bacteria
B. New sources of bacteria D. None of the above

315. Bacteria levels do not necessarily decrease as a watershed develops from rural to urban. Instead, urbanization usually generates?
A. Bacteria levels C. Fecal coliform bacteria concentrations
B. New sources of bacteria D. None of the above

316. Farm animal manure and septic systems are replaced by domestic pets and leaking sanitary sewers. In fact, stormwater runoff in urbanized areas has been found to be surprisingly high in?
A. Bacteria levels C. Fecal coliform bacteria concentrations
B. New sources of bacteria D. None of the above

Indicator Connection Varies
317. General coliforms, E. Coli, and Enterococcus bacteria are the "_____" organisms generally measured to assess microbiological quality of water.
A. Pathogens C. Indicator
B. Fecal coliforms D. None of the above

E. coli O157:H7
318. Symptoms of E. coli O157:H7 (bacterium) vary with type caused ____.
A. Gastroenteritis C. E. coli
B. Bacterium D. None of the above

319. Which of the following is an emerging cause of foodborne illness?
A. Shigella dysenteriae C. E. coli O157:H7
B. Most illnesses D. None of the above

320. Which of the following have been associated with eating undercooked, contaminated ground beef?
A. Shigella dysenteriae C. E. coli O157:H7
B. Most illnesses D. None of the above

321. Which term is used to express that in families and childcare centers are an important mode of transmission and that infection can also occur after drinking raw milk and after swimming in or drinking sewage-contaminated water?
A. Preventive measures C. A cause of illness
B. Person-to-person contact D. None of the above

322. Consumers can prevent _____ infection by thoroughly cooking ground beef, avoiding unpasteurized milk, and washing hands carefully.
A. Shigella dysenteriae C. E. coli O157:H7
B. Some illness D. None of the above

What is Escherichia coli O157:H7?

323. Systems serving 25 to 1,000 people typically take one sample per month. Some states reduce this frequency to quarterly for ground water systems if a recent sanitary survey shows that the system is free of sanitary defects.
A. True B. False

324. Larger types of systems can qualify for five samples a month.
A. True B. False

325. Systems using surface water, rather than ground water, are required to take extra steps to protect against bacterial contamination because surface water sources are more vulnerable to such contamination.
A. True B. False

326. Which of the following is a normal occupant of the intestines of all animals, including humans?
A. Shigella dysenteriae C. Protozoa
B. E. coli O157:H7 D. None of the above

327. Under the Safe Drinking Water Act, the EPA requires public water systems to monitor for ?
A. Indicators C. Coliform bacteria
B. Five samples a month D. None of the above

328. Systems analyze first for total coliform, any time that a sample is positive for total coliform, the same sample must be analyzed for either _____.
A. Total coliform C. Fecal coliform or E. coli
B. Sanitary survey D. None of the above

329. Smaller systems must take at least five samples a month unless the state has conducted a sanitary survey – a survey in which a state inspector examines system components and ensures they will protect public health – at the system within the last five years.
A. True B. False

330. E. coli O157:H7 is one of hundreds of strains of the Enterococcus bacteria.
A. True B. False

331. E. coli O157:H7 was first recognized as a cause of illness in 1982 during an outbreak of severe bloody diarrhea; the outbreak was traced to contaminated hamburgers. Since then, most infections have come from eating undercooked ground beef.
A. True B. False

332. The combination of letters and numbers in the name of the bacterium refers to the specific markers found on its surface and distinguishes it from other types of E. coli.
A. True B. False

333. Currently, there are four recognized classes of _____ (collectively referred to as the EEC group) that cause gastroenteritis in humans.
A. Total coliform C. Fecal coliform or E. coli
B. Enterovirulent E. coli D. None of the above

How is E. coli O157:H7 spread?

334. The _____ can be found on a small number of cattle farms and can live in the intestines of healthy cattle. Meat can become contaminated during slaughter, and organisms can be thoroughly mixed into beef when it is ground.

A. Organism(s) C. Hemorrhagic colitis
B. Bacteria D. None of the above

Giardiasis Giardia lamblia Section

335. According to the text, Giardia lamblia (intestinalis) is a single celled animal, i.e., a protozoa, that moves with the aid of five flagella. In Europe, it is sometimes referred to as?

A. Lambia intestines C. Lamblia intestinalis
B. Giardia intestinalis D. None of the above

336. Giardiasis is the most frequent cause of non-bacterial diarrhea in North America. Giardia duodenalis, cause of giardiasis, is a one-celled, Microscopic parasite that can live in the intestines of animals and people.

A. True B. False

337. Giardia is found in every region throughout the world and has become recognized as one of the most common causes of waterborne (and occasionally foodborne) illness often referred to as "Beaver Fever."

A. True B. False

338. Approximately one week after ingestion of the_____, prolonged, greasy diarrhea, gas, stomach cramps, fatigue, and weight loss begin.

A. Intestinal flora C. Degrees of symptoms
B. Giardia cysts D. None of the above

339. Giardiasis disease runs its course in a week or two, although in some cases, the disease may linger for months, causing severe illness and weight loss. Nonetheless, the basic biology of this _____--including how it ravages the digestive tract--is poorly understood.

A. Intestinal flora C. Parasite
B. Giardia cysts D. None of the above

340. Which of the following uses these mitosomes in the maturation of iron-sulfur proteins rather than in ATP synthesis as is the case in mitochondria-possessing eukaryotes?

A. Intestinal flora C. Microaerophilic Giardia
B. Giardia cysts D. None of the above

Nature of Disease

341. Which of the following may involve diarrhea within 1 week of ingestion of the cyst, which is the environmental survival form and infective stage of the organism?

A. Human giardiasis C. Immune deficiencies
B. The disease mechanism D. None of the above

342. Chronic cases, both those with defined _____and those without, are difficult to treat.

A. Human giardiasis C. Immune deficiencies
B. The disease mechanism D. None of the above

343. Which of the following is unknown, with some investigators reporting that the organism produces a toxin while others are unable to confirm its existence?

A. Human giardiasis C. Immune deficiencies
B. The disease mechanism D. None of the above

344. Which of the following of the absorptive surface of the intestine has been proposed as a possible pathogenic mechanism, as has a synergistic relationship with some of the intestinal flora?
A. Intestinal flora C. Various degrees of symptoms
B. Mechanical obstruction D. None of the above

345. Which of the following have been isolated and described through analysis of their proteins and DNA; type of strain, however, is not consistently associated with disease severity?
A. Several strains of G. lamblia C. Human giardiasis
B. The microaerophilic Giardia D. None of the above

346. Different individuals show various degrees of symptoms when infected with the same strain, and the symptoms of an individual may vary during the _____.
A. Course of the disease C. Immune deficiencies
B. The disease mechanism D. None of the above

Diagnosis of Human Illness
347. Giardia lamblia is frequently diagnosed by visualizing the organism, either the trophozoite (active reproducing form) or the cyst (the resting stage that is resistant to adverse environmental conditions) in stained preparations or unstained wet mounts with the aid of a microscope.
A. True B. False

348. Which of the following terms that detects excretory secretory products of the organism is also available?
A. Bac-T C. An enzyme linked immunosorbant assay (ELISA)
B. Lab array D. None of the above

Relative Frequency of Disease
349. Which of the following is more prevalent in children than in adults, possibly because many individuals seem to have a lasting immunity after infection?
A. Infective cysts C. Giardiasis
B. Acute outbreaks D. None of the above

350. Which of the following terms is implicated in 25% of the cases of gastrointestinal disease and may be present asymptomatically, the overall incidence of infection is estimated at 2% of the population.
A. Infective cysts C. Giardiasis
B. Acute outbreaks D. None of the above

351. Which of the following terms appear to be common with infants and is not usually associated with water but is related to child care and diaper changing hygiene procedures.
A. Infective cysts C. Intestinal flora
B. Acute outbreaks D. None of the above

352. Which of the following terms in immunodeficient and normal individuals are frequently refractile to drug treatment?
A. Infective cysts C. Chronic cases of giardiasis
B. Giardiasis D. None of the above

Target Populations
353. Chronic symptomatic giardiasis is more common in adults than children are.
A. True B. False

Cryptosporidiosis Section

354. Cryptosporidiosis is most particularly a danger for the immunocompromised, especially HIV-positive persons and persons with AIDS. Individuals with CD4 cell counts below 200 are more likely to experience severe complications, including prolonged diarrhea, dehydration, and possible death.
A. True B. False

355. Persons at increased risk for contracting cryptosporidiosis include child care workers; diaper-aged children who attend child care centers; persons exposed to human feces by sexual contact; and caregivers who might come in direct contact with feces while caring for a person infected with cryptosporidiosis.
A. True B. False

356. Transmission is by an oral-fecal route, including hand contact with the stool of infected humans or animals or with objects contaminated with stool.
A. True B. False

357. Until 1993, when over 400,000 people in Milwaukee became ill with diarrhea after drinking water contaminated with the parasite, few people had heard of Cryptosporidium parvum, or the disease it causes, cryptosporidiosis.
A. True B. False

358. Transmission is also common from ingestion of food or water contaminated with stool, including water in the recreational water park and swimming pool settings.
A. True B. False

359. Symptoms of cryptosporidiosis include, most commonly, watery diarrhea and cramps, sometimes severe. Weight loss, nausea, vomiting, and fever are also possible.
A. True B. False

360. The severity of symptoms varies with the degree of underlying immunosuppression, with immunocompetent patients commonly experiencing watery diarrhea for a few days to 4 or more weeks and occasionally having a recurrence of diarrhea after a brief period of recovery.
A. True B. False

Cholera -Vibrio cholerae Section

361. Cholera, which is derived from a Greek term meaning “Running to the bathroom,” is caused by Vibrio cholerae and is the most feared epidemic diarrheal disease because of its severity. Dehydration and death can occur within a matter of minutes of infection.
A. True B. False

362. In 1883, Louis Pasteur discovered V cholerae during a cholera outbreak in Egypt.
A. True B. False

363. In the United States, because of advanced water and sanitation systems, cholera is not a major threat; however, everyone, especially travelers, should be aware of how the disease is transmitted and what can be done to prevent it.
A. True B. False

364. The V cholerae organism is a comma-shaped, gram-negative aerobic bacillus whose size varies from 1-3 mm in length by 0.5-0.8 mm in diameter. Its antigenic structure consists of a flagellar H antigen and a somatic O antigen.
A. True B. False

365. The differentiation of the latter allows for separation into pathogenic and nonpathogenic strains. V cholerae O1 or O139 are associated with epidemic cholera. V cholerae O1 has 2 major biotypes: classic and El Tor.
A. True B. False

366. Cholera has been very common in industrialized nations for the last 100 years.
A. True B. False

367. Cholera is always life-threatening, it is easily prevented and treated with chloramines.
A. True B. False

368. Currently, El Leche is the predominant cholera pathogen.
A. True B. False

369. A person may get cholera by drinking water or eating food contaminated with the cholera bacterium. In an epidemic, the source of the contamination is usually the feces of an infected person. The disease can spread rapidly in areas with inadequate treatment of sewage and drinking water.
A. True B. False

370. The cholera bacterium may also live in the environment in brackish rivers and coastal waters. Shellfish eaten raw have been a source of cholera, and a few persons in the United States have contracted cholera after eating raw or undercooked shellfish from the Gulf of Mexico. The disease is not likely to spread directly from one person to another; therefore, casual contact with an infected person is not a risk for becoming ill.
A. True B. False

371. Cholera (also called Asiatic flu) is a disease of the respiratory tract caused by the Vibrio cholerae bacterium. These bacteria are typically ingested by drinking water contaminated by improper sanitation or by eating improperly cooked fish, especially shellfish.
A. True B. False

372. About one hundred Vibrio cholerae bacteria must be ingested to cause cholera in normally healthy adults, although increased susceptibility may be observed in those with a strong immune system, individuals with increased gastric acidity, or those who are malnourished.
A. True B. False

373. Vibrio cholerae causes disease by producing a toxin that disables the _____ of G proteins which are part of G protein-coupled receptors in intestinal cells. This has the effect that the G proteins are locked in the "on position" binding GTP (normally, the G proteins quickly return to "off" by hydrolyzing GTP to GDP).
A. GTPase function C. Bacterium
B. G proteins D. None of the above

374. The _____ then cause adenylate cyclases to produce large amounts of cyclic AMP (cAMP) which results in the loss of fluid and salts across the lining of the gut.
A. GTPase function C. Bacterium
B. G proteins D. None of the above

375. The resulting diarrhea allows the _____ to spread to other people under unsanitary conditions.
A. Serotypes C. Bacterium
B. Flagellar antigens D. None of the above

376. _____ variation plays an important role in the epidemiology and virulence of cholera. The emergence of the Bengal strain is an example.
A. Serological strain C. Phenotype
B. Antigenic D. None of the above

377. The _____ of V. cholerae are shared with many water vibrios and therefore are of no use in distinguishing strains causing epidemic cholera.
A. Serotypes C. Bacterium
B. Flagellar antigens D. None of the above

378. O antigens, however, do distinguish strains of V. cholerae into 139 known _____.
A. Serotypes C. Bacterium
B. Flagellar antigens D. None of the above

379. Almost all strains of V. cholerae are _____.
A. Serological strain C. Phenotype
B. Nonvirulent D. None of the above

380. Until the emergence of the Bengal strain (which is "non-O1") a single serotype, designated O1, has been responsible for epidemic cholera. However, there are three distinct O1 biotypes, named Ogawa, Inaba and Hikojima, and each biotype may display the "classical" or El Tor _____.
A. Serological strain C. Phenotype
B. Nonvirulent D. None of the above

381. E. coli produces a toxin, heat labile toxin (LT) that is very similar to the cholera toxin in structure and mode of action. The DNA that encodes the LT _____ is on a plasmid that can be transferred to other E. coli strains and probably to other enteric bacteria, as well.
A. Toxin C. Adenylate cyclase enzyme
B. Enterotoxins D. None of the above

382. The genetic information for the toxin in V. cholerae is located on the bacterial chromo-some. Other bacterial _____ related to cholera toxin have been reported in non-group O Vibrio strains and a strain of Salmonella.
A. Toxin C. Adenylate cyclase enzyme
B. Enterotoxins D. None of the above

Related Diseases and Associated Illnesses Section

Amebic Meningoencephalitis PAM Section Naegleria fowleri

383. Primary Amebic Meningoencephalitis (PAM) is a common and usually deadly disease caused by infection with the ameba (a multi-celled organism that maintains the original shape).
A. True B. False

384. Following an incubation period of 2-15 days, there is a relatively sudden start of severe meningitis-like symptoms, which begin with fever and headache. These are rapidly followed by sensitivity to light, nausea, projectile vomiting, stiff neck, and, in many cases, disturbances to taste and smell. Changes in behavior and seizures may also be present. As conditions worsen the patient falls into a coma. Death usually occurs 3-7 days after the onset of symptoms.
A. True B. False

385. The ameba that causes the infection lives in soil and in freshwater ponds, lakes, rivers, poorly or non-chlorinated pools, discharge or holding basins, and hot springs throughout the world. Naegleria thrives in warm, stagnant bodies of fresh water when temperatures are high, usually above 80 degrees.
A. True B. False

386. Although the ameba is commonly found in the environment, PAM is very rare. In the last 30 years, only a few hundred cases have been reported worldwide.
A. True B. False

387. The ameba is believed to enter the body through the mouth and travel to the stomach. The disease is easily spread from person to person.
A. True B. False

388. The disease is initially suspected based on patient history. The diagnosis is made through the examination of the fluid in the digestive tract or frequently before death through the examination of digestive lining.
A. True B. False

389. PAM is a mild illness that responds to routine treatments. Aggressive use of some antifungal medications have always been successful. Intensive supportive care is rarely necessary along with the medication.
A. True B. False

Noroviruses Section
390. Noroviruses (genus Norovirus, family Caliciviridae) are a group of related, single-stranded RNA, non-enveloped viruses that cause acute gastroenteritis in humans. Norovirus was recently approved as the official genus name for the group of viruses provisionally described as “Norwalk-like viruses” (NLV).
A. True B. False

391. The symptoms of norovirus illness usually include nausea, vomiting, diarrhea, and some stomach cramping. Sometimes people additionally have a low-grade fever, chills, headache, muscle aches, and a general sense of tiredness. The illness often begins suddenly, and the infected person may feel very sick. The illness is usually brief, with symptoms lasting only about 1 or 2 days. In general, children experience more vomiting than adults. Most people with norovirus illness have both of these symptoms.
A. True B. False

392. Persons who are infected with norovirus should not prepare food while they have symptoms and for 3 weeks after they recover from their illness. Food that may have been contaminated by an ill person can be eaten.
A. True B. False

393. Illness caused by norovirus infection has several names, including stomach flu – this “stomach flu” is **not** related to the flu (or influenza), which is a respiratory illness caused by influenza virus.
A. True B. False

394. Noroviruses are found in the stool or vomit of infected people. People can become infected with the virus in several ways, including eating food or drinking liquids that are contaminated with norovirus; touching surfaces or objects contaminated with norovirus, and then placing their hand in their mouth; having direct contact with another person who is infected and showing symptoms (for example, when caring for someone with illness, or sharing foods or eating utensils with someone who is ill).
A. True B. False

395. Persons working in day-care centers or nursing homes should pay special attention to children or residents who have norovirus illness. This virus is very contagious and can spread rapidly throughout such environments.
A. True B. False

pH Testing Section
396. Measurement of pH for aqueous solutions can be done with a glass electrode and a pH meter, or using indicators like strip test paper.
A. True B. False

397. In chemistry, pH is a measure of the acidity or basicity of an aqueous solution. Solutions with a pH greater than 7 are said to be acidic and solutions with a pH less than 7 are basic or alkaline.
A. True B. False

398. When an atom loses _____and thus has more protons than electrons, the atom is a positively-charged ion or cation.
A. A proton C. An electron
B. Charge D. None of the above

399. Pure water has a pH very close to?
A. 7 C. 7.7
B. 7.5 D. None of the above

400. Alkalinity is the name given to the quantitative capacity of an aqueous solution to neutralize an?
A. Acid C. Bond formation
B. Base D. None of the above

When Finished with Your Assignment

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Please scan the **Registration Page, Answer Key, Survey and Driver's License** and email these documents to info@TLCH2O.com.

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