MICROBIOLOGY 205   Name: _____
SPRING 2003, EXAM 1.

1. In the Gram staining, after decolorizing with alcohol the Gram (-) cells stain _____, while Gram (+)
   cells stain _____.
   a. blue:red   b. red:blue   c. colorless:blue   d. blue:colorless

2. In the Acid-Fast staining after adding the counter staining acid fast (-) cells stain _____ while acid fast (+)
   cells stain _____.
   a. blue:red   b. red:blue   c. colorless:blue   d. blue:colorless

3. Place the following parts of the light microscope in order as they would appear from the observer's eyes:
   1) light source   2) objective lens   3) Condenser   4) stage   5) diaphragm/iris

   a) 2,3,4,5,1   b) 2,4,3,5,1   c) 4,2,3,5,1   d) 4,3,2,5,1   e) None is correct

4. When a microorganism is placed in a(n) _____ solution, water will enter the cell and cause it to swell.
   a. hypotonic   b. isotonic   c. hypertonic   d. protoplasmic   e. autolysin

5. Lipopolysaccharide is typically found in:
   a. cell walls of Gram negative bacteria.   b. cell walls of Gram positive bacteria.
   c. outer membranes of Gram negative bacteria.   d. outer membranes of Gram positive bacteria.
   e. the coat of bacterial endospores

6. Most bacteria belong to the Kingdom:
   a. bacteria   b. protista   c. monera   d. Invertebrata   e) None of the above

7. Variolation was an early attempt to control:
   A. syphilis   B. typhoid   C. cholera
   D. plague   E. smallpox

8. The germ theory of disease states that:
   A. one infectious agent causes one disease
   B. microorganisms can invade macro-organisms and cause disease
   C. cells are the fundamental units of life
   D. macro-organisms can invade microorganisms and cause disease
   E. inadequate washing can cause disease to be transmitted from one individual to a new individual

9. Koch's postulates are used to:
   A. demonstrate spontaneous generation   B. demonstrate that viruses are filterable agents
   C. demonstrate sterility   D. demonstrate the use of solid media to obtain pure cultures
   E. demonstrate a cause-effect relationship between an infectious agent and a disease

10. Which one of the following is equal to one micrometer?
    A. 0.001 meter   B. 0.01 nanometer   C. 0.001 nanometer
    D. 0.001centimeter   E. 0.001millimeter

11. Which of the following procedures represents the correct order of reagents for the Gram stain?
    A. crystal violet, then iodine, then alcohol, then safranin
    B. crystal violet, then alcohol, then iodine, then safranin
    C. crystal violet, then alcohol, then safranin, then iodine
    D. crystal violet, then iodine, then safranin, then alcohol
    E. crystal violet, then safranin, then alcohol, then iodine

12) A bacterial cell is found to be motile and resistant to high temperatures and phagocytosis. What structures does this cell probably have?
   a) flagella, plasmid, pili b) endospore, flagella, capsule c) flagella, pili, capsule
   d) endospore, flagella, cytoplasmic inclusions e) endospore, pili, capsule

13. Most biological oxidations
   a) involve the loss of hydrogen atoms. b) involve the gain of electrons. c) require ATP.
   d) occur without simultaneous reduction. e) occur spontaneously

14. What stage of carbohydrate metabolism is responsible for the production of the most amount of ATP?
   a) glycolysis b) pentose phosphate pathway c) electron transport
   d) Krebs cycle e) fermentation

15. All of the following are true of fermentation except
   a) a small amount of ATP is produced. b) the Krebs cycle is not involved. c) oxygen is not required.
   d) energy is released from sugars. e) the final electron acceptor is an inorganic molecule.

16. An eukaryotic cell with a diploid number of 6 chromosomes undergoes mitosis. The number of chromosomes in each of the daughter cells is
   a. 24 b. 6 c. 12 d. 18

17. Which of the following requires carrier proteins, but does not require energy?
   a) active transport b) facilitated diffusion c) group translocation
   d) passive diffusion

18. The following are associated with osmosis?
   a) Concentration gradient b) Water c) Selective membrane
   d) All three are correct e) Only two are correct

19. A bacterial arrangement as "a bunch of grapes" is described as a:
   a. diplococcus b. tetrads c. streptococcus e. staphylococcus

20. Fimbriae in bacteria:
   a) are found in all bacterial cells b) allow bacterial conjugation c) allow cell motility
   d) allow adherence to surfaces e) form the cell's glycocalyx

21. Bacterial endospores function in:
   a. reproduction b. survival c. protein synthesis d. storage

22. The arrangement of flagella on the cell surface can help in the identification of an organism. For example, *Proteus spp.* has flagella at both ends of the cell surface that is referred as:
   a) lopothrichous flagellation b) monotrichous flagellation c) peritrichous flagellation d) amphitrichous flagellation e) a hairy dude

23. Arrange the following terms in the order they would be found if you traveled FROM the cytoplasm THE external environment of a Gram negative cell:
   1. periplasmic space 2. peptidoglycan 3. capsule
   4. lipopolysaccharide 5. cytoplasmic membrane

   a. 5,1,2,4,3 b. 3,1,2,4,5; c. 5,2,1,4,3 d. 5,1,2,3,4

24. The magnification when using a 40X objective lense is:
   a) 4 times b) 40 times c) 400 times d) unable to calculate

Matching: Choices can only be used ONCE.

_____ 25. Proved the association between microbes and disease   a) Louis Pasteur
_____ 26. Implemented hygiene measures to reduce childbirth fever transmission   b) Edward Jenner
_____ 27. Vaccinated chickens against cholera using attenuated organisms   c) Robert Koch
                                                                                     d) R. Virchow
                                                                                     e) I. Semmelweis

28. The resolving power (limit of resolution) of the light microscope is:
   a. 2 mm   b. 2 μm   c. 0.2 mm   d. 0.2 μm   e. 0.02 mm

29. Organisms such as *E. coli* or *Salmonella typhimurium*, which typically utilize _____as a source
    of energy, are referred to as _____.
    A. light, autotrophs   B. organic chemicals, heterotrophs   C. O_2, aerobes
    D. organic chemicals, autotrophs   E. CO_2, autotrophs

30. If the size of bacterium the instructors gives you is 10 μm. What would be its size in mm?
   a) 10 mm   b) 100 mm   c) 0.01 mm   d) 0.001 mm   e) None

31. Mention a genus of bacteria capable of producing spores:
   a. *Mycobacterium*   b. *Clostridium*   c. *Mycoplasma*   d. *Streptococcus*

32. Calculate the resolving power of the following objective lens with a numerical aperture of 0.65. Use the
    following formula: RP = λ/2(NA)

   a) 38 μm   b) 384 μm   c) 0.38 μm   d) 0.038 μm

33. Gram positive bacterial cell walls contain all of the following except?
   a. N-acetylglucosamine   b. cell membrane   c. lipopolysaccharides
   d. techoic acid   e. periplasmic space

34. What is the fate of pyruvic acidin an organism that uses aerobic respiration?
   a) It is reduced to lactic acid   b) It is oxidized in the Krebs cycle   c) It is catabolized in
   glycolysis   d) It is oxidized in the electron transport chain   e) It is reduced in the Krebs cycle

35. A strict fermentative baceteria produces energy:
   a) by aerobic respiration only   b) by glycolysis only   c) by fermentation or aerobic respiration
   d) only in the absence of oxygen   e) only in the presence of oxygen

36. As the magnification of a series of objective lenses DECREASES, the working distance
   a. increases   b. decreases   c. stays the same   d. cannot be predicted

37. Immersion oil is used with some microscope lenses because _____
   a. Increases magnification   b. prevents light scattering   c. it has better resolution
   d. it is fashionable   e) the TA likes it

38. Techoic acid is most likely to be located in which part of a bacterial cell?
   a. capsule   b. spore   c. flagellum   d. cell wall   e. cytoplasmic membrane

39. When there are more dissolved solids (higher concentration) in the surrounding medium than there are
    inside the bacterial cell, the bacteria cell is considered _____ in relation to the surrounding medium.
   a. isotonic   b. hypertonic   c. hypotonic   d. plasmolysis   e. lysis

40. Penicillin can destroy the cell wall but organisms can continue to live if placed in isotonic environments. What would be the name given to a Gram (-) cell obtained after being incubated with penicillin:
   a) Spheroplast   b) Protoplast   c) Mycoplast   d) None

41. From the above question, what cell structures would be left after the treatment:
   a) cell membrane+ peptidoglycan   b) cell membrane+ outer membrane
   c) cell membrane+ peptidoglycan + outer membrane   d) peptidoglycan + outer membrane

42. Penicillin and lysozyme are similar in that
   a) both are enzymes   b) both are antibiotics   c) both affect cell walls
   d) both are brand names of the same compound   e) both affect the cell membrane

43. If a student accidentally inoculates a bacterial culture into a hypertonic solution instead of balanced nutrient broth, which of the following describes the inoculated culture
   a. the solution has a lower solute concentration compared to the cells
   b. water will leave the cell
   c. the solution has a higher water concentration compared to the cells
   d. water will enter the cell
   e. the cells will burst

44. The most distinctive difference(s) between Gram (-) and Gram (+) is/are:
   a) The Gram (+) cell wall is thinner   b) The Gram (+) cell wall is more complex
   c) The Gram (-) cell wall has an outer membrane   d) Two are correct   e) Only one is correct

45. For each [$NADH^+$] entering the electron transport chain, the number of ATP molecules produced is:
   a. 2   b. 3   c. 4   d. 5   e. 6

46. In the Krebs Cycle:
   a. A large number of reduced intermediate electron carriers, $FADH_2$ and NADH+, are produced
   b. Pyruvate is broken down to lactic acid, yielding NADH+
   c. Glucose is broken down to pyruvate, yielding ATP and NADH+
   d. Oxidative phosphorylation occurs   e) Net ATP production is zero

47. In glycolysis:
   a. Many intermediate electron carriers, $FADH_2$ and NADH+, are produced
   b. Pyruvate is broken down to lactate, yielding NADH+
   c. Glucose is broken down to pyruvate, yielding ATP and NADH+
   d. Oxidative phosphorylation occurs   e) Net ATP production is zero

48. In the electron transport chain:
   a. A large number of reduced intermediate electron carriers, $FADH_2$ and NADH+, are produced
   b. Pyruvate is broken down to lactic acid, yielding NADH+
   c. Glucose is broken down to pyruvate, yielding ATP and NADH+
   d. Oxidative phosphorylation occurs   e) Net ATP production is zero

49. Substrate-level physphorylation occurs in:
   a. Electron transport chain   b. Glycolysis   c. Krebs cycle
   d. Glycolysis & Krebs cycle   e. Krebs cycle, glycolysis, & electron transport chain

50. Which of the following is mismatched?
   A. chloroplasts --- site of photosynthesis   B. Golgi complex --- centromeres and basal bodies
   C. microtubules --- part of the cytoskeleton   D. mitochondria --- site of energy generation
   E. endoplasmic reticulum --- synthesis and transport of proteins