Prof. Lester's BIOL 210 Practice Exam 1 (There is no answer key. Please do not email or ask me for answers.)

Chapters 1, 3, 4, 5, 6

1) Which of the following is a scientific name?
A) IGAS B) Flesh−eating bacteria C) Group A streptococcus
D) *Streptococcus pyogenes* E) Streptococci

2) Which of the following is *NOT* a domain in the three−domain system?
A) Animalia B) Archaea C) Bacteria D) Eukarya

3) Which of the following statements about viruses is false?
A) They lack cells. B) They cannot metabolize nutrients. C) They cannot reproduce themselves.
D) They have both DNA and RNA. E) They are parasites.

4) Regarding the experiments that proved spontaneous generation, which of the following statements is probably true?
A) Air was lacking. B) Too much heat was applied.
C) The food source could not support life. D) Microorganisms were already present.
E) Excess carbon dioxide was present.

5) Regarding Pasteur's experiments with the S−neck flask, which of the following statements is true?
A) There was air involved. B) There was a food source involved. C) Any possibility of contamination was removed.
D) All microorganisms were killed before beginning. E) All of the above.

6) Who disproved the theory of spontaneous generation?
A) Hooke B) Koch C) van Leeuwenhoek D) Pasteur E) Virchow

7) Which of the following statements is false?
A) All bacteria lack nuclear membranes. B) All fungi are multicellular. C) All protozoa are unicellular.
D) All viruses are parasites. E) All fungi have nuclear membranes.

8) Which of the following pairs is mismatched?
A) Chemotherapy ☐ treatment of disease B) Pathogen ☐ disease causing
C) Vaccine ☐ a preparation of microorganisms D) Penicillin ☐ antibiotic E) Normal microbiota ☐ harmful

9) You are observing a cell through a microscope and note that it has no apparent nucleus. You conclude that it most likely
A) Has a peptidoglycan cell wall. B) Has a cellulose cell wall. C) Moves by pseudopods.
D) Is part of a multicellular animal. E) Is a plant cell.

10) In the name *Escherichia coli*, *coli* is the
A) Domain. B) Kingdom. C) Genus. D) Specific epithet. E) Discoverer.

11) Archaea differ from bacteria in that archaea
A) Lack peptidoglycan. B) Lack nuclei. C) Use organic compounds for food. D) Reproduce by binary fission.
E) Are prokaryotic.

12) What structure does light pass through after leaving the condenser in a compound light microscope?
A) Ocular lens B) Objective lens C) Specimen D) Illuminator

13) Which of the following pairs is mismatched?
A) Gram−negative bacteria ☐ negative stain B) Iodine ☐ mordant
C) Alcohol−acetone ☐ decolorizer D) Acid−alcohol ☐ decolorizer E) Crystal violet ☐ simple stain

14) Place the steps of the Gram stain in the correct order: 1−Alcohol; 2−Crystal violet; 3−Safranin; 4−Iodine.
A) 1−2−3−4 B) 2−1−4−3 C) 2−4−1−3 D) 4−3−2−1 E) 1−3−2−4

15) Place the following steps in the correct sequence: 1−Staining; 2−Making a smear; 3− Heat Fixing.
A) 1−2−3 B) 3−2−1 C) 2−3−1 D) 1−3−2 E) The order doesn't matter

16) Which of the following microscopes uses visible light?
A) Confocal microscope B) phase contrast C) Fluorescence microscope
D) Scanning acoustic microscope E) Scanning electron microscope

17) Which microscope achieves the highest magnification and greatest resolution?
A) Compound light microscope B) Phase−contrast microscope C) Darkfield microscope
D) Fluorescence microscope E) Electron microscope

18) This microscope produces an image of a light cell against a dark background; internal structures are *NOT* visible.
A) Compound light microscope B) Phase−contrast microscope C) Darkfield microscope
D) Fluorescence microscope E) Electron microscope

19) Which of the following is *NOT* correct?
A) 1 μm = 10^{-6} m B) 1 nm = 10^{-9} m C) 1 μm = 10^{3} nm D) 1 μm = 10^{-3} mm E) 1 nm = 10^{-6} μm

20) Which microscope is used to observe a specimen that emits light when illuminated with an ultraviolet light?
A) Compound light microscope B) Phase−contrast microscope C) Darkfield microscope
D) Fluorescence microscope E) Electron microscope

22) What is the total magnification of a chloroplast viewed with a 10x ocular lens and a 45x objective lens?
A) 4.5x B) 10x C) 45x D) 100x E) 450x

23) Bacterial smears are fixed before staining to
A) Kill the bacteria. B) Affix the cells to the slide. C) Make their walls permeable. D) A and B. E) Accept stain.

24) The resolution of a microscope can be improved by changing the
A) Condenser. B) Fine adjustment. C) Wavelength of light. D) Diaphragm. E) Coarse adjustment.

25) Which of the following is *NOT* a distinguishing characteristic of prokaryotic cells?
A) Their DNA is not enclosed within a membrane. B) They lack membrane−enclosed organelles.
C) They have cell walls containing peptidoglycan. D) Their DNA is not associated with histones.
E) They lack a plasma membrane.

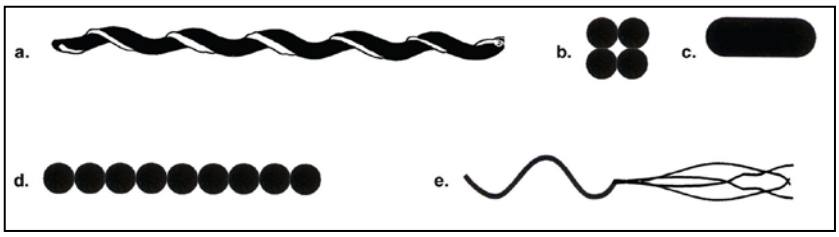
26) Which of the following statements about a gram−positive cell wall is false?
A) It maintains the shape of the cell. B) It is sensitive to lysozyme. C) It protects the cell in a hypertonic environment.
D) It contains teichoic acids. E) It is sensitive to penicillin.

27) Which of the following statements best describes what happens when a bacterial cell is placed in a solution containing 5% NaCl?
A) Sucrose will move into the cell from a higher to a lower concentration. B) The cell will undergo osmotic lysis.
C) Water will move out of the cell. D) Water will move into the cell. E) No change will result; the solution is isotonic.

28) Which of the following have a cell wall?
A) Protoplasts B) Fungi C) L forms D) Mycoplasmas E) Animal cells

29) Which of the following statements is true?
A) Endospores are for reproduction. B) Endospores allow a cell to survive environmental changes.
C) Endospores are easily stained in a Gram stain. D) A cell produces one endospore and keeps growing.
E) A cell can produce many endospores.

Figure 4.1



30) Which drawing in Figure 4.1 is a tetrad?
A) a B) b C) c D) d E) e

31) Which drawing in Figure 4.1 possesses an axial filament?
A) a B) b C) c D) d E) e

32) Which drawing in Figure 4.1 is streptococci?
A) a B) b C) c D) d E) e

34) Which drawing in Figure 4.1 is a bacillius?
A) a B) b C) c D) d E) e

35) Which of the following structures is *NOT* found in prokaryotic cells?
A) Flagellum B) Axial filament C) Cilia D) Pilus E) Peritrichous flagella

36) Which of the following is *NOT* a chemical component of a bacterial cell wall?
A) Cellulose B) Peptidoglycan C) Teichoic acids D) Peptide chains E) N−acetylmuramic acid

Figure 4.2

37) Which of the following terms best describes the cell in Figure 4.2?
A) Peritrichous flagella B) Amphitrichous flagella
C) Lophotrichous flagella D) Monotrichous flagella
E) Axial filament

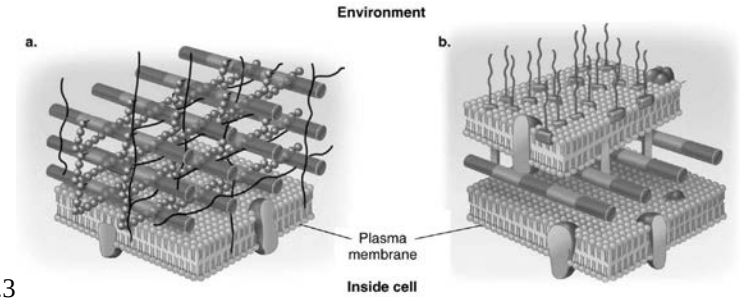


Figure 4.3

38) In Figure 4.3, which diagram of a cell wall is decolorized by alcohol?
A) a B) b C) Both a and b D) Neither a nor b E) Can't tell

39) In Figure 4.3, which diagram of a cell wall is resistant to many antibiotics (e.g., penicillin)?
A) a B) b C) Both a and b D) Neither a nor b E) Can't tell

40) In Figure 4.3, which diagram of a cell wall contains teichoic acids?
A) a B) b C) Both a and b D) Neither a nor b E) Can't tell

41) What will happen if a bacterial cell is placed in distilled water with lysozyme?
A) The cell will plasmolyze. B) The cell will undergo osmotic lysis. C) Water will leave the cell.
D) Lysozyme will diffuse into the cell. E) No change will result; the solution is isotonic.

42) What will happen if a bacterial cell is placed in 10% NaCl with penicillin?
A) The cell will plasmolyze. B) The cell will undergo osmotic lysis.
C) Water will enter the cell. D) Penicillin will diffuse into the cell.
E) No change will result; the solution is isotonic.

43) Which of the following compounds is *NOT* an enzyme?
A) Dehydrogenase B) Cellulase C) Coenzyme A D) β−galactosidase E) Sucrase

44) Which organism is *NOT* correctly matched to its energy source?
A) Photoheterotroph ☐ light B) Photoautotroph ☐ CO_2 C) Chemoautotroph ☐ Fe^{2+}
D) Chemoheterotroph ☐ glucose E) Chemoautotroph ☐ NH_3

45) Which of the following statements about anaerobic respiration is false?
A) It involves glycolysis only. B) It involves the Krebs cycle. C) It involves the reduction of nitrate.
D) It generates ATP. E) It requires cytochromes.

46) What is the fate of pyruvic acid in an organism that uses aerobic respiration?
A) It is reduced to lactic acid. B) It is oxidized in the Krebs cycle. C) It is oxidized in the electron transport chain.
D) It is catabolized in glycolysis. E) It is reduced in the Krebs cycle.

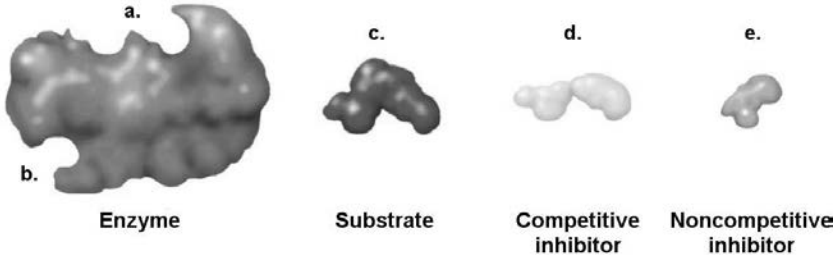


Figure 5.3

47) How would a noncompetitive inhibitor interfere with a reaction involving the enzyme shown in Figure 5.3?
A) It would bind to a. B) It would bind to b. C) It would bind to c. D) It would bind to d. E) Can't tell.

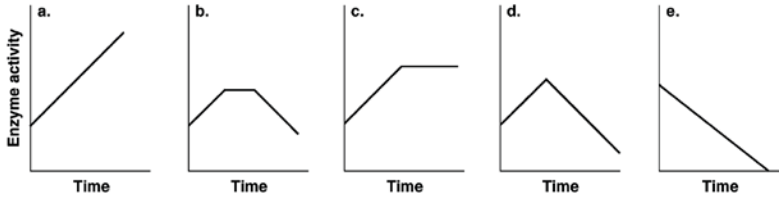


Figure 5.5

48) Which of the graphs in Figure 5.5 best illustrates the activity of an enzyme that is saturated with substrate?
A) a B) b C) c D) d E) e

49) Which of the following is the best definition of *oxidative phosphorylation*?
A) Electrons are passed through a series of carriers to O2.
B) The energy released as carrier molecules are oxidized is used to generate ATP.
C) The energy released in the reduction of carrier molecules is used to generate ATP.
D) The transfer of a high−energy phosphate group to ADP.

50) Which of the following statements about substrate−level phosphorylation is false?
A) It involves the direct transfer of a high−energy phosphate group from an intermediate metabolic compound to ADP.
B) No final electron acceptor is required.
C) It occurs in glycolysis.
D) The oxidation of intermediate metabolic compounds releases energy that is used to generate ATP.
E) It occurs in the Krebs cycle.

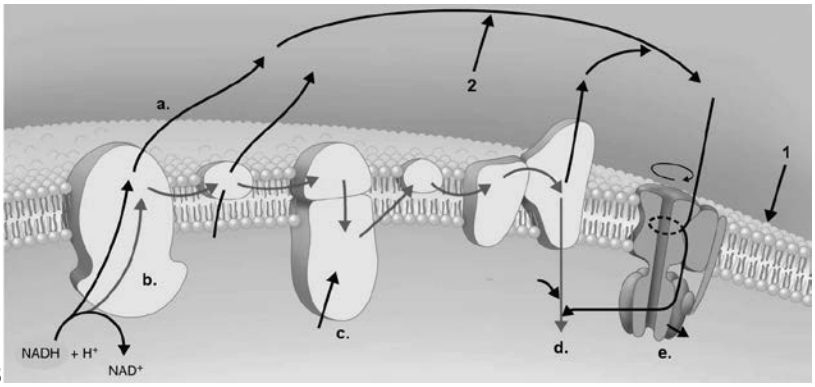
51) A strictly fermentative bacterium produces energy
A) By glycolysis only. B) By aerobic respiration only. C) By fermentation or aerobic respiration.
D) Only in the absence of oxygen. E) Only in the presence of oxygen.

52) Which of the following is the best definition of *fermentation*?
A) The reduction of glucose to pyruvic acid
B) The oxidation of glucose with organic molecules serving as electron acceptors
C) The complete catabolism of glucose to CO_2 and H_2O
D) The production of energy by substrate−level phosphorylation
E) The production of ethanol from glucose

53) Which of the following uses CO_2 for carbon and H_2 for energy?
A) Chemoautotroph B) Chemoheterotroph C) Photoautotroph D) Photoheterotroph

54) Assume you are working for a chemical company and are responsible for growing a yeast culture that produces ethanol. The yeasts are growing well on the maltose medium but are not producing alcohol. What is the most likely explanation?
A) The maltose is toxic. B) O_2 is in the medium. C) Not enough protein is provided.
D) The temperature is too low. E) The temperature is too high.

55) An enzyme, citrate synthase, in the Krebs cycle is inhibited by ATP. This is an example of all of the following *EXCEPT*
A) Allosteric inhibition. B) Competitive inhibition. C) Feedback inhibition. D) Noncompetitive inhibition.

Figure 5.8 

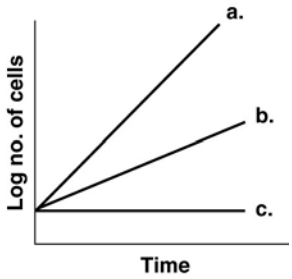
56) In Figure 5.8, where is ATP produced?
A) a B) b C) c D) d E) e

57) Refer to Figure 5.8. In aerobic respiration, where is water formed?
A) a B) b C) c D) d E) e

58) In Figure 5.8, the structure labeled (1) is
A) NAD+. B) ATP synthase. C) Plasma membrane. D) Cell wall. E) Cytoplasm

59) In Figure 5.8, the path labeled (2) is the flow of
A) Electrons. B) Protons. C) Energy. D) Water. E) Glucose.

60) What is the most acidic place in Figure 5.8?
A) a B) b C) c D) d E) e



Chapter 6

1. In the graph, which line best depicts a facultative anaerobe in the absence of O_2?

a. A b. B c. C

2. In the graph, which line best illustrates a mesophile at 5°C above its optimum temperature?

a. A b. B c. C

3. In the graph, which line best depicts an obligate anaerobe in the presence of O_2?

a. A b. B c. C

4. In the graph, which line best depicts a mesophile with an optimum temperature of 35°C incubated at 40°C?

a. A b. B c. C

5. In the graph, which line shows the growth of an obligate aerobe incubated anaerobically?

a. A b. B c. C

6. In the graph, which line best illustrates the growth of a facultative anaerobe incubated aerobically?

a. A b. B c. C

7. In the graph, which line best depicts a catalase-negative cell incubated aerobically?

a. A b. B c. C

8. Micrococci are facultative halophiles. In the graph, which line best depicts the growth of *M. luteus* in a nutrient medium containing 7.5% NaCl?

a. A b. B c. C

9. In the graph, which line best depicts a psychrophile incubated at room temperature?

a. A b. B c. C

10. In the graph, which line best depicts a psychrotroph incubated at 0°C?

a. A b. B c. C

11. In the graph, which line best depicts *Neisseria gonorrhoeae* when growing inside the human body?

a. A b. B c. C

13. The term *facultative anaerobe* refers to an organism that
A) Doesn't use oxygen but tolerates it.
B) Is killed by oxygen.
C) Uses oxygen or grows without oxygen.
D) Requires less oxygen than is present in air.
E) Prefers to grow without oxygen.

17. Most bacteria grow best at pH
A) 1. B) 5. C) 7. D) 9. E) 14.

20. In the diagram, in which tube are microaerophiles growing?
A) a B) b C) c D) d E) e

21. In the diagram, in which tube are facultative anaerobes growing?
A) a B) b C) c D) d E) e

22. Which enzyme catalyzes the reaction: $O_2^- + O_2^- + 2H^+ \rightarrow H_2O_2 + O_2$?
A) Catalase B) Oxidase C) Peroxidase D) Superoxide dismutase

23. Which enzyme catalyzes the reaction: $2H_2O_2 \rightarrow 2H_2O + O_2$?
A) Catalase B) Oxidase C) Peroxidase D) Superoxide dismutase

24. Which enzyme catalyzes the reaction: $H_2O_2 + 2H^+ \rightarrow 2H_2O$?
A) Catalase B) Oxidase C) Peroxidase D) Superoxide dismutase