MBIO 1220: Essentials of Microbiology, term test #1 Test paper **A**

READ THE FOLLOWING INSTRUCTIONS CAREFULLY:

- **The test consists of 40 multiple choice questions that must be answered on one answer sheet.**
- **Your NAME and STUDENT NUMBER must appear on the answer sheet.**
- **The answer sheet MUST be returned.**

Name _____ Student number_____

1. **Which of the following species names does NOT follow the rules of nomenclature:**
   a. *Bacteroides fragilis*
   b. *B. fragilis*
   c. *B. Fragilis*
   d. Bacteroides fragilis
   e. None of the above (all of the above names follow the rules of nomenclature)

2. **True or False: The glycerol component of a fat can be catabolized via cellular respiration for the generation of ATP.**
   a. True
   b. False

3. **An organism that breaks down hydrogen sulfide as a source of energy and gets its carbon from carbon dioxide would be classified as a:**
   a. Chemoautotroph
   b. Photoheteroptroph
   c. Chemoheterotroph
   d. Photoautotroph

4. **MOST bacteria capable of causing disease in humans are:**
   a. Acidophiles
   b. Halophiles
   c. Mesophiles
   d. Psychrotrophs
   e. Two of the above

5. **Which of following characteristics makes water essential to cellular life as we know it?**
   a. Water is a solvent for polar compounds
   b. Water is capable of forming hydrogen bonds
   c. Water exists as a liquid over a broad range of temperatures
   d. Only answers b and c are correct
   e. All of the above are essential characteristics of water

6. **Cells of some organisms have an obligate requirement for oxygen gas (O_2). Why?**
   a. Oxygen gas is important in maintaining fluidity of the plasma membrane
   b. O_2 plays an important role in energy generation by the process of cellular respiration
   c. O_2 serves as an important source of elemental oxygen, needed for building proteins

7. **All of the following are true of the bacterial cell wall EXCEPT that it:**
   a. May contain phospholipids
   b. Can be used to differentiate between different groups of bacteria
   c. Protects against cell lysis caused by osmotic changes
   d. ~~May contain mycolic acids~~
   e. None of the above (all of the listed statements are true of the bacterial cell wall)

8. **Which of the following statements concerning DNA is correct:**
   a. It contains the purine thymine
   b. It is synthesized from nucleotides that contain the sugar ribose
   c. It contains the pyrimidine uracil
   d. It forms a double helix structure
   e. All of the above statements are correct

9. **Which of the following statements regarding microscopy is correct:**
    a. A microscope with a resolving power of 10 nm can only distinguish two objects that are less than 10 nm apart
    b. Light with a longer wavelength will give greater magnification than light with a shorter wavelength
    c. The total magnification of a compound microscope is calculated by adding the magnification of the ocular lens to the magnification of the objective lens
    d. A shorter wavelength of light generates better resolution than light of a longer wavelength
    e. None of the above statements are correct

10. **Which term best describes the arrangement of flagella on this bacterial cell?**

    a. Monotrichous
    b. Ditrichous
    c. Amphitrichous
    d. Lophotrichous
    e. Peritrichous

11. **Which of the following statements is INCORRECT?**
    a. Bacteria do not have mitochondria
    b. Protozoa do not have nucleoids
    c. Viruses are not made of cells
    d. Fungi do not have phospholipids
    e. Humans do not have peptidoglycan

12. **Bacteria use enzymes to catalyze the breakdown of glucose because:**
    a. Glucose would break down to carbon dioxide if the cell did not use enzymes
    b. Glucose would break down very, very, very slowly without the assistance of enzymes
    c. Glucose would break down too quickly without the assistance of enzymes
    d. It is not possible for glucose to breakdown without the assistance of enzymes

13. **A scientist is interested in determining where bacterial ribosomes are located within the cell. Which of the following microscopes should be used to accomplish this task?**
    a. Light microscope
    b. Transmission electron microscope
    c. Scanning tunneling microscope
    d. Scanning electron microscope
    e. All of the above microscopes could be used to determine the location of ribosomes inside a bacterial cell

14. **Which of the following is NOT a true difference between Gram positive bacteria and Gram negative bacteria:**
    a. Gram negative bacteria contain endotoxin in their outer membrane
    b. Gram positive bacteria may produce specialized structures, called endospores, that allow resistance to harsh environmental extremes
    c. Gram positive organisms contain lipoteichoic acids which function to anchor the peptidoglycan layer to the plasma membrane
    d. Gram negative bacteria have 70S ribosomes, whereas Gram positive bacteria have 80S ribosomes
    e. Gram positive organisms Gram stain purple, Gram negative organisms Gram stain pink

15. **Bacteria are important to us and our environment because:**
    a. Bacteria can change atmospheric nitrogen into a form useable by plants
    b. Bacteria can produce lactic acid, which results in the flavor of fermented foods like yogurt
    c. Normal bacteria found on the human body can help protect the human from other disease causing microbes
    d. Bacteria can break down organic material in the waste products of other organisms
    e. All of the above

16. Organisms that are killed by high oxygen concentrations but require small amounts of oxygen for survival are classified as:

a. Aerotolerant organisms
b. Facultative anaerobes
c. Microaerophiles
d. Obligate anaerobes
e. Obligate aerobes

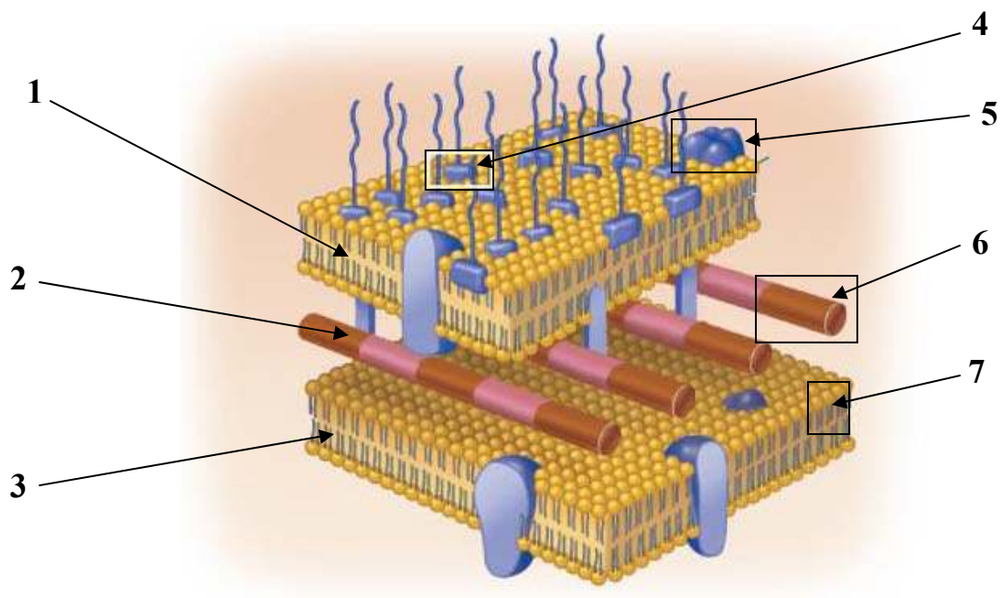
17. Which of the following is true regarding atoms:

a. Cations form when neutral atoms gain a proton
b. Cations and anions are atoms that pair to form covalent bonds
c. Protons exist in characteristic regions of space around atoms called orbitals
d. The nucleus of an atom does not carry a net charge
e. None of the above statements are true

18. The drug imidazole inhibits sterol synthesis. This drug would most likely interfere with:

a. Bacterial cell walls
b. Genes
c. Protein synthesis by ribosomes
d. Eukaryotic plasma membranes
e. Prokaryotic plasma membranes

****Examine the cell envelope shown in the diagram below to answer questions 19 and 20****



19. Which arrow points to a layer of the cell envelope that is responsible for protecting the cell from osmotic lysis?

a. 1
b. 2
c. 3
d. All three layers in the cell envelope pictured above help to protect the cell from osmotic lysis

20. Which arrow on the diagram points to a molecule that is toxic to humans?

a. 4
b. 5
c. 6
d. 7
e. More than one of the arrows points to a molecule that is toxic to humans

21. True or False: The Gram positive cell wall is a semi-permeable barrier that slows the movement of water molecules into and out of the cell.

a. True
b. False

22. All bacteria need nitrogen in order to make their:

a. Carbohydrates
b. Lipids
c. Proteins
d. Nucleic acids
e. More than one of the above

23. A grocery store has recently encountered significant spoilage of a particular variety of salted fish. The organism that is responsible for the spoilage is likely classified as which of the following:

a. Thermophilic
b. Acidophilic
c. Psychrophilic
d. Halophilic
e. Mesophilic

24. Which of the following statements regarding metabolism is NOT correct?

a. Glycolysis generates 2 ATP per glucose molecule
b. Fermentation is a more efficient process than cellular respiration
c. The Krebs cycle generates more NADH than glycolysis
d. Most of the ATP generated during respiration is produced by the electron transport chain
e. More than one of the above

25. Which of the following statements is true of bacterial endospores?

a. They are produced only by Gram positive bacteria.
b. They are the most resistant life form known!
c. Some can survive in boiling water for hours.
d. They are characteristic of the bacterium *Bacillus anthracis*, which is responsible for the disease anthrax.
e. All of the above.

26. A precursor metabolite is a chemical that:

a. Can serve as the starting point for building more complicated organic molecules
b. Can be produced from the breakdown of glucose
c. Can be an intermediate of either glycolysis or the Krebs cycle
d. Contains both carbon and hydrogen
e. All of the above

27. Antibiotic resistance is mediated by the transfer of DNA from one organism to another. Which of the following extracellular structures makes this transfer possible?

a. Flagella
b. Fimbriae
c. Capsule
d. Pili
e. Slime layer

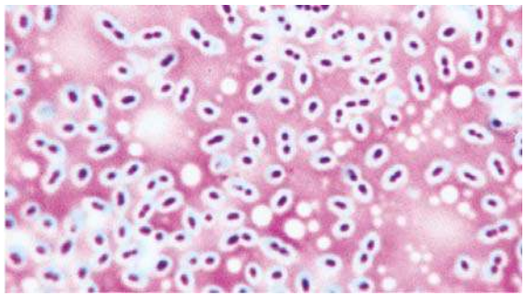
28. Which of the following pairs is mismatched?

a. Protein – amino acid
b. Polysaccharide – monosaccharide
c. Nucleic acid – nucleotide
d. Lipid – fatty acid
e. None of the above. (All of the above pairs are correctly matched)

29. Fats:

a. Are saturated when they contain one or more carbon-carbon double bonds
b. Are hydrophilic due to their ability to contribute to hydrogen bonding networks
c. Can be cleaved into fatty acids and glycerol, which can then be used to produce ATP
d. Typically carry four different fatty acids
e. None of the above are true of fats

30. What kind of microscopy was most likely used to take the following picture of a pure culture of bacteria?



a. Light microscopy
b. Transmission electron microscopy
c. Scanning electron microscopy
d. Scanning tunnelling microscopy
e. It doesn't look like microscopy was used to take this picture

31. In the 1870's, Robert Koch isolated bacteria from the blood of sick cattle and re-injected them into a healthy cow. The healthy cow then became sick and died. When he isolated the bacteria from the cow he injected, he found it to be identical to bacteria from the sick cattle. What did this experiment prove to him?

a. Bacteria can spontaneously generate
b. Disease is transmitted by blood
c. All bacteria cause disease in cattle
d. A specific bacterium can be responsible for a particular disease
e. All of the above

32. All of the following are differences between prokaryotic cells and eukaryotic cells EXCEPT:

a. Prokaryotic cells contain peptidoglycan, whereas eukaryotes do not
b. Prokaryotic cells have sterols in the plasma membrane, whereas eukaryotes do not
c. Eukaryotic cells may be capable of endocytosis, whereas prokaryotes are not
d. Eukaryotic cells have a nuclear membrane, whereas prokaryotes do not

33. Which of the following is true of an organism that obtains its energy from sunlight, and gets its carbon from carbon dioxide?

a. This organism is a photoheterotroph
b. This organism MUST have eukaryotic cell structure
c. This organism could be a eukaryote OR a prokaryote
d. This organism MUST have chloroplasts
e. More than one of the above

34. Which of the following statements is incorrect:

a. Nucleotides are the individual units of DNA
b. Short amino acid chains are called peptides
c. Saccharides are the individual units of protein
d. Amino acid side groups determine the amino acid's chemical properties
e. None of the above are incorrect

35. Which of the following is true of the Gram stain:

~~a. It is a differential stain that detects the presence of mycolic acids in the cell wall~~
b. It stains Gram positive organisms pink
c. It is a special stain that allows visualization of thin extracellular structures such as flagella
d. It is a differential stain that interacts with peptidoglycan
e. It is a differential stain that leaves endospores green

36. True or false: Many dangerous microbes can grow quickly when cooked food is stored at room temperature, but not when it is stored above 50°C or below 10°C.

a. True
b. False

37. Which of the following is correct regarding ions:

a. Anions are positively charged ions
b. Anions are formed when a neutral atom gains an electron
c. Cations are formed when a neutral atom gains an electron
d. Ionic bonds are formed when two negatively charged atoms share electrons
e. None of the above choices are correct

38. In lactic acid fermentation:

a. Lactic acid is fermented into alcohol to generate oxygen
b. Sugar is fermented into lactic acid to generate ATP
c. Lactic acid is fermented into ATP to produce carbon dioxide
d. Sugar is fermented into alcohol to generate NADH
e. None of the above

39. True or False: Electron microscopes provide greater magnification AND better resolution than light microscopes.

a. True
b. False

40. Alexander Fleming's remarkable observation that revolutionized medicine was which of the following?

a. He observed that bacteria could inhibit the growth of a mold
b. Certain dyes stained microbes but not animal cells
c. He observed that people who had been sick with cow pox could not contract small pox
d. None of the above

*****THE END*****