**Bio 175 Spring, 2025 Brilakis Lecture Assessment #2 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
1. The four kingdoms of Domain Eukarya are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_,\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_,
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. What structure do all of these kingdoms have in common? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. What are three criteria used to classify members of Domain Eukarya?
 a.
 b.
 c.

3. Is facilitated diffusion and example of active or passive transport? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 Explain your answer.

4.

​3. ​Robert Koch was the first to prove \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 by identifying the bacterium that causes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
 Louis Pasteur used his swan neck flask experiment to disprove \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

4. Starting with the broadest category, list Linneaus’ scientific classification system.
 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_,
 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_,
 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. What do all members of Domain Eukarya have in common? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6. Domains Archae and Bacteria are similar in that members of both lack a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

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7. On 2/4/25, the NIH stated that Uganda has launched a trial of a vaccine against the Sudan *strain* of the Ebola virus. There is currently an approved vaccine against the Zaire *strain* which is prevalent in the Democratic Republic of Congo. Why won’t the vaccine approved for the Zaire *strain* protect the Sudanese people since they are being exposed to the same viral *species?*

8. Why do *endospore* producing bacteria, such as Clostridium botulinum which causes botulism,
 cause more difficulties in the safe processing of foods than non-spore producing bacteria?

9. In our class this semester, we will examine/identify microbes by completing three steps. They are:
 step 1:

 step 2:

 step 3:

10. Atoms engaged in ionic bonds (share/transfer) electrons between them while atoms engaged in covalent bonds (share/transfer) electrons between them.

11. What does an atom’s electronegativity have to do with its covalent bond being polar?

12. The bonds between Oxygen and Hydrogen in a molecule of water are polar covalent bonds.
 Explain how this allows molecules of water to *hydrogen bond* to one another.

13. Carbon has an atomic number of 6. Hydrogen has an atomic number of 1.
 The formula for methane = CH4.
 a. How many atoms does one molecule of methane exhibit? \_\_\_\_\_\_\_\_\_\_
 b. *Referencing their atomic numbers*, explain why these atoms covalently bond with one
 another?

14. The pH scale quantifies \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

15. What is the role of a buffer?

16. In an aqueous solution, as the H+ concentration increases, the OH- concentration
 (circle one: increases/decreases).

17. Complete this chart:
 monomer (s) polymer
 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 1. polysaccharide

 2. triglyceride lipid

 3. protein

 4. nucleic acid

18. The formula for glucose is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

19. Although both starch and cellulose are made from glucose monomers, the arrangement of these monomers in the polymer is different. *Referencing the role of enzymes*, why does this arrangement matter in a biological system?

20. There are \_\_\_\_\_ different amino acids. Each of these versions of amino acids is different because
 each has a different \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

21. Sickle Cell Disease is due to an error in the sequence of the amino acids in the hemoglobin protein. Explain how just one amino acid error can cause a protein to not function correctly.

22. Saturated triglycerides are considered a less healthy food choice than unsaturated triglycerides.
 Explain how the structural difference between these two types of lipids causes nutritionists to
 suggest we eat more plant oils vs animal fats.

23. List the 4 structures common to all bacterial cells and a function for each.

a.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

d. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

24. Bacterial cells walls are composed of a unique polymer called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

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25. Cell membranes are composed of molecules called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
 a. Describe the structure of this molecule.

 b. How are these molecules arranged in the cell membrane?

 c. What characteristics of these molecules permit this membrane arrangement?

26. Superbugs are bacteria that are resistant to multiple antibiotics and can cause serious infections. Plasmids are circular strands of DNA that can be exchanged between bacteria.
How are these two facts related?

27. Bacteria reproduce asexually via a process called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

 *Supplemental questions:*\* a high surface area to volume ration favors diffusion. How does this fact relate to cell size?

\*\* what are the advantages for a bacterium to be pleiomorphic?

\*\*\* list the three types of filamentous structures which extend from some bacterial cells and give a
 function for each.

\*\*\*\*what is the formula for a degradative enzymatic reaction?

\*\*\*\*\*what is Ignaz Semmelweis best known for?
 **Lab test #1**

1. Your lab partner enters class with long hair that is not tied back. You both are about to fix a bacterial sample prior to running a Gram stain test. Explain why this could be a dangerous situation.

2. If after flaming your loop you place it on the table before using it, what might be the potential
 consequence?

3. You are asked to identify just the cell shape of a bacterial sample. Would you choose to use a
 a differential stain or a simple stain to do so? Explain your answer.

4. Streptococcus pneumoniae infections are most prevalent during the winter and early spring.
Working in a clinical lab, you are asked to determine if a sample taken from an ill patient is this Gram (+) pathogen. You perform a Gram Stain test. What color, cell shape and orientation would you be looking for when viewing this sample under the scope?

5. How did you fix a bacterial sample grown on an agar plate to a slide.

6. List the four reagents used during your Gram staining process and the function of each.
a.

b.

c.

d.

6. Following our Gram stain procedure in class, some of the slides did not show the presence of any bacteria when viewed under 1000x. What are two possible reasons for this?
a.

b.

7. Station A:
 Identify the cell morphology, orientation and Gram stain status of this sample.

8. Station B:
 Identify the cell morphology, orientation and Gram stain status of this sample.

9. Station C:
 Focus the slide you are given to 1000X using the correct technique reinforced in class.
 set-up technique \_\_\_\_\_\_\_
 focus quality \_\_\_\_\_\_\_
 removal technique \_\_\_\_\_\_\_

10. List the total magnifications for:
 scanning (low) power \_\_\_\_\_\_\_\_\_\_\_\_\_
 medium power \_\_\_\_\_\_\_\_\_\_\_\_\_
 high power \_\_\_\_\_\_\_\_\_\_\_\_\_
 oil immersion \_\_\_\_\_\_\_\_\_\_\_\_\_

11. As magnification increases, your light intensity (increases/decreases) and the size of your field of view (increases/decreases).