PASS
PEER ASSISTED STUDY SESSIONS

MOCK EXAM
FOR PRACTICE ONLY

COURSE: BIOL 1103 AT **FACILITATOR:** Alyssa Stowe

It is **most beneficial** to you to write this mock midterm **UNDER EXAM CONDITIONS**.
This means:

- Complete the midterm in 1.5 hour(s).
- Work on your own.
- Keep your notes and textbook closed.
- Attempt every question.

After the time limit, go back over your work with a different colour or on a separate piece of paper and try to do the questions you are unsure of. Record your ideas in the margins to remind yourself of what you were thinking when you take it up at PASS.

The purpose of this mock exam is to give you practice answering questions in a timed setting and to help you to gauge which aspects of the course content you know well and which are in need of further development and review. Use this mock exam as a ***learning tool*** in preparing for the actual exam.

Please note:

- Come to the PASS workshop with your mock exam complete. During the workshop you can work with other students to review your work.
- Often, there is not enough time to review the entire exam in the PASS workshop. Decide which questions you most want to review – the Facilitator may ask students to vote on which questions they want to discuss in detail.
- Facilitators do not bring copies of the mock exam to the session. Please print out and complete the exam before you attend.
- **Facilitators do not produce or distribute an answer key for mock exams.** Facilitators help students to work together to compare and assess the answers they have. If you are not able to attend the PASS workshop, you can work alone or with others in the class.

Good Luck writing the Mock Exam!!

Date and location of mock exam take-up:
Friday October 6th 4:30-7:00 PM (MC 2000)

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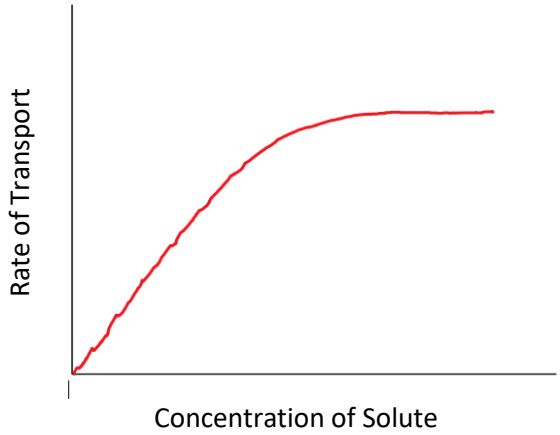
1. A cell that gains water when it is immersed in a solution must have been…
   A) Isoosmotic to its environment
   B) Hyperosmotic to its environment
   C) Hypoosmoticic to its environment
   D) Metabolically inactive
   E) None of the above

2. Which transport mechanism does the following graph represent?



   A) Endocytosis
   B) Simple Diffusion
   C) Osmosis
   D) Facilitated Diffusion
   E) None of the above

3. Where does glycolysis occur?
   A) Intermembrane space
   B) Mitochondrial matrix
   C) Cytoplasm
   D) Nucleus
   E) Stroma

4. Which of the following structure-function pairs is *mismatched*?
   A) Peroxisomes ----- Hydrogen peroxide metabolism
   B) Smooth endoplasmic reticulum ----- Detoxification of drugs
   C) Nucleolus ------- Ribosome production
   D) Lysosome ------ Intracellular digestion
   E) Chloroplast ------ Cellular respiration

5. Why is the digestion of cellulose not possible for humans?
   A) Humans do not have enzymes that can hydrolyze the β glycosidic linkages of cellulose.
   B) The monomer of cellulose is galactose.
   C) Humans do not have enzymes that can hydrolyze the α glycosidic linkages of cellulose.
   D) Humans do not have cellulose-digesting bacteria in their digestive tract.
   E) The digestion of cellulose is actually possible for humans.

6. An imbalanced microbiome has been associated with which of the following?
   A) Depression
   B) Irritable bowel syndrome
   C) Obesity
   D) Acne
   E) All of the above

7. What monomer—linkage type pair is mismatched?
   A) Monosaccharides—Glycosidic linkages
   B) Amino acids—Peptide bonds
   C) Nucleotides—Phosphodiester bonds
   D) Lipids—Ester bonds
   E) None of the above

8. Which of the following statements concerning *unsaturated* fats is true?
   A) They are more common in animals than in plants.
   B) They have double bonds in the carbon chains of their fatty acids.
   C) They are solid at room temperature.
   D) They contain more hydrogen than saturated fats.
   E) They have fewer fatty acid molecules per fat molecule.

9. Which structure is <u>not</u> part of the endomembrane system?
   A) Lysosomes
   B) Mitochondria
   C) Golgi Apparatus
   D) Plasma membrane
   E) Endoplasmic reticulum

10. Which of the following factors would tend to increase membrane fluidity?
   A) A greater proportion of unsaturated fatty acids.
   B) A greater proportion of saturated fatty acids.
   C) Lowering the temperature.
   D) A relatively high protein content in the membrane.
   E) A greater proportion of relatively large glycolipids compared with lipids having smaller molecular masses.

11. Which of the following processes is exergonic?
   A) The synthesis of glucose from carbon dioxide and water
   B) Photosynthesis
   C) The breakdown of glucose
   D) ADP + Pi → ATP
   E) Answers B and D are both correct.

12. Which of the following regarding non-enzymatic glycolysis is ***<u>true</u>***?
   A) It occurs only when enzymes become over-saturated.
   B) It occurs in the absence of oxygen.
   C) It occurs only in bacteria.
   D) It suggests that metabolism is prebiotic.
   E) It does not exist; glycolysis requires enzymes.

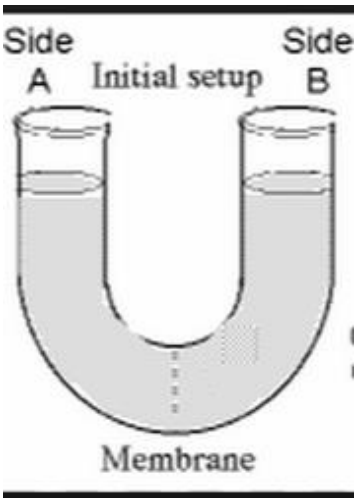
13. What did the Frye-Edidin experiment demonstrate?
   A) The membrane proteins are unable to move within the plane of the plasma membrane.
   B) That some membrane proteins move sideways within the plane of the plasma membrane.
   C) That phospholipids can “flip-flop” across the plasma membrane.
   D) That phospholipids cannot move sideways within the plane of the plasma membrane.
   E) None of the above.

14. The Blood-Brain-Barrier forms a seal between the brain and the rest if the body that only allows a select few molecules to pass through. Which type of junctions form this structure?
    A) Tight Junctions
    B) Desmosomes
    C) Gap Junctions
    D) Plasmodesmata
    E) Semi-permeable Junctions

15. Put the following stages in cellular respiration in the correct order:
    1. Pyruvate Oxidation 2. The citric acid cycle 3. Glycolysis 4. Oxidative phosphorylation
    A) 1, 3, 4, 2
    B) 3, 1, 2, 4
    C) 1, 2, 3, 4
    D) 4, 2, 1, 3
    E) 2, 1, 4, 3

Sucrose 2M

Glucose 1M



Sucrose 1M

Glucose 3M

15. A selectively permeable separates side A and side B and two different solutions are placed on either side. The membrane is permeable to water and to the simple sugar glucose but completely impermeable to the disaccharide sucrose. After the system reaches equilibrium, what changes are observed?
    A) The molarity of Glucose will be higher in side A compared to side B.
    B) The water level will increase in side A compared to side B.
    C) The water level will increase in side B compared to side A.
    D) The molarity of sucrose will be higher in side B than in side A.
    E) There will be no changes.

16. What does it mean if a reaction has a negative △G?
    A) The reaction can occur spontaneously.
    B) The reaction cannot occur spontaneously.
    C) We must invest a minimum of △G into the system to drive the reaction for G (initial) to G (final).
    D) No energy needs to be expended to take the system from G (initial) to G (final)
    E) A and D are both correct

17. When does substrate-level phosphorylation take place?
    A) During glycolysis
    B) During the citric acid cycle
    C) During oxidative phosphorylation
    D) A and B
    E) B and C

18. Where does the citric acid cycle take place?
    A) Cytoplasm
    B) Stroma
    C) Nucleus
    D) Mitochondrial matrix
    E) Intermembrane Space

19. When a substance is oxidized it _____ and when a substance is reduced it_____.
    A) loses electrons; gains electrons.
    B) gains electrons; loses electrons.
    C) gains protons; loses protons.
    D) gains oxygen; loses oxygen.
    E) gains electrons; gains electrons.

20. Where does oxidative phosphorylation take place?
    A) Cytoplasm
    B) Mitochondrial matrix
    C) Inner mitochondrial matrix
    D) Outer mitochondrial matrix
    E) Stroma

21. Which of the following can passively diffuse through a membrane's lipid bilayer?
    A) $K^{=}$
    B) O_2
    C) Sucrose
    D) Glucose
    E) Cl^-

22. Which of the following statements about enzymes is <u>true</u>?
    A) The increase the rate of chemical reactions.
    B) They function as biological catalysts by lowering the activation energy.
    C) They regulate chemical reactions in a cell.
    D) They operate at an optimal pH and optimal temperature.
    E) All of the above.

23. Which of the following is NOT evidence for the endosymbiosis theory?
    A) Chloroplasts and mitochondria use ATP the same way that prokaryotes do.
    B) Chloroplasts and mitochondria can generate ATP through electron transport processes.
    C) Chloroplasts and mitochondria are similar in size to prokaryotes.
    D) Chloroplasts and mitochondria reproduce in a similar way to prokaryotes.
    E) The DNA found in mitochondria and chloroplasts is similar to that of prokaryotes.

24. The R group of the amino acid methionine is non-polar and the R group of the amino acid serine is polar. Where would you expect to find these amino acids if they are part of a globular protein in aqueous solution?
    A) Methionine would be in the interior, and serine would be on the exterior of the globular protein.
    B) Serine would be in the interior, and methionine would be on the exterior of the globular protein.
    C) Both serine and methionine would be in the interior of the globular protein.
    D) Both serine and methionine would be on the exterior of the globular protein.
    E) Both methionine and serine would be on the interior and exterior of the globular protein.

25. What is the Oparin-Haldane hypothesis?
    A) Organic molecules that formed the building blocks of life could not have been formed given the conditions that prevailed on primitive Earth.
    B) Organic molecules that formed the building blocks of life could have been formed given the conditions that prevailed on primitive Earth.
    C) Life developed through various physical, chemical and biological processes over billions of years.
    D) Organic molecules that formed the building blocks of life were already present on primitive Earth.
    E) Life on Earth was "seeded" by organic molecules brought to Earth via meteorites.

26. Which of the following do all cells have?
    A) Nucleus
    B) Plasma membrane
    C) Membrane bound organelles
    D) Cell walls containing peptidoglycan
    E) Endomembrane system

27. During the metabolism of one molecule of glucose by glycolysis, how many molecules of NADH are produced?
    A) 0
    B) 2
    C) 4
    D) 6
    E) 8

28. What will happen if an animal cell that contain the equivalent of 0.15 M NaCl is transferred to a solution that contains the equivalent of 0.45 M NaCl?
    A) NaCl will be exported from the cell.
    B) NaCl will passively diffuse into the cell.
    C) Water will leave the cell, causing it to shrivel.
    D) NaCl will be actively transported into the cell.
    E) Water will move into the cell causing it to swell and lyse.

29. What is the function of cholesterol?
    A) Helps maintain proper levels of membrane fluidity when temperature changes in animals.
    B) Serves only as the starting material for steroids.
    C) Is part of the intercellular transduction pathway.
    D) Helps maintain proper levels of membrane fluidity in eukaryotes when temperature changes
    E) None of the above.

30. For a plant cell to be considered normal and healthy, its concentration of solute must be…
    A) Greater than the concentration of solute in the solution that surrounds the cell.
    B) Less than the concentration of solute in the solution that surrounds the cell.
    C) Equal to the concentration of solute in the solution that surrounds the cell.
    D) It doesn't matter what the concentration of solute is in the cell.
    E) There is no solute found in plant cells.

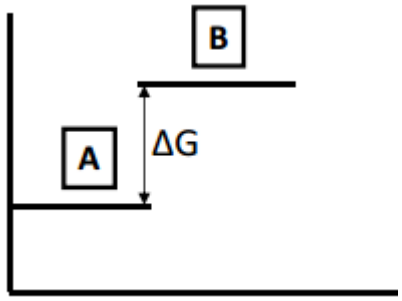
31. What is the main type of bond that provides structural support to fibrous proteins at their highest level of organization?
    A) Covalent bonds
    B) Ionic bonds
    C) Hydrogen bonds
    D) Disulphide Bridges
    E) London Forces

32. Which step of cellular respiration produces the most ATP per molecule of glucose?
    A) NADH is oxidized by the electron transport chain.
    B) $FADH_2$ is oxidized by the electron transport chain.
    C) Glucose is reduced to pyruvate.
    D) Succinyl CoA is converted to Fumarate.
    E) They all produce the same amount of ATP.

33. A cell's cytoskeleton is composed of microtubules made of tubulin, intermediate filaments made of keratins, and microfilaments made of actin. Which of these structures is responsible for cytoplasmic streaming in plant cells?
    A) Microtubules
    B) Intermediate Filaments
    C) Microfilaments
    D) Both A) and C)
    E) All three structures interact to cause cytoplasmic streaming.

34. Which of the following statements regarding enzymes is true?
    A) Enzymes lower the activation energy and the ΔG produced from a reaction.
    B) Enzymes in primary metabolism respond only to specific substrates.
    C) All Enzymes require cofactors in order to function.
    D) There is no difference between competitive inhibition and non-competitive inhibition.
    E) When presented with adverse conditions (such as a drastic change in temperature or pH) an enzyme will lose its function, but maintain its structure and shape.

35. Which type of reaction is depicted in the following graph?



    A) Exothermic
    B) Endothermic
    C) Exergonic
    D) Endergonic
    E) Spontaneous

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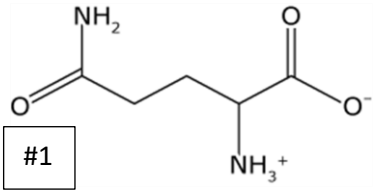
Use the diagrams presented below to answer questions 36-39.

#1



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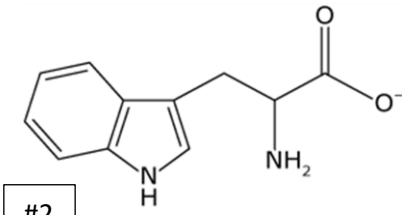

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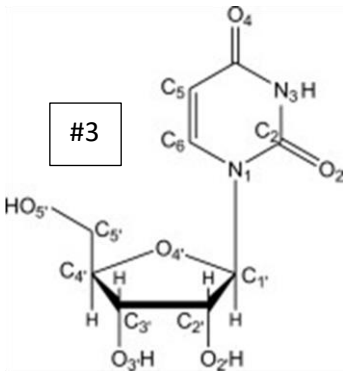

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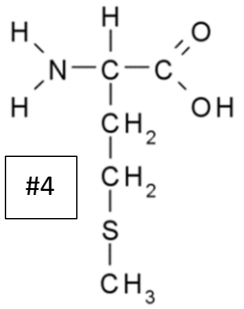

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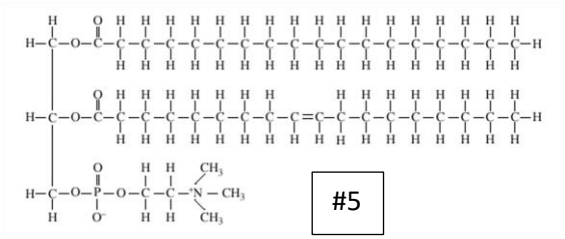

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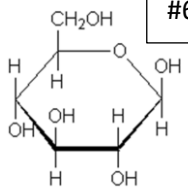

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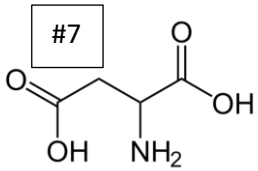

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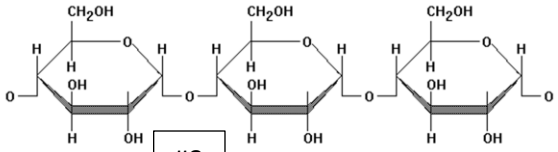

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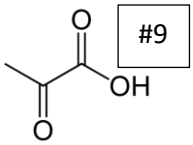

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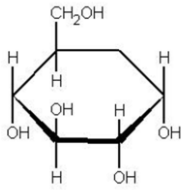

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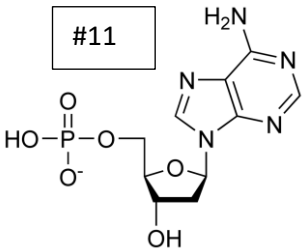

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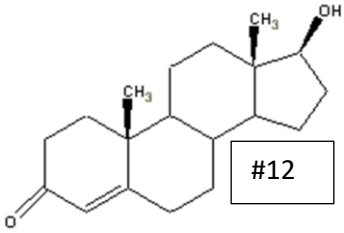

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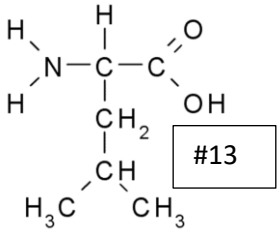

36. Which molecule plays an important role in the structure of DNA?
    A) 3
    B) 11
    C) 2
    D) 12
    E) 10

37. Which molecules are amino acids?
    A) 2 and 4
    B) 1 and 7
    C) 9 and 13
    D) Both A) and B) are correct.
    E) All of the above.

38. Identify the molecule(s) that contain(s) phosphate groups.
    A) 1
    B) 5
    C) 11
    D) Both B) and C) are correct.
    E) Options A), B) and C) are all correct.

39. Which molecule is a lipid?
    A) 10
    B) 5
    C) 12
    D) 3
    E) B and C are both correct.

40. Proteins can become denatured when they are exposed to extreme temperatures or pH. Which molecules can reverse this structural change?
    A) Enzymes
    B) Chaperones
    C) RNA complexes
    D) Structural support cells
    E) It is impossible to reverse denaturation of proteins.

41. In which level of structure is a protein's folding pattern determined?
    A) Primary structure
    B) Secondary structure
    C) Tertiary structure
    D) Quaternary structure
    E) It is dependent on the environment.

42. Which of the following statements regarding a scientific theory is *true*?
    A) It is an untestable statement that makes reasonable claims and is thus accepted as true by society.
    B) It is a testable statement that makes reasonable claims and is thus accepted as true by society.
    C) It is the concluding statement of an experiment that is supported by results.
    D) It is a statement that is supported by large amounts of research and is thus accepted as true by society.
    E) It is homologous to a scientific hypothesis.

43. Oral rehydration therapy was developed to help patients suffering from the bacterial infection known as Cholera. What are the main constituents of a good oral rehydration therapy?
    A) Water, salt, calcium
    B) Carbohydrates, lipids, and proteins
    C) Sugar, salt, and potassium
    D) Sodium, calcium, glucose
    E) Antibiotics, potassium, carbohydrates

44. Hydrogenation of an unsaturated fat can lead to:
    A) Lower melting point
    B) Higher melting point
    C) Conversion to trans fats
    D) Options A and C are both correct
    E) Options B and C are both correct

45. What is the oxidizing agent in the following reaction?

$$\text{Pyruvate} + \text{NADH} + H^+ \longrightarrow \text{Lactate} + NAD^+$$

    A) Oxygen
    B) NADH
    C) NAD^+
    D) Lactate
    E) Pyruvate