Name:_____

Student ID:_____

Biology 107 midterm section A3
October 23, 2012

1. There are 42 multiple choice questions on the exam. Each question is worth 1 mark. You must do each question. There is one best answer for each question.

2. Pages 2 to 9 of this booklet contain the questions.

3. All answers must be put on the computer "General Purpose Answer Sheet" using positions 1 to 40.

4. Use only a soft lead PENCIL on the general purpose computer answer sheet (scantron).

5. Print your name and student ID number on the general purpose answer sheet in the correct fields and fill in the corresponding circles.

6. Fill in the code **2** under special codes in column **J**.

7. No source materials, calculators, notes, books, manuals, cell phones, pagers, or headsets may be used during the exam.

8. At the end of the exam, put down your pencils immediately when instructed to do so, and hand in the exam booklet and the general purpose answer sheet to the proctors at the front of the room.

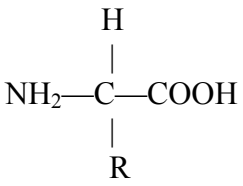
9. This exam is worth 15% of your final grade. There are 42 possible marks.

10. You have **60 minutes** to complete this exam. Use your time wisely!

1. Ribose is an example of:
A) a nucleic acid
B) an amino acid
C) a phospholipid
D) a monosaccharide
E) a component of cellulose

2. The molecular formula for glucose is $C_6H_{12}O_6$. What would be the molecular formula for a molecule made by linking three glucose molecules together by dehydration reactions?
A) $C_{18}H_{36}O_{18}$
B) $C_2H_4O_2$
C) $C_{18}H_{32}O_{16}$
D) $C_{18}H_{30}O_{15}$
E) $C_{18}H_{40}O_8$

3. The following shows the general structure of:



A) an amino acid
B) steroid
C) a sugar
D) an amphiphilic molecule
E) none of the above

4. Phosphodiester bonds are found in:
A) carotenoids
B) bacterial cell walls
C) carbohydrates
D) microtubules of cilia or flagella
E) some components of ribosomes

5. Chitin is a polymer of which monomer?
A) glucose
B) N-acetylglucosamine
C) glutamic acid
D) palmitic acid
E) cholesterol

6. The outermost material on a Gram negative bacterial cell wall would usually be
A) a lipid bilayer
B) peptidoglycan
C) lipopolysaccharide
D) the plasma membrane
E) proteoglycan

EITHER A OR C WILL BE ACCEPTED

7. Proplastids are most closely related to:
A) Bacterial prokaryotes
B) Archael prokaryotes
C) mitochondria
D) chloroplasts
E) trans Golgi vesicles

8. A diacylglycerol molecule is made up of:
A) two glycerol molecules and one fatty acid chain
B) two glycerol molecules and two fatty acid chains
C) one glycerol molecule and one fatty acid chain
D) one glycerol molecule and two fatty acid chains
E) two fatty acid chains

9. Most plant fats exist as oils at room temperature because relative to animal fats
A) they contain shorter chain fatty acids
B) they contain cis double bonds in their fatty acids
C) they contain trans double bonds in their fatty acids
D) they are hydrogenated fats
E) they contain phosphates

10. Which of the following best describes trans fats?
A) they are all triglycerides
B) they occur naturally in most organisms
C) they contain no double bonds
D) they are synthesized in a specific part of the Golgi
E) most are created by processes used in the food industry

11. One model for the relationship between the three domains of life in early evolution suggests that it is best represented by a ring. This is because:
A) the common ancestor of all life forms most likely had a circular chromosome
B) of the endosymbiont hypothesis
C) the two prokaryote domains are more closely related to each other than they are to eukaryotes
D) the formation of molecules whose atoms are arranged in rings was an important step in the evolution of life
E) there was so much exchange of genetic material among early organisms that clear branches from one to another cannot be established

12. Under normal conditions, the sucrose-H^+ cotransporter does which of the following:
A) creates a H^+ gradient
B) transports sucrose to the outside of the cell
C) increases intracellular pH
D) hydrolyzes ATP to provide energy for moving sucrose and H^+ against their concentration gradients
E) none of the above

13. Which of the following terms best describes aquaporin?

A) ion channel
B) uniporter
C) antiporter
D) symporter
E) H^+ pump

14. Pinocytosis is one form of:

A) facilitated diffusion
B) replenishing the cis Golgi
C) exocytosis
D) removing water from the plant cell vacuole
E) endocytosis

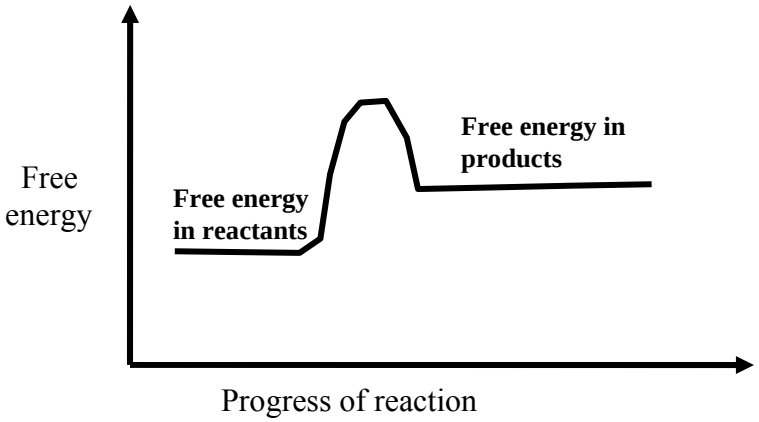
15. Consider the characteristics of the lipids in a membrane and predict which would solidify first with decreasing temperature:

A) short chains with one double bond
B) short chains with no double bonds
C) long chains with one double bond
D) long chains with no double bonds
E) long chains with several double bonds

16. Which of the following would be least likely to diffuse across a biological membrane?

A) glycogen
B) glycerol
C) water
D) carbon dioxide
E) glucose

17. The graph below is most likely to represent which of the reactions shown below the graph?



A) CO_2 + water → gasoline + O_2
B) ATP → ADP + Pi
C) Cellulose → 100 glucose
D) the flow of Na^+ ions down their electrochemical gradient
E) passive diffusion of O_2 across a biological membrane

18. In a hypotonic environment, you would expect a plant cell to be:

A) flaccid
B) shriveled
C) plasmolyzed
D) turgid
E) lysed

19. Which of the following could not be the atom (or molecule) pumped by an electrogenic pump?

A) sucrose
B) protons
C) sodium ions
D) potassium ions
E) calcium ions

20. Which of the following stimulates release of the phosphate group from the sodium-potassium pump?

A) release of Na^+ ions outside the cell
B) binding of Na^+ ions inside the cell
C) release of K^+ ions inside the cell
D) binding of K^+ ions from outside the cell
E) a change in membrane potential

21. N-acetylglucosamine and N-acetylmuramic acid would both be found in:

A) Gram negative bacteria
B) Archaea
C) primitive eukaryotes
D) the nuclear lamina
E) none of the above

22. The intermembrane space exists

A) in the nucleus
B) between the cisternae of the ER
C) the thylakoid membrane
D) in mitochondria
E) in Gram positive bacteria

23. Microtubule organizing centers contain

A) γ tubulin
B) the "positive" end of microtubules
C) plant cell centrioles
D) nine doublets of microtubules
E) intermediate filaments

24. Dynein, kinesin, and myosin are all

A) composed, at least partially, of actin filaments
B) prokaryotic motor molecules
C) required for the transport of ribosomes to the ER
D) structural parts of the cytoskeleton
E) powered by ATP

25. The "secondary cell wall"

A) provides Gram negative bacteria with an outer membrane
B) requires transpeptidation to insure it is crosslinked
C) is a distinguishing feature of the Archaea
D) exists between the plasma membrane and primary cell wall of some plant cells
E) is another term for the extracellular matrix

26. If one considers the name of an intracellular structure or organelle and pairs it with its function, which of the following is an incorrect match:

A) ribosome/protein synthesis
B) chloroplast/photosynthesis
C) microtubules/muscle contraction
D) nucleolus/ribosomal subunit formation
E) basal body/anchoring cilia

27. Fibronectin is an example of

A) an integral membrane protein
B) a peripheral membrane protein
C) a thin filament
D) a component of a Gram positive cell wall
E) a component of the primary cell wall

28. The plasmodesmata of plant cells would be functionally most closely related to which of the following animal cell components:

A) gap junctions
B) desmosomes
C) tight junctions
D) basal bodies
E) centrioles

29. Which of the following does not normally travel through the nuclear pore complex?

A) DNA
B) ribosomal subunits
C) RNA
D) protein
E) all of the above normally travel through the nuclear pore complex

30. If a cell somehow lost its Golgi apparatus, then it

A) could not perform protein synthesis in the cytosol
B) would be deficient in lipid synthesis
C) would contain no transitional ER
D) could not communicate with neighboring cells
E) could not properly direct proteins to the plasma membrane

31. The endosymbiont hypothesis describes

A) the origin of the three domains of life
B) the origin of mitochondira and chloroplasts
C) the arrangement of the nucleolus and nucleus
D) the evolution of ribosomes and protein synthesis
E) the relationship between eukaryotes and the Archaea

32. The phrase "CO_2 is fixed" refers to:

A) adding CO_2 molecules to existing carbohydrates during photosynthesis
B) bringing CO_2 molecules from the air into the leaf so that photosynthesis can begin
C) performing a redox reaction in chloroplasts to fill electron holes in CO_2 molecules that exist after a photon is absorbed
D) removing excess CO_2 from a reaction so that it can go to completion
E) calling Mike Holmes to get your furnace working properly

33. Suppose a biological reaction converting reactants to products had proceeded to equilibrium. More enzyme catalyzing that reaction was then added to the reaction. The result would be:

A) no change in the amounts of products and reactants
B) the amount of products would increase and the amount of reactants would decrease
C) the amount of reactants would increase and the amount of products would decrease
D) The entropy of the system would increase
E) The temperature of the reaction would change

34. The extracellular matrix

A) exists only on young plant cells
B) exists only on animal cells
C) cannot interact with the cytoskeleton
D) contains nucleic acids
E) can be avoided by taking the "blue pill"

35. Ribosomes exist in (or on) how many organelles of a plant cell that are not part of the endomembrane system:

A) 0
B) 1
C) 2
D) 3
E) 4

36. For the reaction X→Y, ΔG is -6 kcal/mol. If the reaction goes to equilibrium, then

A) ΔG is still -6 kcal/mol
B) ΔG is now +6 kcal/mol
C) ΔG is now 0 kcal/mol
D) The concentration of X will have increased
E) The concentration of X and Y will have both increased

37. If a photon of green light is absorbed by a pigment and fluorescence occurs, we know that

A) no heat is produced
B) the photon given off is not a blue light photon
C) an enzyme was needed to lower the activation energy for the reaction
D) ATP was formed
E) none of the above can be known with certainty

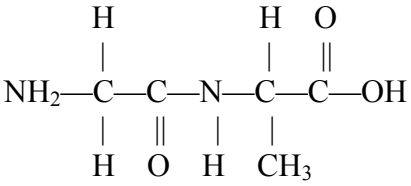
38. Which of the following is not a way of stating the second law of thermodynamics

A) All energy transfers or transformations have no effect on the total energy in the universe.
B) All energy transfers or transformations make the universe more disordered.
C) All energy transfers or transformations cause some of the energy to become unuseful.
D) All energy transfers or transformations increase the entropy of the universe.
E) Reactions occur spontaneously in the direction that increases the entropy of the universe.

39. Which of these enzyme catalyzed reactions is most likely coupled to the breakdown of ATP?

A) proteins→amino acids
B) glucose→glycogen
C) any reaction whose ΔG is negative
D) nucleic acids→nucleotides
E) cellulose→glucose

40. The structure below is representative of which of the following:



A) an ester linkage
B) a peptide bond
C) a glycosidic bond
D) a phosphodiester bond
E) none of the above

41. Which of these structures is not made up at least partly of phospholipids?

A) micelles
B) bilayer sheets
C) spherical lipid bilayer
D) integral membrane proteins
E) mitochondrial inner membrane

42. Which of the conditions below must exist for osmosis to occur?

A) Water must move through protein channels that solutes cannot enter
B) The energy of ATP hydrolysis must be coupled to the movement of a solute
C) A transport protein that mediates facilitated diffusion must be present in a selectively permeable membrane
D) Solutions with the same concentration of the same solute must be separated by a selectively permeable membrane
E) Solutions containing different concentration of the same solute must be separated by a selectively permeable membrane