

Name: \_\_\_\_\_

Student # \_\_\_\_\_

1. Which statement about prokaryotes is NOT true?
  - a. Prokaryotes have much less internal membrane organization than eukaryotes.
  - b. Prokaryotes vastly outnumber all other types of organisms.
  - c. Prokaryotic cells are significantly smaller than typical eukaryotic cells.
  - d. Prokaryotes are less versatile biochemically than eukaryotes.**
  - e. Prokaryotes utilize an electron transport chain.
  
2. Oxygen acts as a final electron acceptor in respiration and is ultimately converted into which molecule?
  - a. water**
  - b. ATP
  - c. CO<sub>2</sub>
  - d. glucose
  - e. NAD<sup>+</sup>
  
3. Which of the following contains a phosphate group, a ribose sugar and a nitrogenous base?
  - a. a disaccharide
  - b. an amino acid
  - c. a nucleotide**
  - d. a fatty acid
  - e. a polypeptide
  
4. Why is it an important prediction in Oparin and Haldane's postulate that the early atmosphere was a reducing atmosphere?
  - a. because the molecules in reducing atmosphere contain the minimum possible number of electrons that can be easily donated in reactions that lead to synthesis of complex molecules
  - b. because the molecules in reducing atmosphere contain the maximum possible number of electrons that can be easily donated in reactions that lead to synthesis of complex molecules**
  - c. because the molecules in reducing atmosphere contain the maximum possible number of protons that can be easily donated in reactions that lead to synthesis of complex molecules
  - d. because the molecules in reducing atmosphere contain the maximum possible number of protons that can be easily accepted in reactions that lead to synthesis of complex molecules
  - e. All of the above.
  
5. The final product of glycolysis is
  - a. glucose.
  - b. pyruvate.**
  - c. glyceraldehyde-3-phosphate.
  - d. fructose.
  - e. CO<sub>2</sub>

Name: \_\_\_\_\_

Student # \_\_\_\_\_

6. During every energy transformation, it can be said that

- a. **the entropy of the universe increases.**
- b. the entropy of the universe decreases.
- c. there is a change in the free energy of the universe.
- d. there is a change in the total energy of the universe.
- e. both a. and d. are correct.

7. Enzymes work with at least three mechanisms. Which of the following is NOT a mechanism by which enzymes function?

- a. changing the shape of a substrate molecule
- b. **altering the free energy ( $\Delta G$ ) of the reaction**
- c. altering the immediate environment of the reactants to promote reactant interactions
- d. orienting the reactants so they are positioned to favour the transition state
- e. putting reactants in close proximity to each other

8. \_\_\_\_\_ is the net movement of uncharged molecules from a low concentration to a higher concentration.

- a. **Active transport**
- b. Facilitated diffusion
- c. Exocytosis
- d. Osmosis
- e. Passive diffusion

9. The \_\_\_\_\_ component of the cell membrane functions as a selective barrier, while the \_\_\_\_\_ component has specific functions such as transport, recognizing other cells, and binding to other cells.

- a. carbohydrate; nucleic acid
- b. protein; lipid
- c. **lipid; protein**
- d. lipid; carbohydrate
- e. carbohydrate; lipid

10. What powers ATP synthase directly?

- a. electron transfer
- b. NADH and FADH<sub>2</sub>
- c. carbohydrate metabolism
- d. **proton gradient**
- e. O<sub>2</sub>

11. What must be true when electrons are passed between protein complexes?

- a. The oxidized electron carrier passes on the electron and becomes reduced.
- b. **The reduced electron carrier passes on the electron and becomes oxidized.**
- c. The matrix decreases in pH.
- d. A proton is translocated to the inner mitochondrial space.
- e. The electron is translocated to the cytosol

Name: \_\_\_\_\_

Student # \_\_\_\_\_

12. A scientist took a mouse cell and a human cell and labelled them with specific antibodies (antibodies to mouse proteins–green; antibodies to human proteins–red). She then mixed the cells together with a virus which caused them to fuse. When she looked at the fused cell an hour later she observed that

- a. the cell was still half red and half green.
- b. the red and green fluorescent labels were uniformly distributed across the entire membrane.**
- c. the red and green labels were distributed in intermingled patches.
- d. the red and green labels flashed intermittently.
- e. Only the human proteins (green) were observable.

13. Where can you find ATP synthase in a plant cell?

- a. in the cytoplasm
- b. in the mitochondrial inner membrane
- c. in the thylakoid membrane
- d. embedded in the plasma membrane
- e. Both b. and c. are correct**

14. Which statement about cells is NOT true?

- a. All cells possess a selectively permeable membrane.
- b. The DNA of both prokaryotic and eukaryotic cells is organized into chromosomes.
- c. The DNA of an eukaryote is found localized in a central region called a nucleoid.**
- d. The cytoplasm consists of the cytosol and organelles.
- e. Information flow in cells is DNA-RNA-Protein

15. In an aqueous environment, the phospholipids of a membrane

- a. are arranged in a single layer.
- b. are arranged in a single layer head-to-tail
- c. are arranged in a bilayer with the fatty acid tails located at the surface.
- d. are arranged in a bilayer but the phospholipids have no specific orientation.
- e. are arranged in a bilayer with the polar heads of each layer located at the surface.**

16. Membrane sterols such as cholesterol function in animal cell membranes to

- a. increase the rate of diffusion.
- b. communicate with other cells.
- c. facilitate ion transport.
- d. maintain membrane fluidity.**
- e. store cellular energy.

17. What absorbs the photons of light in photosynthesis?

- a. carotenoids
- b. chlorophyll
- c. chlorophyll and carotenoids**
- d. the thylakoid membrane
- e. Rubisco

Name: \_\_\_\_\_

Student # \_\_\_\_\_

18. Which molecule(s) is/are responsible for delivering the high-energy electrons from the Krebs cycle to the electron transfer system?

- a. NADH only
- b. O<sub>2</sub>
- c. **both NADH and FADH<sub>2</sub>**
- d. Cyt C and Q
- e. FADH<sub>2</sub> only

19. \_\_\_\_\_ molecules pass through a cell membrane most easily by diffusion.

- a. Macromolecules
- b. Large, polar
- c. Large, hydrophilic
- d. **Small, hydrophobic**
- e. Ionic

20. A channel that opens in response to changes in ionic charge across a membrane is called a

- a. **voltage-gated channel.**
- b. ligand-gated channel.
- c. charge-gated channel.
- d. electric-gated channel.
- e. size-gated channel.

21. Which of these correctly describes the purpose of the Calvin cycle?

- a. **produce sugars using CO<sub>2</sub> as a carbon source**
- b. recover electrons lost when water was split
- c. to transport electrons
- d. counteract increasing atmospheric CO<sub>2</sub> concentrations (global warming)
- e. capture photons of light

22. A red blood cell was placed in a beaker of solution. The cell immediately began to swell and ultimately burst. This happened because the cytoplasm of the cell was \_\_\_\_\_ to the solution in the beaker, which was \_\_\_\_\_.

- a. **hypertonic; hypotonic**
- b. hypotonic; hypertonic
- c. isotonic; isotonic
- d. hypertonic; isotonic
- e. hypotonic; isotonic

23. What is the importance of the Miller-Urey experiment?

- a. it showed that unimportant molecules could be produced abiotically.
- b. it showed that molecules crucial to life could be produced biotically.
- c. it showed that unimportant molecules could be produced biotically.
- d. **it showed that molecules crucial to life could be produced abiotically.**
- e. it showed that molecules crucial to life could be produced in an oxidizing atmosphere.

Name: \_\_\_\_\_

Student # \_\_\_\_\_

24. Which products of the light reactions are used in the Calvin cycle?

- a. CO<sub>2</sub> and RuBP
- b. water, O<sub>2</sub>, ATP.
- c. electrons and photons
- d. ATP and NADPH**
- e. O<sub>2</sub> and RuBP

25. Eukaryotic cells import large molecules through the process of \_\_\_\_\_ and secrete larger molecules by \_\_\_\_\_.

- a. endocytosis; exocytosis**
- b. diffusion; exocytosis
- c. exocytosis; endocytosis
- d. endocytosis; phagocytosis
- e. pinocytosis; phagocytosis

26. Which of these correctly describes the purpose of the C<sub>4</sub> pathway?

- a. It replaces the carbon fixation stage of the Calvin cycle.
- b. It supplements the activity of rubisco by providing a second source of 3PGA for the reduction stage of the Calvin cycle.
- c. It inhibits the activity of Rubisco.
- d. It ensures that CO<sub>2</sub> is provided to rubisco and thus prevents photorespiration.**
- e. It is more efficient than the Calvin cycle because less ATP is consumed in the process.

27. Which of the following is a correct match between monomer and polymer?

- a. glucose and lipids
- b. amino acids and tri-glycerides
- c. nucleic acids and protein
- d. nucleotides and DNA**
- e. amino acids and DNA

28. During which stages of cellular respiration is CO<sub>2</sub> released?

- a. krebs cycle
- b. both pyruvate oxidation and citric acid cycle**
- c. glycolysis
- d. electron transport system
- e. both glycolysis and the electron transport system

29. What is the fate of CoA after it delivers an acetyl group into the citric acid cycle?

- a. It is degraded and used for energy.
- b. It is recharged with another acetate.**
- c. It is used in protein synthesis.
- d. It remains in an inactive form until the cell dies.
- e. It is secreted by exocytosis.

Name: \_\_\_\_\_

Student # \_\_\_\_\_

30. Amino acids have an amino group at one end and a \_\_\_\_\_ group at the other.

- a **Carboxyl**
- b Methyl
- c Phosphate
- d Anhydrous
- e R

31. Plants differ from animal cells in a number of ways, including having a cellulose cell wall. Which of the following can also be used to differentiate plant cells from animal cells?

- a chloroplasts
- b phospholipid membrane
- c vacuole
- d **both a. and c. are correct**
- e both b. and c. are correct

32. Where did the first oxygen come from?

- a anaerobic respiration
- b **oxidizing water by cyanobacteria**
- c fermentation
- d aerobic respiration
- e the first eukaryotes

33. Which are the major membrane components in a eukaryotic cell?

- a nuclear envelope, mitochondria, and chloroplasts
- b **nuclear envelope, the endoplasmic reticulum, and the Golgi complex**
- c nuclear envelope, the endoplasmic reticulum, and chloroplasts
- d nuclear envelope, golgi complex, and chloroplasts
- e nuclear envelope, the endoplasmic reticulum, and mitochondria

34. When ATP is split into ADP and Pi,

- a the ADP is degraded into AMP and the Pi secreted from the cell.
- b the energy is directly transferred to the target molecule by an unknown mechanism.
- c **the binding of ADP or Pi to the target molecule allows the energy of ATP hydrolysis to be transferred to the target molecule.**
- d the two remaining phosphates acquire the energy that had been present in the linkage of three phosphates.
- e the energy is released in the form of heat.

35. The fact that not all eukaryotic cells contain both mitochondria and chloroplasts indicates that

- a endosymbiosis did not occur at all.
- b **endosymbiosis occurred in stages.**
- c endosymbiosis did not occur in stages.
- d endosymbiosis occurred only in the evolution of mitochondria.
- e endosymbiosis occurred only in the evolution of chloroplasts.