

Biology 10
Dr. Balukjian
Lecture Exam 1 Answer Key

Your Name:

Now's your time to shine. Keep your eyes on the prize (your test, that is, not your neighbor's) and do your best. Part 1 (Questions 1-25) requires the scantron. **Be sure to also put your name on your scantron.** You may make marks on your exam and in the margins. Be sure to read the entire question and all possible choices before answering each question, and choose the *best* answer. May the Force be with you.

Part 1: Multiple Choice (25 questions, 50 points). Read each question and the 4 possible answer choices carefully, and then select the best answer by filling in the appropriate circle on your scantron. Use a #2 or mechanical pencil only.

1. Biology is

- a. **the study of life.**
- b. the study of chemical elements.
- c. the study of organic molecules.
- d. what puts a smile on your face each morning when you roll out of bed.

2. True or False: Plants use cell respiration to provide energy for their cells to do work.

- a. **True**
- b. False

3. The building blocks (monomers) of proteins are called

- a. nucleotides
- b. monosaccharides
- c. pyruvic acids
- d. **amino acids**

4. A bacterium has which of the following in its cell?

- a. nucleus
- b. ribosomes**
- c. lysosomes
- d. candy canes

5. Imagine you observe a population of fish in a pond over the course of several weeks, and notice that every week there are fewer and fewer fish present. You suggest to a friend that the fish population has declined because the hot weather has increased the temperature of the water, decreasing the amount of oxygen in the water and killing many of the fish. Your statement is an example of

- a. a scientific theory
- b. a scientific hypothesis**
- c. an observation
- d. the scientific method

6. If the amount of oxygen in the water in the above example did in fact decrease, why might this be harmful for the fish?

- a. fish need oxygen in order for the algae on their scales to photosynthesize
- b. fish need oxygen in order to complete cell respiration, an anaerobic process
- c. fish need oxygen in order to complete cell respiration, an aerobic process**
- d. fish need oxygen in order to complete cell respiration, which takes place primarily in the cytoplasm.

7. In the above example (question #5), you take some readings of the pond water over time and realize that the pH has gone down dramatically along with the fish population. The drop in pH could affect the fish by

- a. denaturing a key enzyme through an inhibitor binding at the active site
- b. increasing the activity of ribosomes, which make lipids
- c. denaturing a key enzyme through an inhibitor binding to the enzyme and changing the shape of the active site
- d. a and c**

8. In the fermentation process that creates beer, _____ is produced in the absence of _____ through _____.

a. alcohol; oxygen; glycolysis

b. carbon dioxide; ADP; the citric acid cycle

c. alcohol; carbon dioxide; the citric acid cycle

d. ATP; pyruvic acid; the electron transport chain

9. All organic molecules contain the element

a. oxygen

b. kryptonite

c. carbon

d. nitrogen

10. True/False : All life on Earth has a common evolutionary ancestor.

a. True

b. False

c. Maybe

11. The bonds between O and H atoms in a water molecule are

a. ionic bonds

b. hydrogen bonds

c. bon-bonds

d. polar covalent bonds [NOTE: This should have said "bonds" not "ponds," so I gave everyone full credit for this question]

12. In a covalent bond, electrons are

a. taken from one atom by another to form ions

b. shared between two atoms

c. shared between two isotopes

d. dressed up like rabbits

13. You notice an insect walking on the surface of a pond. The water supporting the insect's weight is an example of which special property of water?

- a. adhesion
- b. high specific heat
- c. hangover cure
- d. surface tension**

14. The property observed in question #13 is due to which of the following?

- a. the ionic bonds within water molecules
- b. the covalent bonds between water molecules
- c. ice having lower density than water
- d. the hydrogen bonds between water molecules**

15. Science is

- a. a process in which scientists test hypotheses
- b. a collection of facts about the natural world
- c. concerned with natural phenomena
- d. all of the above**
- e. boring

16. People who are lactose-intolerant cannot digest lactose, which is a

- a. sugar
- b. disaccharide
- c. protein
- d. a and b**

17. Lactose-intolerant people lack the enzyme lactase, which is an example of a

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

18. The overall chemical equation for photosynthesis is

- a. $6 \text{O}_2 + 6 \text{H}_2\text{O} + \text{Sunlight} \longrightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6 \text{CO}_2$
- b. $6 \text{CO}_2 + 6 \text{H}_2\text{O} + \text{Sunlight} \longrightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6 \text{O}_2$**



19. What is the function of the lysosome? (student-submitted question)

a. To digest nutrients in food and to break down harmful bacteria in white blood cells

b. To digest nutrients in food and to build proteins

c. To break down harmful bacteria and to modify proteins for export from cell

d. To provide structure for the other organelles

20. A pencil sitting on top of a desk has _____ energy. When it is falling off the desk, it has _____ energy.

a. chemical; kinetic

b. kinetic; potential

c. potential; kinetic

d. potential; chemical

21. Leaves appear green because they

a. are envious of flower petals

b. have carotenoids in their vacuoles

c. have chlorophyll in their chloroplasts, which absorbs light in the green part of the electromagnetic spectrum

d. have chlorophyll in their chloroplasts, which reflects light in the green part of the electromagnetic spectrum

22. In a redox reaction, the substance that gains electrons is _____ while the substance that loses electrons is _____.

a. reduced; oxidized

b. ionized; oxidized

c. oxidized; reduced

d. oxidized; ionized

23. The organelle that contains most of the DNA of an organism is called the

a. centriole

b. nucleus

c. mitochondria

d. Golgi apparatus

24. The rough ER is called rough because it

a. is crudely formed, unlike the smooth ER

b. roughly does the job of the ribosomes

c. has lysosomes attached, giving it a “rough” surface

d. has ribosomes attached, giving it a “rough” surface

25. If the acidity of a solution increases, the pH goes

a. up

b. down

c. sideways

Part 2: Circle One (10 questions, 20 points): Read each statement carefully and select the word or phrase in parentheses that best completes the statement by circling it.

1. The anabolic steroids that athletes sometimes take to enhance their performance are a type of (**lipid**/carbohydrate).

2. Human beings are members of the domain (Archaea/**Eukarya**).

3. With 8 electrons in its outer shell, the element neon is chemically (reactive/**unreactive**).

4. If the atomic number of carbon is 6, its mass number is about (6/**12**).

5. In the (Calvin cycle/**light reactions**) of photosynthesis, water is split into oxygen and hydrogen atoms.

6. In our lecture on cell respiration, we ate (**Hershey’s kisses**/Crunch bars) to explore the process of cell respiration.

7. (Fructose/**glucose**) is the main fuel in cell respiration.

8. An enzyme that lowers the activation energy of a chemical reaction is also known as a (reactant/**catalyst**).
9. The laws of thermodynamics state that energy is (created/destroyed/**neither**) in chemical reactions.
10. ATP, the molecule from which we obtain most of our energy to do cellular work, is composed of adenosine bonded to (glycerol/**phosphate groups**).

Part 3: Fill-in-the-Blanks (10 questions, 20 points): Read the following statements carefully and fill-in the blanks with the appropriate word or phrase.

1. Bacteria, single-celled organisms, are comprised of ___**prokaryotic**_____ cells, which are tiny and lack a nucleus and membrane-bound organelles.
2. The plasma membrane's ___**phospholipid bilayer**_____ is comprised of a mix of proteins and phospholipids, which regulates the transport of molecules into and out of cells.
3. ___**Nucleotides**_____ are the monomers of nucleic acids, and include the nitrogenous bases adenine, guanine, thymine, and cytosine.
4. In the double strand of DNA, ___**adenine**_____ always pairs with thymine, and ___**guanine**_____ with cytosine.
5. Much of the funding for scientific research comes from the ___**the federal government**_____, including such agencies as the National Science Foundation and National Institutes of Health.
6. When following the scientific method, a ___**hypothesis**_____ is tentative answer to a scientific question, based on observations and past research.
7. In class, Dr. B ate a ___**donut**_____ to illustrate the idea that many simple, everyday foods contain a variety of important organic molecules.
8. The ___**primary**_____ structure of a protein is the amino acid sequence.

9. Mutations in the DNA sequence of a gene could lead to changes in the amino acid sequence, which could change the ___**protein**_____ that is ultimately produced.

10. The citric acid cycle and electron transport chain take place in the ___**mitochondria**_____ of cells.

Part 4: Short-Answer Questions (2 questions, 10 points): Please read the questions carefully and then write a short response in the space provided.

1. Federally funded stem cell research is a controversial issue in today's society. Provide one argument in favor of federally funded research and one argument against; in each case, who might be some of the groups of people who would make that argument? (5 points)

Possible reasons in favor: Stem cell research could help us find cures or treatment for many debilitating diseases and conditions, such as Parkinson's, paralysis, and heart disease. People who might make this argument: People with debilitating diseases and their families, doctors, researchers.

Possible reasons against: Ethically, stem cell research, in particular embryonic stem cell research, is wrong because it involves tampering with and ultimately destroying human life. Also, the federal government has no business using public tax dollars to fund research on something that is so ethically controversial. Finally, research is expensive, and we should put that money towards other things in our federal budget. People who might make this argument: Christian fundamentalists and right-to-lifers, libertarians.

2. Suppose you wanted to answer the question: “where in a plant cell does photosynthesis take place?” You may already know the answer, but you want to demonstrate to a friend who has no idea how science works how we arrived at the answer to this question. In your lab, you decide to test two different organelles for photosynthetic activity: the mitochondrion and the chloroplast. Based on what you already know, what would your hypothesis be? You’re given a fancy set of scientific instruments to measure the presence and concentration of different molecules inside the organelles. What molecules would you expect to find entering the organelle if photosynthesis was taking place (hint: what are the reactants in photosynthesis?) What molecules would you expect to find being produced in the organelle if photosynthesis is taking place? (5 points)

Your hypothesis, based on what you have learned in the class so far, should have been that photosynthesis takes place in the chloroplast. In your experiment, you would expect to find CO₂ and water entering the organelle where photosynthesis takes place, and glucose and oxygen being produced.

Part 5: Extra Credit (3 questions, 6 possible points)

1. What types of organisms did Dr. B study in his PhD? What domain of life do they belong to?

Insects; Eukarya

2. What team is currently winning the color war?

Yellow

3. Name one reason why a rock is not considered alive.

Any of the 7 reasons given in lecture for what characterizes life, except the one about order, since rocks do have complex but organized structure.