

# BIOLOGY 11 REVIEW FOR EXAM 1

Along with all your Blue Book Questions (BBQ's), Reading Assignments and Lab Activities, you should also be able to answer all of the following questions for the next exam. This review sheet is provided to help you learn how to organize your studying for the class, **it is not meant to be an exhaustive list of all possible questions** on the test. I highly recommend using the activities and practice quizzes in your textbook as well as the videos and other resources on my webpage: <http://zanniedallarasciencepage.weebly.com/>

**Topics:** Characteristics of Life, Scientific Method, Chemistry, Water, & Biological Molecules

**Chapters:** 1&2

**Lectures:** 1-4

**Blue Book:** Address 3 misconceptions, and BBQ's 1-7 (Below) & Activity #1-2

## Lecture #1&2 & Lab 1: Introduction: Scientific Method

**STUDENT LEARNING OUTCOMES: (1) THE SCIENTIFIC METHOD:** THE STUDENTS WILL BE ABLE TO RESEARCH A TOPIC, DESIGN EXPERIMENTS, SYNTHESIZE AND EVALUATE THE INFORMATION, JUSTIFY AND EXPRESS THEIR OPINIONS.

### Big Idea:

- 1) What are the benefits of the scientific method?
- 2) What word do scientists use instead of "prove"?
- 3) Scientists use the word theory and hypothesis different than the average person and what misconceptions does this generate?
- 4) What are the steps of the scientific method? How do you do each step?
- 5) You should be able to generate multiple hypotheses, experiments, and predictions for given observations. Remember experiments, or tests, should discriminate between hypotheses.
- 6) Why can't we prove a hypothesis?
- 7) What is the difference between the scientific use and the common use of the word theory?
- 8) What is the difference between a scientific hypothesis, a scientific theory and a scientific law?
- 9) What is a control and why is it useful?
- 10) Explain the difference between discovery science and hypothesis driven science.

## Lecture #2: Introduction: What is Life

**STUDENT LEARNING OUTCOME: (2) CELL THEORY:** THE STUDENTS WILL BE ABLE TO IDENTIFY VARIOUS CELLS AND THEIR STRUCTURAL COMPONENTS AND DIFFERENTIATE THE FUNCTIONS OF EACH OF THEIR COMPONENTS. **(5) DIVERSITY OF ORGANISMS:** The students will be able to compare and contrast characteristics of various organisms particularly related to energy sources (feeding style), cellular composition, reproduction and relationship to the ecosystem.

### Big Idea:

1. What is biology?
2. How can you tell that something is alive?
3. What are the 8 characteristics of life?
  - o Which 2 are species level, and what does that mean?
4. Understand the relative size of atoms → molecules → organelle → cells
5. What is the difference between Abiotic and Biotic?

## Lecture #3: Basic Chemistry

**STUDENT LEARNING OUTCOMES: (3) DNA AND HEREDITY:** THE STUDENTS WILL BE ABLE TO 1) UNDERSTAND THE SIGNIFICANCE OF DNA AS THE BASIS FOR HEREDITY, STRUCTURE, FUNCTION AND DISEASE IN LIVING ORGANISMS: 2) DESCRIBE THE DNA MOLECULE AND EXPLAIN HOW IT IS USED IN LIVING SYSTEMS TO CREATE PROTEINS: AND 3) DESCRIBE HOW PROTEINS FUNCTION IN LIVING CELLS.

### Big Idea:

1. Knowing the basic structures of atoms will be a reference point that we add to in each subsequent topic.
2. What makes Carbon special and why is it the basic atom of life?
3. Why are bonds so important and what do they have to do with energy?
4. How does the structure of water contribute to its 4 unusual properties?

5. What is matter? What is an element? What are the four most common elements in biological molecules?
6. Describe the basic structure of an atom in terms of protons, neutrons, and electrons. (drawing a picture is helpful). What charges are associated with each subatomic particle?
7. What does the atomic number represent?
8. How many electrons fit in the first shell of an atom? The second? The third? Why is this significant? (valance shells)
9. The mass number of an element tells you how many \_\_\_\_\_ an atom of that element has. What is an isotope?
10. How are molecules different from atoms?
11. Explain how covalent, ionic, and hydrogen bonds form. If given the atomic number of an element, be able to tell me how many protons and electrons it has and how many covalent bonds it is likely to make.
12. Compare and contrast polar and non-polar covalent bonds. What type of molecules are formed by polar covalent bonds?
13. How are hydrogen bonds different from covalent bonds?
14. **Water Chemistry:** What are the unique characteristics of water and how are they related to hydrogen bonds and its overall structure? Be Able to draw the molecular structure of water.

#### **Lecture #4: Macromolecules**

**STUDENT LEARNING OUTCOMES: (3) DNA AND HEREDITY: THE STUDENTS WILL BE ABLE TO 1) UNDERSTAND THE SIGNIFICANCE OF DNA AS THE BASIS FOR HEREDITY, STRUCTURE, FUNCTION AND DISEASE IN LIVING ORGANISMS: 2) DESCRIBE THE DNA MOLECULE AND EXPLAIN HOW IT IS USED IN LIVING SYSTEMS TO CREATE PROTEINS: AND 3) DESCRIBE HOW PROTEINS FUNCTION IN LIVING CELLS.**

#### **Big Idea:**

1. What role does the structure of DNA play in its function?
2. Proteins make up every cell and cells make up every organism, what factors control the function of a protein?
3. How is a small monomer built into a large and complex polymer and how is it broken down? What process does digestion do?
4. When you eat a bite of chicken or beans, something with protein and build muscle into your own body how does that process take place?
5. Describe how macromolecules (polymers) are taken apart and put together. What are these processes called?
6. List the monomers for the 4 large biological molecules.
7. Which large biological molecules contain only carbon, oxygen, and hydrogen? Which large biological molecules require nitrogen in addition to C, O, H?
8. Name 3 polysaccharides made with glucose. What are the differences between them? What is each one used for? Which can we digest? Why can we digest these, but not all of them?
9. What is the difference in molecular structure between saturated and unsaturated fats? Which are solid at room temperature? Which are associated with heart disease?
10. What makes a trans fat?
11. What type of lipid is used to make plasma membranes? Why do these lipids form a bilayer in water?
12. How many different amino acids are used to make proteins? What is the same and what is different in each amino acid?
13. What causes a polypeptide to fold up to form its final shape?
14. Why does the shape of a protein affect its function?
15. Name at least three different functions of proteins.
16. Why is the structure of a protein so important?
17. What is an R group in an amino acid?
18. What does heat do to that structure?
19. Give 2 examples of a nucleic acid.

**Lecture #5: Cell Types and Structures**

Student Learning Outcomes: 2) **CELL THEORY:** THE STUDENTS WILL BE ABLE TO IDENTIFY VARIOUS CELLS AND THEIR STRUCTURAL COMPONENTS AND DIFFERENTIATE THE FUNCTIONS OF EACH OF THEIR COMPONENTS.

5) **DIVERSITY OF ORGANISMS:** THE STUDENTS WILL BE ABLE TO COMPARE AND CONTRAST CHARACTERISTICS OF VARIOUS ORGANISMS PARTICULARLY RELATED TO ENERGY SOURCES (FEEDING STYLE), CELLULAR COMPOSITION, REPRODUCTION AND RELATIONSHIP TO THE ECOSYSTEM.

**Big Idea:**

1. Why are cells called the basic unit of life?
  2. How did life evolve from cells?
  3. How are bacteria different from the cells in your own body?
  4. Are all bacteria bad?
5. Compare and contrast prokaryotic and eukaryotic cells. Which evolved first? How long ago did they evolve?
  6. List the functions of all organelles and structures in eukaryotic cells.
    - Be able to identify these structures in a picture or by description. (It may be helpful to use the town analogy for this)
  7. Compare and contrast plant and animal cells.
    - There are three structures found in plant cells, but not animals, why do plants need these structures but animals do not?
  8. Describe the structure and function of cell membranes.
  9. Why does the plasma membrane make a good barrier for a cell?