Life Science EOC Blueprint
Number of Questions per Item in Bold

Unit 1 Introduction to Life Science

Understand:

1. Scientists have a logical method to solve problems.
2. Scientists use observations and data to make interferences and predictions.
3. There are major differences between a hypothesis, theory, and a law.
4. Universally accepted units of measurement in science are based on the metric system.
5. Living things must meet certain requirements to be considered living things.
6. Proper use of lab equipment and following proper safety procedures in the laboratory ensure safety and accuracy
7. Knowledge of major parts and use of the microscope and other laboratory equipment ensures proper use in the laboratory.

8. Scientists use models to explain or demonstrate a concept.

Know:

1. The six major steps of the scientific method/inquiry **(1)**
   - State the Problem or Question
   - Form a Testable Hypothesis
   - Design an Experiment
   - Collect and Analyze the Data
   - Draw Conclusions
   - Communicate Results
2. A scientific hypothesis is prediction that can be tested **(1)**
3. The scientific method/inquiry is a logical way to solve problems and the basis of scientific research/discovery. **(1)**
4. The metric/SI units of length are based on the meter, units of mass are based on the gram, and units of volume are based on the liter. **(2)**
5. The six characteristics of living organisms **(1)**
   - Cellular Organization
   - Growth and Development
   - Response to Surroundings
   - Reproduction
   - Energy Use
   - Chemicals of Life
6. Parts of the Microscope **(1)**
   - Stage
   - Eye Piece

- Arm
- Base
- Light Source
- Objective lens
- Course and Fine Adjustments

7. Safe practices in the laboratory reduce injuries and should always be followed.

Be Able To:

1. Identify and use the steps of the scientific method/inquiry in order.

2. Understand the importance of the scientific method/inquiry.

3. Generate and interpret data from charts and graphs. **(4)**

4. Differentiate between a hypothesis, theory, and law. **(1)**

5. Identify the metric/SI units for length, mass, and volume in the lab/classroom and the tools used to measure them. **(1)**

6. Describe why a living thing is considered living using the six characteristics of living organisms. **(1)**

7. Identify the parts of the microscope and their function. **(1)**

8. Be able to use a microscope properly including finding the total magnification, focusing a specimen, and preparing slides. **(2)**

9. Follow safe laboratory practices.

Unit 2 Cells

Understand:

1. Discoveries throughout history have led to the formation of the cell theory.
2. Cells grow and divide to make more cells through the process of the cell cycle which includes interphase, mitosis, and cytokinesis.
3. Cells perform a variety of processes, including osmosis, diffusion, respiration, and photosynthesis, to sustain life.
4. Physical characteristics differentiate plant and animal cells.
5. Cells have many organelles that carry out specific functions in a cell.
6. Most cell functions involve chemical reactions. **(6)**

Know:

1. The three major components of the cell theory (All living things are composed of cells, Cells are the basic unit of structure/function in living things, Cells come from pre-existing cells). **(1)**
2. One of the inventions that led to the discovery of the cell is the microscope. **(1)**
3. Some of the major scientists whose work led to the discovery of the cell theory. (Schwann, Hooke, Virchow, Schleiden) **(1)**
4. The major characteristics of plant and animal cells. (Similarities and Differences)
5. The process of the cell cycle (names of phases and activities: interphase, mitosis, and cytokinesis). **(1)**
6. The process of mitosis (phases and activities: prophase, metaphase, anaphase, telephase) **(1)**
7. The names and functions of major cell organelles. (Nucleus, Cell Membrane, Cell Wall, Cytoplasm, Mitochondrion, ER, Vacuoles, Lysosomes, Ribosome, Chloroplasts and Golgi Bodies)
8. The two major types of cellular transport and how they are used to maintain homeostasis. (Passive-Osmosis and Diffusion, Active) **(5)**
9. Processes of photosynthesis and respiration and how they relate to one another. **(3)**

Be Able To:

1. Identify the three components of the cell theory.
2. Identify the microscope as one of the inventions that led to the discovery of the cell.

3. Recognize the major scientists whose work on cells led to the discovery of the cell theory.
4. Draw and label the major organelles of a plant and animal cell.
5. Visually identify interphase and mitosis stages.
6. Recognize the major organelles within a plant and animal cell. **(2)**
7. Recognize the difference between passive and active transport and how they are used to maintain homeostasis.
8. Identify the raw materials and products of photosynthesis and respiration. **(1)**

Unit 3 Genetics

Understand:

1. Meiosis is the process of producing sex cells with half the number of chromosomes.
2. There is a relationship between genes, chromosomes, and DNA.
3. DNA is responsible for the transfer of traits from parents to offspring.
4. Genetic material is responsible for trait similarities and differences between all organisms.
5. Through gathering, synthesizing, and interpreting data probabilities of genetic outcome can be predicted.
6. Changes in genetic structure can have both positive and negative effects.
7. Discoveries in genetics are related to advances in technology.

Know:

1. Meiosis reduces the number of chromosomes by half. **(1)**
2. The basic structure of the DNA model. (Bases, double helix)
3. The relationship between DNA, chromosomes, and genes. **(1)**
4. How to predict probabilities using Punnett squares. **(2)**
5. That genetic information is inherited and passed down from parents to their offspring. **(2)**
6. That probability is the likelihood of something occurring and is used to predict genetic outcome. **(1)**
7. That the characteristics of living organisms are due to their genetic code. **(1)**
8. That there are positive and negative effects created by changes in genetic code (Genetic Engineering, Mutations, etc.) **(1)**
9. Alleles are different forms of a gene. **(1)**
10. The difference between genotype and phenotype. **(2)**

Be Able To:

1. Explain that meiosis reduces the number of chromosomes by half.
2. Correctly pair DNA bases.
3. Explain the relationships of DNA, chromosomes and genes.
4. Calculate probability outcomes using Punnett squares. **(2)**
5. Explain that the genes determine an offspring's genetic code that it receives from its parents. **(1)**

Unit 4 Human Body

Understand:

1. Complex living organisms are made up of organ systems which are essential for life.
2. The function of complex living organisms is dependent on interaction of organ systems.
3. Malfunctions of one organ may alter the functions of an organ system or systems.
4. The body maintains a constant internal environment called homeostasis in order to ensure survival.
5. There is a system of organization in complex organisms from individual cells to multi-cellular organisms.
6. An organism's cells have a specific design which enables them to carry out specific functions in an organism.

Know:

1. The organ systems and their function. **(4)**
2. The organs within each organ system and their functions. **(2)**
3. How organ systems interact to maintain homeostasis. **(2)**
4. That breathing and respiration are separate processes. **(1)**
5. That there are two major types of digestion (chemical and mechanical)
6. The major functions that blood plays in the body. **(2)**
7. The primary components of blood (RBC, WBC, Platelets, Plasma). **(2)**
8. The 3 primary blood vessels (veins, arteries, and capillaries). **(1)**
9. The 4 chambers of the heart. (2 atria, 2 ventricles) **(1)**
10. The major components of a bone and their roles (Marrow, Spongy/Compact Bone, Periosteum). **(1)**
11. The 3 types of muscle tissue and their locations in the body (Smooth-internal organs, vessels, Skeletal- skeletal muscles, Cardiac- heart). **(2)**
12. The 3 major parts of the neuron and their function (Axon, Dendrites, Cell Body) **(2)**
13. The 3 major sections of the brain and the role that each plays (Cerebrum, Cerebellum, Brainstem) **(2)**
14. How differences in cell structures alters function. (Muscle cells contain more mitochondria, Adult Human Red Blood Cells contain no nucleus, Plant cells have one larger vacuole) **(1)**
15. The five levels of organization from cell to organism. (Cell, Tissue, Organ, Organ System, Organism) **(1)**

Be Able To:

1. Identify the organ systems and their major functions.
2. Recognize the primary organs within each organ system and their primary functions.
3. Provide examples of how organ systems are important to one another. **(2)**
4. Demonstrate an understanding that breathing and respiration are separate processes.
5. Compare and Contrast the two major types of digestion. **(1)**
6. Explain bloods primary roles within the body.
7. Match the functions with the proper components of blood.
8. Compare and Contrast the three types of blood vessels and their roles.
9. Label the 4 chambers of the heart.
10. Label the main components of a bone and describe the function that each serves.
11. Explain the differences between the 3 types of muscle tissue and provide examples of their locations.
12. Draw, label, and describe the neuron and its major structures.
13. Differentiate between the 3 major sections of the brain and the roles that they play.
14. Make connections between the structures of a cell with the job that it performs in an organism.
15. Diagram the levels of organization from cell to organism.

Unit 5 Plants / Ecosystems

Understand:

1. Complex plants are made up of organ systems all of which are required to sustain life.
2. The function of complex plants is dependent on the interaction of organ systems and proper function of the organs in those systems.
3. Plants are producers gathering energy from the sun to begin the energy cycle consisting of producers, consumers and decomposers.
4. There are factors that limit the abundance of organisms.
5. Atoms and molecules cycle between living and non-living factors in an ecosystem.
6. In an effort to conserve natural resources, it is necessary to identify alternative sources of energy.

Know:

1. Types of vascular seed plants (Gymnosperms, Angiosperms)
2. The plant organ systems and their functions (roots, stem, leaves, flowers). **(3)**
3. Some similarities between systems in animals and plants. **(2)**
4. Plants maintain balance in the carbon / oxygen cycle through photosynthesis.
5. Factors that limit abundance of and distribution of organisms (limiting factors, carrying capacity). **(2)**
6. Producers, consumers (herbivore, carnivore, omnivore), decomposers. **(3)**
7. How energy is transferred within an ecosystem (food web and energy pyramid). **(3)**
8. Alternative sources of energy. **(1)**

Be Able To:

1. Identify the types of vascular plants and the important roles they play. **(2)**
2. Recognize the major plant organ systems and their function.
3. Draw similarities between the organ systems in plants and animals. **(2)**
4. Describe the process of photosynthesis as it relates to the carbon / oxygen cycle.
5. Create a food web tracing energy flow through an ecosystem.