SEVENTH GRADE
LIFE SCIENCE

Performance Indicators
Essential Questions
Suggested Activities
Suggested Resources

December 2003

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The seventh grade science curriculum for Knox County is outlined in this document. Teachers are expected to include all performance indicators designated as essential (E), but may cover other skills that are important (I) or compacted (C) as time permits.

The science skills described in Unit I, although not state tested, are important for all science students and should be integrated throughout the school year.

Prioritizing Performance Objectives

<u>Essential Skills</u> (E)—skills that should take a minimum of seventy percent (70%) of your course time. Essential skills are considered to be vital to the academic course, and all students enrolled in the course should be exposed to them. These skills are the core of the curriculum for that grade level/course.

<u>Important Skills</u> (I)—areas of the curriculum that might be considered to be enrichment or work beyond the basics. A teacher may also see a need to do more in-depth work in an area where student shave shown a particular interest or motivation to learn more about the topic. Important skills may be foundational to establishing the next new learning. These skills should take no more than twenty percent (20%) of the course time.

<u>Compact Skills</u> (C)—should take no more than ten percent (10%) of the course time. They may be review, continuation, or prior knowledge.

SEVENTH GRADE LIFE SCIENCE

UNIT I
SCIENTIFIC PROCESSES
(10%)
Integrate throughout the year

Performance Indicators

1. Scientific Method:

   (E) (2.1) a. The student will be able to recognize and apply the sequential order of the scientific method.

   (E) (2.1) b. The student will be able to identify the hypothesis, variable, and control in an experiment.

   (E) (2.1) c. The student will be able to read, interpret, and create scientific charts and graphs.

2. Lab Safety:

   (E) (2.1) a. The student will be able to demonstrate safe laboratory procedures.

3. Tools of Science:

   (E) (2.1) a. The student will be able to identify parts of a microscope and demonstrate appropriate usage.

   (E) (2.1) b. The student will be able to prepare a wet-mount slide.

   (E) (2.1) c. The student will be able to use graduated cylinders, balances, rulers, thermometers, and beakers for measurement.

   (E) (2.1) d. The student will be able to demonstrate an understanding of and use metric units in all science applications.

Essential Questions

1. Why does scientific investigation involve a sequential procedure?
2. What is the importance of having both an experimental and control group in scientific investigations?
3. What is the advantage of representing scientific data in chart, graph, or table form?
4. How does lab safety affect experimental outcome?
5. Why is it important to follow proper procedures when using a microscope?
6. How would a fly wing be prepared for microscopic viewing?
7. How do tools like balances, beakers, and rulers improve scientific observation?
8. Why is metric measurement used in science?

SEVENTH GRADE LIFE SCIENCE

UNIT II
CHARACTERISTICS OF LIFE
(5%)

Performance Indicators

Characteristics of Life:

(E) (1.2) a. The student will be able to distinguish between living (biotic) and nonliving (abiotic) material.

(I) (1.2) b. The student will be able to compare and contrast a virus to a living cell/organism.

(C) (1.2) c. The student will be able to identify scientific evidence, other than fossils, that support proof of an organism's existence and/or change over time.

Essential Questions

1. What are some similarities and differences between a candle flame or motor and a living thing?

2. Should viruses be classified as living?

3. How do we know how living things have changed?

SEVENTH GRADE LIFE SCIENCE

UNIT III
CELLS
(35%)

Performance Indicators

1. Cell History:

   (I) (5.1) a. The student will be able to identify milestones in the history of the microscope and its role in the study of cells.

   (I) (5.4) b. The student will be able to identify scientists and their contributions to the components of the cell theory.

2. Cell Structure and Function:

   (E) (1.2) a. The student will be able to identify major cell organelles and the function of each.

   (E) (1.2) b. The student will be able to distinguish between plant and animal cells.

   (E) (1.2) c. The student will be able to explain the relationships among cells, tissues, organs, systems, and organisms.

3. Cell Transport:

   (E) (1.2) a. The student will be able to predict the movement of substances across a cell membrane by diffusion, osmosis, and active and passive transport.

4. Cell Reproduction:

   (E) (1.2) a. The student will be able to sequence a series of diagrams depicting the movement of chromosomes during mitosis and meiosis.

   (I) (1.2) b. The student will be able to compare and contrast the relationship of mitosis and meiosis to health, growth, and reproduction.

(I) (1.2) c. The student will be able to explain the significance of the difference in chromosome number of new cells that are formed through mitosis and meiosis.

(E) (1.2) d. The student will be able to compare and contrast the cell cycle in plant and animal cells.

Essential Questions

1. How has microscopy affected our understanding of the natural world?
2. How did the work of Robert Hooke, Matthias Schleiden, Theodor Schwann, and Rudolph Virchow contribute to our understanding of cells?
3. Do all cells need to have the same basic structures to function?
4. What are the similarities and differences in plant and animal cells?
5. How does the presence of cells, tissues, organs, and/or systems relate to the complexity of organisms?
6. How do concentration and particle size affect the movement of some materials into and out of a cell?
7. How does the movement of chromosomes relate to the goal of cell division?
8. How do mitosis and meiosis affect an organism's health, growth, and reproduction?
9. Why must chromosome number be reduced during meiosis and maintained in mitosis?
10. What are similarities and differences in plant and animal cell cycles?

SEVENTH GRADE LIFE SCIENCE

UNIT IV
PHOTOSYNTHESIS & RESPIRATION
(5%)

Performance Indicators

Energy for Life:

(E) (1.2) a. Given an equation, the student will be able to identify the reactants and products of photosynthesis and respiration.

(E) (1.2) b. The student will be able to identify the cell organelles in which photosynthesis and respiration occur.

(E) (1.2) c. The student will be able to interpret a diagram of the oxygen- carbon dioxide cycle.

Essential Questions

1. How does the relationship between photosynthesis and respiration sustain life on this planet?

2. What is the relationship between plants and animals in the oxygen-carbon dioxide cycle?

3. How does a cell's function relate to the number of mitochondria present?

SEVENTH GRADE LIFE SCIENCE

UNIT V
HEREDITY & REPRODUCTION
(15%)

Performance Indicators

1. Methods of Reproduction:

   (E) (1.2) a. The student will be able to distinguish between sexual and asexual methods of reproduction.

2. Genetics & Heredity:

   (E) (1.2) a. The student will be able to identify dominant and recessive traits.

   (E) (1.5) b. The student will be able to identify the structure and components of a DNA molecule.

   (C) (1.2) c. The student will be able to distinguish between homozygous and heterozygous genotypes.

   (E) (1.2) d. The student will be able to determine the genotype and phenotype of a monohybrid cross using a Punnett Square.

   (C) (1.2) e. The student will be able to demonstrate genetic probability using a Punnett Square.

   (E) (1.2) f. Given a diagram illustrating a series of nitrogen bases in DNA, the student will be able to determine the matching pair for each base and changes that result in mutations.

3. Biotechnology:

   (I) (5.3) a. The student will be able to evaluate the impact of genetic engineering on society.

Essential Questions

1. In nature, what are the adaptive advantages of sexual and asexual reproduction?

2. How does genotype affect phenotype?

3. What is the structure of a DNA molecule and how have the contributions of notable scientists led to our understanding of DNA?

4. How might an individual who has a dominant human trait determine if he/she is homozygous dominant or heterozygous?

5. In the selective breeding of guinea pigs for coat color or texture, why is it important to understand possible genotypes and phenotypes?

6. How does the Punnett Square predict genetic probability?

7. What are some causes for and effects of changes in nitrogen bases in DNA?

8. What scientific, ethical, and legal issues must society consider with advances in genetic engineering and biotechnology (recombinant DNA, selective breeding, hybridization, cell and tissue culturing, transgenic organisms, and DNA fingerprinting)?

SEVENTH GRADE LIFE SCIENCE

UNIT VI
ADAPTATION, CLASSIFICATION, & DIVERSITY
(30%)

Performance Indicators

1. Adaptation:

   (C) (1.2) a. The student will be able to identify ways organisms are adapted for living in certain environments.

   (C) (1.2) b. The student will be able to describe how natural, random genetic variation affects a population over time.

2. Classification:

   (I) (3.1) a. The student will be able to explain why a classification system is needed.

   (C) (5.4) b. The student will be able to outline the history of how the present classification system developed.

   (I) (1.2) c. The student will be able to correctly sequence the seven major classification levels in Linnaean classification.

   (E) (1.2) d. The student will be able to identify the kingdoms of life and the major characteristics of each.

   (E) (1.2) e. The student will be able to use binomial nomenclature to identify different species.

   (E) (1.2) f. The student will be able to determine the relatedness of different organisms using the Linnaean system of classification.

   (E) (1.1) g. The student will be able to develop and use a dichotomous key for classification.

3. Diversity:

   (I) (4.1) a. The student will be able to compare and contrast the basic structure and life functions of bacteria and their ecological roles.

(I) (1.2) b. The student will be able to identify the characteristics, life processes, and environmental roles of protists and fungi.

(I) (1.2) c. The student will be able to compare and contrast the structural components and life cycles of various types of plants (mosses, ferns, gymnosperms, and angiosperms).

(I) (1.2) d. Given a diagram or picture, the student will be able to infer the body symmetry of an animal.

(E) (1.2) e. The student will be able to compare and contrast basic structural components and life cycles of different types of animals.

Essential Questions

1. What is the relationship of structure to function?
2. How might the loss of biodiversity and population reduction of organisms affect life on Earth?
3. How are classification systems beneficial (like a bookstore or supermarket)?
4. How does Linnaean classification compare to earlier classification systems?
5. What is the relationship between the levels of Linnaean classification and the characteristics of organisms assigned to each level?
6. How have characteristics been used to assign organisms into kingdoms?
7. Why does binomial nomenclature improve scientific communication?
8. What characteristics are used to determine the relatedness of organisms?
9. Are dichotomous keys effective problem solving tools?
10. How can bacteria be both helpful and harmful?
11. How do protists and fungi impact our environment?
12. How do structure and reproduction in seedless and seed-bearing plants compare?

13. In what ways might bilateral symmetry be more adaptive evolutionarily than radial symmetry or asymmetry?

14. How do structural adaptations contribute to the increasing complexity of animals?