



MISSISSIPPI  
DEPARTMENT OF  
EDUCATION

Ensuring a bright *future* for every child

***Alternate  
Science  
Elements II***  
(Secondary course  
to be added to  
***MS AAAS for Science,***  
approved 2018)

***Effective Date: 2019-2020 School Year***

## Introduction

The Mississippi Department of Education (MDE) is dedicated to student success, which includes improving student achievement and establishing communication skills within a technological environment. The *Mississippi Alternate Academic Achievement Standards (MS AAAS) for Science* provides a consistent, clear understanding of what students are expected to know and be able to do by the end of each course. The purpose of the *MS AAAS for Science* is to build a bridge from the content in general education to academic expectations for students with the most significant cognitive disabilities. The standards are designed to be rigorous and relevant to the real world, reflecting the knowledge and skills that students need for success in postsecondary settings.

*Alternate Science Elements II* is a secondary course that was created after the MS AAAS for K-8 Science and Biology were developed. This course will be added to the *MS AAAS for Science*.

In special education, prompting is often used to mean a system of structured cues to elicit desired behaviors that otherwise would not occur. In order to clearly communicate that teacher assistance is permitted during instruction of the MS AAAS and is not limited to structured prompting procedures. Guidance and support during instruction should be interpreted as teacher encouragement, general assistance, and informative feedback to support the student.

## ALTERNATE SCIENCE ELEMENTS II

Alternate Science Elements II, **a one-credit course**, offered to students who are determined to have a significant cognitive disability (SCD). This course is a requirement for students who are working toward achieving an Alternate Diploma which is documented in the student's individualized education program (IEP). It is recommended that *Alternate Science Elements II* be taken after successful completion of *Alternate Biology Elements*.

Components for *Alternate Science Elements II* include the following strands: Anatomy and Physiology, Earth and Space Science, Botany, Zoology, and Physical Science. Each of these strands were selected for inclusion in this particular course. A synopsis of each strand is provided below:

Anatomy and Physiology core content emphasizes the structure and function of cells, tissues, and organs; organization of the human body; the skeletal, muscular, digestive, respiratory, cardiovascular, and reproductive systems; and the impact of diseases on certain systems. Laboratory activities, research, the use of technology, and the effective communication of results through various methods are integral components in this course.

Earth and Space Science core content provides opportunities for students to continue to develop and communicate a basic understanding of the Earth and its place in the universe. Natural hazards and other geologic events that impact the earth and human society are covered. Human impact on the Earth through resource extraction and land use is included. A major focus is becoming responsible stewards of Earth's natural resources.

Zoology core content includes morphological characteristics of each division and variation in their reproduction, physiology, taxonomy, evolution, and the interactions of human society and animals. Laboratory activities, research, the use of technology, and the effective communication of results through various methods are integral components in this course.

Physical Science core content includes the characteristics and structure of matter, Newton's Laws of Motion, thermal energy, and thermal energy transfer

The standards and performance objectives do not have to be taught in the order presented in this document. The performance objectives are intentionally broad to allow school districts and teachers the flexibility to create a curriculum that meets the needs of their students.

### Alternate Science Elements II: Anatomy and Physiology

#### HAP.1 Physiological Functions/Anatomical Structure

**Conceptual Understanding:** Anatomists have developed a universal set of reference terms that aid in the identification of body structures with a high degree of specificity. Body organization from simple to complex levels and an introduction to the organ systems forming the body lead to a higher understanding of anatomical structures in the human body.

**HAP.1 Students will demonstrate an understanding of how anatomical structures and physiological functions are organized and described using anatomical position.**

**A.HAP.1 Students will identify how basic anatomical structures and physiological functions are organized.**

**A.HAP.1.1** *Locate main organs and their applicable body cavities.*

**A.HAP.1.2** *Identify the interdependence of the basic body systems to each other and to the body as a whole.*

## Alternate Science Elements II: Human Anatomy and Physiology

### HAP.4 Skeletal System

**Conceptual Understanding:** The skeletal system is composed of cartilage and bone. Together these supportive tissues form the framework for the body. The skeletal system encloses organs, attaches skeletal muscles, and connects bone, forming joints to aid in movement.

**HAP.4** Students will investigate the structures and functions of the skeletal system including the cause and effect of diseases and disorders.

**A.HAP.4** Students will identify the basic structures and function of the skeletal system.

**A.HAP.4.1** Identify the basic function of the skeletal system.

**A.HAP.4.2** Match major bones (skull, pelvis, humerus, ulna, radius, femur, tibia, fibula, vertebrae, phalanges and ribs) to corresponding parts of the appendicular or axial skeleton (e.g, the femur, tibia, fibula are bones of the leg).

**A.HAP.4.3** Identify activities that pose threat to bones or joints of the skeletal system.

**A.HAP.4.6** Identify common skeletal diseases and disorders (e.g., arthritis, osteoporosis, Osteogenesis imperfecta-brittle bone disease).

**A.HAP.4.7** Identify appropriate first aid immediate responses to common injuries such as a bone fracture (e.g., call 911, notify an adult, report to nearest emergency medical facility).

## Alternate Science Elements II: Human Anatomy and Physiology

### HAP.5 Muscular System

**Conceptual Understanding:** The muscular system, with the aid of three types of muscle tissue (skeletal, cardiac, and smooth), provides movement, contour and shape, joint stability, heat generation, and the transportation of materials throughout the body.

**HAP.5** Students will investigate the structures and functions of the muscular system, including the cause and effect of diseases and disorders.

**A.HAP.5** Students will identify the basic structures and function of the muscular system.

**A.HAP.5.1** Identify a muscle structure of the body.

**A.HAP.5.2** Use models to locate the major muscles (pectorals, biceps, abdominal, quadriceps, hamstring, and triceps) and investigate the movements controlled by each muscle.

**A.HAP.5.7** Identify common muscular diseases and disorders (e.g., muscle cramps or strains related to muscular dystrophy and/or cerebral palsy) that affect the muscular system.

## Alternate Science Elements II: Human Anatomy and Physiology

### HAP.8 Male and Female Reproductive Systems

**Conceptual Understanding:** The reproductive system's biological function is to generate offspring for the continuance of our species. Interactions of the egg and sperm, the biological clock, and fertility play critical roles in the production of an offspring. Proper embryonic development directly depends on the health of the reproductive system.

**HAP.8** Students will investigate the structures and functions of the male and female reproductive system, including the cause and effect of diseases and disorders.

**A.HAP.8** Students will identify the basic structures and functions of the male and female reproductive system, including the cause and effect of diseases and disorders.

**A.HAP.8.1** *Identify the basic structure and function of the male and female reproductive systems.*

**A.HAP.8.2** *Identify basic male reproductive anatomy and relate structure to sperm production.*

**A.HAP.8.3** *Identify basic female reproductive anatomy and relate structure to egg production.*

**A.HAP.8.4** *Examine the negative influences on personal decision making for responsible sexual behavior.*

**A.HAP.8.5** *Identify various contraceptive methods.*

**A.HAP.8.6** *Describe the basic changes that occur during embryonic/fetal development, birth, and the growth and development from infancy, childhood, and adolescence to adult.*

**A.HAP.8.7** *Identify the basic causes and effects of various reproductive diseases and disorders (e.g., infertility, sexually transmitted diseases, and ectopic pregnancy).*

## Alternate Science Elements II: Human Anatomy and Physiology

### HAP.9 Blood

**Conceptual Understanding:** Blood is the necessary fluid that transports oxygen and other elements throughout the body and removes waste products. Blood's unique composition allows for grouping into four major blood type groups (A, B, AB, and O). Blood types and pathological conditions are based on inherited traits.

**HAP.9** Students will analyze the structure and functions of blood and its role in maintaining homeostasis.

**A.HAP.9** Students will identify the basic functions of blood and its role in maintaining homeostasis.

**A.HAP.9.1** *Identify the basic roles of blood in the body (e.g., transports oxygen and other elements throughout the body and removes waste products) which result in homeostasis.*

**A.HAP.9.2** *Identify the four major blood type groups (i.e., A, B, AB, and O).*

**A.HAP.9.3** *Identify various inherited pathological conditions of blood in the body (e.g., anemia, leukemia, sickle cell, and hemophilia).*

## Alternate Science Elements II: Human Anatomy and Physiology

### HAP.10 Cardiovascular System

**Conceptual Understanding:** The cardiovascular system is composed of the heart and blood vessels. The heart is the mechanism that cycles the blood throughout the body via the blood vessels. Using blood as a carrier, the system transports nutrients, gases, wastes, antibodies, electrolytes, and many other substances to and from the cells of the body. The location, size, and orientation of the heart, blood vessels, veins, arteries, and capillaries are essential in maintaining cardiovascular health. Maintenance of this system is vital.

**HAP.10** Students will investigate the structures and functions of the cardiovascular system, including the cause and effect of diseases and disorders.

**A.HAP.10 Students will identify the basic organs, functions of those organs, and the circulation of blood through the cardiovascular system. Students will describe ways to maintain and monitor cardiovascular health.**

*A.HAP.10.1 Identify the organs in the cardiovascular system (e.g., heart, blood vessels, veins, arteries, and capillaries) and their location in the body.*

*A.HAP.10.2 Identify the main functions of the organs of the cardiovascular system.*

*A.HAP.10.3 Describe the direction of the flow of blood through the cardiovascular system.*

*A.HAP.10.4 Describe ways to maintain and monitor the cardiovascular system (e.g., exercise, healthy diet, check pulse and blood pressure).*

## **Alternate Science Elements II: Human Anatomy and Physiology**

### **HAP.12 Respiratory System**

**Conceptual Understanding:** The respiratory system provides the body with an abundant and continuous supply of oxygen and removes carbon dioxide from the body. The organs of this system include the nose, pharynx, larynx, trachea, bronchi and their smaller branches, and the lungs. The interaction of these organs with the cardiovascular system transports respiratory gases to the tissue cells throughout the body. Interruptions in the mechanics of this system will lead to respiratory distress.

**HAP.12 Students will investigate the structures and functions of the respiratory system, including the cause and effect of diseases and disorders.**

**A.HAP.12 Students will identify the basic organs, the functions of those organs, the flow of oxygen through the respiratory system, the basic symptoms of illness(es) of the respiratory system, and ways to maintain a healthy respiratory system.**

*A.HAP.12.1 Identify the basic organs of the respiratory system and their essential functions (e.g., nose, mouth, esophagus/windpipe, and lungs).*

*A.HAP.12.2 Identify the basic symptoms of pathological conditions of the respiratory system (e.g., asthma, bronchitis, influenza, pneumonia, and COPD).*

*A.HAP.12.3 Identify new environmental causes of respiratory distress (e.g., e-cigarettes, environmental pollutants, and changes in inhaled gas composition).*

*A.HAP.12.4 Describe ways to maintain a healthy respiratory system (e.g., no smoking, exercising, maintaining a healthy weight, avoid exposure to environmental pollutants and irritants).*

## **Alternate Science Elements II: Human Anatomy and Physiology**

### **HAP.13 Digestive System**

**Conceptual Understanding:** The digestive system processes food so that it can be absorbed and used by the body's cells. The organs of this system include mouth, esophagus, stomach, large intestines, small intestines, and colon. The organs of the system are responsible for food ingestion, digestion, absorption, and elimination of the undigested remains from the body. Disturbances in the digestive system may result in symptoms indicative of pathological conditions. Maintaining a healthy digestive system is vital.

**HAP.13 Students will investigate the structures and functions of the digestive system, including the cause and effect of diseases and disorders.**

**A.HAP.13 Students will identify the basic structures and functions of the digestive system, including basic symptoms of illness(es), common pathological conditions, and basic treatment of symptoms.**

*A.HAP.13.1 Identify primary organs of the digestive system (e.g., mouth, esophagus, stomach, large intestines, small intestines, and colon) and their basic functions.*

*A.HAP.13.2 Identify basic symptoms of illness(es) of the digestive system (e.g., upset stomach, stomach pain, nausea, diarrhea).*

*A.HAP.13.3 Identify common pathological conditions of the digestive system (e.g., stomach virus, lactose intolerance, GERD/acid reflux) and treatment responses (e.g., staying hydrated, taking over-the-counter medication, knowing when to seek medical attention).*

## **Alternate Science Elements II: Botany**

### **BOT.1 Plant Morphology, Cell Structure, and Function**

**Conceptual Understanding:** Plants are a diverse and important part of the environment, providing oxygen, and food for other organisms. The diversity of plants are characterized by unique traits that are observed to identify the various plant divisions.

**BOT.1 Students will investigate the morphology, anatomy, and physiology of plants.**

**A.BOT.1 Students will develop a basic understanding of the anatomy and growth of plants.**

*A.BOT.1.1 Identify the basic needs of native plants (to the specific region) to survive.*

*A.BOT.1.2 Identify growing seasons, sunlight requirements, and water needs of native food-bearing plants (e.g., corn, carrots, turnip greens, potatoes, tomatoes, squash, watermelons, cantaloupe, bell pepper).*

*A.BOT.1.3 Identify the basic process of seed germination for a variety of native plants. (e.g., soil, seed, sprout, flower, fruit).*

*A.BOT.1.4 Identify the needs of native plants at various stages of development (e.g., pole beans require a stake or trellis to grow on, tomatoes require shoots that grow out of the joint where a branch on the plant meets a stem to be removed).*

*A.BOT.1.5 Identify poisonous (harmful) plants. (e.g., poison ivy, holly berries, poison oak, sumac)*

*A.BOT.1.6 Identify various methods, including technology, of harvesting native plants (e.g., fruits, vegetables, grains, or hay)*

## **Alternate Science Elements II: Earth and Space Science**

### **ESS.4 Earth's Resources and Human Activity**

**Conceptual Understanding:** Natural hazards and other geologic events impact earth and human society. In addition, humans also impact the Earth through resource extraction and land use.

**ESS.4 Students will develop an understanding of Earth's resources and the impact of human activities.**

**A.ESS.4 Students will develop a basic understanding of Earth's resources and the impact of human activities and methods to preserve the Earth.**

- A.ESS.4.1** *Identify Earth’s most basic natural resources (e.g., oil, minerals, soil, and water).*
- A.ESS.4.2** *Identify how humans impact Earth’s systems and natural resources. (e.g., deforestation, pollution, erosion)*
- A.ESS.4.3** *Identify everyday consumable products that are environmentally friendly and those products that contribute to polluting environments. (e.g., reusable grocery bags, products made from recycled material, car emissions, factory emissions, chemical run off from farms, aerosol)*
- A.ESS.4.4** *Identify models to aid in the responsible management of natural resources (e.g., recycling, composting, energy usage).*

## **Alternate Science Elements II: Zoology II**

### **ZOO.7 Phylum Chordata, Classes Chondrichthyes and Osteichthyes**

**Conceptual Understanding:** Of the members of classification chordate, fish species are most numerous. These aquatic vertebrates have gills throughout their lives and either have or are descended from ancestors with scales or armor.

- ZOO.7** **Students will understand the structure and function of phylum Chordata, classes Chondrichthyes and Osteichthyes, and how they demonstrate the characteristics of living things.**
- A.ZOO.7** **Students will understand the basic structure and function of fish and how they demonstrate the characteristics of living things.**
- A.ZOO.7.1** *Students will identify changes that fish have made over time to adapt to the different aquatic environments.*
- A.ZOO.7.2** *Identify common freshwater fish (e.g., bass, bream, catfish, white perch) and saltwater fish (e.g., shark, flounder, red snapper, red fish, Mahi Mahi) and their differences.*
- A.ZOO.7.3** *Identify interaction dangers between humans and fish.*



## Alternate Science Elements II: Zoology II

### ZOO.8 Phylum Chordata, Classes Amphibia and Reptilia

**Conceptual understanding:** The two groups of amphibians and reptiles are similar in appearance, but differ drastically in development and body structure.

**ZOO.8** Students will understand the structure and function of phylum Chordata, classes Amphibia and Reptilia, and how they demonstrate the characteristics of living things.

**A.ZOO.8** Students will understand the basic structure and function of amphibians and reptiles and how they demonstrate the characteristics of living things.

**ZOO.8.1** *Identify that amphibians live part of their lives in water and part on land.*

**ZOO.8.2** *Identify common amphibians (e.g., frogs, salamanders) and reptiles (e.g., turtles, lizards, snakes).*

**ZOO.8.3** *Identify common amphibians and reptiles as well as their dangers and benefits to humans.*

## Alternate Science Elements II: Zoology II

### ZOO.9 Phylum Chordata, Class Aves

**Conceptual understanding:** Class Aves, including birds, are heat-absorbing egg-laying vertebrates with bodies covered in feathers. Although they are descendants of dinosaurs, they have evolved a unique physiology, making most capable of flight.

**ZOO.9** Students will understand the structure and function of phylum Chordata, class Aves, and how they demonstrate the characteristics of living things.

**A.ZOO.9** Students will understand the structure and function of birds and how they demonstrate the characteristics of living things.

**A.ZOO.9.1** *Identify how birds have adapted to their changing environment.*

**A.ZOO.9.2** *Identify common birds (e.g., hummingbird, mocking bird, hawk).*

**A.ZOO.9.3** *Identify birds of prey and how they use their keen sense of sight to locate and attack prey.*

**A.ZOO.9.4** *Identify parenting behavior of different birds in order to incubate their eggs and care for hatchlings.*

**A.ZOO.9.5** *Identify basic reasons for bird migration.*

## Alternate Science Elements II: Zoology II

### ZOO.10 Phylum Chordata, Class Mammalia

**Conceptual Understanding:** Class Mammalia consists of heat-absorbing organisms with hair, a four-chambered heart, a diaphragm, and mammary glands. As inhabitants of every continent, they are successful in a great variety of ecosystems.

**ZOO.10 Students will understand the structure and function of phylum Chordata, class Mammalia, and how they demonstrate the characteristics of living things.**

**A.ZOO.10 Students will understand the structure and function of mammals and how they demonstrate the characteristics of living things.**

*A.ZOO 10.1 Identify characteristics and behaviors that distinguish mammals from other classes of living things.*

*A.ZOO 10.2 Identify how human impact has changed the environments of other organisms.*

*A.ZOO 10.3 Identify common mammals (e.g., raccoon, feral pig, fox, squirrel, deer) and the differences in caring for their offspring.*

*A.ZOO 10.4 Identify dangerous interactions and best practice responses between humans and mammals (e.g., black bears).*

## Alternate Science Elements II: Physical Science

### PHS.1 Nature of Matter

**Conceptual Understanding:** This standard develops basic ideas about the characteristics and structure of matter. Matter is anything that has mass and occupies space. Matter can exist as a solid, liquid, gas, or plasma.

**PHS.1 Students will demonstrate an understanding of the nature of matter.**

**A.PHS.1 Students will identify and investigate the states of matter.**

*A.PHS.1.1 Examine the properties of solids, liquids, and gases.*

*A.PHS.1.2 Measure mass, volume, length, and temperature.*

*A.PHS.1.3 Identify symbols that portray dangerous or hazardous materials.*

### PHS.5 Newton's Laws of Motion

**Conceptual Understanding:** The motion of objects can be described using words, diagrams, numbers, and graphs. This standard describes and explains the motion of real-world objects.

**PHS.5 Students will analyze the scientific principles of motion, force, and work.**

**A.PHS.5 Students will investigate motion, force, and work.**

*A.PHS.5.1 Investigate the motion of an object using properties such as displacement, time of motion, velocity, and acceleration.*

*A.PHS.5.2 Identify the different types of simple machines (e.g. incline plane, wedge, pulley, lever).*

*A.PHS.5.3 Demonstrate an understanding of the similarities and differences of everyday machines, and identify how they have improved and impacted society (e.g., electrical appliances, transportation vehicles).*

## **PHS.8 Thermal Energy**

**Conceptual Understanding:** Thermal energy is transferred in the form of heat. Heat is always transferred from an area of high heat to low heat. More complex concepts and terminology related to phase changes are developed, including the distinction between heat and temperature.

**PHS.8 Students will demonstrate an understanding of temperature scales, heat, and thermal energy transfer.**

**A.PHS.8 Identify characteristics of temperature scales, heat, and thermal energy transfer.**

**PHS.8.1** Identify characteristics of freezing point, melting point, boiling point, vaporization, and condensation of different substances.

**PHS.8.2** Identify temperature of freezing point and boiling point.



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### Alternate Science Elements II: Anatomy and Physiology

#### HAP.1 Physiological Functions/Anatomical Structure

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**HAP.1 Students will demonstrate an understanding of how anatomical structures and physiological functions are organized and described using anatomical position.**

**A.HAP.1 Students will identify how basic anatomical structures and physiological functions are organized.**

**A.HAP.1.1** *Locate main organs and their applicable body cavities.*

**A.HAP.1.2** *Identify the interdependence of the basic body systems to each other and to the body as a whole.*

## Alternate Science Elements II: Human Anatomy and Physiology

### HAP.4 Skeletal System

**Conceptual Understanding:** The skeletal system is composed of cartilage and bone. Together these supportive tissues form the framework for the body. The skeletal system encloses organs, attaches skeletal muscles, and connects bone, forming joints to aid in movement.

**HAP.4** Students will investigate the structures and functions of the skeletal system including the cause and effect of diseases and disorders.

**A.HAP.4** Students will identify the basic structures and function of the skeletal system.

**A.HAP.4.1** Identify the basic function of the skeletal system.

**A.HAP.4.2** Match major bones (skull, pelvis, humerus, ulna, radius, femur, tibia, fibula, vertebrae, phalanges and ribs) to corresponding parts of the appendicular or axial skeleton (e.g, the femur, tibia, fibula are bones of the leg).

**A.HAP.4.3** Identify activities that pose threat to bones or joints of the skeletal system.

**A.HAP.4.6** Identify common skeletal diseases and disorders (e.g., arthritis, osteoporosis, Osteogenesis imperfecta-brittle bone disease).

**A.HAP.4.7** Identify appropriate first aid immediate responses to common injuries such as a bone fracture (e.g., call 911, notify an adult, report to nearest emergency medical facility).

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**Conceptual Understanding:** The muscular system, with the aid of three types of muscle tissue (skeletal, cardiac, and smooth), provides movement, contour and shape, joint stability, heat generation, and the transportation of materials throughout the body.

**HAP.5** Students will investigate the structures and functions of the muscular system, including the cause and effect of diseases and disorders.

**A.HAP.5** Students will identify the basic structures and function of the muscular system.

**A.HAP.5.1** Identify a muscle structure of the body.

**A.HAP.5.2** Use models to locate the major muscles (pectorals, biceps, abdominal, quadriceps, hamstring, and triceps) and investigate the movements controlled by each muscle.

**A.HAP.5.7** Identify common muscular diseases and disorders (e.g., muscle cramps or strains related to muscular dystrophy and/or cerebral palsy) that affect the muscular system.

~~**Conceptual Understanding:** All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water, and air. Animals (including humans) use their senses to learn about the world around them.~~

~~**L.K.1B** Students will demonstrate an understanding of how animals (including humans) use their physical features and their senses to learn about their environment.~~

~~A.L.K.1B—Students will identify how animals (including humans) use their physical features and their senses to learn about their environment.~~

~~A.L.K.1B.1—Identify the five senses and the related body parts.~~

~~A.L.K.1B.2—Select body parts animals use to obtain food and move.~~

## Alternate Science Elements II: Human Anatomy and Physiology

### HAP.8 Male and Female Reproductive Systems

**Conceptual Understanding:** The reproductive system’s biological function is to generate offspring for the continuance of our species. Interactions of the egg and sperm, the biological clock, and fertility play critical roles in the production of an offspring. Proper embryonic development directly depends on the health of the reproductive system.

**HAP.8** Students will investigate the structures and functions of the male and female reproductive system, including the cause and effect of diseases and disorders.

**A.HAP.8** Students will identify the basic structures and functions of the male and female reproductive system, including the cause and effect of diseases and disorders.

*A.HAP.8.1 Identify the basic structure and function of the male and female reproductive systems.*

*A.HAP.8.2 Identify basic male reproductive anatomy and relate structure to sperm production.*

*A.HAP.8.3 Identify basic female reproductive anatomy and relate structure to egg production.*

*A.HAP.8.4 Examine the negative influences on personal decision making for responsible sexual behavior.*

*A.HAP.8.5 Identify various contraceptive methods.*

*A.HAP.8.6 Describe the basic changes that occur during embryonic/fetal development, birth, and the growth and development from infancy, childhood, and adolescence to adult.*

*A.HAP.8.7 Identify the basic causes and effects of various reproductive diseases and disorders (e.g., infertility, sexually transmitted diseases, and ectopic pregnancy).*

## Alternate Science Elements II: Human Anatomy and Physiology

### HAP.9 Blood

**Conceptual Understanding:** Blood is the necessary fluid that transports oxygen and other elements throughout the body and removes waste products. Blood’s unique composition allows for grouping into four major blood type groups (A, B, AB, and O). Blood types and pathological conditions are based on inherited traits.

**HAP.9** Students will analyze the structure and functions of blood and its role in maintaining homeostasis.

**A.HAP.9** Students will identify the basic functions of blood and its role in maintaining homeostasis.

*A.HAP.9.1 Identify the basic roles of blood in the body (e.g., transports oxygen and other elements throughout the body and removes waste products) which result in homeostasis.*

*A.HAP.9.2 Identify the four major blood type groups (i.e., A, B, AB, and O).*



**A.HAP.9.3** *Identify various inherited pathological conditions of blood in the body (e.g., anemia, leukemia, sickle cell, and hemophilia).*

## Alternate Science Elements II: Human Anatomy and Physiology

### HAP.10 Cardiovascular System

**Conceptual Understanding:** The cardiovascular system is composed of the heart and blood vessels. The heart is the mechanism that cycles the blood throughout the body via the blood vessels. Using blood as a carrier, the system transports nutrients, gases, wastes, antibodies, electrolytes, and many other substances to and from the cells of the body. The location, size, and orientation of the heart, blood vessels, veins, arteries, and capillaries are essential in maintaining cardiovascular health. Maintenance of this system is vital.

**HAP.10** **Students will investigate the structures and functions of the cardiovascular system, including the cause and effect of diseases and disorders.**

**A.HAP.10** **Students will identify the basic organs, functions of those organs, and the circulation of blood through the cardiovascular system. Students will describe ways to maintain and monitor cardiovascular health.**

**A.HAP.10.1** *Identify the organs in the cardiovascular system (e.g., heart, blood vessels, veins, arteries, and capillaries) and their location in the body.*

**A.HAP.10.2** *Identify the main functions of the organs of the cardiovascular system.*

**A.HAP.10.3** *Describe the direction of the flow of blood through the cardiovascular system.*

**A.HAP.10.4** *Describe ways to maintain and monitor the cardiovascular system (e.g., exercise, healthy diet, check pulse and blood pressure).*

## Alternate Science Elements II: Human Anatomy and Physiology

### HAP.12 Respiratory System

**Conceptual Understanding:** The respiratory system provides the body with an abundant and continuous supply of oxygen and removes carbon dioxide from the body. The organs of this system include the nose, pharynx, larynx, trachea, bronchi and their smaller branches, and the lungs. The interaction of these organs with the cardiovascular system transports respiratory gases to the tissue cells throughout the body. Interruptions in the mechanics of this system will lead to respiratory distress.

**HAP.12** **Students will investigate the structures and functions of the respiratory system, including the cause and effect of diseases and disorders.**

**A.HAP.12** **Students will identify the basic organs, the functions of those organs, the flow of oxygen through the respiratory system, the basic symptoms of illness(es) of the respiratory system, and ways to maintain a healthy respiratory system.**

**A.HAP.12.1** *Identify the basic organs of the respiratory system and their essential functions (e.g., nose, mouth, esophagus/windpipe, and lungs).*

**A.HAP.12.2** *Identify the basic symptoms of pathological conditions of the respiratory system (e.g., asthma, bronchitis, influenza, pneumonia, and COPD).*

- A.HAP.12.3** Identify new environmental causes of respiratory distress (e.g., e-cigarettes, environmental pollutants, and changes in inhaled gas composition).
- A.HAP.12.4** Describe ways to maintain a healthy respiratory system (e.g., no smoking, exercising, maintaining a healthy weight, avoid exposure to environmental pollutants and irritants).

## Alternate Science Elements II: Human Anatomy and Physiology

### HAP.13 Digestive System

**Conceptual Understanding:** The digestive system processes food so that it can be absorbed and used by the body's cells. The organs of this system include mouth, esophagus, stomach, large intestines, small intestines, and colon. The organs of the system are responsible for food ingestion, digestion, absorption, and elimination of the undigested remains from the body. Disturbances in the digestive system may result in symptoms indicative of pathological conditions. Maintaining a healthy digestive system is vital.

**HAP.13** Students will investigate the structures and functions of the digestive system, including the cause and effect of diseases and disorders.

**A.HAP.13** Students will identify the basic structures and functions of the digestive system, including basic symptoms of illness(es), common pathological conditions, and basic treatment of symptoms.

- A.HAP.13.1** Identify primary organs of the digestive system (e.g., mouth, esophagus, stomach, large intestines, small intestines, and colon) and their basic functions.
- A.HAP.13.2** Identify basic symptoms of illness(es) of the digestive system (e.g., upset stomach, stomach pain, nausea, diarrhea).
- A.HAP.13.3** Identify common pathological conditions of the digestive system (e.g., stomach virus, lactose intolerance, GERD/acid reflux) and treatment responses (e.g., staying hydrated, taking over-the-counter medication, knowing when to seek medical attention).

## Alternate Science Elements II: Botany

### BOT.1 Plant Morphology, Cell Structure, and Function

**Conceptual Understanding:** Plants are a diverse and important part of the environment, providing oxygen, and food for other organisms. The diversity of plants are characterized by unique traits that are observed to identify the various plant divisions.

**BOT.1** Students will investigate the morphology, anatomy, and physiology of plants.

**A.BOT.1** Students will develop a basic understanding of the anatomy and growth of plants.

- A.BOT.1.1** Identify the basic needs of native plants (to the specific region) to survive.
- A.BOT.1.2** Identify growing seasons, sunlight requirements, and water needs of native food-bearing plants (e.g., corn, carrots, turnip greens, potatoes, tomatoes, squash, watermelons, cantaloupe, bell pepper).
- A.BOT.1.3** Identify the basic process of seed germination for a variety of native plants. (e.g., soil, seed, sprout, flower, fruit).

- A.BOT.1.4** *Identify the needs of native plants at various stages of development (e.g., pole beans require a stake or trellis to grow on, tomatoes require shoots that grow out of the joint where a branch on the plant meets a stem to be removed).*
- A.BOT.1.5** *Identify poisonous (harmful) plants. (e.g., poison ivy, holly berries, poison oak, sumac)*
- A.BOT.1.6** *Identify various methods, including technology, of harvesting native plants (e.g., fruits, vegetables, grains, or hay)*

## **Alternate Science Elements II: Earth and Space Science**

### **ESS.4 Earth's Resources and Human Activity**

**Conceptual Understanding:** Natural hazards and other geologic events impact earth and human society. In addition, humans also impact the Earth through resource extraction and land use.

**ESS.4** **Students will develop an understanding of Earth's resources and the impact of human activities.**

**A.ESS.4** **Students will develop a basic understanding of Earth's resources and the impact of human activities and methods to preserve the Earth.**

- A.ESS.4.1** *Identify Earth's most basic natural resources (e.g., oil, minerals, soil, and water).*
- A.ESS.4.2** *Identify how humans impact Earth's systems and natural resources. (e.g., deforestation, pollution, erosion)*
- A.ESS.4.3** *Identify everyday consumable products that are environmentally friendly and those products that contribute to polluting environments. (e.g., reusable grocery bags, products made from recycled material, car emissions, factory emissions, chemical run off from farms, aerosol)*
- A.ESS.4.4** *Identify models to aid in the responsible management of natural resources (e.g., recycling, composting, energy usage).*

## **Alternate Science Elements II: Zoology II**

### **ZOO.7 Phylum Chordata, Classes Chondrichthyes and Osteichthyes**

**Conceptual Understanding:** Of the members of classification chordate, fish species are most numerous. These aquatic vertebrates have gills throughout their lives and either have or are descended from ancestors with scales or armor.

**ZOO.7** **Students will understand the structure and function of phylum Chordata, classes Chondrichthyes and Osteichthyes, and how they demonstrate the characteristics of living things.**

**A.ZOO.7** **Students will understand the basic structure and function of fish and how they demonstrate the characteristics of living things.**

- A.ZOO.7.1** *Students will identify changes that fish have made over time to adapt to the different aquatic environments.*
- A.ZOO.7.2** *Identify common freshwater fish (e.g., bass, bream, catfish, white perch) and saltwater fish (e.g., shark, flounder, red snapper, red fish, Mahi Mahi) and their differences.*
- A.ZOO.7.3** *Identify interaction dangers between humans and fish.*

## Alternate Science Elements II: Zoology II

### ZOO.8 Phylum Chordata, Classes Amphibia and Reptilia

**Conceptual understanding:** The two groups of amphibians and reptiles are similar in appearance, but differ drastically in development and body structure.

**ZOO.8** Students will understand the structure and function of phylum Chordata, classes Amphibia and Reptilia, and how they demonstrate the characteristics of living things.

**A.ZOO.8** Students will understand the basic structure and function of amphibians and reptiles and how they demonstrate the characteristics of living things.

**ZOO.8.1** *Identify that amphibians live part of their lives in water and part on land.*

**ZOO.8.2** *Identify common amphibians (e.g., frogs, salamanders) and reptiles (e.g., turtles, lizards, snakes).*

**ZOO.8.3** *Identify common amphibians and reptiles as well as their dangers and benefits to humans.*

## Alternate Science Elements II: Zoology II

### ZOO.9 Phylum Chordata, Class Aves

**Conceptual understanding:** Class Aves, including birds, are heat-absorbing egg-laying vertebrates with bodies covered in feathers. Although they are descendants of dinosaurs, they have evolved a unique physiology, making most capable of flight.

**ZOO.9** Students will understand the structure and function of phylum Chordata, class Aves, and how they demonstrate the characteristics of living things.

**A.ZOO.9** Students will understand the structure and function of birds and how they demonstrate the characteristics of living things.

**A.ZOO.9.1** *Identify how birds have adapted to their changing environment.*

**A.ZOO.9.2** *Identify common birds (e.g., hummingbird, mocking bird, hawk).*

**A.ZOO.9.3** *Identify birds of prey and how they use their keen sense of sight to locate and attack prey.*

**A.ZOO.9.4** *Identify parenting behavior of different birds in order to incubate their eggs and care for hatchlings.*

**A.ZOO.9.5** *Identify basic reasons for bird migration.*

## Alternate Science Elements II: Zoology II

### ZOO.10 Phylum Chordata, Class Mammalia

**Conceptual Understanding:** Class Mammalia consists of heat-absorbing organisms with hair, a four-chambered heart, a diaphragm, and mammary glands. As inhabitants of every continent, they are successful in a great variety of ecosystems.

**ZOO.10 Students will understand the structure and function of phylum Chordata, class Mammalia, and how they demonstrate the characteristics of living things.**

**A.ZOO.10 Students will understand the structure and function of mammals and how they demonstrate the characteristics of living things.**

*A.ZOO 10.1 Identify characteristics and behaviors that distinguish mammals from other classes of living things.*

*A.ZOO 10.2 Identify how human impact has changed the environments of other organisms.*

*A.ZOO 10.3 Identify common mammals (e.g., raccoon, feral pig, fox, squirrel, deer) and the differences in caring for their offspring.*

*A.ZOO 10.4 Identify dangerous interactions and best practice responses between humans and mammals (e.g., black bears).*

## Alternate Science Elements II: Physical Science

### PHS.1 Nature of Matter

**Conceptual Understanding:** This standard develops basic ideas about the characteristics and structure of matter. Matter is anything that has mass and occupies space. Matter can exist as a solid, liquid, gas, or plasma.

**PHS.1 Students will demonstrate an understanding of the nature of matter.**

**A.PHS.1 Students will identify and investigate the states of matter.**

*A.PHS.1.1 Examine the properties of solids, liquids, and gases.*

*A.PHS.1.2 Measure mass, volume, length, and temperature.*

*A.PHS.1.3 Identify symbols that portray dangerous or hazardous materials.*

### PHS.5 Newton's Laws of Motion

**Conceptual Understanding:** The motion of objects can be described using words, diagrams, numbers, and graphs. This standard describes and explains the motion of real-world objects.

**PHS.5 Students will analyze the scientific principles of motion, force, and work.**

**A.PHS.5 Students will investigate motion, force, and work.**

*A.PHS.5.1 Investigate the motion of an object using properties such as displacement, time of motion, velocity, and acceleration.*

*A.PHS.5.2 Identify the different types of simple machines (e.g. incline plane, wedge, pulley, lever).*

*A.PHS.5.3 Demonstrate an understanding of the similarities and differences of everyday machines, and*

*identify how they have improved and impacted society (e.g., electrical appliances, transportation vehicles).*

## **PHS.8 Thermal Energy**

**Conceptual Understanding:** Thermal energy is transferred in the form of heat. Heat is always transferred from an area of high heat to low heat. More complex concepts and terminology related to phase changes are developed, including the distinction between heat and temperature.

**PHS.8 Students will demonstrate an understanding of temperature scales, heat, and thermal energy transfer.**

**A.PHS.8 Identify characteristics of temperature scales, heat, and thermal energy transfer.**

**PHS.8.1** Identify characteristics of freezing point, melting point, boiling point, vaporization, and condensation of different substances.

**PHS.8.2** Identify temperature of freezing point and boiling point.