Science

ANATOMY

STANDARD 1
The student *understands and uses scientific concepts and principles.*

To meet this standard, the student will:

Benchmark A.1.1: Use properties to identify, describe, and categorize substances, materials, and objects

Indicators:

A.1.1.1 Identify the major elements that form the bulk of body matter
A.1.1.2 Explain the relationships among atoms, molecules, elements and compounds
A.1.1.3 Explain the importance of water to body homeostasis
A.1.1.4 Describe the concept of pH and its relationship to acids and bases in the human body

Benchmark A.1.2: Identify, describe, and categorize living things based on their characteristics

Indicators:

A.1.2.1 Identify the major body systems
A.1.2.2 Define the terms: anatomy, physiology, and homeostasis; explain the importance of the interaction between the structure and function of organs and organ systems in the human body
A.1.2.2 Describe the anatomical position and apply anatomical terms and terms of direction to describe the body and the relationship of its parts
A.1.2.3 Name the four major groups of organic substances in the human body and give examples and functions of specific members of each group
A.1.2.4 Name the four major categories of tissues and compare the location, structure and function of each
A.1.2.5 Describe the anatomy and physiology of the integumentary, skeletal, muscular, nervous, endocrine, cardiovascular, immune and lymphatic, respiratory, digestive, urinary and reproductive systems
A.1.2.6 Identify the components of the integumentary, skeletal, muscular, nervous, endocrine, cardiovascular, immune and lymphatic, respiratory, digestive, urinary and reproductive systems
A.1.2.7 Discuss the physiological mechanisms of the integumentary, skeletal, muscular, nervous, endocrine, cardiovascular, immune and lymphatic, respiratory, digestive, urinary and reproductive systems
A.1.2.8 Identify the macroscopic and microscopic structure of the integumentary, skeletal, muscular, nervous, endocrine, cardiovascular, immune and lymphatic, respiratory, digestive, urinary and reproductive systems

Benchmark A.1.3: Measure properties and characteristics

Indicators:

A.1.3.1 Be able to properly use a microscope and other tools to obtain accurate information about objects and events
A.1.3.2 Use multiple measures to derive a best value and range of uncertainty for measurements
A.1.3.3 Use and manipulate different units of measurement

Key: 1. Discipline 1.1 Standard 1.1.1 Benchmark 1.1.1.1 Indicator

Benchmark A.1.4: Recognize the components, structure, and organization of systems and the interconnections within and among them

Indicators:

A.1.4.1 Identify the cavities of the body and locate the essential organs in each
A.1.4.2 Describe the structure and function of the components of a typical animal cell, including membrane bound and non-membrane bound organelles
A.1.4.3 Relate membrane structure to active and passive transport mechanisms
A.1.4.4 Describe structure and function are related in terms of cell and tissue types
A.1.4.6 Relate the structure of the integumentary system to its functional role in protecting the body and maintaining homeostasis
A.1.4.7 Explain how the skeletal structures provide support and protection for tissues, and function together with the muscular system to make movements possible
A.1.4.8 Analyze and explain the relationships between the respiratory and cardiovascular systems as the obtain oxygen needed for the oxidation of nutrients and removal of carbon dioxide
A.1.4.9 Relate the role of the urinary system to regulation of body wastes (i.e. water-electrolyte balance and volume of body fluids)
A.1.4.10 Describe the effects of aging on body systems
A.1.4.11 Explain how the functions of the reproductive organs are regulated by hormonal interactions
A.1.4.12 Describe the stages of development from birth the adulthood (i.e. neonatal period, infancy, childhood, adolescence and puberty and maturity)

Benchmark A.1.5: Understand that interactions within and among systems cause changes in matter and energy

Indicators:

A.1.5.1 Interpret interactions among hormones, senses and nerves which make possible the coordination of functions of the body
A.1.5.2 Investigate the physiology of electrochemical impulses and neural integration and trace the pathway of an impulse, relating biochemical changes involved in the conduction of the impulse
A.1.5.3 Describe how the body perceives internal and external stimuli and responds to maintain a stable internal environment, as it relates to biofeedback
A.1.5.4 Describe the chemical and physical mechanisms of digestion, elimination , transportation and absorption with in the body to change food and derive energy
A.1.5.5 Examine various conditions that change normal body functions (e.g. tissue rejection, allergies, injury, diseases and disorders) and how the body responds
A.1.5.6 Research the scientific, technological, and mathematical knowledge and training requirements in career fields
A.1.5.7 Identify an educational pathway which meets personal interest, aspirations, and abilities

Benchmark A.1.6: Construct and use models to predict, test, and understand scientific phenomena

Indicators:

A.1.6.1 Construct and interpret scale drawings and three-dimensional models of the integumentary, skeletal, muscular, nervous, endocrine, cardiovascular, immune and lymphatic, respiratory, digestive, urinary and reproductive systems
A.1.6.2 Identify limitations of various models
A.1.6.3 Understand how models serve as representations of objects, processes, or events

Science

ANATOMY

STANDARD 2
The student *conducts scientific investigations to expand understanding of the natural world.*

To meet this standard, the student will:

Benchmark A.2.1: Plan and implement scientific investigations

Indicators:

- A.2.1.1 Distinguish between an observation and an inference
- A.2.1.2 Draw inferences based on observations
- A.2.1.3 Develop questions and testable hypotheses in response to observations
- A.2.1.4 Use appropriate tools to collect data and test a hypothesis
- A.2.1.5 Plan and conduct a controlled experiment, individually and collaboratively
- A.2.1.6 Develop and communicate descriptions, results, explanations, conclusions, and models from evidence
- A.2.1.7 Understand and follow proper safety procedures

Benchmark A.2.2: Think logically, analytically, and creatively

Indicators:

- A.2.2.1 Approach questions and problems using several different strategies
- A.2.2.2 Distinguish between evidence, explanation, and opinion
- A.2.2.3 Make predictions and create explanations by drawing inferences and recognizing patterns and relationships (especially mathematical relationships)
- A.2.2.4 Describe the thought process associated with a particular series of actions

Benchmark A.2.3: Practice the principles of scientific inquiry

Indicators:

- A.2.3.1 Recognize the role of science as a way of looking at the world
- A.2.3.2 Evaluate and modify processes of investigation
- A.2.3.3 Accurately record and report a series of observations
- A.2.3.4 Give proper credit to informative sources
- A.2.3.5 Explain the importance of openness, honesty, and skepticism in science
- A.2.3.6 Analyze a set of knowledge and recognize what is still unknown or unanswered
- A.2.3.7 Recognize the logical process of basing conclusions on evidence
- A.2.3.8 Recognize that scientific knowledge is always changing
- A.2.3.9 Recognize that observations can be influenced by faulty procedures and by the beliefs of the observer
- A.2.3.10 Recognize that scientific understanding can come from unexpected results
- A.2.3.11 Analyze basic assumptions held by scientists

Benchmark A.2.4: Understand the relationship between evidence and scientific explanation

Indicator:

- A.2.4.1 Understand that the process of science results from inventive acts of imagination, intelligence and logical inquiry which meet certain criteria of testability, consistency, and rules of evidence

Key: 1. Discipline 1.1 Standard 1.1.1 Benchmark 1.1.1.1 Indicator

Science

ANATOMY

STANDARD 3
The student *applies science knowledge and skills to solve problems and meet challenges.*

To meet this standard, the student will:

Benchmark A.3.1: Identify problems and challenges in which science knowledge and skills can be applied

Indicators:

A.3.1.1 Analyze a relevant problem or challenge which is related to science or technology
A.3.1.2 Identify the components of the problem and criteria for a suitable solution
A.3.1.3 Describe disorders associated with the integumentary, skeletal, muscular, nervous, endocrine, cardiovascular, immune and lymphatic, respiratory, digestive, urinary and reproductive systems

Benchmark A.3.2: Research, design, and test a variety of ways to address problems and/or challenges

Indicators:

A.3.2.1 Use scientific tools and methods to individually and collaboratively research, design, test, and compare alternative solutions to a problem
A.3.2.2 Conduct risk-benefit analyses, investigate trade-offs and constraints, and make predictions about the consequences of implementing various solutions to a problem

Benchmark A.3.3: Evaluate solutions and consequences

Indicator:

A.3.3.1 Develop a written report which completely describes an experimental investigation

Science

ANATOMY

STANDARD 4
The student *uses effective communication skills and tools to build and demonstrate understanding of science.*

To meet this standard, the student will:

Benchmark A.4.1: Use listening, observing, and reading skills to obtain scientific information

Indicators:

A.4.1.1 Practice listening to and paraphrasing someone describing his/her own observations
A.4.1.2 Read, understand, and summarize informative text

Benchmark A.4.2: Use writing and speaking skills to organize and express science ideas

Indicators:

A.4.2.1 Construct, interpret, and utilize line graphs and other graphical displays of information
A.4.2.2 Write informative reports that make use of formulas, symbols, diagrams, tables, and graphs
A.4.2.3 Recognize, use, and be able to explain common science terms

Benchmark A.4.3: Use effective communication strategies and tools to prepare and present science information

Indicators:

A.4.3.1 Utilize computer software and hardware to produce science products and conduct scientific research and investigations
A.4.3.2 Recognize and interpret chemical equations
A.4.3.3 Clearly present information as evidence to support a conclusion

Key: 1. Discipline 1.1 Standard 1.1.1 Benchmark 1.1.1.1 Indicator

Science

ANATOMY

STANDARD 5
The student *understands how science knowledge and skills are connected to other subject areas and real-life situations.*

To meet this standard, the student will:

Benchmark A.5.1: Use mathematics to enhance scientific understanding

Indicator:
A.5.1.1 Use statistical methods and estimation skills to make predictions and describe and analyze results

Benchmark A.5.2: Understand the relationship between science and technology

Indicators:
A.5.2.1 Describe workplace situations which utilize scientific inquiry and technological design processes
A.5.2.2 Explain the interdependence of science, technology, and public awareness

Benchmark A.5.3: Examine the relationship between science and history

Indicator:
A.5.3.1 Research and describe how individual contributions, various tools and techniques, and different historical periods and events have influenced the development of science

Benchmark A.5.4: Examine the relationship among science, society, and the workplace

Indicators:
A.5.4.1 Describe how the scientific enterprise is influenced by societal, environmental, economic, political, and ethical considerations
A.5.4.2 Explain how the actions of humans can affect the environment and the supply of resources
A.5.4.3 Recognize and explain some short-term and long-term consequences of science and technology

Science

ANATOMY

STANDARD 6
The student *understands how science knowledge carries with it responsibility for its application.*

To meet this standard, the student will:

Benchmark A.6.1: Understand how science contributes to the treatment of diseases in the maintenance of a healthy lifestyle (Personal and Community Health)

Indicators:

- A.6.1.1 Identify the mechanisms for disease transmission
- A.6.1.2 Identify several pathogens
- A.6.1.3 Describe how HIV affects the immune system
- A.6.1.4 Describe how alcohol, tobacco and drugs affect the neural system
- A.6.1.5 Describe the neurochemistry of addiction

Benchmark A.6.2: Understand how the use of resources affects population growth and the global environment (Population)

Indicators:

- A.6.2.1 Describe how the management of resources directly affects populations
- A.6.2.2 Explain how the domestication of animals and plants has affected human population growth

Benchmark A.6.3: Understand the importance of maintaining resources and environmental quality (Environmental Quality/Resources)

Indicators:

- A.6.3.1 List at least three types of renewable resources
- A.6.3.2 List several primary pollutants and sources
- A.6.3.3 Analyze the impact of industrialization on the environment

Benchmark A.6.4: Understand the ethical issues inherent in scientific research (Ethics)

Indicators:

- A.6.4.1 Identify the components of credible scientific research
- A.6.4.2 Analyze the implications of current biological research in the areas of health and genetics
- A.6.4.3 Ensure experiments are performed without endangering animals
- A.6.4.4 Understand that the power of scientific knowledge carries with it ethical responsibilities as well