

# Science

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**At the end of the school year, students will be able to...**

## **GOAL 11 Inquiry**

(Integrated into the whole year) **Understand the process of scientific inquiry and technological design to investigate questions, conduct experiments and solve problems.**

### **STANDARD A**

**Know and apply concepts, principles and processes of scientific inquiry.**

#### **DESCRIBE an OBSERVED EVENT**

- ✧ State a problem in the form of a question.
- ✧ Formulate a hypothesis that can be tested by observation and measurement.

#### **COLLECT DATA**

- ✧ Design an experiment to test a hypothesis.
- ✧ Identify and control variables in an experiment.
- ✧ Describe and apply the concepts of sample size and repetitive trials in an experiment.

#### **RECORD and STORE DATA**

- ✧ Select and use appropriate tools for collecting data.
- ✧ Select and label recorded data using appropriate units of measure.
- ✧ Use the International System of measurement.
- ✧ Organize collected data into tables, charts and graphs.

#### **REPORT and DISPLAY RESULTS**

- ✧ Draw conclusions based on collected data.
- ✧ Relate a conclusion to the test hypothesis.
- ✧ Explain unexpected data.
- ✧ Publish and present results of an experiment using various media.

## GOAL 12 Concepts

Understand the fundamental concepts, principles, and interconnections of the life, physical and earth/space sciences.

### STANDARD A

Know and apply concepts that explain how living things function, adapt and change.

### STANDARD B

Know and apply concepts that explain how living things interact with each other and with their environment.

#### CELLS and ORGANISMS

- ✧ Identify the structure and functions of cell organelles.
- ✧ Compare and contrast prokaryotic and eukaryotic cells.
- ✧ Define cell theory.
- ✧ Calculate a cell's surface to volume ratio and relate this ratio to limits of cell size.
- ✧ Describe differences between plant and animal cells.
- ✧ Explain how cells are organized from single cells to ecosystems.
- ✧ Explain the differences between diffusion, osmosis, and active transport.
- ✧ Describe photosynthesis and cellular respiration.
- ✧ Compare cellular respiration and fermentation.
- ✧ Explain how cells reproduce and the importance of mitosis.

#### DNA and HEREDITY

- ✧ Explain the experiments of Gregor Mendel.
- ✧ Define genetic terms.
- ✧ Explain how genes and alleles are related to genotype and phenotype.
- ✧ Use the information in a Punnett square to explain reproductive probability.
- ✧ Explain the differences between mitosis and meiosis.
- ✧ Explain sex determination in humans.
- ✧ Describe the basic structure of the DNA molecule.
- ✧ Explain how DNA replicates.
- ✧ Outline the basic steps of protein synthesis.
- ✧ Define mutation and give examples.
- ✧ Identify forms and causes of genetic disorders.

- ✧ Relate mutation to genetic variability within a population.

### **EVOLUTION**

- ✧ Explain evolution as change through time from accumulated mutations and adaptation.
- ✧ Explain how fossils provide evidence for evolution.
- ✧ Define species and explain speciation through adaptation.
- ✧ Discuss structural, embryonic and molecular evidence for evolution.
- ✧ Discuss the role of environmental pressure on speciation.
- ✧ Describe Darwin's theory of natural selection.
- ✧ Relate adaptive change to antibiotic and pesticide resistance.
- ✧ Explain how fossils are formed.
- ✧ Describe the geologic time scale and the characteristics of each of the four eras.
- ✧ Discuss theories and causes of mass extinctions.
- ✧ Describe the evidence for the evolution of humans.
- ✧ Compare the shared characteristics of primates.

### **CELLS and ORGANISMS – THE HUMAN BODY**

- ✧ Identify the major tissues of the human body.
- ✧ Compare an organ with an organ system.
- ✧ Describe a function of each organ system.
- ✧ Identify the major organs and functions of the skeletal system.
- ✧ Describe different muscle types and the major parts and functions of the muscle system.
- ✧ Describe how muscles work in opposing pairs.
- ✧ Describe the parts and functions of the cardiovascular system.
- ✧ Describe the parts and functions of the respiratory system.
- ✧ Describe the parts and functions of the digestive system.
- ✧ Describe the parts and functions of the excretory system.
- ✧ Describe the parts and functions of the nervous system.
- ✧ Describe the parts and functions of the integumentary system.
- ✧ Describe the parts and functions of the endocrine system.
- ✧ Describe the parts and functions of the lymphatic system.

- ✧ Describe the parts and functions of the reproductive system.
- ✧ Describe common diseases of and injuries to each of the body systems and how to prevent them.

## **GOAL 13 Connections**

**Understand the relationship among science, technology and society in historical and contemporary contexts.**

### **STANDARD A**

**Know and apply the accepted practices of science.**

#### **SAFETY**

- ✧ Use proper safety procedures for lab experiences, including appropriate use of equipment, proper disposal of wastes and proper cleanup of workspace.
- ✧ Identify procedures and policies consistent with safety in science activities.

#### **VALIDITY**

- ✧ Identify and explain why similar investigations might not produce similar results.
- ✧ Identify bias in the results and conclusions of experiments.
- ✧ Identify factors that affect validity.

#### **EVOLUTION of KNOWLEDGE in SCIENCE**

- ✧ Compare and contrast hypothesis, theory and scientific law.
- ✧ Develop new models as new data are recognized.

### **STANDARD B**

**Know and apply the concepts that describe the interactions between science, technology and society.**

#### **EVOLUTION of KNOWLEDGE in SCIENCE**

- ✧ Describe how science and technology affect our society.
- ✧ Identify the scientific and technological skills used in various occupations.

#### **HISTORY**

- ✧ Identify individuals who have contributed to the scientific and technological development of society.