Alabama Science

Grade 7

From Molecules to Organisms: Structures and Processes

Cell Structure and Processes

Structure and Function

1 Develop and use a model to explain the functions of specific cell structures necessary for maintaining a stable environment, including the cell membrane, cell wall, chloroplasts, endoplasmic reticulum, golgi apparatus, mitochondria, nucleus, ribosomes, and vacuoles. 7.1

- a Engage in argument from evidence to support claims of cell theory. 7.1.A
- b Construct an explanation of how prokaryotic and eukaryotic cells differ in structure and function. 7.1.B

Cell Structure and Processes

Stability and Change

Cell Structure and Processes

Energy and Matter

2 Construct an explanation of how photosynthesis and cellular respiration cycle matter and establish the flow of energy into and out of an organism. 7.2

- a Ask questions and construct an explanation of how anaerobic bacteria produce energy in environments with no oxygen. 7.2.A

Growth and Development

Structure and Function

3 Construct an explanation of how the process of mitosis maintains complex organisms and ensures new cells with identical genetic information. 7.3

Growth and Development

Cause and Effect

Growth and Development

Systems and System

4 Obtain, evaluate, and communicate information explaining how cells, tissues, and organs of various systems of the human body work together for specific functions, including the circulatory, digestive, muscular, nervous, respiratory, and skeletal systems. 7.4

Plan and carry out an investigation to identify and explain features of a cell's semi-permeable membrane which enable it to control what enters and exits the cell. 7.1.C

c **Plan and carry out an investigation to identify and explain features of a cell's semi-permeable membrane which enable it to control what enters and exits the cell.** 7.1.C

Ask questions and communicate information regarding how errors in mitosis may affect cell division. 7.3.A

a **Ask questions and communicate information regarding how errors in mitosis may affect cell division.** 7.3.A

Ecosystems: Interactions, Energy, and Dynamics

Matter and Energy Flow

Energy and Matter

5 Construct an explanation of how the cycling of matter between abiotic and biotic parts of ecosystems demonstrates the flow of energy and the conservation of matter, including the carbon, nitrogen, and water cycles. 7.5

Population Dynamics

Cause and Effect

6 Analyze and interpret data to predict how environmental conditions, genetic factors, and resource availability will impact the growth of individual organisms and populations of organisms in an ecosystem. 7.6

7 Analyze and interpret data to explain how density-independent and density-dependent limiting factors in an ecosystem can lead to shifts in populations. 7.7

Interdependent Relationships

Cause and Effect

8 Construct an explanation that predicts patterns of interactions between and among organisms in different ecosystems. 7.8

Biodiversity

Cause and Effect

9 Design a solution to maintain biodiversity and ecosystem services in a given scenario. 7.9

10 Obtain, evaluate, and communicate information about characteristic animal behaviors and specialized plant structures and their effect on the probability of successful reproduction. 7.10

Heredity: Inheritance and Variation of Traits

Genetics and Biotechnology

Cause and Effect

11 Develop and use models to demonstrate how genetic variations between parents and offspring result from differences in inherited genes located on chromosomes. 7.11

12 Develop and use models to explain how genes are expressed through the flow of genetic information from DNA to RNA to a functional protein. 7.12

13 Develop and use models to explain that meiosis results in new genetic combinations with increased variation. 7.13

- a Construct an explanation of the advantages and disadvantages of asexual and sexual reproduction. 7.13.A
- b Construct an explanation from evidence of how genetic variants may result in harmful, beneficial, or neutral effects on the structure and function of an organism. 7.13.B

14 Obtain, evaluate, and communicate information on the use of technologies that impact the inheritance and appearance of traits in organisms. 7.14

Phylogenetics

Patterns

15 Analyze and interpret data from examination of fossils, relict species, and modern organisms to determine patterns of change in anatomical structures over time. 7.15

16 Obtain, evaluate, and communicate evidence comparing patterns in the embryological development of multiple species to identify relationships not evident in the fully formed adult anatomy. 7.16

Natural Selection

Cause and Effect

17 Ask questions to clarify how natural selection over generations may lead to changes in the frequency of specific traits to enhance survival and reproduction of a population. 7.17