

Science

Grade: 7

Domain: Cells and Genetics

Domain Description

Cells and Genetics refers to differentiating between the component parts of cells and understanding their functions and interactions, categorizing groups of cells and recognizing the functions and interactions of these groups, identifying the roles of genes and chromosomes in reproduction, and comparing and contrasting types of reproductive processes.

Standards Associated with Domain

S7L2

S7L3

Associated Concepts, Skills, and Abilities

- Demonstrate understanding of how cells take in nutrients in order to grow, divide, and make needed materials
- Correlate cell structures to basic cell function, such as:
 - cell membrane
 - nucleus
 - cytoplasm
 - chloroplast
 - mitochondria
- Categorize cells and groups of cells by levels of cellular organization, such as:
 - cells are organized into tissues
 - tissues are organized into organs
 - organs are organized into systems
 - systems are organized into organisms
- Explain that tissues, organs, and organ systems serve the needs cells have for oxygen, food, and waste removal
- Demonstrate understanding of the purpose of the major organ systems in the human body, such as:
 - digestion
 - respiration
 - reproduction
 - circulation
 - excretion
 - movement
 - control
 - coordination
 - protection from disease
- Explain the role of genes and chromosomes in the process of inheriting a specific trait

- Compare and contrast asexual and sexual reproduction for organisms, such as:
 - animals
 - plants
 - fungi
 - bacteria
 - protists
- Demonstrate understanding that selective breeding can produce plants or animals with desired traits

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Domain: Interdependence of Life

Domain Description

Interdependence of Life refers to recognizing the relationships that organisms have with themselves, each other, and their environments, understanding food webs and how environmental change and competitive and beneficial relationships affect individual organisms and entire species, and comparing and contrasting Earth's major terrestrial and aquatic biomes.

Standards Associated with Domain

S7L4

Associated Concepts, Skills, and Abilities

- Evaluate how matter is transferred in a food web from one organism to another, such as:
 - from producer to consumer
 - from consumer to consumer
 - from consumer to decomposer
- Demonstrate understanding of how matter can recycle between organisms and their environments
- Demonstrate understanding that energy that originates from the Sun moves from organism to organism within a food web
- Predict how changes in environmental conditions can affect the survival of both individuals and entire species
- Categorize relationships between organisms that are competitive or mutually beneficial
- Compare and contrast the characteristics of Earth's major terrestrial and aquatic biomes, such as:
 - tropical rain forest
 - savannah (also spelled savanna)
 - temperate
 - desert
 - taiga
 - tundra
 - mountain
 - freshwater
 - estuaries
 - marine

Science**Grade: 7****Domain: Evolution****Domain Description**

Evolution refers to understanding how organisms adapt to their environment over time and generations through natural selection, determining how natural selection affects the survival of species, and using the fossil record to study the evolution of life.

Standards Associated with Domain**S7L5****Associated Concepts, Skills, and Abilities**

- Explain how physical characteristics of organisms have changed over successive generations, such as:
 - Darwin's finches
 - peppered moths
- Demonstrate understanding of the processes of natural selection
- Describe ways in which species on Earth have evolved due to natural selection
- Demonstrate understanding that the fossil record found in sedimentary rock provides evidence for evolution

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Characteristics of Science

Characteristics of Science items are integrated across the three content domains.

Characteristics of Science refers to understanding the process skills used in the learning and practice of science. These skills include testing a hypothesis, record keeping, using correct safety procedures, using appropriate tools and instruments, applying mathematics and technology, analyzing data, interpreting results, and communicating scientific information. Characteristics of Science also refers to understanding how science knowledge grows and changes, and the processes that drive those changes.

Standards Associated with Characteristics of Science

S7CS1	S7CS4	S7CS7
S7CS2	S7CS5	S7CS8
S7CS3	S7CS6	S7CS9

Associated Concepts, Skills, and Abilities

- Demonstrate understanding of the important factors in keeping records, such as:
 - honesty
 - clarity
 - accuracy
- Demonstrate understanding that hypotheses can be valuable, even if they turn out not to be completely accurate
- Explain correct procedures for using scientific apparatus
- Describe appropriate techniques in laboratory situations
- Explain the correct protocol for identifying and reporting safety problems and violations
- Analyze scientific data by using, interpreting, and comparing numbers in several equivalent forms, such as:
 - integers
 - fractions
 - decimals
 - percents
- Distinguish between the mean, median, and mode of scientific data
- Apply the metric system to scientific investigations
- Convert between metric units
- Analyze data to determine valid conclusions

- Determine what degree of precision is adequate, and round off appropriately
- Describe the importance of accuracy and precision and their relationship to each other
- Identify appropriate tools for measuring objects and/or substances
- Explain how parts are related to other parts in a system
- Understand that different models (such as physical replicas, pictures, and analogies) can be used to represent the same thing.
- Organize scientific information and determine relationships shown in representations, such as:
 - tables
 - charts
 - graphs
- Evaluate claims based on unclear sources or on statements made by people outside their area of expertise
- Identify the flaws of reasoning that are based on poorly designed research, such as:
 - facts intermingled with opinion
 - conclusions based on insufficient evidence
 - small samples of data
 - biased samples
 - samples for which there was no control
- Recognize that there may be more than one way to interpret a given set of findings
- Determine whether the results in similar investigations are trivial or significant
- Explain the importance of completing further investigations before accepting results as meaningful
- Demonstrate understanding that when new experimental results are inconsistent with an existing, well-established theory, scientists may require further experimentation to decide whether the results are flawed or the theory requires modification
- Recognize that scientific knowledge may change when prevailing theories are challenged by new information
- Demonstrate understanding that scientific investigations are conducted for different reasons, such as
 - exploring new phenomena
 - confirming previous results
 - testing how well a theory predicts
 - comparing competing theories

- Demonstrate understanding that scientific investigations usually involve similar steps, such as:
 - collecting evidence
 - reasoning
 - devising hypotheses
 - formulating explanations
 - observing the effects of one variable on another, keeping all other variables constant
- Demonstrate understanding that scientists often collaborate to design research. To prevent bias, scientists conduct independent studies to answer the same questions.
- Explain the important factors for maintaining an investigator's credibility, such as:
 - accurate record keeping
 - data sharing
 - replication of results
- Demonstrate understanding that scientists use technology and mathematics to enhance the process of scientific inquiry
- Demonstrate understanding that scientists must adhere to the ethics of science when conducting research, and special care must be taken when human and animal subjects are used in scientific research
- Classify organisms based on physical characteristics using a dichotomous key of the six-kingdom system