

Cell Structure and Function

- SB.4.A** Compare and contrast prokaryotic and eukaryotic cells, including their complexity, and compare and contrast scientific explanations for cellular complexity
- S.B.4.B** Investigate and explain cellular processes, including homeostasis and transport of molecules; and
- S.B.5.A** Describe the stages of the cell cycle, including deoxyribonucleic acid (DNA) replication and mitosis, and the importance of the cell cycle to the growth of organisms.
- S.B.5.C** Recognize that disruptions of the cell cycle lead to diseases such as cancer

Mechanisms of Genetics

- S.B.6** The student know the mechanisms of genetics such as the role of nucleic acids and the principles of Mendelian and non-Mendelian genetics.
- S.B.6** A Identify the components of DNA, identify how information for specifying the traits of an organism is carried in the DNA, examine scientific explanations for the origin of DNA
- S.B.6.B** Recognize that components that make up the genetic codes are common to all organisms
- S.B.6.C** Explain the purpose and process of transcription and translation using models of DNA and RNA
- S.B.6.D** recognize that gene expression is a regulated process
- S.B.6.E** Identify and illustrate changes in DNA and evaluate the significance of these changes
- S.B.6.F** Predict possible outcomes of various genetic combinations such as monohybrid crosses, dihybrid crosses, and non-Mendelian inheritance
- S.B.6.G** Recognize the significance of meiosis to sexual reproduction.

- **iCell®**



- **HudsonAlpha Meiosis Video**

www.youtube.com/watch?v=9sJU9-ellrs

- **Collecting Cancer Causing Changes**

- **Chromosocks® Chromosock Mitosis Protocol**

<https://hudsonalpha.org/compendium-resources/>

- **Guidebook: Foundational Concepts and Applications: Cancer, Stem Cells**



- **Guidebook: Foundational Concepts and Applications: DNA Sequencing, Recombinant DNA and genetic Engineering, Synthetic Biology, RNA and Protein Analyses, Gene Therapy and RNAi, Stem Cells; Therapeutic Approaches: Gene Therapy, Copy Number Variation, Personal Genome Analysis**

- **iCell®**

- **Touching Triton®**

- **HG Helix®**

- **HNPCC®**
- **Genes & ConSEQUENCES®**
- **Chromosock Meiosis**

- **Genetics of Eye Color:**

<https://hudsonalpha.org/the-genetics-of-eye-color/>

- **Progress of Science: Biotechnology Timeline™**



Biological Evolution and Classification

S.B.7 The student knows evolutionary theory is a scientific explanation for the unity and diversity of life.

S.B.7 A Analyze and evaluate hoe evidence of common ancestry among groups is provided by the fossil records, biogeography, and homologies, including anatomical, molecular and developmental.

S.B.7.D Analyze and evaluate how the elements of natural selection including inherited variation, the potential of a population to produce more offspring than can survive and a finite supply of environmental resources, result in differential reproductive success.

S.B.7.E Analyze and evaluate the relationship of natural selection to adaptation and to the development of diversity in and among species.

S.B.7.F Analyze other evolutionary mechanisms, including genetic drift, gene glow, mutation and recombination

- **Guidebook:** Foundational Concepts and Applications: Comparative Genomics, Studying the Genome to Understand the Sequence

- **Shareable Science:**
The Science of Skin Color
<https://hudsonalpha.org/the-science-of-skin-color/>



- **Human Genome Diversity Project**
<https://hudsonalpha.org/human-genome-diversity-project/>

Interdependence within Environmental Systems

S.B.11 A summarize the role of microorganism in both maintaining and disrupting the health of both organisms and ecosystems

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- **Guidebook:** Foundational Concepts and Applications: Agriculture: Sequencing Plant Genomes for Food and Bioenergy Needs, Comparative Genomics, Recombinant DNA and Genetic engineering: Agriculture.



Metabolic Process and Energy

S.B.9 The student know the significance of various molecules involved in metabolic processes and energy conversions that occur in living organisms.

S.B.9.A Compare the Functions of different types of biomolecules, including carbohydrates, lipids, proteins and nucleic acids

S.B.9.B Compare the reactants and products of photosynthesis and cellular respiration in terms of energy, energy conversions and matter

S.B.9.C Identify and investigate the role of enzymes

- **Guidebook:** Foundational Concepts and Applications: DNA Sequencing, RNA and Protein Analyses, Recombinant DNA and Genetic engineering, Synthetic Biology, Pharmacogenomics

- **BioBeads: Modeling Cell Processes**
<https://hudsonalpha.org/compendium-resources/>

- **Guidebook:** Genetics, Plant Growth and Photosynthesis (pgs. 20-21 of 2018-19)

- **Enzymes to Go!®** to purchase contact edoutreach@hudsonalpha.org

