

Unit 7 Cell Reproduction and Differentiation

Content Area: **Science**
Course(s): **Biology CP, Biology Honors, STEM Biology Honors**
Time Period: **September**
Length: **6 weeks**
Status: **Published**

Enduring Understandings

Big Idea: Organisms reproduce, develop, and have predictable life cycles. Organisms contain genetic information that influences their traits, and they pass this on to their offspring during reproduction.

- Cells divide through the process of mitosis, resulting in daughter cells that have the same genetic composition as the original cell.
- Cell differentiation is regulated through the expression of different genes during the development of complex multicellular organisms.

Essential Questions

- How are asexual reproduction and sexual reproduction different from one another?
- What are the main events of the cell cycle?
- How do organisms grow and repair tissues?
- How is the cell cycle controlled and how does loss of this control lead to cancer?
- How do cells differentiate into different cell types?

Content

Chapter 10

Vocabulary:

- **asexual reproduction**
- **cell division**
- **cell cycle**
- **chromosome**
- **sister chromatids**
- **centromere**
- **cytokinesis**
- **prophase**
- **metaphase**
- **anaphase**
- **telophase**
- **cyclins**
- **mutation**

- meiosis

Skills

- Explain how the many cells in an individual can be very different from one another, even though they are all descended from a single cell and thus have essentially identical genetic instructions
- Trace the general process where the progeny from a single cell form an embryo in which the cells multiply and differentiate to form the many specialized cells, tissues and organs that comprise the final organism
- Present evidence that supports the concept that complex multicellular organisms are formed as a highly organized arrangement of differentiated cells
- Relate the specialization of cells in multicellular organisms to the different patterns of gene expression rather than to differences of the genes themselves
- Recognize that certain chemicals, pathogens, and high-energy radiation can seriously impair normal cell functions and the health of the organism

Resources

Standards

LA.9-10.CCSS.ELA-Literacy.CCRA.R.2

Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.

LA.9-10.CCSS.ELA-Literacy.CCRA.R.3

Analyze how and why individuals, events, and ideas develop and interact over the course of a text.

LA.9-10.CCSS.ELA-Literacy.CCRA.R.4

Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

LA.9-10.CCSS.ELA-Literacy.CCRA.R.7

Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

LA.9-10.CCSS.ELA-Literacy.CCRA.R.8

Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.

SCI.9-12.5.1.12.C

Scientific knowledge builds on itself over time.

SCI.9-12.5.1.12.C.1

Reflect on and revise understandings as new evidence emerges.

SCI.9-12.5.1.12.C.2

Use data representations and new models to revise predictions and explanations.

SCI.9-12.5.3.12

All students will understand that life science principles are powerful conceptual tools for making sense of the complexity, diversity, and interconnectedness of life on Earth. Order in natural systems arises in accordance with rules that govern the physical world, and the

	order of natural systems can be modeled and predicted through the use of mathematics.
SCI.9-12.5.3.12.A	Living organisms are composed of cellular units (structures) that carry out functions required for life. Cellular units are composed of molecules, which also carry out biological functions.
SCI.9-12.5.3.12.A.4	Distinguish between the processes of cellular growth (cell division) and development (differentiation).
SCI.9-12.5.3.12.A.5	Describe modern applications of the regulation of cell differentiation and analyze the benefits and risks (e.g., stem cells, sex determination).
SCI.9-12.5.3.12.A.6	Describe how a disease is the result of a malfunctioning system, organ, and cell, and relate this to possible treatment interventions (e.g., diabetes, cystic fibrosis, lactose intolerance).
SCI.9-12.5.3.12.D	Organisms reproduce, develop, and have predictable life cycles. Organisms contain genetic information that influences their traits, and they pass this on to their offspring during reproduction.
SCI.9-12.5.3.12.D.2	Predict the potential impact on an organism (no impact, significant impact) given a change in a specific DNA code, and provide specific real world examples of conditions caused by mutations.
SCI.9-12.5.3.12.D.3	Demonstrate through modeling how the sorting and recombination of genes during sexual reproduction has an effect on variation in offspring (meiosis, fertilization).
SCI.9-12.5.3.12.E	Sometimes, differences between organisms of the same kind provide advantages for surviving and reproducing in different environments. These selective differences may lead to dramatic changes in characteristics of organisms in a population over extremely long periods of time.
SCI.9-12.5.3.12.E.1	Account for the appearance of a novel trait that arose in a given population.
CCSS.ELA-Literacy.RST.9-10.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
CCSS.ELA-Literacy.RST.9-10.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
CCSS.ELA-Literacy.RST.9-10.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
CCSS.ELA-Literacy.RST.9-10.7	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
CCSS.ELA-Literacy.RST.9-10.8	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
CCSS.ELA-Literacy.WHST.9-10	Writing
CCSS.ELA-Literacy.WHST.9-10.1	Write arguments focused on discipline-specific content.
CCSS.ELA-Literacy.WHST.9-10.1.a	Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.
CCSS.ELA-Literacy.WHST.9-10.1.b	Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns.
CCSS.ELA-Literacy.WHST.9-10.1.d	Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
CCSS.ELA-Literacy.WHST.9-10.1.e	Provide a concluding statement or section that follows from or supports the argument

presented.

Text Types and Purposes

Integration of Knowledge and Ideas

Craft and Structure