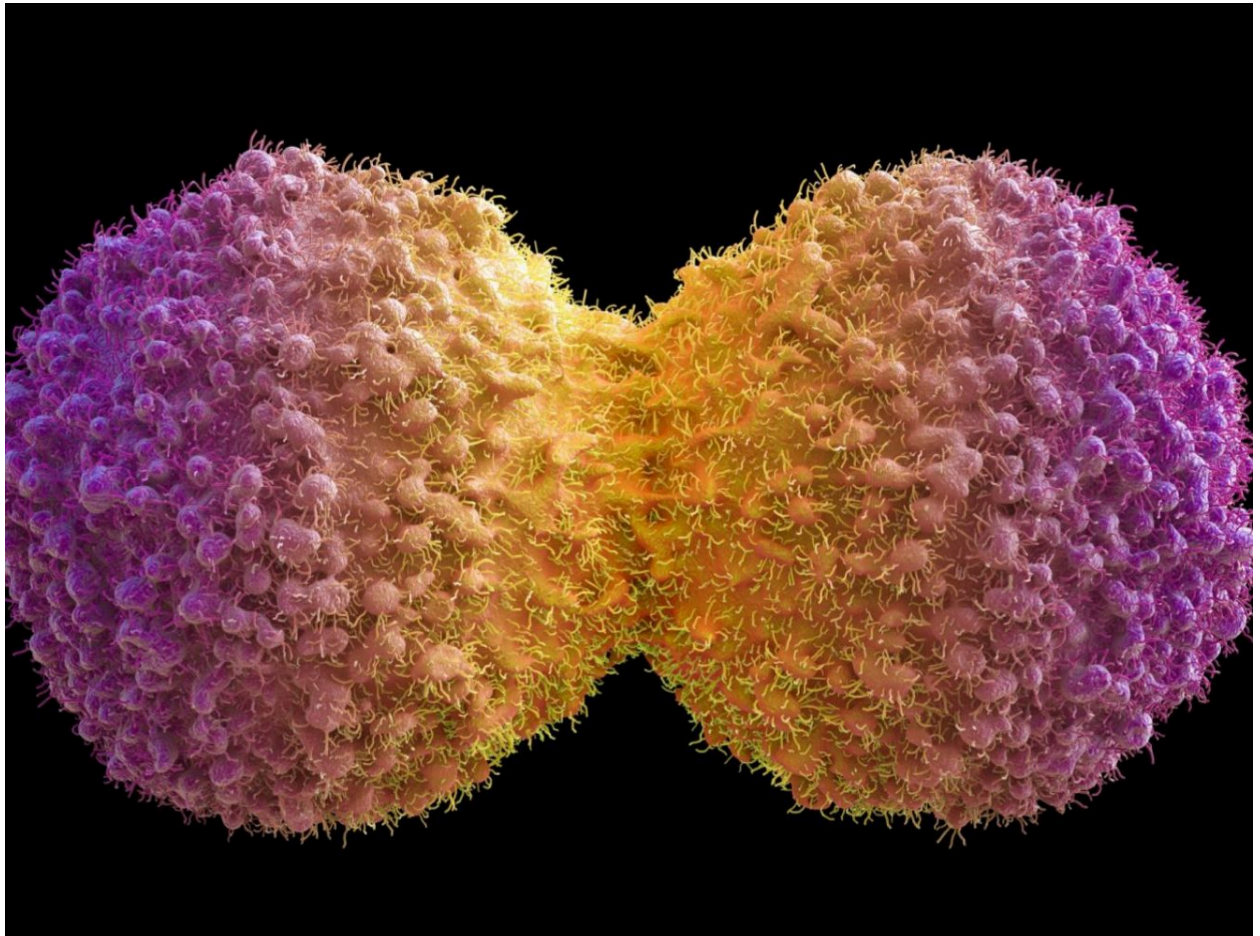


Mitosis and Meiosis



Unit Introduction

The cell cycle is an ordered series of events involving cell growth and cell division that produces two new daughter cells. Cells on the path to cell division proceed through a series of precisely timed and carefully regulated stages of growth, DNA replication, and division that produces two identical (clone) cells. In this unit, students will understand the life cycle of the cells that make up the organism.

Unit Priority Standards

- HS-LS1-4 Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.
- HS-LS3-1 Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.
- HS-LS3-2 Make and defend a claim based on evidence that inheritable genetic variations may result from (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

Unit Transfer Goals

- The ability to engage in scientific inquiry and define real-world problems.
- Using and developing scientific models to explain laws, theories, natural phenomena, and original ideas.
- Design and conduct an authentic scientific investigation in order to collect and analyse data and draw meaningful conclusions.

- The ability to create visual and verbal analysis of a scientific investigation or experiment.

Unit Essential questions	
<ol style="list-style-type: none"> 1. How do cells grow and reproduce? 2. What processes are responsible for life's unity and diversity? 	
Acquisition of Knowledge Skill	
<p><i>Students will know...</i></p> <ol style="list-style-type: none"> 1. Surface area-to-volume ratios affect the ability of a biological system to obtain necessary resources, eliminate waste products, acquire or dissipate thermal energy, and otherwise exchange chemicals and energy with the environment. 2. The surface area of the plasma membrane must be large enough to adequately exchange materials 3. The cell cycle is a highly regulated series of events for the growth and reproduction of cells 4. Mitosis is a process that ensures the transfer of a complete genome from a parent cell to two genetically identical daughter cells 5. Disruptions to the cell cycle may result in cancer and/or programmed cell death 6. Meiosis is a process that ensures the formation of haploid gamete cells in sexually reproducing diploid organisms 7. Mitosis and meiosis are similar in the way chromosomes segregate but differ in the number of cells produced and the genetic content of the daughter cells 8. Separation of the homologous chromosomes in meiosis I ensures that each gamete receives a haploid (1n) set of chromosomes that comprises both maternal and paternal chromosomes. 9. During meiosis I, homologous 	<p><i>Students will be skilled at...I can...</i></p> <ol style="list-style-type: none"> 1. Explain the effect of surface area-to-volume ratios on the exchange of materials between cells or organisms and the environment. 2. Describe the events that occur in the cell cycle. 3. Explain how mitosis results in the transmission of chromosomes from one generation to the next. 4. Describe the effects of disruptions to the cell cycle on the cell or organism. 5. Explain how meiosis results in the transmission of chromosomes from one generation to the next. 6. Describe similarities and/ or differences between the phases and outcomes of mitosis and meiosis. 7. Explain how the process of meiosis generates genetic diversity. 8. Explain how cellular division and differentiation produce and maintain complex organisms 9. Describe the medical uses and controversy surrounding stem cell usage

<p>chromatids exchange genetic material via a process called “crossing over” (recombination), which increases genetic diversity among the resultant gametes.</p> <p>10. Sexual reproduction in eukaryotes involving gamete formation—including crossing over, the random assortment of chromosomes during meiosis, and subsequent fertilization of gametes—serves to increase variation.</p> <p>11. Stem cells are cells that can both self-renew and differentiate</p>	
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Unit Plan

Week 1: (1/26 - 1/28)	How do cells grow and reproduce?
Learning Target(s):	<input type="checkbox"/> Explain the effect of surface area-to-volume ratios on the exchange of materials between cells or organisms and the environment. <input type="checkbox"/> Describe the events that occur in the cell cycle. <input type="checkbox"/> Explain how mitosis results in the transmission of chromosomes from one generation to the next.
Acquired Knowledge:	<input type="checkbox"/> Surface area-to-volume ratios affect the ability of a biological system to obtain necessary resources, eliminate waste products, acquire or dissipate thermal energy, and otherwise exchange chemicals and energy with the environment. <input type="checkbox"/> The surface area of the plasma membrane must be large enough to adequately exchange materials <input type="checkbox"/> The cell cycle is a highly regulated series of events for the growth and reproduction of cells <input type="checkbox"/> Mitosis is a process that ensures the transfer of a complete genome from a parent cell to two genetically identical daughter cells
Skills,	<input type="checkbox"/> Surface Area to Volume Lab

Activities, Due Dates and Assessments:	<input type="checkbox"/> Cell Cycle Activity
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Week 2: 2/3 - 2/4)	How do cells grow and reproduce?
Learning Target(s):	<input type="checkbox"/> Describe the events that occur in the cell cycle. <input type="checkbox"/> Explain how mitosis results in the transmission of chromosomes from one generation to the next. <input type="checkbox"/> Describe the effects of disruptions to the cell cycle on the cell or organism.
Acquired Knowledge:	<input type="checkbox"/> The cell cycle is a highly regulated series of events for the growth and reproduction of cells <input type="checkbox"/> Mitosis is a process that ensures the transfer of a complete genome from a parent cell to two genetically identical daughter cells <input type="checkbox"/> Disruptions to the cell cycle may result in cancer and/or programmed cell death
Skills, Activities, Due Dates and Assessments:	<input type="checkbox"/> Mitosis Project

Week 3: (2/7 - 2/11)	How do cells grow and reproduce?
Learning Target(s):	<input type="checkbox"/> Describe the events that occur in the cell cycle. <input type="checkbox"/> Explain how mitosis results in the transmission of chromosomes from one generation to the next. <input type="checkbox"/> Describe the effects of disruptions to the cell cycle on the cell or organism.
Acquired	<input type="checkbox"/> The cell cycle is a highly regulated series of events for the growth and

Knowledge:	reproduction of cells <input type="checkbox"/> Mitosis is a process that ensures the transfer of a complete genome from a parent cell to two genetically identical daughter cells <input type="checkbox"/> Disruptions to the cell cycle may result in cancer and/or programmed cell death
Skills, Activities, Due Dates and Assessments:	<input type="checkbox"/> Mitosis Project

Week 4: (2/14 - 2/18)	How do cells grow and reproduce? What processes are responsible for life's unity and diversity?
Learning Target(s):	<input type="checkbox"/> Describe the events that occur in the cell cycle. <input type="checkbox"/> Explain how mitosis results in the transmission of chromosomes from one generation to the next. <input type="checkbox"/> Describe the effects of disruptions to the cell cycle on the cell or organism <input type="checkbox"/> Explain how meiosis results in the transmission of chromosomes from one generation to the next. <input type="checkbox"/> Describe similarities and/ or differences between the phases and outcomes of mitosis and meiosis. <input type="checkbox"/> Explain how the process of meiosis generates genetic diversity.
Acquired Knowledge:	<input type="checkbox"/> The cell cycle is a highly regulated series of events for the growth and reproduction of cells <input type="checkbox"/> Mitosis is a process that ensures the transfer of a complete genome from a parent cell to two genetically identical daughter cells <input type="checkbox"/> Disruptions to the cell cycle may result in cancer and/or programmed cell death <input type="checkbox"/> Meiosis is a process that ensures the formation of haploid gamete cells in sexually reproducing diploid organisms <input type="checkbox"/> Mitosis and meiosis are similar in the way chromosomes segregate but differ in the number of cells produced and the genetic content of the daughter cells <input type="checkbox"/> Separation of the homologous chromosomes in meiosis I ensures that each gamete receives a haploid (1n) set of chromosomes that comprises both

	<p>maternal and paternal chromosomes.</p> <ul style="list-style-type: none"> <input type="checkbox"/> During meiosis I, homologous chromatids exchange genetic material via a process called “crossing over” (recombination), which increases genetic diversity among the resultant gametes. <input type="checkbox"/> Sexual reproduction in eukaryotes involving gamete formation—including crossing over, the random assortment of chromosomes during meiosis, and subsequent fertilization of gametes—serves to increase variation.
Skills, Activities, Due Dates and Assessments:	<ul style="list-style-type: none"> <input type="checkbox"/> Time for Mitosis Lab <input type="checkbox"/> Meiosis Web Activity <input type="checkbox"/> Snurfle Meiosis

Week 5: (2/21 - 2/25)	<p>How do cells grow and reproduce?</p> <p>What processes are responsible for life’s unity and diversity?</p>
Learning Target(s):	<ul style="list-style-type: none"> <input type="checkbox"/> Explain how cellular division and differentiation produce and maintain complex organisms <input type="checkbox"/> Describe the medical uses and controversy surrounding stem cell usage
Acquired Knowledge:	<ul style="list-style-type: none"> <input type="checkbox"/> Stem cells are cells that can both self-renew and differentiate
Skills, Activities, Due Dates and Assessments:	<ul style="list-style-type: none"> <input type="checkbox"/> Stem Cells Activity <input type="checkbox"/> Mitosis and Meiosis Unit Review <input type="checkbox"/> Mitosis and Meiosis Unit Test

Assessment Details

Evidence	
I will check students' understanding throughout the unit by...	
Summative	Formative

<p>Unit Test</p> <ul style="list-style-type: none"> • Multiple Choice and Free Response Question assessment <p>Labs and Project</p> <ul style="list-style-type: none"> • Students will conduct several lab investigations that will give them hands-on experience working with organisms, equipment, and techniques that will help reinforce concepts, ideas, and skills learned in class. Through lab exercises and projects, students will have the opportunity to experience science by using scientific research procedures. 	<p>Homework/Classwork</p> <ul style="list-style-type: none"> • Homework and class activities will provide myself and the students with information about their understanding.
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