

Time Frame: Apr-Jun	Unit Title: Cells, Specialization, and Variation: Disease Storyline and Case Study	Course Name: Biology (CP and honors)
Stage 1 - Desired Results		
Established Goals NGSS performance expectations (HS-LS) LS1-1: Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells. LS1-3: Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. LS1-4: Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms. LS3-1: Ask questions to	Transfer	
	<i>Students will be able to independently use their learning to...</i> analyze how mutations in DNA can impact the cell cycle in an unfamiliar scenario, changing the homeostasis and survival of systems of cells and the organism.	
	Meaning	
	UNDERSTANDINGS <i>Students will understand that....</i> All cells contain genetic information in the form of DNA molecules. DNA is organized in cells into chromosomes. Each chromosome consists of a single very long DNA molecule, and each gene on the chromosome is a particular segment of that DNA. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. The instructions for forming species' characteristics are carried in DNA. All cells in an organism have the same genetic content, but the genes used (expressed) by the cell may be regulated in different ways. Differences in DNA are passed from parents to offspring through patterns of inheritance, meaning that differences in traits are also inherited. Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation	ESSENTIAL QUESTIONS <i>Students will keep considering...</i> What is cancer? What causes cancer? Why is cancer so difficult to treat? How are cancer cells different from other body cells? How is DNA inherited, when cells reproduce and when organisms reproduce? What causes mutations?

<p>clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.</p> <p>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.</p>	<p>and distribution of traits observed depends on both genetic and environmental factors.</p> <p>In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism. In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation. Although DNA replication is tightly regulated and remarkably accurate, errors do occur and result in mutations, which are also a source of genetic variation. Environmental factors can also cause mutations in genes (in DNA), and viable mutations are inherited.</p>	
<p>Acquisition</p>		
	<p><i>Students will know...</i></p> <ul style="list-style-type: none"> - basic structure of DNA, RNA, and proteins - how DNA is transcribed into RNA and how RNA is translated into amino acids of protein - ways inheritable genetic variation can be made - features of Punnett squares and pedigrees - phases of mitosis (boundary: does not include rote memorization of phases) - phases of meiosis (boundary: does not include rote memorization of phases) 	<p>Students will be skilled at...</p> <p>8 science & engineering practices (NGSS)</p> <ul style="list-style-type: none"> ● Asking questions and defining problems ● Developing and using models ● Planning and carrying out investigations ● Analyzing and interpreting data ● Using mathematics and computational thinking

	<ul style="list-style-type: none"> - cells have specialized functions within organisms - organisms are complex collections of cells, balanced and regulated through homeostatic feedback mechanisms 	<ul style="list-style-type: none"> • Constructing explanations and designing solutions • Engaging in argument from evidence • Obtaining, evaluating, and communicating information <ul style="list-style-type: none"> - using data to support arguments for causes and effects of genetic variation - modeling processes of cell division for cell replication (mitosis) or organismal sexual reproduction (meiosis) - explaining and demonstrating how the structure of DNA determines the structure of proteins through transcription and translation - asking questions to clarify relationships about the role of DNA and chromosomes for passing traits from parents to offspring - defending a claim with evidence about the origin of genetic traits - obtain and communicate information about specialized cells in an organism and how they are regulated as part of homeostasis
--	---	---