Subject and Grade:	Living Environment 10th Grade	School Year:	2023-2024
Unit Title:	African Storyline	Author/s:	Michele Shaw

NYS Next Gen Learning Standards	Essential Question/Big Ideas
HS-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. **HS-LS1-2**. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. **HS-LS1-3**. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis **HS-LS1-6**. Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements such as nitrogen, sulfur, and phosphorus to form amino acids and other carbon-based molecules. **HS-LS1-7**. Use a model to illustrate that aerobic cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy. **HS-LS2-1**. Use mathematical and/or computational representations to support explanations of biotic and abiotic factors that affect carrying capacity of ecosystems at different scales. **HS-LS2-2**. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.	**Driving Questions and anchoring phenomenon** ● How do organisms get what they need to survive? ● Why are lions living in groups? ● How do we know which lions are related? ● How is life similar or different among the different lion populations? ● How do different organisms obtain their energy? ● What is the primary source of energy and how does a carnivore differ from a herbivore or an omnivore? ● How do humans impact food webs? ● Why are elephants important and what threats do they face? ● What do plants need to survive and how have they adapted to survive in the african savanna?

HS-LS2-3. Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in ecosystems **HS-LS2-4**. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. **HS-LS2-6**. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem. **HS-LS2-7**. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity. **HS-LS2-8**. Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce **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, (3) mutations caused by environmental factors and/or (4) genetic engineering. **HS-LS3-3**. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population. **HS-LS4-1**. Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. **HS-LS4-2**. Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the	

environment	

Brief Unit Summary	**Content Vocabulary**
Ecology - Interactions of organisms with each other and their environment. Characteristics of living things and how energy is passed down through the ecosystem.	-DNA -Karyotype -Chromosomes -Organism -Adaptation -Gene -Allele -Genotype -Homozygous -Heterozygous -Geography -Phylogenetic tree -Producer -Consumer -Niche -Herbivore -Carnivore -Omnivore -Detritivore -Decomposer -Food Web -Food Chain -Energy pyramid -Trophic level -Protein -Carbohydrate -Fat(Lipid)

	-Macromolecule -Amino Acid -Photosynthesis -Cellular Respiration -DNA Fingerprinting -Interspecific Competition -Intraspecific Competition -Mitosis -Nitrogen cycle

Content Skills or Learning Targets	**Assessments (Pre-Assessments, Formative, and Summative)**	**Timeframe**
Science and Engineering Practices: SEP 1: Asking questions and defining problems SEP 2: Developing and using models SEP 3: Planning and carrying out investigations SEP 4: Analyzing and interpreting data SEP 5: Using mathematics and computational thinking SEP 6: Constructing explanations and designing solutions SEP 8: Obtaining, evaluating & communicating information	Questioning Forms Self and Peer Assessments Karyotype Assessment Labs Concept Maps CERs Exit Tickets Summative Evaluations Formative Assessment Ideas	September - December

Cross Cutting Concepts: **Systems and System Models** ▪ Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales. **Structure and Function** ▪ Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem. **Stability and Change** ▪ Feedback (negative or positive) can stabilize or destabilize a system. Connections **Energy and Matter** ▪ Changes of energy and matter in a system can be described in terms of energy and matter flows into, out of, and within that system. ▪ Energy can be transferred between one place and another place, between objects and/or fields, or between systems. ▪ Energy drives the cycling of matter within and between systems.	Formative Assessment Ideas (starts on page 38) Summative Assessment Ideas	

Cause and Effect ▪ Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. **Scale, Proportion, and Quantity** ▪ The significance of a phenomenon is dependent on the scale, proportion, and quantity at which it occurs. ▪ Using the concept of orders of magnitude allows one to understand how a model at one scale relates to a model at another scale.		

Differentiation/Enrichment	Materials	Resources

Subject and Grade:	**Living Environment 10th Grade**	**School Year:**	2023-2024
Unit Title:	**Homeostasis Storyline**	**Author/s:**	Michele Shaw

NYS Next Gen Learning Standards	**Essential Question/Big Ideas**
HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	**Driving Questions and anchoring phenomenon** Energy flow and feeding relationships in the Pacific Northwest What limits populations?

HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis **HS-LS1-5**. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy **HS-LS2-1**. Use mathematical and/or computational representations to support explanations of biotic and abiotic factors that affect carrying capacity of ecosystems at different scales. **HS-LS2-2**. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. **HS-LS2-3**. Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in ecosystems **HS-LS2-4**. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem **HS-LS2-5**. Develop a model to illustrate the role of various processes in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere **HS-LS2-6**. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem. **HS-LS4-2**. Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment	• What is carrying capacity? • What happened to the urchin population? • What effect(s) does atmospheric CO2 have on ocean acidification? • How do nutrients cycle in the ecosystem? • How are organisms interdependent within their environment? • How have humans impacted the ecosystem and its communities? • How does homeostasis maintain balance in ecosystems? • How does homeostasis maintain balance in organisms? • How does homeostasis maintain balance in cells?

HS-LS4-3. Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait. **HS-LS4-4**. Construct an explanation based on evidence for how natural selection leads to adaptation of populations. **HS-LS4-5**. Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species	

Brief Unit Summary	**Content Vocabulary**
Cycling of matter through the ecosystem Cycles - photosynthesis and cellular respiration Human impact on sea otter populations Feedback mechanisms Cell organelles	• homeostasis • Biotic • Abiotic • Food Chain • Food web • Energy pyramid • Ecosystem • Community • population • carrying capacity • Phenotype • Genetic drift • Genotype • Phenotype • Equilibrium • Diffusion • Natural Selection

	• Acidification

Content Skills or Learning Targets	Assessments (Pre-Assessments, Formative, and Summative)	Timeframe
Science and Engineering Practices: SEP 1: Asking questions and defining problems SEP 2: Developing and using models SEP 3: Planning and carrying out investigations SEP 4: Analyzing and interpreting data SEP 5: Using mathematics and computational thinking SEP 6: Constructing explanations and designing solutions SEP 7: Engaging in argument from evidence SEP 8: Obtaining, evaluating & communicating information **Cross Cutting Concepts:** **Systems and System Models** ▪ Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales.	Questioning Forms Self and Peer Assessments Formative Assessments Labs Exit Tickets CERs Concept Maps Modeling activities Summative Evaluations Formative Assessment Ideas Formative Assessment Ideas (starts on page 38) Summative Assessment Ideas	January - Mid March

Structure and Function ▪ Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem. **Stability and Change** ▪ Feedback (negative or positive) can stabilize or destabilize a system. Connections **Energy and Matter** ▪ Changes of energy and matter in a system can be described in terms of energy and matter flows into, out of, and within that system. ▪ Energy can be transferred between one place and another place, between objects and/or fields, or between systems. ▪ Energy drives the cycling of matter within and between systems. **Cause and Effect** ▪ Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. **Scale, Proportion, and Quantity** ▪ The significance of a phenomenon is dependent on the scale, proportion, and quantity at which it occurs. ▪ Using the concept of orders of magnitude allows one to understand how a		

model at one scale relates to a model at another scale. **Patterns** ▪ Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.		

Differentiation/Enrichment	Materials	Resources

Subject and Grade:	**Living Environment 10th Grade**	**School Year:**	2023-2024
Unit Title:	**Melanin Storyline**	**Author/s:**	Michele Shaw

NYS Next Gen Learning Standards	**Essential Question/Big Ideas**
HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out	**Driving Questions and anchoring phenomenon**

the essential functions of life through systems of specialized cells. **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, (3) mutations caused by environmental factors and/or (4) genetic engineering. **HS-LS3-3**. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population. **HS-LS4-3**. Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait. **HS-LS4-4**. Construct an explanation based on evidence for how natural selection leads to adaptation of populations. **HS-LS4-5**. Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species	• How do traits vary among individuals? • How does albinism happen? Do children get it from their parents? • How is albinism passed down from parents? How does each parent pass traits down to their children? How can children from the same parents be so different? • Did geography play a role in the evolution of different skin colors? • What causes differences in skin color? What is the role of the environment in the evolution of skin color? • How do traits occur in organisms? • What makes one trait different from another trait? • How are proteins used by organisms? • How do genotype and phenotype impact natural selection?

Brief Unit Summary	**Content Vocabulary**
Discovery of how albinism shows up in the human and mice populations. Understanding of chromosomes, DNA, and how traits are passed down Students work with pedigree charts to predict inherited traits.	☐ Genetics ☐ Heredity ☐ Traits

Practice coding for melanin using protein synthesis Natural selection selects for traits that make an organism better fit for their environment.	☐ Sperm, Egg, Zygote ☐ Homologous Chromosomes ☐ Gene, Locus, Alleles ☐ Dominant, Recessive ☐ Genotype, Phenotype ☐ Pedigree ☐ Albinism ☐ Pigments ☐ Sex-linked traits ☐ Protein Synthesis ☐ Transcription, Translation ☐ Mutations ☐ Natural Selection ☐ Mitosis, Meiosis

Content Skills or Learning Targets	**Assessments (Pre-Assessments, Formative, and Summative)**	**Timeframe**
Science and Engineering Practices SEP 1: Asking questions and defining problems SEP 2: Developing and using models SEP 4: Analyzing and interpreting data SEP 5: Using mathematics and computational thinking **Cross Cutting Concepts:**	Questioning Forms Self and Peer Assessments Formative Assessments Labs Exit Tickets CERs Concept Maps	Mid March - Mid May

Structure and Function ▪ Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem. **Cause and Effect** ▪ Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. **Scale, Proportion, and Quantity** ▪ The significance of a phenomenon is dependent on the scale, proportion, and quantity at which it occurs. ▪ Using the concept of orders of magnitude allows one to understand how a model at one scale relates to a model at another scale. **Patterns** ▪ Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.	Modeling activities Summative Evaluations Formative Assessment Ideas Formative Assessment Ideas (starts on page 38) Summative Assessment Ideas	

Differentiation/Enrichment	Materials	Resources

Subject and Grade:	**Living Environment 10th Grade**	**School Year:**	2023-2024
Unit Title:	**Disease Storyline**	**Author/s:**	Michele Shaw

NYS Next Gen Learning Standards	Essential Question/Big Ideas
HS-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. **HS-LS1-4**. Use a model to illustrate cellular division (mitosis) and differentiation **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, (3) mutations caused by environmental factors and/or (4) genetic engineering. ELA Next Generation Standards Crosswalk Math Next Generation Standards Crosswalk Science Standards Social Studies Standards Arts Standards Music Standards Business Standards Physical Education Standards Health and FACS Standards ISTE Standards Information Fluency Continuum Standards	**Driving Questions and anchoring phenomenon** • How are cancer cells different from “normal cells”**?** • How are cancer cells different from “normal” cells? • How do cells multiply for organism growth or repair in mitosis? • How does a cell know when to divide and when not to divide? • What happens when the cell is not properly regulated during cell division? • Why do cells need to die? • Where are the instructions that cells use to divide properly? • How do existing cells pass the directions on to new cells? • What happens if there is a mistake in the DNA? • Why are cells dividing more/faster? • Why don't Henrietta’s children have immortal cells? • How are mitosis and meiosis different? • How is DNA used by viruses?

Foreign Language Standards Computer Science and Digital Fluency Standards Technology Standards	

Brief Unit Summary	**Content Vocabulary**
How and when do normal and cancer cells divide? How does each cell get its own copy of DNA? How does a gene help regulate the cell cycle?	☐ Cell cycle and Mitosis ☐ Normal Cells, Cancer Cells ☐ Stem Cells, Differentiation ☐ Meiosis, Mitosis

Content Skills or Learning Targets	**Assessments (Pre-Assessments, Formative, and Summative)**	**Timeframe**
Science & Engineering Practices: SEP 1: Asking questions and defining problems SEP 2: Developing and using models SEP 3: Planning and carrying out investigations SEP 4: Analyzing and interpreting data SEP 7: Engaging in argument from evidence SEP 8: Obtaining, evaluating & communicating information	Questioning Forms Self and Peer Assessments Formative Assessments Labs Exit Tickets CERs Concept Maps Modeling activities Summative Evaluations	Mid May - end of year

Crosscutting Concepts: **Cause and Effect ▪** Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. **Patterns ▪** Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena. **Structure and Function ▪** Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.	Formative Assessment Ideas Formative Assessment Ideas (starts on page 38) Summative Assessment Ideas	

Differentiation/Enrichment	Materials	Resources