

Grade level: 8

Course Title: Science 8

Topic/Concept: Nature of Science

Time Allotment: 10 days

Unit Sequence: 1

Major Concepts to be learned:

- How does scientific knowledge develop?
- What is a scientist or engineer and what do they do?
- What types of people can be scientists and engineers?
- What is a controlled experiment and what are the parts?
- What is the difference between a hypothesis, theory, and a law?

Expected Skills to be demonstrated:

- I can define science and discuss skills commonly used by all scientists.
- I can explain the purpose of an investigation/experiment.
- I know the difference between a scientific hypothesis, theory, and a law.
- I know and can explain the differences between the scientific method and the engineering process and the purposes of each.
- I know that the scientific/engineering methods are fluid and not limited to the sequence of steps.
- I can engage in scientific experimentation and STEM challenges to model the scientific theory and engineering method.

PA STEELS Standards/NGSS Standards:

SEP/DCI/CCC:

3.5.6-8.L
3.5.6-8.O
3.5.6-8.Q
MS-ETS1-1
MS-ETS1-2

SEP – Planning and Carrying Out Investigation
SEP – Developing and
DCI – Structure and Function
CCC – Scale, Proportion, Quantity
CCC – Connections to Engineering and Tech

Instructional Strategies:

Assessments:

Set Up Binders
Problem solving activities
Lecture
Written work
Hands-on activity
Note Taking

- Lab Safety Quiz
- Variables Quiz
- Interpreting and Analyzing Data Quiz
- Nature of Science Unit Exam
- Nature of Science One-Pager

Grade level: 8

Course Title: Science 8

Topic/Concept: Living Things in the Biosphere

Time Allotment: 18 days

Unit Sequence: 2

Major Concepts to be learned:

- Lesson 1 - Living Things
 - What are the characteristics of life?
 - What evidence is there
 - Where do living things come from?
 - What do living things need to live, grow and reproduce
- Lesson 2 - Classification Systems
 - How are living things classified into groups?
 - How does the theory of evolution support the classification of organisms?
- Lesson 3 - Viruses, Bacteria, Protists and Fungi
 - What are all living things made of?
 - What are the characteristics of viruses, bacteria, protists, and fungi?
 - How do viruses, bacteria, protist and fungi interact with nature and humans?
- Lesson 4 - Plants and Animals
 - What makes animals and plants different in form and function?
 - Which special structures inside plants and animal cells determine an organism's characteristics?
 - How do similar cells work together?
 - What traits are unique to animals?

Expected Skills to be demonstrated:

- Lesson 1 – Living Things
 - I can explain that all living things are made of one or more cells.
 - I can compare unicellular and multicellular organisms.
 - I can describe the characteristics that all living things share
- Lesson 2 – Classification Systems
 - I can explain how living things are classified into groups.
 - I can identify organisms based on their classification.
 - I can explain how the theory of evolution supports the classification of organisms.
- Lesson 3 – Viruses, Bacteria, Protists, and Fungi
 - I can explain that all living things are made of one or more cells.
 - I can compare unicellular and multicellular organisms.
 - I can describe the characteristics of viruses, bacteria, protists, and fungi.
 - I can explain how viruses are similar to and different from living things.
 - I can describe how microorganisms interact with humans and the environment.
- Lesson 4 – Plants and Animals
 - I can compare plant and animal cells based on structure and function.
 - I can identify cell structures that determine an organism's characteristics.
 - I can explain how similar cells work together to form tissues.
 - I can describe the levels of organization in living things.
 - I can identify traits that are unique to animals.

PA STEELS Standards/NGSS Standards:

SEP/DCI/CCC:

3.1.6-8.A,B,J,K,N MS LS1 - 1,2,3 MS LS4 - 2	<p>SEP</p> <ul style="list-style-type: none">• Developing and Using Models• Analyzing and Interpreting Data• Constructing Explanations• Engaging in Argument from Evidence• Obtaining, Evaluating, and Communicating Information <p>DCI</p> <ul style="list-style-type: none">• Structure and Function• Information Processing• Interdependent Relationships in Ecosystems• Evidence of Common Ancestry and Diversity• Biodiversity and Humans <p>CCC</p> <ul style="list-style-type: none">• Patterns• Structure and Function• Systems and System Models• Cause and Effect• Stability and Change
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Instructional Strategies:

Assessments:

Inquiry stations Claim–Evidence–Reasoning (CER) Doodle notes / visual note-taking Interactive dichotomous keys Modeling and drawing activities Concept sorting / card sorts Phenomena-based lesson introductions Graphic Organizers Digital simulations and interactives Collaborative projects Performance tasks	<ul style="list-style-type: none">• Characteristics of Life Quiz• Classification Quiz• Microscopic Organisms Info• Is it Living CER• Living things in the Biosphere Unit Exam• Plant vs Animal Poster Project
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Grade level: 8

Course Title: Science 8

Topic/Concept: The Cell System

Time Allotment: 24 days

Unit Sequence: 3

Major Concepts to be learned:

- Lesson 1 – Structure and Function of Cells
 - What are the components of the cell theory?
 - Why cells the basic unit of life
 - How do living things obtain and use energy?
 - How do we know living things are made of elss?
- Lesson 2 – Cell Structures
 - How are living things classified into groups?
 - How does the theory of evolution support the classification of organisms?
- Lesson 3 – Obtaining and Removing Materials
 - What are all living things made of?
 - What are the characteristics of viruses, bacteria, protists, and fungi?
 - How do viruses, bacteria, protist and fungi interact with nature and humans?
- Lesson 4 – Cell Division
 - What makes animals and plants different in form and function?
 - Which special structures inside plants and animal cells determine an organism's characteristics?
 - How do similar cells work together?
 - What traits are unique to animals?
- Lesson 5 – Photosynthesis
 - How do plants and other organisms use photosynthesis to make food?
 - What are the roles of light, carbon dioxide, water, and chlorophyll in photosynthesis?
 - What role does photosynthesis play in cycling materials and energy through ecosystems?
- Lesson 6 – Cellular Respiration
 - How does cellular respiration break down food to produce energy and carbon dioxide?
 - How can cells release energy without using oxygen?
 - How are matter and energy conserved during cellular respiration?

Expected Skills to be demonstrated:

- Lesson 1 – Structure and Function of Cells
 - I can describe the components of the cell theory.
 - I can distinguish between living and non-living things.
 - I can provide evidence that all living things are made of cells
 - I can explain how living things obtain and use energy.
- Lesson 2 – Cell Structures
 - I can identify the parts of a cell, specifically the nucleus, chloroplasts, mitochondria, cell membrane and cell wall.
 - I can explain how each organelle function contributes to the cell as a whole
 - I can compare the structure and function of plant and animal cells
- Lesson 3 – Obtaining and Removing Materials
 - I can describe the structure and function of the cell wall
 - I can explain how cells obtain energy and remove waste materials.
- Lesson 4 – Cell Division
 - I can describe and explain the phases of the cell cycle
 - I can list the functions of cell division
 - I can differentiate between division in unicellular and multicellular organisms
- Lesson 5 – Photosynthesis
 - I can explain and model how plants and other organisms use photosynthesis to make glucose
 - I can explain the roles of light, CO₂, H₂O and chlorophyll in photosynthesis.
 - I can describe how photosynthesis in the cycling of materials and energy through ecosystems
- Lesson 6 – Cellular Respiration
 - I can describe the processes that cells use to break down glucose using oxygen
 - I can describe how cells can release energy without using oxygen

PA STEELS Standards/NGSS Standards:

SEP/DCI/CCC:

3.1.6-8.A,B,C,F,G,K MS LS1 - 1,2,3,6,7 MS LS2 - 3	Science and Engineering Practices (SEPs) <ul style="list-style-type: none">• Developing and Using Models• Analyzing and Interpreting Data• Constructing Explanations• Engaging in Argument from Evidence• Obtaining, Evaluating, and Communicating Information Disciplinary Core Ideas (DCIs) <ul style="list-style-type: none">• Structure and Function• Growth and Development of Organisms• Organization for Matter and Energy Flow in Organisms• Energy in Chemical Processes and Everyday Life Crosscutting Concepts (CCCs) <ul style="list-style-type: none">• Structure and Function• Systems and System Models• Energy and Matter• Cause and Effect• Stability and Change
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Instructional Strategies:

Assessments:

Inquiry stations Claim–Evidence–Reasoning (CER) Doodle notes / visual note-taking Interactive dichotomous keys Modeling and drawing activities Concept sorting / card sorts Phenomena-based lesson introductions Graphic Organizers Digital simulations and interactives Collaborative projects Performance tasks	<ul style="list-style-type: none">• Cell Theory Graphical Organizer• Spontaneous Generation CER• Cell Parts Quizzes• Microscopy Lab• Cell Membrane Modeling• Mitosis Mover• Photosynthesis and Cellular Respiration Flipbook• Unit 2 Test• Cell Model Project
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Grade level: 8

Course Title: Science 8

Topic/Concept: Human Body Systems

Time Allotment: 20 days

Unit Sequence: 4

Major Concepts to be learned:

- Lesson 1 – Body Organization
 - How do groups of cells form interacting subsystems in the body?
 - How do the structures of specialized organs relate to their functions in the body?
- Lesson 2 - Systems Interacting
 - How do organ systems interact to carry out all the necessary functions for an organism's growth and survival?
 - How do organ systems interact to maintain homeostasis?
- Lesson 3 – Supplying Energy
 - What are the important nutrients your body needs to carry out its processes?
 - How does food become the materials your body can use?
 - How do your body's systems process the food you eat?
- Lesson 4 – Managing Materials
 - How are materials transported in the body?
 - How does the respiratory system interact with other systems to exchange gases?
 - How do the excretory systems interact with other systems to remove wastes from the body?
- Lesson 5 - Controlling Processes
 - Which systems control processes in the human body?
 - How does the body sense and respond to stimuli in the environment?
 - How do the cells that make up the nervous system respond to stimuli?

Expected Skills to be demonstrated:

- Lesson 1 – Body Organization
 - I can list the levels of organization in the body
 - I can describe the organization of body systems
 - I can describe the function of cells, tissue, organs and body systems.
 - I can compare the structure and function of body systems to other systems
 - I can explain the general functions of body systems including how they work together to function
- Lesson 2 – Systems Interacting
 - I can describe and explain:
 - Stimulus-response situations
 - How glands of the endocrine system control body processes
 - How the nervous system compares to the endocrine system
 - How systems interact to maintain homeostasis
 - I can predict
 - What may happen if one body system stops interacting with another
 - How blocked blood vessels affect cells
 - How healthy choices affect organ systems
- Lesson 3 - Supplying Energy
 - I can describe and explain:
 - the important nutrients a body needs to carry out its processes.
 - how the body's systems process the foods you eat.
 - I can provide arguments for:
 - why some food choices are healthier than others.
 - how food becomes materials the body can use.
 - I can analyse proportional relationships to determine the total daily nutrient allowances.
- Lesson 4 – Managing Materials
 - I can explain how body systems interact to transport materials through the body
 - I can use diagrams to explain how the respiratory system interacts with other systems to exchange gases
 - I can explain how other body systems interact to remove waste
- Lesson 5 – Controlling Processes
 - I can explain what systems control process in the human body
 - I can diagram how nerve signals travel
 - I can use models to show how the body senses and reacts to surroundings

PA STEELS Standards/NGSS Standards:

SEP/DCI/CCC:

3.1.6-8.C,G,H MS LS1 - 3,8	<p>Science and Engineering Practices (SEPs)</p> <ul style="list-style-type: none">• Developing and Using Models• Analyzing and Interpreting Data• Constructing Explanations• Engaging in Argument from Evidence• Using Mathematics and Computational Thinking <p>Disciplinary Core Ideas (DCIs)</p> <ul style="list-style-type: none">• Structure and Function• Growth and Development of Organisms• Organization for Matter and Energy Flow in Organisms• Energy in Chemical Processes and Everyday Life <p>Crosscutting Concepts (CCCs)</p> <ul style="list-style-type: none">• Structure and Function• Systems and System Models• Energy and Matter• Cause and Effect• Stability and Change
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Instructional Strategies:

Assessments:

Inquiry stations Claim–Evidence–Reasoning (CER) Doodle notes / visual note-taking Interactive dichotomous keys Modeling and drawing activities Concept sorting / card sorts Phenomena-based lesson introductions Graphic Organizers Digital simulations and interactives Collaborative projects Performance tasks	<ul style="list-style-type: none">• Body Systems Graphical Organizer• Homeostasis Demo Responses• Labeling Activities• Body Systems Card Sort• Mini Quizzes• Worm Dissection• Cricket Dissection• Unit 2 Test• Body System Poster Project
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Grade level: 8

Course Title: Science 8

Topic/Concept: Reproduction & Growth

Time Allotment: 15 days

Unit Sequence: 5

Major Concepts to be learned:

- Lesson 1 – Patterns of Reproduction
 - How do organisms reproduce and transfer genes to their offspring?
 - How do offspring produced by asexual reproduction and sexual reproduction compare?
 - Why do different offspring of the same parent(s) usually look different?
- Lesson 2 – Plant Structures for Reproduction
 - How do plants reproduce?
 - How do seeds become new plants?
 - Which specialized structures affect the probability of successful reproduction?
- Lesson 3 – Animal Behaviors for Reproduction
 - What causes animals to behave in certain ways?
 - What are some different ways in which animals reproduce?
 - How can the behaviors of animals increase their chances of reproducing?
- Lesson 4 – Factors Influencing Growth
 - How do environmental and genetic factors influence an organism's growth?
 - What stimulates plant growth?
 - Which factors control plant and animal growth?

Expected Skills to be demonstrated:

- Lesson 1 – Patterns of Reproduction
 - I can explain how organisms reproduce either sexually or asexually and how these reproductive processes result in the transfer of genetic information to their offspring.
 - I can describe how asexual reproduction results in offspring that are genetically identical while sexual reproduction results in offspring with genetic variation.
 - I can articulate how the inheritance of half of an offspring's genes from each parent and how this leads to variations in traits.
- Lesson 2 – Plant Structures for Reproduction
 - I can explain and compare reproductive cycles in plants
 - I can provide descriptions of plant reproduction and seed dispersal
 - I can model the structures and sequence of events in plant reproduction.
- Lesson 3 – Animal Behaviors for Reproduction
 - I can describe how animals use behaviors to increase chances of survival and reproduction
 - I can use models to convey information about types of mating systems
 - I can use models to compare animal migration patterns with human movement patterns
 - I can describe the relationship between fertilization type and parental investment
- Lesson 4 – Factors influencing Growth
 - I can describe the relationship between environmental factors that influence an organism's growth.
 - I can describe the genetic factors that influence an organism's growth
 - I can identify methods to stimulate plant growth
 - I can identify mechanisms that factor and control plant and/or animal growth

PA STEELS Standards/NGSS Standards:

SEP/DCI/CCC:

3.1.6-8.D,E,J MS LS1 - 4,5 MS LS3 - 2	Science and Engineering Practices (SEPs) <ul style="list-style-type: none">• Developing and Using Models• Analyzing and Interpreting Data• Constructing Explanations• Engaging in Argument from Evidence• Using Mathematics and Computational Thinking Disciplinary Core Ideas (DCIs) <ul style="list-style-type: none">• Structure and Function• Growth and Development of Organisms• Organization for Matter and Energy Flow in Organisms• Energy in Chemical Processes and Everyday Life Crosscutting Concepts (CCCs) <ul style="list-style-type: none">• Structure and Function• Systems and System Models• Energy and Matter• Cause and Effect• Stability and Change
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Instructional Strategies:

Assessments:

Inquiry stations Claim–Evidence–Reasoning (CER) Doodle notes / visual note-taking Interactive dichotomous keys Modeling and drawing activities Concept sorting / card sorts Phenomena-based lesson introductions Graphic Organizers Digital simulations and interactives Collaborative projects Performance tasks	<ul style="list-style-type: none">• Reproductive strategies chart• Mitosis Spinner• Seed dispersal Graphical Organizer• Quizzes• Vocab• Unit 5 Test
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Grade level: 8

Course Title: Science 8

Topic/Concept: Ecosystems

Time Allotment: 12 days

Unit Sequence: 6

Major Concepts to be learned:

- Lesson 1 – Living Things and the Environment
 - How are populations affected by changes to the amount and availability of resources?
 - How are populations size and resources availability related?
- Lesson 2 - Energy flow in Ecosystems
 - What are the energy roles in an ecosystem?
 - How is energy transferred between living and nonliving parts of an ecosystem
 - How is energy conserved in an ecosystem?
- Lesson 3 Cycles of Matter
 - How is matter transferred between the living and nonliving parts of an ecosystem?
 - How is matter conserved in an ecosystem?

Expected Skills to be demonstrated:

- Lesson 1 – Living Things and the Environment
 - I can explain how changes in the amount and availability of resources affect populations within an ecosystem.
 - I can predict the size of a population as it is directly affected by the availability of resources
- Lesson 2 – Energy Flow in Ecosystems
 - I can model how energy enters an ecosystem
 - I can describe the roles of producers, consumers, and decomposers in cycling energy through an ecosystem
 - I can model the flow of energy between living and nonliving things in a food web
 - I can explain how energy is conserved within an ecosystem
- Lesson 3 - Cycles of Matter
 - I can explain how matter is transferred between living and nonliving parts of an ecosystem
 - I can explain how matter is conserved in an ecosystem

PA STEELS Standards/NGSS Standards:

SEP/DCI/CCC:

3.1.6-8.I,J,K,L,M,N,O,P MS LS2 - 1,3	<p>Science and Engineering Practices (SEPs)</p> <ul style="list-style-type: none">• Developing and Using Models• Analyzing and Interpreting Data• Constructing Explanations• Engaging in Argument from Evidence• Using Mathematics and Computational Thinking <p>Disciplinary Core Ideas (DCIs)</p> <ul style="list-style-type: none">• Structure and Function• Growth and Development of Organisms• Organization for Matter and Energy Flow in Organisms• Energy in Chemical Processes and Everyday Life <p>Crosscutting Concepts (CCCs)</p> <ul style="list-style-type: none">• Structure and Function• Systems and System Models• Energy and Matter• Cause and Effect• Stability and Change
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Instructional Strategies:

Assessments:

Inquiry stations Claim–Evidence–Reasoning (CER) Doodle notes / visual note-taking Interactive dichotomous keys Modeling and drawing activities Concept sorting / card sorts Phenomena-based lesson introductions Graphic Organizers Digital simulations and interactives Collaborative projects Performance tasks	<ul style="list-style-type: none">• Matter and Energy Flow Chart• Biotic/Abiotic Scavenger hunt• CER – Biotic/Abiotic (Review COL)• Vocab• Unit 6 Test
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Grade level: 8

Course Title: Science 8

**Topic/Concept: Populations, Communities,
& Ecosystems**

Time Allotment: 15 days

Unit Sequence: 7

Major Concepts to be learned:

- Lesson 1 – interactions in Ecosystems
 - How can resource availability affect interactions between organisms?
 - How is population size affected by predation and symbiotic relationships?
 - How are patterns of interactions between organisms similar in different ecosystems?
- Lesson 2 - Dynamic and Resilient Ecosystems
 - How can changes to a physical or biological component of an ecosystem affect organisms and populations?
 - How do natural events impact the environment?
 - How do human activities impact the ecosystem?
- Lesson 3 - Biodiversity
 - What is the value of biodiversity?
 - What factors affect biodiversity?
 - How do human activities impact biodiversity?
- Ecosystem Services
 - Why is it important to maintain healthy ecosystems?
 - Which supporting services are necessary to all other ecosystem services?
 - How does biodiversity impact ecosystem services?

Expected Skills to be demonstrated:

- Lesson 1 –Interaction in Ecosystems
 - I can use data to predict the cause and effect of the amount and availability of a given resource on its population
 - I can use data to predict the impact of resource availability on competition
 - I can describe predator and symbiotic relationships and their influence of populations
 - I can explain competition, predation and symbiotic relationships across ecosystems.
- Lesson 2 – Dynamic and Resilient Ecosystems
 - I can explain how changes to physical or biological components of an ecosystem affect organisms and populations
 - I can explain relationships between changes in components of an ecosystem and changes in populations
 - I can explain human impacts on ecosystems
- Lesson 3 - Biodiversity
 - I can describe direct and indirect values of biodiversity
 - I can describe the need to protect global biodiversity
 - I can explain how human population density affects biodiversity
- Lesson 4 – Ecosystem Services
 - I can defend the role of healthy ecosystems
 - I can explain the importance of maintaining healthy ecosystems
 - I can explain which supporting services are necessary for all other ecosystems.
 - I can describe the impact of biodiversity on ecosystem services.

PA STEELS Standards/NGSS Standards:

SEP/DCI/CCC:

3.1.6-8.I,J,K,L,M,N,O,P MS LS2 - 1,2,3,4,5	<p>Science and Engineering Practices (SEPs)</p> <ul style="list-style-type: none">• Developing and Using Models• Analyzing and Interpreting Data• Constructing Explanations• Engaging in Argument from Evidence• Using Mathematics and Computational Thinking <p>Disciplinary Core Ideas (DCIs)</p> <ul style="list-style-type: none">• Structure and Function• Growth and Development of Organisms• Organization for Matter and Energy Flow in Organisms• Energy in Chemical Processes and Everyday Life <p>Crosscutting Concepts (CCCs)</p> <ul style="list-style-type: none">• Structure and Function• Systems and System Models• Energy and Matter• Cause and Effect• Stability and Change
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Instructional Strategies:

Assessments:

Inquiry stations Claim–Evidence–Reasoning (CER) Doodle notes / visual note-taking Interactive dichotomous keys Modeling and drawing activities Concept sorting / card sorts Phenomena-based lesson introductions Graphic Organizers Digital simulations and interactives Collaborative projects Performance tasks	<ul style="list-style-type: none">• Ecosystem Level Sorting• PhET Ecosystem Simulation• Population Dynamics Graphical Analysis• CER – Predation• 12*12 Biodiversity Assessment• Unit 7 Test• Food Chain and Food Web Poster
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Grade level: 8

Course Title: Science 8

Topic/Concept: Gene & Heredity

Time Allotment: 20 days

Unit Sequence: 8

Major Concepts to be learned:

- Lesson 1 – Patterns of Inheritance
 - How did Gregor Mendel advance the fields of genetics and inheritance?
 - How are inherited alleles related to an organisms traits?
 - How is probability related to inheritance?
- Lesson 2 - Chromosomes and Inheritance
 - What is the relationship among genes, chromosomes, and inheritance?
 - How is a pedigree used to track inheritance?
 - How does the formations of sex cells during meiosis differ from the process of cell division?
- Lesson 3 – Genetic Coding and Protein Synthesis
 - Why do cells undergo DNA replication?
 - How do cells make proteins?
 - Why do cells undergo protein synthesis?
- Lesson 4 – Trait Variations
 - How do genes on sex chromosomes determine different traits?
 - How do mutations affect protein synthesis and increase variation?
 - How does the environment influence genetic traits?
- Lesson 5 – Genetic Technologies
 - How do humans use artificial selection to produce organisms with desired traits?
 - How do scientists engineer new genes?
 - How can genetic information be used?

Expected Skills to be demonstrated:

- Lesson 1 – Patterns of Inheritance
 - I can recall Gregor Mendel's contributions to the fields of genetics and inheritance
 - I can describe how variations of traits between parents and offspring arise from variations between genes/alleles from each parent
 - I can use a model to predict the probability of inheritance of specific genetic variations
- Lesson 2 – Chromosomes and Inheritance
 - I can differentiate between genes, alleles and chromosomes to determine how they are related to inheritance
 - I can describe the cause and effect of the influence of pedigree on variations in inherited traits across generations
 - I can compare and contrast the formation of sex cells and the process of cell division
- Lesson 3 - Genetic Coding and Protein Synthesis
 - I can describe why cells undergo DNA replication
 - I can use a model to explain how cells make protein
 - I can explain why cells undergo protein synthesis
- Lesson 4 – Trait Variations
 - I can explain sex linked inheritance using a Punnett square
 - I can analyse indicators of sex linked disease
 - I can model how genetic mutations occur
 - I can explain the role of the environment in genetic mutations
- Lesson 5 – Genetic Technologies
 - I can explain how humans use artificial selection to produce organisms with desired traits
 - I can explain how scientists engineer new genes
 - I can provide evidence for how genetic information can be used

PA STEELS Standards/NGSS Standards:

SEP/DCI/CCC:

3.1.6-8.F,G,H,M,N,R,S MS LS3 - 1,2 MS LS4 - 4,5	Science and Engineering Practices (SEPs) <ul style="list-style-type: none">• Developing and Using Models• Analyzing and Interpreting Data• Constructing Explanations• Engaging in Argument from Evidence• Using Mathematics and Computational Thinking Disciplinary Core Ideas (DCIs) <ul style="list-style-type: none">• Structure and Function• Growth and Development of Organisms• Organization for Matter and Energy Flow in Organisms• Energy in Chemical Processes and Everyday Life Crosscutting Concepts (CCCs) <ul style="list-style-type: none">• Structure and Function• Systems and System Models• Energy and Matter• Cause and Effect• Stability and Change
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Instructional Strategies:

Assessments:

Inquiry stations Claim–Evidence–Reasoning (CER) Doodle notes / visual note-taking Interactive dichotomous keys Modeling and drawing activities Concept sorting / card sorts Phenomena-based lesson introductions Graphic Organizers Digital simulations and interactives Collaborative projects Performance tasks	<ul style="list-style-type: none">• Pea Plant CER• Trait inventory• Punnett square practice• Playdoh Protein synthesis• Dire Wolves CER• Unit 8 Test• Super Hero Genetics Project
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Grade level: 8

Course Title: Science 8

Topic/Concept: Natural Selection & Change Over Time

Time Allotment: 18 days

Unit Sequence: 9

Major Concepts to be learned:

1. Lesson 1 – Early Study of Evolution
 - a. What processes explain how organisms can change over time?
 - b. What observations and evidence support the theory of evolution?
2. Lesson 2 - Natural Selection
 - a. How does natural selection lead to change over time in organisms?
 - b. What are the roles of genes, mutations and the environment in natural selection?
3. Lesson 3 – The Process of Evolution
 - a. How do natural selection and inherited variations influence a population?
 - b. How does sexual selection influence a population's genetic variation?
 - c. How is species interaction a factor in evolution?
4. Lesson 4 – Evidence in the Fossil Record
 - a. What supports evidence for the scientific theory of evolution?
 - b. How do fossils show change over time?
 - c. What does the early development of different organisms tell us about evolution?
 - d. How does failure to adapt to a changing environment lead to a species extinction?
5. Lesson 5 – Other Evidence of Evolution
 - a. How does modern technology provide evidence that all organisms have a common ancestor?
 - b. What new discoveries about evolution has modern technology made possible?

Expected Skills to be demonstrated:

- Lesson 1 – Early Study of Evolution
 - I can describe how organisms can change over time
 - I can provide reasoning to support the theory of evolution
- Lesson 2 – Natural Selection
 - I can explain how natural selection leads to change over time in organisms
 - I can explain the roles of genes, mutations and the environment in natural selection
- Lesson 3 - The process of Evolution
 - I can use math to explain how natural selection and inherited variations influence a population
 - I can use evidence to explain the influence of sexual selection on a population's genetic variation
 - I can describe the interactions between species that influence evolution
- Lesson 4 – Evidence in the Fossil Record
 - I can use data to support the theory of evolution
 - I can explain how fossils show change over time
 - I can use models to explain what early development tells us about evolution
 - I can use math to explain how failure to adapt to environmental changes can lead to species extinction
- Lesson 5 – Other Evidence of Evolution
 - I can use math to explain how modern technology provides evidence that all organisms have a common ancestor
 - I can explain how modern technology has made new discoveries about evolution possible

PA STEELS Standards/NGSS Standards:

SEP/DCI/CCC:

3.1.6-8.O,P,Q,R,S,T
MS LS4 - 1,2,3,4,5,6

- Science and Engineering Practices (SEPs)
- Developing and Using Models
 - Analyzing and Interpreting Data
 - Constructing Explanations
 - Engaging in Argument from Evidence
 - Using Mathematics and Computational Thinking
- Disciplinary Core Ideas (DCIs)
- Structure and Function
 - Growth and Development of Organisms
 - Organization for Matter and Energy Flow in Organisms
 - Energy in Chemical Processes and Everyday Life
- Crosscutting Concepts (CCCs)
- Structure and Function
 - Systems and System Models
 - Energy and Matter
 - Cause and Effect
 - Stability and Change

Instructional Strategies:

Assessments:

Inquiry stations
Claim–Evidence–Reasoning (CER)
Doodle notes / visual note-taking
Interactive dichotomous keys
Modeling and drawing activities
Concept sorting / card sorts
Phenomena-based lesson introductions
Graphic Organizers
Digital simulations and interactives
Collaborative projects
Performance tasks

- PhET Natural Selection
- Natural/Artificial Selection Sorting
- EoE Graphic Organizer
- COT CER
- Unit 9 Test
- Adaption Presentation

