Unit: OTP 10 Life Science Biology

Content Area: **Science**
Course(s): **OTP Science**
Time Period: **year**
Length: **40 Weeks**
Status: **Published**

Unit Overview

This unit is designed to have students explore and demonstrate the scientific process, and will explore characteristics of plants and animals as well as the processes that are important for their survival. In addition, students will learn about the genetics of life and how life on earth evolved.

Transfer

Students will be able to independently use their learning to...

- use the Scientific Method to complete inquiries throughout the Life Science Unit.
- describe the 6 characteristics of life.
- describe the basic characteristics of plants, animals and microorganisms.
- explore and compare the important processes that allow plants, animals and microorganisms to survive.
- describe cell reproduction and division.
- summarize the basic principles of gene structure, gene expression and inheritance.
- discuss the origin of life on earth and how life has evolved.

What kinds of long term, independent accomplilshments are desired?

- Students should be able to use the Scientific Method to complete a science experiment and analyze their results.
- Students should be able to identify the chracteristics of living things and discern these from non-living things.
- Students should be able to compare plants, animals and microorganisms as well as explain how they function and survive.
- Students should be able to explain why cell division and cell reproduction are important in living things.
- Students should be able to describe how an organism passes on its traits.
- Students should be able to discuss the evolution of life on earth and how organisms have evolved over time.

For more information, read the following article by Grant Wiggins.

http://www.authenticeducation.org/ae_bigideas/article.lasso?artid=60

Meaning

Understandings

Students will understand that...

- there is a procedure you can follow to find the answer to a scientific question.
- all life has certain common characteristics that are different from non-living things.
- plants, animals and microorganisms have many similarities and differences.
- there are certain processes that plants, animals and microorganisms have to undergo to survive.
- plants, animals and microorganisms must have a way to grow, change, repair damage and reproduce in order to survive.
- organisms pass on traits to future generations.
- life on earth began billions of years ago and has evolved over time.

What inferences should they make/grasp/realize?

- Scientists use the Scientific Method to make new discoveries and test thoeries and we can use the same method in our own scientific inquiries.
- Living things have qualities that non-living things don't.
- Plants, animals, and microorganisms have many similarities and differences.
- All living things must undergo certain processes to survive.
- All living things grow and change over time.
- All living things pass on their traits to their offspring.
- Life on Earth has been evolving for billions of years ans will continue to evolve.

Essential Questions

Students will keep considering...

- What is Biology? What are other sciences called?
- What is an organism?

- What makes living things different from non-living things? What are the 6 characteristics of life?
- How do organisms respond to their environment?
- What is a cell?
- What are the parts of a cell?
- How to cells get and use energy?
- What is homeostatis and why is it important?
- What is cellular reproduction and division and why are these processes important?
- What happens if cells reproduce or divide incorrectly?
- How are plant and animal cells different?
- What is DNA and what is its purpose?
- What are the kingdoms of life?
- What species are in each kingdom?
- What are the 5 types of animals? What are examples of animals for each type?
- What are characteristics common to all animals?
- What are vertebrates and invertebrates? What are some examples of animals for each type?
- What is the plant kingdom?
- How are plants and animals different?
- What are the parts of a plant and what do they do?
- What is photosynthesis? Why is is important?
- What is fertilization and germination?
- What is the function of fruit and seeds?
- What is cellular respiration and why is it important?
- What is DNA? What is a gene? What is a chromosome?
- What is the purpose of DNA, genes and chromosomes?
- What is mitosis? What is meiosis? What is the purpose of these processes?
- What happens if cells do not reproduce or divide correctly?
- What is gene expression?
- How does an organism pass on its traits?
- What is a mutation? Why is it important?
- What is the thoery of evolution?
- Why is evolution important?
- Where did life on earth come from?

Application of Knowledge and Skill

Students will know...

Students will know...

- how to follow the steps of the Scientific Method to complete a scientific experiment.
- the 6 characteristics of life.
- the basic characteristics of plants, animals and microorganisms.
- the important processes that plants, animals and microorganisms undergo in order to survive.
- how organisms grow, repair themselves and reproduce.
- what DNA, genes and chromosomes are and how they relate to gene expression and inheritance.
- How life on earth originated and evolved.

What facts and basic concepts should students know and be able to recall?

- Students should know how to complete an experiment using the Scientific Method and report their results.
- Students should know the 6 characteristics of life and compare these to non-living things.
- Students should be able to describe the basic characteristics of plants and animals.
- Students should be able to identify the impotant processes that allow plants. animals and microorganisms to survive.
- Students should be able to explain cellular reproduction and division.
- Students should be able to describe DNA, genes and chromosomes and explain gene expression and inheritance.
- Students should know how life on eath originated and explain evolution.

Students will be skilled at...

Students will be skilled at...

- completing and experiment using the Scientific Method.
- identifying the 6 characteristics of life and how living things differ from non-living things.
- explaining and comparing the characteristics of plants, animals and microorganisms.
- identifying the processes plants, animals and microorganisms must undergo to survive.
- explaining cellular reproduction and division.
- recognizing DNA, genes and chromosomes and describing their importance in gene expression and inheritance.
- discussing the origin of life on earth and explaining the process of evolution.

What discrete skills and processes should students be able to use?

- Students should be able to complete an experiment using the Scientific Method and report the results.
- Students should be able to explain the difference between living and non-living things and identify the 6 characteristics of life.

- Students should be able to identify characteristics of and compare plants, animals and microorganisms.
- Students should be able to explain essential processes in plants, animals and microorganisms.
- Students should be able to indentify the processes of cellular reproduction and division.
- Students should be able to discuss the relationship between dna, genes and chromosomes to gene expression and inheritance.
- Students should be able to discuss the origin of life on eath and evolution.

Academic Vocabulary

Scientific Method	Life	Cells	Plants and Animals		Genetics and Evolu
question/ problem	organism	cell	classification	seed	trait
research	biology	cytoplasm	kingdom	root	offspring
hypothesis/ prediction	botany	cell membrane	species	stem	heredity
experiment	zoology	nucleus	protist	leaf	dominant
procedure	genetics	vacuole	algae	photosynthesis	recessive
materials	microbiology	mitochondrion	bacteria	pistil	chromosome
observation	ecology	cellular respiration	fungus	stamen	gene
data	characteristic	cell wall	moneran	pollen	mutation
conclusion	waste	chloroplast	plant	sperm cell	evolution
laboratory	reproduce	chlorophyll	animal	petal	extinct
	environment	DNA	invertebrate	pollination	fossil
	life span	chromosome	parasite	fertilization	paleontology
		mitosis	host	germination	naturalist
		meiosis	mollusk	fruit	natural selection
		cancer	arthropod		
		sexual reproduction	crustacean		
			vertebrate		
			cold-blooded		
			warm-blooded		
			amphibian		
			reptile		
			migrate		
			mammal		

Learning Goal 10-1

- Students will use the Scientific Method to complete an experiment and explain the meaning of their results.

9-12.HS-LS1-1.6.1	Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world

operate today as they did in the past and will continue to do so in the future.

Target 1

- Students will be able to identify and explain the steps of the Scientific Method.

Target 2

- Students will be able to complete a scietific experiment using the steps of the Scientific Method.

Target 3

- Students will design and execute an experiment using the Scientific Method.

Learning Goal 10-2

- Students will define important vocabulary related to the study of life and identify the six characteristics common to all living things.

SCI.K-12.5.6.3 Identify simple processes common to all living things (e.g. growth).

Target 1

- Students will be able to compare the different fields of biology.

Target 2

- Students will be able to identify the 6 main characteristics of life.

Target 3

- Students will be able to give examples of how an organism responds to its environment.

Learning Goal 10-3

- Students will describe the basic characteristics of plants, animals and microorganisms.

SCI.K-12.5.7.2 Identify similarities and differences in plants and animals.

Target 1

- Students will be able to identify the 6 kingdoms of life and give examples of animals in each kingdom.

Target 2

- Students will be able to identify characterisitcs of organisms in each phylum of the plant, animal, protist, moneran and fungus kingdom.

Target 3

- Students will be able to identify the basic parts of a plant and animal cell.

Target 4

- Students will be able to explain how cells get energy and use it including homeostasis and osmosis.

Target 5

- Students will be able to compare and contrast plant and animal cells.

Target 6

- Students will be able to describe DNA and its function.

Learning Goal 10-4

- Explore and compare the important processes that allow plants, animals and microorganisms to grow, reproduce and repair.

SCI.K-12.5.6.2	Demonstrate appropriate care (cleaning, nourishing, maintaining) of living things.
SCI.K-12.5.7.1	Identify characteristics of plants and animals encountered in everyday life.

Target 1

- Students will be able to describe the parts and processes of a plant and their function including photosynthesis, fertilization, germination and pollination.

Target 2

- Students will be able to describe the processes of an animal and their function including cellular respiration and fertilization.

Target 3

- Students will be able to describe cell reproduction and cell division as well as the function of both processes.

Learning Goal 10-5

- Summarize the basic principles of gene structure, gene expression and inheritance.

9-12.HS-LS3-1.LS1.A.1	All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins.
9-12.HS-LS3-2.LS3.B.1	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, and viable mutations are inherited.

Target 1

- Students will be able to identify a chromosome, a gene and DNA as well as describe how they are related.

Target 2

- Students will be able to explain how an organism passes on its traits and compare dominant and recessive traits.

Target 3

- Students will explore the occurance of a mutation and how it effects an organism.

Learning Goal 10-6

- Discuss the origin of life on earth and how life has evolved.

9-12.HS-LS4-2.LS4.B.1	Natural selection occurs only if there is both
9-12.HS-LS4-2.LS4.B.1.1	variation in the genetic information between organisms in a population and
9-12.HS-LS4-2.LS4.B.1.2	variation in the expression of that genetic information—that is, trait variation—that leads to differences in performance among individuals.
9-12.HS-LS4-2.LS4.C	Adaptation

9-12.HS-LS4-2.LS4.C.1	Evolution is a consequence of the interaction of four factors:
9-12.HS-LS4-2.LS4.C.1.1	the potential for a species to increase in number,
9-12.HS-LS4-2.LS4.C.1.2	the genetic variation of individuals in a species due to mutation and sexual reproduction,
9-12.HS-LS4-2.LS4.C.1.3	competition for an environment's limited supply of the resources that individuals need in order to survive and reproduce, and
9-12.HS-LS4-2.LS4.C.1.4	the ensuing proliferation of those organisms that are better able to survive and reproduce in that environment.

Target 1

- Students will be able to discuss the origin of life on Earth.

Target 2

- Students will be able to describe the major thoery of evolution including natural selection.

Target 3

- Students will be able to explain the role of mutations in evolution.

Summative Assessment

Link to summative assesment guidelines and tools: http://www.edudemic.com/summative-and-formative-assessments/

https://sites.educ.ualberta.ca/staff/olenka.bilash/Best%20of%20Bilash/summativeassess.html

- End of semester exam
- End of unit or chapter test
- Essay or report
- Oral examination
- Participation in lecture, discussion or group work
- Performance in task with rubric or checklist
- Presentation
- Project
- Structured observation

21st Century Life and Careers

CRP.K-12.CRP5.1	Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people, organization, and the environment. They are aware of and utilize new technologies, understandings, procedures, materials, and regulations affecting the nature of their work as it relates to the impact on the social condition, the environment and the profitability of the organization.
CRP.K-12.CRP7.1	Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies. They use reliable research process to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices in their workplace situation.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.

Formative Assessment and Performance Opportunities

Link to formative assesment guidelines and tools: http://www.edudemic.com/summative-and-formative-assessments/

https://www.nwea.org/blog/2016/take-three-55-digital-tools-and-apps-for-formative-assessment-success/

https://docs.google.com/presentation/d/1nzhdnyMQmio5lNT75ITB45rHyLISHEEHZlHTWJRqLmQ/pub?start=false&loop=false&delayms=3000#slide=id.gb49e70aa_370

- Do now
- Exit Ticket
- Graphic organizer
- Questioning/ discussion
- Role play
- Simulation
- Task analysis
- Task rubric
- Teacher observation
- Think-pair-share
- Visual representations
- Weekly quiz
- Work product

Accommodations/Modifications

Lessons and accompanying activities will be presented verbally, in writing and with visual examples of varying complexity to accommodate unique learning styles. Extra staff will be available to students to provide

prompting and support. Assessment of skills will be varied based on ability level and will include written tests, projects and summative activities.

- 1:1 instruction
- Community-based instruction
- Cueing/ prompting
- Reinforcement activities
- Role playing/ simulation
- Small group instruction
- Visual supports

Unit Resources