Evolution

Units: Duration- 5-6 weeks and divided into 5 sections

1. What is a Living Thing?
2. Evolution
3. Evolution of Populations
4. Artificial Selection
5. Activities and Labs

Essential Questions/ Big Ideas

- What are organisms? How do you define a living thing?
- What is evolution?
- Who was Charles Darwin? How did his theory of Natural Selection impact the way we think about evolution?
- What are adaptations and how can they impact a species' survival?
- What is artificial selection?
- How can we use phenotypes to make predictions about offspring?

Standards and Access Points

(highlighted in yellow are tested on FSAA)

SC.912.L.15.1 Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.

- SC.912.L.15.In.1 Identify that prehistoric plants and animals changed over time (evolved) or became extinct.
- SC.912.L.15.Su.1 Match fossils to related species.
- SC.912.L.15.Pa.1 Recognize that plants and animals change as they age.

SC.912.L.15.13 Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.

- SC.912.L.15.In.5 Recognize that some living things produce very large numbers of offspring to ensure that enough survive to continue the species (a condition for natural selection).
- SC.912.L.15.Su.5 Recognize that some living things, such as fish and turtles, produce very large numbers of offspring because most will die as a result of dangers in the environment before they grow up.
- SC.912.L.15.Pa.3 Recognize that animals produce offspring.

Additional:

SC.912.L.15.8 Describe the scientific explanations of the origin of life on Earth.

- SC.912.L.15.In.3 Identify that there are scientific explanations of the origin of life on Earth.
- SC.912.L.15.Su.3 Recognize that there are scientific explanations of how life began.
- SC.912.L.15.Pa.1 Recognize that plants and animals change as they age.

SC.912.L.15.10 Identify basic trends in hominid evolution from early ancestors six million years ago to modern humans, including brain size, jaw size, language, and manufacture of tools

- SC.912.L.15.In.4 Recognize ways that the appearance of humans, their language, and their tools have changed over time.
- SC.912.L.15.Su.4 Recognize that humans have changed in appearance over a very long period of time.
- SC.912.L.15.Pa.1 Recognize that plants and animals change as they age.

SC.912.L.15.14 Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.

- SC.912.L.15.In.1 Identify that prehistoric plants and animals changed over time (evolved) or became extinct.
- SC.912.L.15.Su.1 Match fossils to related species.
- SC.912.L.15.Pa.1 Recognize that plants and animals change as they age.

SC.912.L.15.15 Describe how mutation and genetic recombination increase genetic variation.

- SC.912.L.15.Su.6 Recognize that characteristics of the offspring of living things are sometimes different from their parents.
- SC.912.L.15.Pa.4 Recognize differences in physical characteristics within a species of animals, such as different types of dogs.

SC.912.L.16.2 Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.

- SC.912.L.16.In.2 Identify traits that plants and animals, including humans, inherit.
- SC.912.L.16.Su.1 Recognize characteristics (traits) that offspring inherit from parents.
- SC.912.L.16.Pa.1 Recognize similar characteristics (traits) between a child and parents, such as hair, eye, and skin color, or height.

SC.912.L.16.3 Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.

- SC.912.L.16.In.3 Recognize that a substance called DNA carries genetic information in all organisms, and changes (mutations) in DNA can be helpful or harmful to an organism.
- SC.912.L.16.Su.2 Recognize that all organisms have a substance called DNA with unique information.
- SC.912.L.16.Pa.2 Recognize similarities in characteristics of plants and animals of the same type (species).

SC.912.L.16.4 Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.

- SC.912.L.16.In.3 Recognize that a substance called DNA carries genetic information in all organisms, and changes (mutations) in DNA can be helpful or harmful to an organism.
- SC.912.L.16.Su.2 Recognize that all organisms have a substance called DNA with unique information.
- SC.912.L.16.Pa.2 Recognize similarities in characteristics of plants and animals of the same type (species).

SC.912.L.16.5 Explain the basic processes of transcription and translation, and how they result in the expression of genes.

- SC.912.L.16.In.3 Recognize that a substance called DNA carries genetic information in all organisms, and changes (mutations) in DNA can be helpful or harmful to an organism.
- SC.912.L.16.Su.2 Recognize that all organisms have a substance called DNA with unique information.
- SC.912.L.16.Pa.2 Recognize similarities in characteristics of plants and animals of the same type (species).

SC.912.L.16.8 Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.

- SC.912.L.16.In.4 Identify that cancer can result when cells change or grow uncontrollably.
- SC.912.L.16.Su.3 Recognize that cancer may result when cells change or grow too fast.
- SC.912.L.16.Pa.3 Recognize that illness can result when parts of our bodies are not working properly.

SC.912.L.16.9 Explain how and why the genetic code is universal and is common to almost all organisms.

- SC.912.L.16.In.3 Recognize that a substance called DNA carries genetic information in all organisms, and changes (mutations) in DNA can be helpful or harmful to an organism.
- SC.912.L.16.Su.2 Recognize that all organisms have a substance called DNA with unique information.
- SC.912.L.16.Pa.2 Recognize similarities in characteristics of plants and animals of the same type (species).

Unit Vocabulary

Evolution	Adaptation	Fitness	Natural Selection
Charles Darwin	Species	Ancestors	Genetic Variation
Mutations	Negative Mutations	Genetic Recombination	Gene Transfer
Population	Chromosomes	Fossil	Organism
Artificial Selection	Phenotype	Genes	Genetic Drift

1. What is a Living Thing?

PowerPoint

- 1. Living versus Non-Living PowerPoint Click here

Worksheets

- 1a.Living versus non-living worksheet Click here
- 1b. Living versus non-living answer sheet Click here
- 1c. Characteristics of living things worksheet Click here

Videos and Online Supports

- Living versus Non-Living video Click here
- Living versus Non-Living ONLINE GAME- Click here
- Monarch Reader- What are organisms? Click here

2. Evolution & Natural Selection

Introduce Vocabulary:

- Unit Vocabulary Definitions power point Click here
- Unit Vocabulary Definitions videos power point Click here
- 2a. Evolution crossword Click here
- 2b. Evolution word search Click here

Unit PowerPoint

- Evolution power point Click here

Worksheets

- 2c. Fossils worksheet Click here
- 2d. Adaptation worksheet Click here
- 2e. Natural Selection worksheet Click here

Videos and Resources

- Darwin & Evolution Click here

- Darwin and natural selection Click here
- Natural selection Click here
- 10 Ways Creatures Will Evolve in 100 Years Click here
- What is a species? Click here
- Evolution 101 Click here
- Interactive Documentary on Evolution Click here
- Genotypes at Click here
- Natural Selection Click here
- Adaptations Click here

3. Evolution of Populations

PowerPoint

- 5. Evolution of populations Click here

Worksheets and Online Resources

- 5a. Genetic variation worksheet Click here
- Genetics Word Search Puzzle Click here
- Genetics Crossword Puzzle Click here
- Genetics Quiz Click here

Videos and online sources

- The Evolution of Populations: Natural Selection, Genetic Drift, and Gene Flow Click here
- Mutations video Click here
  *Note there is also a video recap and worksheet available at you tube viewing.
- Mutations Click here
- Learn more about mutations Click here
- Population Variations at Floridastudents.org Click here

4. Artificial Selection

PowerPoint

- Artificial Selection Click here

Worksheets

- Artificial Selection worksheet Click here

Videos

- Natural Selection Click here
- Natural selection v Artificial Selection Click here
- Genetic Drift Click here
- Artificial Selection and Our Food Click here

5. Activities and Labs

PowerPoint for Activities & Labs Click here

Activity 1: Finding Lucy, a Human-Like Hominid

- Video Click here
- Riddle of the Bones http://www.pbs.org/wgbh/evolution/humans/riddle/
- 3.1 million-year-old Lucy's bones tell story of how she died 2:26 minutes Click here

Topics for Discussions

1. What did scientist discover in 1974?
2. Describe Lucy's physical appearance.
3. How can scientist determine how she died?
4. Student Activity: Draw and color a picture of Lucy living in her natural environment.

Activity 2: Homo Habilis "Handy Man" First true humans - the tool-makers 1.8 to 1.6 million BCE

- Activity Click here

Topics for Discussions

1. Discuss why early man invented and created weapons and tools.
2. Describe the Homo Habilis "Handy Man".
3. Who were these early people?
4. What did these early people eat?
5. When/ time-period of these early people?
6. Where did these people live out their lives?
7. Why did these early people perish?

Related video- Stone Tool Technology of Our Human Ancestors

- YouTube Click here 5:41 Minutes

Activity 3

- Darwin Article Click here
- Comprehension questions for the Darwin article 6a. Click here
  *This article is available at 5 reading levels at Newsela. Newsela is a free subscription you can sign up for.
- What is Evolution? Click here

Topics for Discussions

- How do species change over time?
- The theory of evolution was developed by **Charles Darwin** back in 1859. He said that evolution worked through **natural selection**. Explain how evolution worked through natural selection.
- Discuss, why fossil birds were found with teeth

Activity 4: Animal Evolution

- What is a species? Click here
- Pick a commonly known animal and fast-forward 250 years into the future. How has this creature changed? Why have these changed taken place? How might the environment have changed that these adaptations took place?
- Write 5-7 sentences/paragraphs explaining these changes (use FSAA writing format as model)
- Draw what your animal may look like 250 years into the future with these adaptations

Activity 5: Telephone Evolution

- Introduction to think about evolution by using the game 'telephone.'
- Then, have students form a line and tell them they are going to whisper the phrase they hear verbatim into their neighbor's ear. Tell students they need to remember the phrase.
- Begin by whispering a phrase into a student's ear and then have him/her whisper it to the person to their left. Repeat. When they are done, have each student return to his or her desk and write his or her phrase down. Starting at student #1, have each student say their sentence while you write it on the board.
- The students will see how the phrase changed over time. Tell them this is like evolution.

1. Where did the phrase get 'messed up?'
2. Compare these errors to mutations in DNA.
3. How does the first phrase compare to the last phrase? Did enough 'mutations' add up where the new phrase looks nothing like the old phrase?

Activity 6: Evolution Experiment

- John Endler experiment Click here

Activity 7: Variation in Peppers

- Obtain a green, yellow, red, or purple bell pepper.
- Slice open the pepper and count the number of seeds it contains. CAUTION: Always direct a sharp edge or point away from yourself and others.
- Construct Tables: Collect data from your class and construct a data table. Compare your data with the data of other students who have a different pepper.
- Ask Questions: think about the kinds of variations among organisms that Darwin observed. Suppose Darwin analysed your class data. What questions might he have asked?
- Analyse Data: Calculate the average (mean) number of seeds in your class's peppers. By how much does the number of seeds in each pepper differ from the average number of seeds?

Activity 8: Genetics

- Information and activities on genetics Click here

Topics for Discussions

1. What is genetics?

2. What are genes?
3. What are chromosomes?
4. What is DNA?

Activity 9: Artificial Selection in Dogs

- Activity Click here
- Students will learn how artificial selection can be used to develop new dog breeds with characteristics that make the dog capable of performing a desirable task.