

Unit 2-Life Science-Why do Organisms Look the Way They Do?

Content Area: **TEMPLATE**
Course(s):
Time Period: **Full Year**
Length: **Type Length of Unit**
Status: **Published**

General Overview, Course Description or Course Philosophy

Science and engineering—significant parts of human culture that represent some of the pinnacles of human achievement—are not only major intellectual enterprises but also can improve people’s lives in fundamental ways. Although the intrinsic beauty of science and a fascination with how the world works have driven exploration and discovery for centuries, many of the challenges that face humanity now and in the future—related, for example, to the environment, energy, and health—require social, political, and economic solutions that must be informed deeply by knowledge of the underlying science and engineering.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

CONTENT AREA STANDARDS

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| 6-8.MS-LS1-1 | Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells. |
| 6-8.MS-LS1-4 | Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively. |
| 6-8.MS-LS1-5 | Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. |
| 6-8.MS-LS2-2 | Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. |
| 6-8.MS-LS4-6 | Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time. |
| 6-8.MS-LS3-2 | Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation. |
| 6-8.MS-LS4-4 | Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals’ probability of surviving and reproducing in a specific environment. |
| 6-8.MS-LS4-5 | Gather and synthesize information about technologies that have changed the way humans influence the inheritance of desired traits in organisms. |

6-8.MS-LS3-1

Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

MA.K-12.4	Model with mathematics.
LA.RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts.
LA.RST.6-8.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
LA.RST.6-8.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.
LA.RST.6-8.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
LA.RST.6-8.9	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
LA.WHST.6-8.1	Write arguments focused on discipline-specific content.
LA.WHST.6-8.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
LA.WHST.6-8.7	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
LA.WHST.6-8.8	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
LA.WHST.6-8.9	Draw evidence from informational texts to support analysis, reflection, and research.
LA.SL.8.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.
LA.SL.8.5	Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.
TECH.9.4.8.CI.3	Examine challenges that may exist in the adoption of new ideas (e.g., 2.1.8.SSH, 6.1.8.CivicsPD.2).
TECH.9.4.8.CI.4	Explore the role of creativity and innovation in career pathways and industries.
TECH.9.4.8.CT.1	Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to a local or global problem, such as climate change, and use critical thinking skills to predict which one(s) are likely to be effective (e.g., MS-ETS1-2).
TECH.9.4.8.CT.2	Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1).
TECH.9.4.8.CT.3	Compare past problem-solving solutions to local, national, or global issues and analyze the factors that led to a positive or negative outcome.

STUDENT LEARNING TARGETS

Declarative Knowledge

Students will understand that:

1. Offspring can get instructions for a trait from either parent.
2. Different offspring of the same two parents can inherit different traits from each parent.
3. For some traits, when parents have the same trait, the offspring always have the same trait as the parents (e.g., two nontaster parents can only have nontaster offspring).
4. For some traits, one variation is more likely to be passed on from the parents (e.g., one blue-eyed and one brown-eyed parent usually have brown-eyed children).
5. It is possible for offspring to have a trait that neither parent shows (e.g., a redheaded child of two brown-haired parents).
6. Two organisms can express the same trait but carry different genetic information.
7. Each trait is determined by two copies of instructions: one inherited from the mother and one from the father.
8. When two copies of information for a trait are not the same, one variation determines the expressed trait (phenotype).
9. Two parents can pass on a trait neither expresses if both parents contain one copy of each variation and the offspring happens to get both nonexpressed alleles.
10. Some traits (e.g., PTC [phenylthiocarbamide] tasting, tongue rolling) have only two variations. Other traits have a continuous range of variations (e.g., height, eye color, skin color).
11. Changes in a population can occur when a population of organisms varies on an inherited trait; there is a change in the environment that affects the organism's survival; one variation of the trait has an advantage for survival; individuals with that variation are more likely to survive and reproduce; or the proportion of individuals with that variation increase in the next generations.

Procedural Knowledge

Students will be able to:

1. Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells
2. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.
3. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
4. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
5. Develop a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.
6. Use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of

the organism.

7. Develop a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.
8. Use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.
9. Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.
10. Gather information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.
11. Synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.
12. Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time
13. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.
14. Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.
15. Cite specific textual evidence to support analysis of science and technical texts.
16. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
17. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.
18. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
19. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
20. Write arguments focused on discipline-specific content.
21. Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
22. Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
23. Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
24. Draw evidence from informational texts to support analysis, reflection, and research.
25. Model with mathematics

EVIDENCE OF LEARNING

Formative Assessments

LS1-2: Activity 5.1: How Do I Get New Cells?

LS1-4: Activity 2.2: How Do Plants Reproduce

LS1-5: Activity 8.1: Variations, Variations, and More Variations, Activity 8.2: How Can We Show Ranges of Variation?

LS2-2: Homework 8.2: Who Uses Social Networks More?

LS3-1: Reading 3.3: Heredity Patterns--A Key to Diagnosis, Homework 3.3: Heredity Patterns--A Key to Diagnosis, Activity 6.1: Constructing a Model of Inheritance, Activity 6.2: Testing the Model, Reading 6.2: Models: Using Models to Decide between Possible Explanations, Activity 7.1: Extending and Applying the Model of Inheritance, Activity 7.2: Introducing Albinism, Reading 7.2: Which Instructions Get Followed?, Activity 8.4: How Do Genes work for Continuous Traits?, Reading 8.4: Height--Unraveling a Genetic Puzzle

LS3-2: Activity 1.1: What Traits Do Humans Have?, Activity 1.2: Traits of You and Me, Activity 1.3: Baby, Where Did You Get Those Eyes?, Reading 1.3: Baby, Where Did You Get Those Eyes?, Activity 2.1: Are Traits Connected?, Reading 2.1: Do the Traits I Inherited Affect My Sense of Taste or Smell?, Reading 2.2: What Is the Buzz About?, Activity 2.3: Is There a Pattern to How Traits Get Passed On?, Activity 3.1: What Are the Patterns in How Traits Are Inherited?, Activity 3.2: Are There Patterns in Plant Traits?, Activity 3.3: What Seed Patterns Are There in a Future Generation?, Activity 4.1: How Do Traits Get Passed On?, Activity 4.2: What about the Next Generation of Seeds?, Activity 4.3: Synthesizing the Data, Reading 4.3: Why Are Patterns Important?, Activity 5.2: How Can Parents Produce Offspring with Different Traits?, Reading 5.2: Discovering the Source, Activity 8.3: Variation Everywhere, So What?

LS4-1: Activity 2.1: The Theory of Continental Drift, Reading 2.1: What Is Continental Drift? Activity 2.2: The Exploration of the Ocean Floor, Activity 3.1: The Theory of Plate Tectonics

LS4-4: Activity 9.1: The Case of the Peppered Moth, Reading 9.2: How Does Variation Matter?, Activity 10.1: Background to the Mystery, Activity 10.2: Introducing Data Comparisons and Individual Finch Data, Activity 10.3: Investigating the Finches, Reading 10.3: Where Did the Data Come From?, Activity 10.4: Midpoint Sharing, Activity 10.5: Sharing Ideas, Homework 10.5: What Happens Next?, Activity 11.1: Constructing a General Model of How Populations Can Change, Activity 11.2: Does the Consensus Model work?, Activity 11.3: Putting It All Together--Why Do Organisms Look the Way They Do?

LS4-5: Reading 11.1: Does Selection Always Occur Naturally

LS4-6: Activity 9.2: How Does Variation Matter?, Activity 9.3: Explaining the Change in the Peppered Moth Population

Summative Assessments

- Benchmark Assessments
 - Multiple Choice Assessment administered at the end of each marking period.

Alternative Assessments

- Oral Presentations
- Questions for Comprehension
- Performance Tasks
- Scientific Journals/Notebooks
- Self-Assessment
- WebQuests

RESOURCES (Instructional, Supplemental, Intervention Materials)

IQWST Unit Materials for Life Science 3 Learning Sets

A Framework For K-12 Science Education

Online Resources provided by IQWST not included in the program (to be used as support/reinforcement/enrichment): https://docs.google.com/spreadsheets/d/1VpyFCLA_50_-Iw2NhcGpdNNZ2jj6aJJegcIUNCy_uzQ/pubhtml

Climate change resources:

- In Grade 8, Module 8.3, Learning Set 1, Lesson 2, Activity 2.2: How Does Variation Matter?, students engage in a learning sequence to investigate the cause of the change in the abundance of morphs of peppered moths. Students analyze multiple datasets (SEP-DATA-M4) in order to construct an explanation (SEP-CEDS-M3) of how the variation of traits in the peppered moth population increased some individuals' probability of surviving and reproducing (CCC-CE-M2, DCI-LS4.B-M1).
- <https://www.plt.org/activity-resources/grades-6-8-activity-the-global-climate/>

INTERDISCIPLINARY CONNECTIONS

Collaboration with Math and Language Arts teachers is an essential part of the IQWST curriculum.

Information Writing

Current Events

Data collection/analysis

Computations

Statistics

Engineering

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.

IQWST provides audio recording for all readings in student workbook-available through teacher portal online

Reading differentiation strategies are embedded in the IQWST program and all students prepare for reading through a 'Getting Reading' section which begins each reading.

The sections are designed to engage students, generate interest, activate prior knowledge and provide a purpose for reading. Teachers use advance organizers for desired readings and to encourage students to plan and annotate the passages.

A word wall is developed through vocabulary acquisition in the program. Students develop the word wall as words are learned in context and through experience in class. This helps to build meaning and understanding which support students when reading text.

Students are encouraged to ask questions and post them to the Driving Question Board. This DQB helps students develop a greater level of understanding and encourages students to work together to solve problems in and outside of class.

Support will be provided to students when writing in the student manual and use of the computer, printing, and pasting into the manual is acceptable if there is a present need.