

Unit Planning Guide

Unit Title DNA and Mutations	
Teacher Julie McFarlane	Grade Level 9-12
Subject/Topic Areas Biology/DNA	Number of Periods 1 class period
Key Words: DNA, mutation	Level
Evaluation: Two DNA models and summary questions on DNA structure and function.	Calendar Quarter 4 th quarter
Primary Teaching Method direct instruction; student research; lab	School Vallivue High School

Rationale: What do you students to know, do and be like when they finish this unit of study.

Students will be able to discuss how eukaryotes regulate transcription of genes and will summarize various types of gene mutations in addition to sickle cell disease.

Present a rubric for this project.

Overview: A brief summary of the nature and scope of the unit.

This unit will introduce students to gene regulation and mutation through research and hands-on activities. Students will complete models of normal DNA and DNA with a mutation and answering summary questions. They will learn how gene expression is regulated by the cell, and how a gene mutation causes sickle cell disease.

The BIG question(s) will guide this unit and focus teaching and learning.

How is gene expression regulated by the cell, and how do mutations affect this expression?

Content Objectives:

Idaho Science Standards

Goal 1.2: Understand Concepts and Processes of Evidence, Models

9-10.B.1.2.2 Develop models to explain concepts or systems. (648.02b)

Goal 1.3: Understand Constancy, Change, and Measurement

9-10.B.1.3.2 Analyze changes that can occur in and among systems. (648.03b)

Goal 1.5: Understand Concepts of Form and Function

9-10.B.3.3.1 Identify the particular structures that underlie the cellular functions. (651.01a)

9-10.B.3.3.3 Explain how cells use DNA to store and use information for cell functions. (651.01c)

BIG6 Objectives:

1. **Task Definition** – Look in books, online and at handouts to learn the nitrogen base sequence for the DNA of normal hemoglobin and hemoglobin with a mutation for sickle cell disease and construct a model of each using candies and poster paper. Answer summary questions using these resources.
2. **Information Seeking Strategies** - Brainstorm possible sources of information. Select the best sources.
3. **Location and Access:** Using library and classroom print and non-print resources determine where the source is located and information in each source.
4. **Use of Information** – Engage (read, hear, view, or touch) the information in each source.

Insert page 76 from handbook

Content Outline: activities, timeframe, product/ performance, standards

Day 1: Introduction
K-W-L chart.

Lecture on DNA and mutations using a Powerpoint presentation with pictures of DNA and blood cells. Review and discuss vocabulary term relevant to this unit. Read on topic from the textbook.
Introduce the hemoglobin project. Students will work with a partner to research and construct the models and answer the summary questions.

Day 2: Research the nitrogen base structure of the gene for hemoglobin and the gene for hemoglobin that contains a mutation for sickle cell disease. Begin constructing the model and answering the summary questions.

Day 3: Finish models and summary questions.

How will students demonstrate what they have learned?

Task Overview

Students will create a model of the gene for normal human hemoglobin and the gene containing a mutation for sickle cell disease and answer summary questions.

Evaluation: What evidence will show that students understand?

Students have completed the expectations of the rubric.
Students have answered the summary questions correctly.

Teaching Materials:

Textbook, print and non-print resources, computers, poster board, markers, candy and glue.

Resources:

Print and non-print resources.

Follow-Up Activities

Optional

Finish the K-W-L chart.

Worksheet 5-5— Lesson Plan Format

(adapted with permission)

Subject: Biology
Lesson Name: DNA & Mutations
Class: Grade 9-10
Date: March 10, 2009

Teacher: McFarlane, Julie
Location: Vallivue High School
Unit Context: DNA and Heredity

Activities

1. Team of two. One person has the normal DNA sequence. The second team member has the DNA sequence that has the mutation (sickle cell anemia). The instructions are as follows:

Arrange your candies in the following manner red M&M's are thymine; blue M&M's are cytosine; yellow M&M's are adenine; and green M&M's are guanine. The red licorice forms the hydrogen bonds between nitrogen bases. The Good and Plenties represent the phosphate and sugar molecules. White is the sugar molecules and pink is the phosphate molecules.
2. Put your candies in the correct configuration. See the DNA sequence shown below. One partner does the normal sequence and the second partner does the mutation. After you get the template strand, add the complimentary bases and the licorice bonds. Add the Good and Plenties for the

Big6™ Skills

1. Task Definition: Identify information needed to complete the task. What is the task? To create a model of a normal DNA sequence compared to the mutation that causes sickle cell anemia. Answer an information sheet to discover the chemicals in nature that cause DNA mutations. Rubric presented. What is a mutation and what effect does it have on the human body? Need to research DNA structure and nitrogen base sequences, hemoglobin, and mutation causing chemicals
2. Information Seeking Strategies. The range of resources will be the biology textbook, Internet Sites, and the use of the LiLi data base, and evaluation the best resources.
3. Location & Access. Use chapter 11-13 in the biology text and use Internet, computer per team.
4. Use of Information. Engage and extract. Summarize key points on chemicals that cause mutations, and

Idaho Science Standards

Goal 1.2: Understand Concepts and Processes of Evidence, Models

9-10.B.1.2.2 Develop models to explain concepts or systems. (648.02b)

Goal 1.3: Understand Constancy, Change, and Measurement

9-10.B.1.3.2 Analyze changes that can occur in and among systems. (648.03b)

Goal 1.5: Understand Concepts of Form and Function

Goal 3.3: Understand the Cell is the Basis of Form and Function for All Living Things

9-10.B.3.3.3 Explain how cells use DNA to store and use information for cell functions. (651.01c)

<p>sugar and phosphate molecules. Let your teacher know when your molecule is complete. (You can eat the extras).</p> <p>Completing the information sheet. While you are waiting for the teacher to approve your molecule, research the following and fill in your information sheet.</p> <ol style="list-style-type: none"> 1. Summarize the DNA structure and its function. 2. What is the function of hemoglobin? 3. What is sickle cell anemia and how does this disease affect a person with this disease? 4. How are the red blood cells different between a person with normal hemoglobin and sickle cell anemia? 5. Research difference chemicals and factors that cause mutations in the DNA sequence. Use your book and Internet sources. If you use Internet, please include the web site or print out a short copy of the page. 	<p>information on DNA structure and sickle cell anemia.</p> <ol style="list-style-type: none"> 5. Synthesis. Organize information by filling in information sheet on DNA and chemicals that cause mutations. 6. Evaluation. Teacher walks around the room and evaluates their two models of DNA correctly comparing the normal versus the DNA mutation. Information sheet is overviewed and students are told to redo/expand certain items. 	
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Learning Context: Understand the effect of mutations on DNA.

The Big Question: What is the importance of the structure of DNA to the health of the human body?

Materials/Resources:

M&M's Good and Plenties

Red licorice White paper (2)

Computers, biology textbooks

Evaluation:

Students have satisfactorily completed the Information Sheet and correctly arranged the DNA models comparing normal DNA and the mutated DNA sequence, fulfilling all aspects of the rubric.

Notes:

Lill Resources:

Bloom, Miriam. Understanding Sickle Cell Disease. Jackson: University Press of Mississippi, 1995.

Blood. Produced by Films for the Humanities & Sciences. Videocassette. 1995.

Unit Planning Guide

Unit Title Common Minerals and Their Uses	
Teacher Julie McFarlane	Grade Level 9-12
Subject/Topic Areas Earth Science/Minerals	Number of Periods 4 for preparation; 1 for presentations
Key Words: mineral, resource, utilization,	Level
Evaluation Method poster and oral presentation	Calendar Quarter 4 th quarter
Primary Teaching Method direct instruction; student research; lab	School Vallivue High School

Rationale: What do you students to know, do and be like when they finish this unit of study.

Students will know 15 common minerals and how they are useful to society. Teams of two students will each research one of the minerals and create a poster or Powerpoint presentation to provide information on their mineral. The team will give a five minute oral report to the class. Students will be more aware of and respect our limited natural resources.

Present a rubric for this project.

Overview: A brief summary of the nature and scope of the unit.

This unit will introduce students to various natural minerals through research and hands-on activities. Students will learn how minerals are formed and how they are mined and used by society. They will also learn how minerals are identified.

The BIG question(s) will guide this unit and focus teaching and learning.

What is the importance of natural mineral resources and how can I manage and conserve them?

Content Objectives:

9-10B.5.2.1 Analyze environmental issues such as water and air quality, hazardous waste, and depletion of natural resources. (656.01a)

8-9.ES.5.3.1 Describe the difference between renewable and nonrenewable resources. (656.03a)

BIG6 Objectives:

1. Task Definition – Select one mineral to research. Create a poster to provide information regarding how the mineral is formed in nature and how people mine and use the mineral. The team will give a five-minute presentation to the class on their mineral.
2. Information Seeking Strategies - Brainstorm possible sources of information. Select the best sources.
3. Location and Access: Using library print and non-print resources determine where the source is located and information in each source.
4. Use of Information – Engage (read, hear, view, or touch) the information in each source.

Insert page 76 from handbook

Content Outline: activities, timeframe, product/ performance, standards

Day 1: Introduction
K-W-L chart.

Lecture on minerals using a Powerpoint presentation with pictures of minerals.
Review and discuss vocabulary term relevant to this unit. Read on topic from the textbook.
Introduce the mineral project. Students will select a mineral to research for their projects and submit the choice to the teacher

Day 2: Discuss Moh's Hardness scale for minerals and how each team will test a sample of their mineral. Students will practice testing minerals samples.

Teams will begin researching their minerals in the classroom using computers and print resources including citation information.

Day 3: Continue gathering information for the final product.

Day 4: Create the final product (poster or Powerpoint presentation. Develop the oral presentation.

Day 5: Class presentations of projects.

How will students demonstrate what they have learned?

Task Overview

Students will create a poster or PowerPoint presentation and an oral presentation to provide information on their mineral.

Evaluation: What evidence will show that students understand?

Students have completed the expectations of the rubric.

Teaching Materials:

Textbook, print and non-print resources, mineral samples, hardness testing tools, computers, poster board, markers, and glue.

Resources:

Print and non-print resources.

Follow-Up Activities

Optional

Finish the K-W-L chart.

Learning Activities: (Description of the sequence of teaching and learning activities.)

Worksheet 5-5— Lesson Plan Format

(adapted with permission)

Subject: Earth Science	Teacher: Julie McFarlane
Lesson Name: Investigate a Mineral and Its Uses	Location: Vallivue High School
Class: 9-10	Unit Context: Natural Resources
Date: March 10, 2009	

<p>Activities Introduction</p> <p>1. K-W-L chart on minerals and their uses.</p> <p>2. Lecture on minerals using a Powerpoint presentation with pictures of minerals. Review and discuss vocabulary terms relevant to this unit. Read on topic from the textbook.</p> <p>Introduce the mineral project. Students will select a mineral to research for their projects and submit the choice to the teacher.</p>	<p>Big6™ Skills</p> <ol style="list-style-type: none"> 1. Task Definition – Select one mineral to research. Create a poster to provide information regarding how the mineral is formed in nature and how people mine and use the mineral. The team will give a five-minute presentation to the class on their mineral. 2. Information Seeking Strategies - Brainstorm possible sources of information. Select the best sources. 3. Location and Access: Using library print and non-print resources determine where the source is located and information in each source. 4. Use of Information – Engage (read, hear, view, or touch) the information in each source. 5. Synthesis – Organize information from multiple sources. Present the information – Organize the information in a poster or Powerpoint presentation. Plan a 5-minute oral presentation. 6. Evaluation – Judge the completeness and effectiveness of the poster or Powerpoint presentation. 	<p>Idaho Science Standards 9-10B.5.2.1 Analyze environmental issues such as water and air quality, hazardous waste, and depletion of natural resources. (656.01a)</p> <p>8-9.ES.5.3.1 Describe the difference between renewable and nonrenewable resources. (656.03a)</p>
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Learning Context:
Using and conserving minerals as a natural resource.

The Big Question:
How are minerals processed and used?

Materials/Resources:
Textbook, print and non-print resources, mineral samples, hardness testing tools, computers, poster board, markers, and glue.

Evaluation:
Students have completed the expectations of the rubric.

Notes:

LiLI Resources (LiLI Unlimited):
Luhr, James. Earth. New York: DK Pub., 2003.

Pellant, Chris. Rocks and Minerals. New York: Dorling Kindersley, 1992.

**Worksheet 5-5—
Lesson Plan
Format**

(adapted with permission)

Subject: Earth Science	Teacher: Julie McFarlane
Lesson Name: Investigate a Mineral and Its Uses (Activity 2)	Location: Vallivue High School
Class: 9-10	Unit Context: Natural Resources
Date: March 10, 2009	

Activities
 Day 2: Discuss Moh’s Hardness scale for minerals and how each team will test a sample of their mineral. Students will practice testing minerals samples.
 Teams will begin researching their minerals in the classroom using computers and print resources including citation information.
 Day 3: Continue gathering information for the final product.

Big6™ Skills
 1. Information Seeking Strategies - Brainstorm possible sources of information. Select the best sources.
 2. Location and Access: Using library print and non-print resources determine where the source is located and information in each source.

Idaho Science Standards
 9-10B.5.2.1 Analyze environmental issues such as water and air quality, hazardous waste, and depletion of natural resources. (656.01a)
 8-9.ES.5.3.1 Describe the difference between renewable and nonrenewable resources. (656.03a)

Learning Context: Natural Resources

The Big Question: How are minerals processed and used?

Materials/Resources:

Textbook, print and non-print resources, mineral samples, hardness testing tools, computers, poster board, markers, and glue.

Evaluation: Students have completed the expectations of the rubric.

**Worksheet 5-5—
Lesson Plan
Format**

(adapted with permission)

Subject: Earth Science	Teacher: Julie McFarlane
Lesson Name: Investigate a Mineral and Its Uses (Activity 3)	Location: Vallivue High School
Class: 9-10	Unit Context: Natural Resources
Date: March 10, 2009	

<p>Activities</p> <p>Day 4: Create the final product (poster or Powerpoint presentation). Develop the oral presentation.</p> <p>Day 5: Class presentations of projects.</p>	<p>Big6™ Skills</p> <p>5. Synthesis – Organize information from multiple sources.</p> <p>Present the information – Organize the information in a poster or Powerpoint presentation. Plan a 5-minute oral presentation.</p> <p>6. Evaluation – Judge the completeness and effectiveness of the poster or Powerpoint presentation.</p>	<p>Idaho Science Standards</p> <p>9-10B.5.2.1 Analyze environmental issues such as water and air quality, hazardous waste, and depletion of natural resources. (656.01a)</p> <p>8-9.ES.5.3.1 Describe the difference between renewable and nonrenewable resources. (656.03a)</p>
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Learning Context: Natural Resources

The Big Question: How are minerals processed and used?

Materials/Resources:

Textbook, print and non-print resources, mineral samples, hardness testing tools, computers, poster board, markers, and glue.

Evaluation: Students have completed the expectations of the rubric.

Notes: