PA Multi-Region Mathematics and Science STEM Partnership
UNIT #2

TITLE OF UNIT:	Radiation and Mutation
TARGET GRADE(S):	9
SUBJECT AREA(S):	Biology
KEYWORD SEARCH:	Genetics, DNA, mutation, Proteins, radiation
UNIT SUMMARY:	In this unit, students will study how radiation affects DNA sequencing and subsequent proteins.

DEVELOPED BY:	**DISTRICT/SCHOOL:**
Team Contact Person: Linsey Palazzi	Blairsville-Saltsburg School District
Team Members:	

REGION:_____Western_____

Unit #2 Overview

GRADE LEVEL(S):

9

APPLICABLE PA CORE OR NEXT GENERATION STANDARDS:

Next Generation Science Standards for High School Life Science

HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

Common Core Standards for Reading in Science and Technology

CC.3.5.9-10.E. Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., *force, friction, reaction force, energy*).

CC.3.5.9-10.I. Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.

BIG IDEA(S): (RTOP #6, #7, #8)
(Develop at least one big idea that will enable students to make sense of seemingly isolated facts and learning experiences.)

- Radiation can have an effect on the DNA of an organism.

ESSENTIAL QUESTION(S):
(Develop at least two essential questions that focus learning toward the big idea and fosters critical thinking and deeper understanding.)

- How does radiation affect the DNA of an organism?
- What are the implications of DNA damage?

UNIT GOAL(S):

Students will be able to:

- Analyze text to provide support for a statement.
- Hypothesize about the effects of space travel on human DNA.
- Discuss the ways in which space research can be applied to human activities on Earth.
- Construct a model of a DNA molecule.
- Understand that DNA can be damaged from radiation.
- Visualize models of different kinds of radiation-damaged DNA.
- Explain the difference between double strand and single strand breaks.

MATERIALS AND/OR RESOURCES NEEDED FOR UNIT DELIVERY:
(Include technology, NASA resources, etc…)

- Article: "Mysterious Cancer"
- Copies of NASA Mysterious Cancer Worksheet
- Mini-marshmallows (in 5 colors)
- Marshmallow Peeps
- Toothpicks
- Copies of "Modeling DNA" worksheet

ASSESSMENT/EVALUATION: (authentic student products, assessment methods)

Formative:

- Instructor will circulate and evaluate student understanding as they build their models.
- Instructor will evaluate student participation in class discussion.

Summative:

- Students will submit worksheets for grading at the end of each activity.

ACCOMMODATIONS FOR STUDENTS WITH SPECIAL LEARNNG NEEDS (Choose an important anchor assessment from the unit, and tell how would you modify for a student with a learning disability.)

For students with reading difficulties, small group readings can be arranged with an appropriate adult (teacher, learning support teacher, aide, etc.). The teacher should employ various reading techniques to suit the needs of the class.

IMPLEMENTATION PLAN
Unit #2

A. A professional development component is required for each unit. Each team member should contribute at least one activity via which he/she will share professional knowledge or resources from related to the grant with individuals who are not affiliated with the grant. Some ideas for ways you could meet this requirement include:

- Professional development training to colleagues
- Local program to share with community
- Presentation at a conference
- Video documentary to duplicate and share with others
- Online resources and video for district website
- Professional publication
- STEM Extravaganza (program for parents)
- Other: _____
- Other: _____

B. You are not limited to the examples listed above.

Describe the ways in which your team members will meet the professional development requirement for this unit (i.e., meetings, events, publications):

I will present these lessons, and other relevant NASA information at our professional development Fridays.

UNIT Rubric Unit #2

Instruction: Use the rubric below to review your unit against the indicators listed below. Consider how someone unfamiliar with your unit would rate your work. Place a checkmark in the appropriate rating box.

Indicator Description	Thoroughly Addressed	Adequately Addressed	Some Evidence	No Evidence
Unit summary succinctly articulates the unit goal(s) and types of learning activities through which students will accomplish the learning objective(s). See the example following this rubric.	x			
Aligned with PA Core or Next Generation Science Standards	x			
Big idea is stated as a concise principle, theory, or generalization	x			
Big idea promotes sense-making and in-depth understanding	x			
Big idea is widely applicable across disciplines	x			
Essential questions promote inquiry	x			
Essential questions are formulated as questions with no right or wrong answers	x			
Essential questions focus student learning toward the big idea	x			
Essential questions spark curiosity and a sense of wonder	x			
Unit goals are reflective of desired learning outcomes	x			
Evidence that students will be engaged in real life problem-solving is present	x			
Evidence of technology integration is apparent	x			
Materials and resources listed incorporate NASA content/ resources	x			
Assessments listed clearly address unit goals	x			
Assessments listed offer students a variety of means for demonstrating their understanding or skill proficiency	x			
Accommodations listed are responsive to the needs of a student with a learning disability, yet still permit the assessment of understanding or skill proficiency	x			
Team has articulated in the Implementation Plan the ways in which members will share professional knowledge and/or resources acquired through PA STEM with non-grant participants.	x			