HIGH SCHOOL CHEMISTRY/PHYSICS
INVESTIGATION 5
HOW IS NATURAL RADIOACTIVE DECAY RELATED TO RADIATION MEASUREMENT?

CCS 4.2 (Geometry and measurement) All students will develop spatial sense and the ability to use geometric properties, relationships, and measurement to model, describe and analyze phenomena.

D.2 Grade 12 Choose appropriate tools and techniques to achieve the specified degree of precision and error needed in a situation.
- Degree of accuracy of a given measurement tool
- Finding the interval in which a computed measure (e.g., area or volume) lies, given the degree of precision of linear measurements

CCS 4.4 (Data analysis, probability, and discrete mathematics) All students will develop an understanding of the concepts and techniques of data analysis, probability, and discrete mathematics, and will use them to model situations, solve problems, and analyze and draw appropriate inferences from data.

A.2 Grade 8 Make inferences and formulate and evaluate arguments based on displays and analysis of data.

B.5 Grade 8 Estimate probabilities and make predictions based on experimental and theoretical probabilities.

A.2 Grade 12 Evaluate the use of data in real-world contexts.
- Accuracy and reasonableness of conclusions drawn
- Bias in conclusions drawn (e.g., influence of how data is displayed)
- Statistical claims based on sampling

CCS 4.5 (Mathematical processes) All students will use mathematical processes of problem solving, communication, connections, reasoning, representations, and technology to solve problems and communicate mathematical ideas.

A.1 Grade All Learn mathematics through problem solving, inquiry, and discovery.

A.2 Grade All Solve problems that arise in mathematics and in other contexts (cf. workplace readiness standard 8.3).
- Open-ended problems
- Non-routine problems
- Problems with multiple solutions
- Problems that can be solved in several ways

D.5 Grade All	Make and investigate mathematical conjectures. · Counter examples as a means of disproving conjectures · Verifying conjectures using informal reasoning or proofs
CCS 5.1	(Scientific Processes) All students will develop problem-solving, decision-making and inquiry skills, reflected by formulating usable questions and hypotheses, planning experiments, conducting systematic observations, interpreting and analyzing data, drawing conclusions, and communicating results.
B.1 Grade 12	Select and use appropriate instrumentation to design and conduct investigations.
B.2 Grade 12	Show that experimental results can lead to new questions and further investigations.
CCS 5.4	(Nature and process of technology) All students will understand the interrelationships between science and technology and develop a conceptual understanding of the nature and process of technology.
C.1 Grade 6	Select a technological problem and describe the constraints and criteria that are addressed in solving the problem.
C.1 Grade 12	Plan, develop, and implement a proposal to solve an authentic, technological problem.
CCS 5.6	(Chemistry) All students will gain an understanding of the structure and behavior of matter.
A.2 Grade 12	Know that the number of protons in the nucleus defines the element.
A.3 Grade 12	Know that an atom's electron arrangement, particularly the outermost electrons, determines how the atom can interact with other atoms.
A.5 Grade 12	Explain how the Periodic Table of Elements reflects the relationship between the properties of elements and their atomic structure.
A.6 Grade 12	Know that many biological, chemical and physical phenomena can be explained by changes in the arrangement and motion of atoms and molecules.

CCS 5.7 (Physics) All students will gain an understanding of natural laws as they apply to motion, forces, and energy transformations.

A.5 Grade 12 Know that there are strong forces that hold the nucleus of an atom together and that significant amounts of energy can be released in nuclear reactions (fission, fusion, and nuclear decay) when these binding forces are disrupted.

B.4 Grade 12 Explain the nature of electromagnetic radiation and compare the components of the electromagnetic spectrum from radio waves to gamma rays.