Crime Scene Investigation

Science Elective

Department of Equity, Curriculum and Instruction

Revised: July 2019

Approved by the Montclair Board of Education: August 2019

Instructional Plan

Course: Crime Scene Investigation

Marking Period or Trimester: Semester

Pacing: # of weeks 20 Weeks

Next Generation Science Standards

Life Science: From Molecules to Organisms: Structure and Processes

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.

MS-LS1-2: Develop and use a model to describe the function of a cell as a whole and ways the parts of cells contribute to the function.

MS-LS1-3: Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

MS-LS1-7: Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves.

MS-LS1-8: Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.

Life Science: Heredity: Inheritance and Variation of Traits

MS-LS3-2: Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction result in offspring with genetic variation.

Physical Science: Matter and It's Interaction

MS-PS1-1: Develop models to describe the atomic composition of simple molecules and extended structures.

MS-PS1-2: Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

MS-PS1-3: Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

MS-PS1-4: Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

Physical Science: Motion and Stability: Forces and Interactions.

MS-PS2-2: Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

MS-PS2-3: Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.

MS-PS2-4: Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.

Engineering Design

MS-ETS1-2 Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
MS-ETS1-3 Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

Framing the Learning			
Timeframe	**Big Ideas**	**Essential Questions**	**Enduring Understandings**
1 Week	**Inference**	● Can class evidence alone identify a criminal? What other types of evidence may be helpful?	● Inferences are conclusions reached on the basis of evidence and reasoning.
2 Weeks	**Fingerprint**	● Can fingerprints identify a criminal with absolute certainty? ● What are common ridge patterns found in prints?	● Fingerprints are unique to individuals and can be used as evidence in arguing which individuals were present at a crime scene.
2 Week	**Handwriting**	● What does a person's handwriting say about them? ● What is the process of chromatography?	● Documents can be authenticated using specific e handwriting characteristics as well as the types of ink and paper and other artifacts.
2 Weeks	**Impression**	● How could footprints be used to reconstruct a crime scene? ● How are dental impressions used to identify a victim? ● What are common pieces of evidence of forced entry through a doorway?	● Impression evidence can be collected from materials that have retained the characteristics of other objects through direct contact.
2 Weeks	**Hair/Fiber**	● How are fibers used to link suspects to the crime scene or to victims? ● What are the common characteristics of a human hair?	● Fibers can be identified by observing their chemical and physical properties. ● Hair can be used to analyze for drugs and poisons.
2 Weeks	**Anthropology**	● Explain the role of anthropologists in forensic science. ● Explain how human remains are recovered and processed from a crime scene	● A forensic anthropologist will be able to analyze human remains in order to collect information critical to forensic investigation
1 Week	**Entomology**	● Describe the role of forensic entomologists in crime scene investigation. ● Describe the life cycle of various insects and how they can be used to help determine the time of death.	● All living things have a life cycle, and change throughout their lifetimes.
2 Weeks	**DNA/ Genetics**	● What information can DNA tell us about an individual?	● DNA sequences can be analyzed to provide statistically significant matches to an individual, used to identify or clear a suspect.

		● In what ways can investigators use DNA evidence in a court of law?	
2 Weeks	**Blood**	● What are the four blood types? ● What can blood spatter patterns tell an investigator about a crime?	● Blood spatter shapes and patterns can be used to interpret and reconstruct what happened at the crime scene.
4 Weeks	**Mock Crime Scene**	● How is physical evidence used to recreate a crime scene? ● How were miniature models used in forensic science?	● Forensic Scientists use evidence to reconstruct the events of a crime.

Evidence of Learning
Throughout the course of the semester, students will complete activities and projects that demonstrate their knowledge on how to collect and analyze physical evidence at a crime scene.   Final Mock Crime Scene   Solving Crime Case Studies   Lab Worksheets   Student Presentations   Observations of Student Behavior

Activities
Students will engage in various hands-on activities that revolve around the collection and analysis of physical evidence. These activities are a mix of labs and projects, engineering and designing different models, and case studies.   **Garbage Bag Inference Project:** Students use the evidence collected from a garbage bag to build a profile about the garbage bag owner.   **Personal Fingerprints:** Student collects and analyzes their own fingerprints.   **Latent Prints:** Students learn the process of collecting fingerprints from different surfaces.   **Analyzing Your Handwriting:** Students analyze the patterns in their own handwriting and learn how to spot a forgery.   **Chromatography:** Students perform a chromatography lab to see how the contents of a solution can be used as evidence in an investigation.   **Ransom Notes:** Students create a ransom note using a common method that can be used to hide evidence in the physical note and the handwriting.   **Tools/Tires:** Collect and analyze the impression evidence that can be left by tire treads and different tools.   **Dental:** Students collect and analyze their own dental impressions, and learn about how dental impressions can be used to build a profile.   **Shoeprints:** Students analyze different shoeprints and use the prints to create a physical profile.   **Natural/Synthetic:** Students compare natural and synthetic fibers, and look into their use in everyday items.   **Hair Analysis:** Students collect and analyze different hair samples.   **Bones Basics/Skeleton:** Students investigate anthropology, and the role of anthropologists in forensics.   **Life Cycle/Time of Death:** Students learn how the time of death can be calculated, and focus on the use of insects and their life cycles.   **Genetic Traits:** Students will investigate how traits are passed on through generations, and how DNA is used to in various aspects of a investigation.   **Blood Typing:** Students will learn about the four blood types, and apply it to a crime scene.

Blood Collection: Students learn how to collect blood samples at a scene, and what evidence blood samples can provide.
Blood Spatter: Students investigate the relationship between the velocity of a drop of blood, and how it spatters on a surface.
Vomit Lab: Students will use their understandings of macromolecules to analyze the vomit of a poisoning victim.
Solve a Scene: Students solve a physical scene that has been set up inside the classroom.
Build a Scene: Students build their own miniature crime scene that provides evidence that can solve a case.
Conspiracy Theories: Students investigate different conspiracy theories where forensic evidence has been used to support the conspiracy.

DIFFERENTIATION			
Special Education	**ELL**	**Intervention**	**Acceleration**
- Modify and accommodate as listed in student's IEP or 504 plan - Prioritize instruction - Utilize wait-time - Ensure directions are clear and concise - Utilize probing and clarifying questions - Support instruction with scaffolding - Model (provide step by step instructions) use of learning strategies - Provide extended time for practice and review of learning strategies - Identify, categorize, and teach words critical to understanding instructional texts - Utilize multiple approaches to monitor student understanding - Create rubrics to develop assessments - Vary assessments - Assign peer assisted reading and tutoring - Provide individual help to all students - Create opportunities for/Monitor peer collaboration - Monitor student progress frequently - Utilize flexible/cooperative grouping based on instructional goals - Prioritize and chunk lengthy assignments - Utilize assistive technology, when appropriate - Provide ongoing, effective, specific feedback - Model/Utilize graphic organizers - Provide leveled reading materials - Utilize visual aids and props (flashcards, pictures, symbols) when possible - Utilize a multi-sensory approach to new topics	- Get to know student - Set high expectations - Learn/Utilize/Display some words in student's heritage language - Allow electronic translator - Reword, repeat, and clarify directions - Determine student knowledge and level of understanding - Research instruction that best matches student need - Utilize ongoing informal assessments - Refer to NJDOE Resources: https://www.state.nj.us/education/bilingual/resources/ - NJDOE ELL Support Descriptions: https://www.state.nj.us/education/modelcurriculum/ela/ELLSupport.pdf ***Review Special Education list for additional recommendations.***	- Tiered Interventions following RtI framework - RtI Intervention Bank - Fundations Double-Dose (Tier II) - LLI (Tier III) - FFI Skill Report: DRA On-Line - enVision intervention supports NJDOE resources	- Process should be modified: higher order thinking skills, open-ended thinking, discovery - Utilize project-based learning for greater depth of knowledge - Utilize exploratory connections to higher grade concepts - Contents should be modified: abstraction, complexity, variety, organization - Products should be modified: real world problems, audiences, deadlines, evaluation, transformations - Learning environment should be modified: student-centered learning, independence, openness, complexity, groups varied