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<b>Course Name:</b> Forensics	<b>Grade Level(s):</b> 10, 11, 12
<b>Department:</b> Science	<b>Credits:</b> 1.0
<b>BOE Adoption Date:</b> October 2016	<b>Revision Date(s):</b> October 2019; September 2022

**ABSTRACT**

This course will expose students to the features of inquiry-based science skills as they apply to both criminal and civil law. Its focus is to examine physical evidence that can be used to establish connections between individuals and criminal events and circumstances. The course of study includes the applications of the scientific method to forensic science concepts (which involves biology, chemistry, and physics) to analyze and investigate evidence that may be discovered in a criminal investigation.

Throughout the year, students will be exposed to many critical features of a crime scene that will help them to work toward investigating a scene in its entirety. Topics will include: law enforcement responsibilities, fingerprinting analysis, forensic anthropology and entomology, serology, the investigation of fires and explosives, ballistics, DNA profiling, trace evidence, drug analysis and toxicology, document examination, blood stain pattern analysis, and computer forensics. All of these topics are key components in the investigations of many crimes. Students will examine case studies, analyze crime scenes, and create mock crime scenes for classmates to examine. These will all lead to a culminating experience in which students will examine a large artificial crime scene in order to perform a proper investigation. Classroom activities include: laboratory investigations and activities, research projects, famous case studies, lab practicums, career exploration, and the infusion of technology throughout the scope of the course.

**Proficiencies and Pacing:**

**Course Title: Forensics**

**Prerequisite(s): N/A**

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
Unit 1: Introduction to Forensic Science	2 weeks	<p><b>Subject Area:</b> 21<sup>st</sup> Century Life and Careers:</p> <p>9.3.LW.5 9.3.LW-ENF.12 9.3.ST.5 9.3.ST-SM.3 9.3.ST-SM.4</p> <p>NJSLS-CLKS.3 NJSLS-CLKS.5</p> <p>Interdisciplinary: Technology: 8.1.12.F.1</p> <p>Social Studies: 6.1.4.C.17</p> <p>English Language Arts: NJSLSA.RST.11-12.1 NJSLSA.RST.11-12.2 NJSLSA.RST.11-12.4 NJSLSA.RST.11-12.7</p>	<ul style="list-style-type: none"> <li>Students will understand how scientific advancements have contributed to the development and evolution of forensic science and will be able to analyze two cases and the forensic investigation techniques used in each as it relates to the development of forensic science. (2 weeks)</li> </ul>	<ul style="list-style-type: none"> <li>Define forensic science and list the major disciplines it encompasses.</li> <li>Identify the major contributors to the development of forensic science.</li> <li>Explain how scientific advancements account for the rapid growth of forensic laboratories in the past 40 years.</li> <li>Describe Locard’s Exchange principle.</li> <li>Describe the services of a typical comprehensive crime laboratory in the criminal justice system.</li> <li>Compare and contrast Frye and Daubert decisions relating the admissibility of scientific evidence in the courtroom.</li> <li>Explain the role and responsibilities of the expert witness.</li> <li>Analyze how scientific advancements have contributed to the more</li> </ul>

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
				<p>effective use of forensic science in solving crimes.</p> <ul style="list-style-type: none"> <li>Interpret, organize and summarize information available on credible websites and databases on topics in forensic science.</li> </ul>
Unit 2: Crime Scene Investigation and Physical Evidence	2 weeks	<p><b>Subject Area:</b> 21<sup>st</sup> Century Life and Careers:</p> <p>9.3.LW.5 9.3.LW-ENF.12 9.3.ST.5 9.3.ST-SM.3 9.3.ST-SM.4</p> <p>NJSLS-CLKS.5</p> <p>Interdisciplinary: Technology: 8.1.12.F.1</p> <p>English Language Arts: NJSLSA.RST.11-12.1 NJSLSA.RST.11-12.2 NJSLSA.RST.11-12.4 NJSLSA.RST.11-12.7</p>	<ul style="list-style-type: none"> <li>Students will understand the importance of following procedures and documentation in evidence collection and will be able to properly collect physical evidence and document a crime scene through sketches, photographs and reports.</li> <li>Students will understand the importance of identifying and comparing physical evidence and sharing this information on national databases. Students will be able to classify types of physical evidence and explain their significance in forensic investigation.</li> </ul>	<ul style="list-style-type: none"> <li>Define physical evidence.</li> <li>Describe the responsibilities of the first police officer who arrives at a crime scene.</li> <li>Explain the steps to be taken to thoroughly record the crime scene.</li> <li>Describe the proper procedures for conducting a systematic search of a crime scene for physical evidence.</li> <li>Describe proper techniques for packaging common types of physical evidence.</li> <li>Define and demonstrate the concept of chain of custody.</li> <li>Explain the contributions the forensic pathologist, entomologist, and anthropologist can make to a homicide investigation.</li> <li>Identify the common types of physical evidence encountered at crime scenes.</li> </ul>

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
				<ul style="list-style-type: none"> <li>• Explain the difference between the identification and comparison of physical evidence.</li> <li>• Define and contrast individual and class characteristics of physical evidence.</li> <li>• Assess the value of class characteristics to crime scene investigation.</li> <li>• List and explain the function of national databases available to forensic scientists.</li> </ul>
Unit 3: Fingerprinting	1.5 weeks	<p><b>Subject Area:</b> 21<sup>st</sup> Century Life and Careers:</p> <p>9.3.LW.5 9.3.LW-ENF.12 9.3.ST.5 9.3.ST-SM.3 9.3.ST-SM.4</p> <p>NJSLS-CLKS.5</p> <p>Science (NJSLS-S): HS-PS2-6</p> <p>Interdisciplinary: Technology:</p>	<ul style="list-style-type: none"> <li>• Students will understand the value of fingerprinting to forensic science and will be able to collect, preserve, analyze and compare various types of fingerprints. (1.5 weeks – HS-PS2-6)</li> </ul>	<ul style="list-style-type: none"> <li>• Analyze the common ridge characteristics of a fingerprint.</li> <li>• Identify and compare the three major fingerprint patterns and their respective subclasses.</li> <li>• Distinguish between visible, plastic, and latent fingerprints.</li> <li>• Describe the concept of an automated fingerprint identification system (AFIS) and its importance to forensic investigation.</li> <li>• List and demonstrate the techniques for developing latent fingerprints on porous and nonporous objects.</li> </ul>

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
		<p>8.1.12.F.1</p> <p>Social Studies: 6.1.4.C.17</p> <p>English Language Arts: NJLSA.RST.11-12.1 NJLSA.RST.11-12.2 NJLSA.RST.11-12.4 NJLSA.RST.11-12.7</p>		<ul style="list-style-type: none"> <li>Describe and demonstrate the proper procedures for preserving a developed latent fingerprint.</li> </ul>
Unit 4: Forensic Anthropology and Entomology	2.5 weeks	<p><b>Subject Area:</b> 21<sup>st</sup> Century Life and Careers:</p> <p>9.3.LW.5 9.3.LW-ENF.12 9.3.ST.5 9.3.ST-SM.3 9.3.ST-SM.4</p> <p>NJSLS-CLKS.5</p> <p>Science (NJSLS-S): HS-LS1-6 HS-LS1-7</p> <p>Interdisciplinary: Technology: 8.1.12.F.1 Social Studies: 6.1.4.C.17</p> <p>English Language Arts: NJLSA.RST.11-12.1</p>	<ul style="list-style-type: none"> <li>Students will understand the importance of forensic anthropology and entomology in criminal investigations and will be able to analyze human remains in order to collect information critical to forensic investigation. (2.5 weeks - HS-LS1-6, HS-LS1-7)</li> </ul>	<ul style="list-style-type: none"> <li>Explain the role of anthropologists and entomologists in forensic science.</li> <li>Identify the characteristics of human remains that can be used in determining the estimated time of death.</li> <li>Explain how human remains are recovered and processed from a crime scene.</li> <li>Analyze skeletal remains in order to determine the race, gender, height, and age of an individual.</li> <li>Explain how dental remains can be used in forensic investigation.</li> <li>Describe the role of forensic entomologists in crime scene investigation.</li> <li>Describe the life cycle of various insects and how they</li> </ul>

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
		NJLSA.RST.11-12.2 NJLSA.RST.11-12.4 NJLSA.RST.11-12.7		can be used to help determine time of death.
Unit 5: Serology	2 weeks	<p><b>Subject Area:</b> 21<sup>st</sup> Century Life and Careers:</p> <p>9.3.LW.5 9.3.LW-ENF.12 9.3.ST.5 9.3.ST-SM.3 9.3.ST-SM.4</p> <p>NJSLS-CLKS.5</p> <p>Science (NJSLS-S): HS-LS1-1 HS-LS3-1</p> <p>Interdisciplinary: Technology: 8.1.12.F.1</p> <p>Social Studies: 6.1.4.C.17</p> <p>English Language Arts: NJLSA.RST.11-12.1 NJLSA.RST.11-12.2 NJLSA.RST.11-12.4 NJLSA.RST.11-12.7</p>	<ul style="list-style-type: none"> <li>Students will understand how serology can contribute to forensic investigation and will be able to describe and demonstrate techniques used in forensic serology. (2 weeks, HS-LS1-1, HS-LS3-1)</li> </ul>	<ul style="list-style-type: none"> <li>List the antigens and antibodies found in the blood for each of the four blood types (A, B, AB, and O).</li> <li>Describe and demonstrate the process of blood typing.</li> <li>List and describe forensic tests used to characterize a stain as blood.</li> <li>Explain the concept of antigen-antibody interactions and how they are applied to species identification and drug identification.</li> <li>Explain how each individual contains a unique set of genetic material that is a combination of both parents' genetic material.</li> <li>List the laboratory tests necessary to characterize seminal stains.</li> <li>Explain how suspect blood and semen stains are properly preserved for laboratory examination.</li> <li>Describe the importance of the proper collection of</li> </ul>

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
				physical evidence in a rape investigation.
Unit 6: Forensic Investigation of Fires and Explosions	2 weeks	<p><b>Subject Area:</b> 21<sup>st</sup> Century Life and Careers:</p> <p>9.3.LW.5 9.3.LW-ENF.12 9.3.ST.5 9.3.ST-SM.3 9.3.ST-SM.4</p> <p>NJSLS-CLKS.5</p> <p>Science (NJSLS-S): HS-PS1-4 HS-PS1-5 HS-PS1-6 HS-PS1-7</p> <p>Interdisciplinary: Technology: 8.1.12.F.1</p> <p>Social Studies: 6.1.4.C.17</p> <p>English Language Arts: NJLSA.RST.11-12.1 NJLSA.RST.11-12.2 NJLSA.RST.11-12.4 NJLSA.RST.11-12.7</p>	<ul style="list-style-type: none"> <li>Students will understand the value of various physical evidence commonly found at the scene of an explosion or fire and will be able identify origin, timeline, and probable cause of a fire or explosion given a set of physical evidence. (2 weeks, HS-PS1-4</li> <li>HS-PS1-5, HS-PS1-6, HS-PS1-7)</li> </ul>	<ul style="list-style-type: none"> <li>Identify the conditions necessary to initiate and sustain combustion.</li> <li>Describe the three mechanisms of heat transfer.</li> <li>Identify the telltale signs of an accelerant-initiated fire.</li> <li>Describe how to collect physical evidence at the scene of a suspected arson or explosion.</li> <li>Describe the laboratory procedures used to detect and identify hydrocarbon and explosive residues.</li> <li>Explain how explosives are classified.</li> <li>List common commercial, homemade, and military explosives.</li> </ul>

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
Unit 7: Trace Evidence	4 weeks	<p><b>Subject Area:</b> 21<sup>st</sup> Century Life and Careers:</p> <p>9.3.LW.5 9.3.LW-ENF.12 9.3.ST.5 9.3.ST-SM.3 9.3.ST-SM.4</p> <p>NJSLS-CLKS.5</p> <p>Science (NJSLS-S): HS-PS1-1 HS-PS1-8 HS-PS2-1 HS-PS2-2 HS-PS2-3 HS-PS4-1 HS-PS4-3 HS-LS1-1 HS-LS1-2</p> <p>Interdisciplinary: Technology: 8.1.12.F.1</p> <p>English Language Arts: NJSLSA.RST.11-12.1 NJSLSA.RST.11-12.2 NJSLSA.RST.11-12.4 NJSLSA.RST.11-12.7</p>	<ul style="list-style-type: none"> <li>• Students will understand the physical and chemical properties of glass and will be able to use the properties of glass to compare glass fragments and determine the direction of a projectile.</li> <li>• Students will understand the features of different types of hair and fibers and will be able to use these features in order to compare different types of hair and fibers.</li> <li>• Students will understand the features of metals, paints, and soils and will be able to use these features in order to compare different types of metals, paints and soils.</li> </ul>	<ul style="list-style-type: none"> <li>• Define and distinguish a physical and chemical property of matter.</li> <li>• Describe the differences between the wave and particle theories of light.</li> <li>• Explain the dispersion of light through a prism.</li> <li>• Define and understand the properties of density and refractive index.</li> <li>• List and explain forensic methods for comparing glass fragments.</li> <li>• Understand how to examine glass fractures to determine the direction of impact for a projectile.</li> <li>• Identify the cuticle, cortex and medulla areas of hair.</li> <li>• List the three phases of hair growth.</li> <li>• Distinguish between animal and human hairs.</li> <li>• Describe and understand the role of DNA typing in hair comparisons.</li> <li>• Explain the proper collection of hair and fiber evidence.</li> <li>• Understand the differences between natural and manufactured fibers.</li> </ul>



Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
				<ul style="list-style-type: none"> <li>• List the properties of fibers that are most useful for forensic comparisons.</li> <li>• Describe the usefulness of trace elements for forensic comparison of various types of physical evidence.</li> <li>• Explain how elements can become radioactive.</li> <li>• List the most useful examinations for performing a forensic comparison of paint.</li> <li>• Distinguish continuous and line emission spectra</li> <li>• Understand the parts of a simple emission spectrograph.</li> <li>• Explain the phenomenon of how an atom absorbs and releases energy in the form of light.</li> <li>• Describe the collection and preservation of forensic paint and soil evidence.</li> <li>• List the important forensic properties of soil.</li> </ul>
Unit 8: Ballistics	1 week	<b>Subject Area:</b> 21 <sup>st</sup> Century Life and Careers:  9.3.LW.5 9.3.LW-ENF.12 9.3.ST.5	<ul style="list-style-type: none"> <li>• Students will understand the use of ballistics in forensic investigations and will be able to analyze used bullets in order to match them with the</li> </ul>	<ul style="list-style-type: none"> <li>• Describe the techniques for rifling a barrel.</li> <li>• Identify the class and individual characteristics of bullets and cartridge cases.</li> </ul>

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
		9.3.ST-SM.3 9.3.ST-SM.4  NJSLS-CLKS.5  Science (NJSLS-S): HS-PS2-1 HS-PS2-2 HS-PS2-3  Interdisciplinary: Technology: 8.1.12.F.1  English Language Arts: NJLSA.RST.11-12.1 NJLSA.RST.11-12.2 NJLSA.RST.11-12.4 NJLSA.RST.11-12.7	weapon from which they were fired. <ul style="list-style-type: none"> <li>(1 week, HS-PS2-1 , HS-PS2-2 HS-PS2-3)</li> </ul>	<ul style="list-style-type: none"> <li>Describe the use of a microscope to compare bullets and cartridge cases.</li> <li>Explain the concept of the NIBIN database.</li> <li>Explain the procedure for determining how far from a target a weapon was fired.</li> <li>Identify the laboratory tests for determining whether an individual has fired a weapon.</li> </ul>
Unit 9: DNA Profiling	3 weeks	<b>Subject Area:</b> 21 <sup>st</sup> Century Life and Careers:  9.3.LW.5 9.3.LW-ENF.12 9.3.ST.5 9.3.ST-SM.3 9.3.ST-SM.4  NJSLS-CLKS.5  Science (NJSLS-S): HS-LS1-1 HS-LS3-1 HS-LS3-2	<ul style="list-style-type: none"> <li>Students will understand the significance of the development of DNA technology to forensic science and will be able to compare segments of DNA and describe the use of DNA profiling in the court. (3 weeks, HS-LS1-1, HS-LS3-1, HS-LS3-2, HS-LS3-3)</li> </ul>	<ul style="list-style-type: none"> <li>Identify the parts of a nucleotide and explain how nucleotides are linked to form DNA.</li> <li>Explain the concept of base pairing as it relates to the double-helix structure of DNA.</li> <li>Contrast DNA strands that code for the production of proteins with strands that contain repeating base sequences.</li> </ul>

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
		<p>HS-LS3-3</p> <p>Interdisciplinary: Technology: 8.1.12.F.1</p> <p>English Language Arts: NJLSA.RST.11-12.1 NJLSA.RST.11-12.2 NJLSA.RST.11-12.4 NJLSA.RST.11-12.7</p>		<ul style="list-style-type: none"> <li>• Explain the technology of polymerase chain reaction (PCR) and how it applies to forensic DNA typing.</li> <li>• Contrast the newest DNA typing technique, short tandem repeats (STRs), with previous DNA typing technologies.</li> <li>• Describe the difference between nuclear and mitochondrial DNA.</li> <li>• Explain the use of DNA computerized databases in criminal investigation.</li> <li>• List the necessary procedures for proper preservation of biological evidence for laboratory DNA analysis.</li> </ul>

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
Unit 10: Drug Analysis and Toxicology	3 weeks	<p><b>Subject Area:</b> 21<sup>st</sup> Century Life and Careers:</p> <p>9.3.LW.5 9.3.LW-ENF.12 9.3.ST.5 9.3.ST-SM.3 9.3.ST-SM.4 9.3.LW-ENF.14</p> <p>NJSLS-CLKS.5</p> <p>Science (NJSLS-S): HS-PS1-1 HS-PS1-2 HS-PS1-5 HS-PS1-6 HS-LS1-2 HS-LS1-3</p> <p>Interdisciplinary: Technology: 8.1.12.F.1</p> <p>English Language Arts: NJLSA.RST.11-12.1 NJLSA.RST.11-12.2 NJLSA.RST.11-12.4 NJLSA.RST.11-12.7</p>	<ul style="list-style-type: none"> <li>• Students will understand the significance of drug analysis and toxicology to forensic investigations and will be able to identify various drugs and describe methods drug analysts and toxicologists use in identifying substances. (3 week, HS-PS1-1, HS-PS1-2, HS-PS1-5, HS-PS1-6, HS-LS1-2, HS-LS1-3)</li> </ul>	<ul style="list-style-type: none"> <li>• Compare and contrast psychological and physical dependence.</li> <li>• Name and classify commonly abused drugs.</li> <li>• Describe the laboratory tests normally used to perform a routine drug identification analysis.</li> <li>• Describe and explain the process of chromatography.</li> <li>• Explain the difference between thin-layer chromatography and gas chromatography.</li> <li>• Describe the utility of ultraviolet and infrared spectroscopy for the identification of organic compounds.</li> <li>• Describe the concept and utility of mass spectrometry for identification analysis.</li> <li>• Demonstrate the proper collection and preservation of drug evidence.</li> <li>• Explain how alcohol is absorbed into the bloodstream, transported throughout the body, and eliminated by oxidation and secretion.</li> </ul>

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
				<ul style="list-style-type: none"> <li>• Explain the process by which alcohol is excreted in the breath via the lungs.</li> <li>• Explain the concepts of infrared and fuel cell breath testing devices for alcohol testing.</li> <li>• Describe commonly employed field sobriety tests to assess alcohol impairment.</li> <li>• List and contrast laboratory procedures for measuring the concentration of alcohol in the blood.</li> <li>• Relate the precautions to be taken to properly preserve blood in order to analyze its alcohol content.</li> <li>• Analyze the significance of implied-consent laws and the Schmerber v. California case to traffic enforcement.</li> <li>• Describe techniques that forensic toxicologists use to isolate and identify drugs and poisons.</li> <li>• Explain the significance of finding a drug in human tissues and organs to assessing impairment.</li> </ul>

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
Unit 11: Document Examination	1 week	<p><b>Subject Area:</b> 21<sup>st</sup> Century Life and Careers:</p> <p>9.3.LW.5 9.3.LW-ENF.12 9.3.ST.5 9.3.ST-SM.3 9.3.ST-SM.4</p> <p>NJSLS-CLKS.5</p> <p>Science (NJSLS-S): HS-PS1-2 Interdisciplinary: Technology: 8.1.12.F.1</p> <p>English Language Arts: NJLSA.RST.11-12.1 NJLSA.RST.11-12.2 NJLSA.RST.11-12.4 NJLSA.RST.11-12.7</p>	<ul style="list-style-type: none"> <li>Students will understand the use of document examination in forensic science and will be able to analyze questioned documents for comparison and authenticity. (1 week, HS-PS1-2)</li> </ul>	<ul style="list-style-type: none"> <li>Define questioned document.</li> <li>Identify what common characteristics are associated with handwriting.</li> <li>List important guidelines for collecting known writings for comparison to a questioned document.</li> <li>Identify some of the class and individual characteristics of printers and photocopiers.</li> <li>List some of the techniques document examiners use to uncover alterations, erasures, obliterations, and variations in pen inks.</li> </ul>
Unit 12: Bloodstain Pattern Analysis	2.5 weeks	<p><b>Subject Area:</b> 21<sup>st</sup> Century Life and Careers:</p> <p>9.3.LW.5 9.3.LW-ENF.12 9.3.ST.5 9.3.ST-SM.3 9.3.ST-SM.4</p> <p>NJSLS-CLKS.5</p> <p>Science (NJSLS-S):</p>	<ul style="list-style-type: none"> <li>Students will understand what information can be drawn from the analysis of bloodstain patterns and will be able to analyze bloodstain patterns to reconstruct events during a crime. (2.5 weeks, HS-LS1-2, HS-LS1-3, HS-PS2-1)</li> </ul>	<ul style="list-style-type: none"> <li>Define crime scene reconstruction.</li> <li>Discuss the information that can be gained from bloodstain pattern analysis about the events involved in a violent crime.</li> <li>Explain how surface texture, directionality, and the angle of impact affect the shape of individual blood stains.</li> </ul>

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
		<p>HS-LS1-2 HS-LS1-3 HS-PS2-1</p> <p>Interdisciplinary: Technology: 8.1.12.F.1</p> <p>English Language Arts: NJLSA.RST.11-12.1 NJLSA.RST.11-12.2 NJLSA.RST.11-12.4 NJLSA.RST.11-12.7</p> <p>Math: CCSS.Math.Content.HSA.REI.A.1 CCSS.Math.Content.HSA.REI.A.2</p>		<ul style="list-style-type: none"> <li>• Calculate the angle of impact of a bloodstain using its dimensions.</li> <li>• Describe how the classifications of low, medium, and high velocity impact spatter and appreciate how these classifications should be used.</li> <li>• Discuss the methods to determine the area of convergence and area of origin for impact spatter patterns.</li> <li>• Identify how various blood spatter types are created and which features of each pattern can be used to aid in reconstructing events at a crime scene.</li> <li>• Describe the methods for documenting bloodstain patterns at a crime scene.</li> </ul>
Unit 13: Computer Forensics	2 weeks	<p><b>Subject Area:</b> 21<sup>st</sup> Century Life and Careers:</p> <p>9.3.LW.5 9.3.LW-ENF.12 9.3.ST.5 9.3.ST-SM.3 9.3.ST-SM.4</p> <p>NJSLS-CLKS.5</p>	<ul style="list-style-type: none"> <li>• Students will understand the value of computers in forensic investigations and will be able to describe how computers work and are used to retrieve valuable information. (2 weeks,</li> </ul>	<ul style="list-style-type: none"> <li>• List and describe the hardware and software components of a computer.</li> <li>• Compare read-only memory and random-access memory.</li> <li>• Describe how a hard disk drive is partitioned.</li> <li>• Describe the proper procedure for preserving</li> </ul>

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
		<p>Technology: 8.1.12.F.1 8.1.12.F.2 8.1.12.A.1</p> <p>Interdisciplinary: English Language Arts: NJLSA.RST.11-12.1 NJLSA.RST.11-12.2 NJLSA.RST.11-12.4 NJLSA.RST.11-12.7</p>		<p>computer evidence at a crime scene.</p> <ul style="list-style-type: none"> <li>• Explain the difference between the location of visible and latent data.</li> <li>• List the areas of the computer that will be examined to retrieve forensic data.</li> </ul>
Unit 14: Careers in Forensics	3.5 weeks	<p><b>Subject Area:</b> 21<sup>st</sup> Century Life and Careers:</p> <p>9.3.LW.5 9.3.LW-ENF.12 9.3.ST.5 9.3.ST-SM.3 9.3.ST-SM.4</p> <p>NJSLS-CLKS.5 NJSLS.9.4.12.CT.2</p> <p>Science (NJSLS-S): Dependent upon knowledge and skills cited in final project</p> <p>Interdisciplinary: Technology: 8.1.12.F.1</p>	<ul style="list-style-type: none"> <li>• Students will understand the significance of scientific advancements to forensic investigations and will be able to describe various careers available within forensic science.</li> <li>• Students will be able to construct a crime scene and use knowledge and skills acquired throughout the year to properly document the scene, collect physical evidence, explain techniques used to derive information from gathered physical evidence, and reconstruct the crime scene.(3.5 weeks)</li> </ul>	<ul style="list-style-type: none"> <li>• Describe careers available in forensic science.</li> <li>• Analyze how advancements within explored careers have a direct impact on the growth and development of forensic science.</li> <li>• Use acquired knowledge and skills to:</li> <li>• Properly document and sketch a crime scene.</li> <li>• Collect physical evidence.</li> <li>• Explain techniques used to derive information from gathered physical evidence.</li> <li>• Reconstruct a crime scene.</li> </ul>



Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
		English Language Arts: NJSLA.RST.11-12.1 NJSLA.RST.11-12.2 NJSLA.RST.11-12.4 NJSLA.RST.11-12.7		

<b>Unit 1: Introduction to Forensic Science</b>	<b>Recommended Duration: 2 weeks</b>
<p><b>Unit Description:</b>  This unit is designed to address the fundamental aspects of forensic science. Students will explore the major disciplines within forensic science and the development of the field of forensic science over time. Students will also be able to relate how major scientific advances have contributed to the evolution of the field of forensic science. Students will discuss the role of crime laboratories and the services they provide. Students will have the opportunity to use general forensics websites to explore advancements in the field of forensic science. Students will write a paper analyzing two cases in forensic science in order to exhibit how scientific advancements have contributed to the increased ability of forensic scientists to aid in solving crimes.</p>	

<b>Essential Questions</b>	<b>Enduring Understandings</b>
<ul style="list-style-type: none"> <li>• What is the role of forensic science in modern society?</li> <li>• How has the field of forensic science evolved over the past hundred years?</li> <li>• How have scientific advancements contributed to the evolution of forensic science?</li> <li>• How is the depiction of forensic science in popular culture misleading?</li> </ul>	<ul style="list-style-type: none"> <li>• Forensic science is an ever developing field that depends on knowledge of biology, chemistry, and physics to draw conclusions from physical evidence.</li> <li>• Many scientists were crucial in the development of the field of forensic science by implementing principles and techniques that could be used to examine physical evidence.</li> <li>• Crime laboratories have expanded largely over the past 40 years due to a rapid increase in knowledge and advancements in DNA and chemical analysis techniques.</li> <li>• Comprehensive crime laboratories provide a variety of services including, but not limited to, a physical science unit, biology unit, firearms unit, document examination unit, photography unit, toxicology, fingerprint analysis, polygraph administration, voiceprint analysis, and crime-scene investigation.</li> </ul>

Relevant Standards	Learning Goals	Learning Objectives
<p><b>Content Standards:</b>  <b>Power (Primary):</b>            21<sup>st</sup> Century Life and Careers:            9.3.LW.5            9.3.LW-ENF.12            9.3.ST.5            9.3.ST-SM.3            9.3.ST-SM.4</p> <p><b>Supportive (Secondary):</b>            21<sup>st</sup> Century Life and Careers:            NJSLS-CLKS.3 Consider the environmental, social and economic impacts of decisions.            NJSLS-CLKS.5 Utilize critical thinking to make sense of problems and persevere in solving them.</p>	<ul style="list-style-type: none"> <li>• Students will understand how scientific advancements have contributed to the development and evolution of forensic science and will be able to analyze two cases and the forensic investigation techniques used in each as it relates to the development of forensic science.</li> </ul>	<ul style="list-style-type: none"> <li>• Define forensic science and list the major disciplines it encompasses.</li> <li>• Identify the major contributors to the development of forensic science.</li> <li>• Explain how scientific advancements account for the rapid growth of forensic laboratories in the past 40 years.</li> <li>• Describe Locard’s Exchange principle.</li> <li>• Describe the services of a typical comprehensive crime laboratory in the criminal justice system.</li> <li>• Compare and contrast Frye and Daubert decisions relating the admissibility of scientific evidence in the courtroom.</li> <li>• Explain the role and responsibilities of the expert witness.</li> <li>• Analyze how scientific advancements have contributed to the more effective use of forensic science in solving crimes.</li> <li>• Interpret, organize and summarize information available on credible websites and databases on topics in forensic science.</li> </ul>

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/Assignments/Assessments (required)
KWL, Do Nows, Writing Breaks, Individual and Group White Boards, Questioning, Discussion, Self-Assessment, Case Analysis Studies, Quizzes, Application and Critical Thinking Questions, Lab Notebook  Varied case analysis studies	Introduction to Forensic Science Test	Case Analysis Essay  Case Study on Corruption in Mississippi Justice System (Biases/ethics and their effect on the social justice system; inequities in racial and social subgroups)	Introduction to Forensic Science Test Case Analysis Essay Case Analysis Studies

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/Assignments/Assessments (required)
Highlight forensic scientists with various backgrounds			

Possible Assessment Modifications/Accommodations
<ul style="list-style-type: none"> <li>• Vary test length and answer choices</li> <li>• Extended time on tests and quizzes</li> <li>• Underline or bold key words or phrases</li> <li>• Directions and/or questions read aloud</li> <li>• Oral responses</li> <li>• Provide word banks</li> </ul>

Instructional Strategies (refer to <i>Robert Marzano's 41 Elements</i> )
<ul style="list-style-type: none"> <li>• Cooperative Learning (DQ3:15; DQ4:21)</li> <li>• Direct Instruction (DQ2:9,10)</li> <li>• Compare/Contrast (DQ3:17)</li> <li>• Notetaking and Summarizing (DQ2:10,12)</li> <li>• Guided and Independent Practice (DQ3:15)</li> <li>• Structured Academic Games (DQ3:14; DQ5:25)</li> <li>• Building on Prior Knowledge (DQ2:7; DQ5:31)</li> <li>• Modeling and Visual Representations of Knowledge (DQ2:12; DQ3:15)</li> <li>• Critical Thinking Questioning (DQ4:22)</li> </ul>

Possible Instructional Modifications /Accommodations/Differentiation
<p>Modifications:</p> <ul style="list-style-type: none"> <li>• Provide options for expressing mastery of knowledge (i.e. modeling, drawing, writing, acting)</li> <li>• Reduction in the amount of classwork and homework</li> <li>• Simplified application and critical thinking questions</li> </ul> <p>Accommodations:</p>

- Provide extended time on assignments and activities
- Cueing to stay on task
- Preferential seating
- Guided learning during application and critical thinking questioning
- Provide one-on-one opportunities during SMART Lunch
- Provide opportunities for peer tutoring
- Provide modified notes when necessary
- Provide directions both written and verbally
- Assistance in organization
- Provide additional modes of interacting with new information (i.e. audio, pictures, video)

Differentiation:

- Organization of groups with assigned roles based on student strengths and weaknesses
- Vary levels of guided support and scaffolding based on student need
- Provide option of group work or individual work on certain assignments
- Assign critical thinking questions based on level of difficulty and student's mastery of content

**Unit Vocabulary**

**Essential:** expert witness, Locard's exchange principle

**Non-Essential:** criminalistics, jurisprudence, odontology, pathology, anthropology, questioned documents, toxicology, civil, criminal, entomology

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21 <sup>st</sup> Century Themes: P21 Framework Toolkit	21 <sup>st</sup> Century Skills: P21 Framework Toolkit
<p>Technology: 8.1.12.F.1</p> <p>Social Studies: 6.1.4.C.17</p> <p>English Language Arts: NJLSA.RST.11-12.1 NJLSA.RST.11-12.2 NJLSA.RST.11-12.4 NJLSA.RST.11-12.7</p>	<p>Google Docs Kingsway Teacher Website Online Forums National Forensics Databases Online Research</p>	<p><input checked="" type="checkbox"/> Global Awareness</p> <p><input checked="" type="checkbox"/> Civic Literacy</p> <p><input checked="" type="checkbox"/> Health Literacy</p>	<p><input checked="" type="checkbox"/> Media Literacy</p> <p><input checked="" type="checkbox"/> Critical Thinking and Problem Solving</p> <p><input checked="" type="checkbox"/> Life and Career Skills</p> <p><input checked="" type="checkbox"/> Information &amp; Communication Technologies Literacy</p> <p><input checked="" type="checkbox"/> Communication &amp; Collaboration</p> <p><input checked="" type="checkbox"/> Information Literacy</p>

**Resources:**

**Texts/Materials:**

Forensic Science: An Introduction (2<sup>nd</sup> Ed) – Saferstein  
 Crime Scene Investigations: Real-Life Science Labs for Grades 6-12 – Walker and Wood  
 Jumped, Fell or Pushed? – Koehler  
 Teacher Developed PPT  
 Teacher Developed Notes and Handouts  
 Current Event Articles  
 Leveled Reading- Newsela

<b>Unit 2: Crime Scene Investigation and Physical Evidence</b>	<b>Recommended Duration: 2 weeks</b>
<p><b>Unit Description:</b>  This unit is designed to address the fundamental aspects of crime scene investigation and the identification and comparison of physical evidence. Students will be able to define physical evidence and describe how it is collected and packaged. Students will also be able to describe and demonstrate how a crime scene should be sketched, recorded, and assessed for all valuable physical evidence. Students will build mock crime scenes and use learned skills to demonstrate their ability to properly sketch, record, and collect evidence from a crime scene. In addition, students will also identify and compare various types of physical evidence and compare their values to forensic investigation.</p>	

<b>Essential Questions</b>	<b>Enduring Understandings</b>
<ul style="list-style-type: none"> <li>• What is physical evidence?</li> <li>• Why is it important to collect evidence in a procedural manner?</li> <li>• Why is it important to document information through reports, photographs, and sketches of the crime scene?</li> <li>• What is the difference between the identification and comparison of physical evidence?</li> <li>• Why is it important that physical evidence collected from a crime scene is shared on national databases?</li> </ul>	<ul style="list-style-type: none"> <li>• Physical evidence is crucial in linking victims and suspects to a crime scene.</li> <li>• Physical evidence must be collected in a specific and strategic manner, as well as systematically documented, in order to ensure that no tampering or contamination occurs.</li> <li>• Physical evidence can link specific persons or objects to a crime scene, or may contain class characteristics linking a type of object to a crime scene.</li> <li>• Physical evidence collected from crime scenes (i.e. fingerprints and DNA) are shared on national databases. This dramatically enhances the role of forensic science in criminal investigation.</li> </ul>

<b>Relevant Standards</b>	<b>Learning Goals</b>	<b>Learning Objectives</b>
<p><b>Content Standards:</b>  <b>Power (Primary):</b>  21<sup>st</sup> Century Life and Careers:</p> <p>9.3.LW.5  9.3.LW-ENF.12  9.3.ST.5  9.3.ST-SM.3  9.3.ST-SM.4</p>	<ul style="list-style-type: none"> <li>• Students will understand the importance of following procedures and documentation in evidence collection and will be able to properly collect physical evidence and document a crime scene through sketches, photographs and reports.</li> <li>• Students will understand the importance of identifying and comparing physical evidence and sharing this information on national databases. Students will be able to classify</li> </ul>	<ul style="list-style-type: none"> <li>• Define physical evidence.</li> <li>• Describe the responsibilities of the first police officer who arrives at a crime scene.</li> <li>• Explain the steps to be taken to thoroughly record the crime scene.</li> <li>• Describe the proper procedures for conducting a systematic search of a crime scene for physical evidence.</li> <li>• Describe proper techniques for packaging common types of physical evidence.</li> </ul>

Relevant Standards	Learning Goals	Learning Objectives
<p><b>Supportive (Secondary):</b>            21<sup>st</sup> Century Life and Careers:            NJSLS-CLKS.5 Utilize critical thinking to make sense of problems and persevere in solving them</p>	<p>types of physical evidence and explain their significance in forensic investigation.</p>	<ul style="list-style-type: none"> <li>• Define and demonstrate the concept of chain of custody.</li> <li>• Explain the contributions the forensic pathologist, entomologist, and anthropologist can make to a homicide investigation.</li> <li>• Identify the common types of physical evidence encountered at crime scenes.</li> <li>• Explain the difference between the identification and comparison of physical evidence.</li> <li>• Define and contrast individual and class characteristics of physical evidence.</li> <li>• Assess the value of class characteristics to crime scene investigation.</li> <li>• List and explain the function of national databases available to forensic scientists.</li> </ul>

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/Assignments/Assessments (required)
<p>KWL, Do Nows, Writing Breaks, Individual and Group White Boards, Questioning, Discussion, Self-Assessment, Case Analysis Studies, Quizzes, Application and Critical Thinking Questions, Lab Notebook</p> <p>Varied case analysis studies            Highlight forensic scientists with various backgrounds</p>	<p>Crime Scene Analysis/Physical Evidence Test</p>	<p>Crime Scene Analysis/Physical Evidence Test (performance component)            Crime Scene Sketch            Collection of Physical Evidence            Crime Scene Report            Identification/Classification of Physical Evidence</p>	<p>Crime Scene Analysis Test            Crime Scene Sketch (differentiated scaffolding for various experience with scaling calculations)            Collection of Physical Evidence            Crime Scene Report            Anthropometric Lab            Case Analysis Studies</p>



### **Possible Assessment Modifications/Accommodations**

- Vary test length and answer choices
- Extended time on tests and quizzes
- Underline or bold key words or phrases
- Directions and/or questions read aloud
- Oral responses
- Provide word banks

### **Instructional Strategies (refer to *Robert Marzano's 41 Elements*)**

- Cooperative Learning (DQ3:15; DQ4:21)
- Direct Instruction (DQ2:9,10)
- Compare/Contrast (DQ3:17)
- Notetaking and Summarizing (DQ2:10,12)
- Guided and Independent Practice (DQ3:15)
- Structured Academic Games (DQ3:14; DQ5:25)
- Building on Prior Knowledge (DQ2:7; DQ5:31)
- Modeling and Visual Representations of Knowledge (DQ2:12; DQ3:15)
- Critical Thinking Questioning (DQ4:22)

### **Possible Instructional Modifications /Accommodations/Differentiation**

#### Modifications:

- Provide options for expressing mastery of knowledge (i.e. modeling, drawing, writing, acting)
- Reduction in the amount of classwork and homework
- Simplified application and critical thinking questions

#### Accommodations:

- Provide extended time on assignments and activities
- Cueing to stay on task
- Preferential seating
- Guided learning during application and critical thinking questioning
- Provide one-on-one opportunities during SMART Lunch
- Provide opportunities for peer tutoring
- Provide modified notes when necessary

- Provide directions both written and verbally
- Assistance in organization
- Provide additional modes of interacting with new information (i.e. audio, pictures, video)

Differentiation:

- Organization of groups with assigned roles based on student strengths and weaknesses
- Vary levels of guided support and scaffolding based on student need
- Provide option of group work or individual work on certain assignments
- Assign critical thinking questions based on level of difficulty and student’s mastery of content

**Unit Vocabulary**

**Essential:** algor mortis, autopsy, buccal swab, chain of custody, finished sketch, livor mortis, physical evidence, rigor mortis, rough sketch, standard/reference sample, substrate control, class characteristics, comparison, identification, individual characteristics, product rule

**Non-Essential:** preliminary examination, cross-contamination, depressions, impressions, exonerated

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21 <sup>st</sup> Century Themes: P21 Framework Toolkit	21 <sup>st</sup> Century Skills: P21 Framework Toolkit
Technology: 8.1.12.F.1  English Language Arts: NJLSA.RST.11-12.1 NJLSA.RST.11-12.2 NJLSA.RST.11-12.4 NJLSA.RST.11-12.7	Google Docs Kingsway Teacher Website Online Forums National Forensics Databases Online Research	<input checked="" type="checkbox"/> Global Awareness  <input checked="" type="checkbox"/> Civic Literacy  <input type="checkbox"/> Financial, Economic, Business, & Entrepreneurial Literacy  <input checked="" type="checkbox"/> Health Literacy	<input type="checkbox"/> Creativity & Innovation  <input checked="" type="checkbox"/> Media Literacy  <input checked="" type="checkbox"/> Critical Thinking and Problem Solving  <input checked="" type="checkbox"/> Life and Career Skills  <input checked="" type="checkbox"/> Information & Communication Technologies Literacy  <input checked="" type="checkbox"/> Communication & Collaboration

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21 <sup>st</sup> Century Themes: P21 Framework Toolkit	21 <sup>st</sup> Century Skills: P21 Framework Toolkit
			__X__ Information Literacy

Resources:
<p><b>Texts/Materials:</b>  Forensic Science: An Introduction (2<sup>nd</sup> Ed) – Saferstein  Crime Scene Investigations: Real-Life Science Labs for Grades 6-12 – Walker and Wood  Jumped, Fell or Pushed? – Koehler  Teacher Developed PPT  Teacher Developed Notes</p> <p><b>Major Assignments (required):</b>  Crime Scene/Physical Evidence Analysis Test (with performance component)</p> <p><b>Major Activities (required):</b>  Case Analysis Studies  Crime Scene Sketch  Collection of Physical Evidence  Crime Scene Report</p>

Unit 3: Fingerprinting	Recommended Duration: 2 weeks
<p><b>Unit Description:</b>  This unit will address the value of fingerprints to forensic investigations. Students will describe the difference between various types of fingerprints (visible, plastic, and latent) and techniques used in fingerprint collection and preservation. Students will use characteristics of different patterns to compare fingerprints and explain how fingerprints are used in forensic investigation. Students will also explain the importance of impression databases to forensic scientists. This unit will allow students the opportunity to practice techniques in fingerprint collection, preservation, and identification. Students will continue to exhibit proper techniques in evidence collection and documentation.</p>	

Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> <li>• How does the value of fingerprints compare to the value of other types of physical evidence in forensic investigation?</li> <li>• How has the value of fingerprints in forensic investigation evolved as the field of forensic science has continued to develop?</li> <li>• How are fingerprints created and used to link individuals to crime scenes?</li> </ul>	<ul style="list-style-type: none"> <li>• Fingerprints, which can be created on a variety of surfaces, are used by forensic scientists to connect individuals with objects associated with a crime scene.</li> <li>• Fingerprints contain characteristics that can be used to aid in the analysis and comparison with various fingerprints.</li> <li>• Fingerprints have become of even greater value to forensic investigation with the development of impression databases.</li> </ul>

Relevant Standards	Learning Goals	Learning Objectives
<p><b>Content Standards:</b>  <b>Power (Primary):</b>            21<sup>st</sup> Century Life and Careers:</p> <p>9.3.LW.5            9.3.LW-ENF.12            9.3.ST.5            9.3.ST-SM.3            9.3.ST-SM.4</p> <p>Science (NJSL-S):            HS-PS2-6</p> <p><b>Supportive (Secondary):</b>            21<sup>st</sup> Century Life and Careers:            NJSL-CLKS.5 Utilize critical thinking to make sense of problems and persevere in solving them</p>	<ul style="list-style-type: none"> <li>• Students will understand the value of fingerprinting to forensic science and will be able to collect, preserve, analyze and compare various types of fingerprints.</li> </ul>	<ul style="list-style-type: none"> <li>• Analyze the common ridge characteristics of a fingerprint.</li> <li>• Identify and compare the three major fingerprint patterns and their respective subclasses.</li> <li>• Distinguish between visible, plastic, and latent fingerprints.</li> <li>• Describe the concept of an automated fingerprint identification system (AFIS) and its importance to forensic investigation.</li> <li>• List and demonstrate the techniques for developing latent fingerprints on porous and nonporous objects.</li> <li>• Describe and demonstrate the proper procedures for preserving a developed latent fingerprint.</li> </ul>

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/Assignments/Assessments (required)
KWL, Do Nows, Writing Breaks, Individual and Group White Boards, Questioning, Discussion, Self-Assessment, Case Analysis Studies, Quizzes, Application and Critical Thinking Questions, Lab Notebook Varied case analysis studies Highlight forensic scientists with various backgrounds	Fingerprinting Test Fingerprint Practical	Fingerprint Lab (Collection, Preservation, Identification) Fingerprint Practical	Fingerprinting Test Fingerprint Lab Fingerprint Practical Case Analysis Studies

Possible Assessment Modifications/Accommodations
<ul style="list-style-type: none"> <li>• Vary test length and answer choices</li> <li>• Extended time on tests and quizzes</li> <li>• Underline or bold key words or phrases</li> <li>• Directions and/or questions read aloud</li> <li>• Oral responses</li> <li>• Provide word banks</li> </ul>

Instructional Strategies (refer to <i>Robert Marzano's 41 Elements</i> )
<ul style="list-style-type: none"> <li>• Cooperative Learning (DQ3:15; DQ4:21)</li> <li>• Direct Instruction (DQ2:9,10)</li> <li>• Compare/Contrast (DQ3:17)</li> <li>• Notetaking and Summarizing (DQ2:10,12)</li> <li>• Guided and Independent Practice (DQ3:15)</li> <li>• Structured Academic Games (DQ3:14; DQ5:25)</li> <li>• Building on Prior Knowledge (DQ2:7; DQ5:31)</li> <li>• Modeling and Visual Representations of Knowledge (DQ2:12; DQ3:15)</li> <li>• Critical Thinking Questioning (DQ4:22)</li> </ul>

### Possible Instructional Modifications /Accommodations/Differentiation

#### Modifications:

- Provide options for expressing mastery of knowledge (i.e. modeling, drawing, writing, acting)
- Reduction in the amount of classwork and homework
- Simplified application and critical thinking questions

#### Accommodations:

- Provide extended time on assignments and activities
- Cueing to stay on task
- Preferential seating
- Guided learning during application and critical thinking questioning
- Provide one-on-one opportunities during SMART Lunch
- Provide opportunities for peer tutoring
- Provide modified notes when necessary
- Provide directions both written and verbally
- Assistance in organization
- Provide additional modes of interacting with new information (i.e. audio, pictures, video)

#### Differentiation:

- Organization of groups with assigned roles based on student strengths and weaknesses
- Vary levels of guided support and scaffolding based on student need
- Provide option of group work or individual work on certain assignments
- Assign critical thinking questions based on level of difficulty and student's mastery of content

### Unit Vocabulary

**Essential:** anthropometry, arch, digital imaging, fluoresce, iodine fuming, latent fingerprint, livescan, loop, ninhydrin, Physical Developer, pixel, plastic print, portrait parle, ridge characteristics (minutiae), sublimation, superglue fuming, visible print, whorl

**Non-Essential:** epidermis, dermis, dermal papillae, ulnar, radial, delta, porous, cyanoacrylate, LEDs

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21 <sup>st</sup> Century Themes: P21 Framework Toolkit	21 <sup>st</sup> Century Skills: P21 Framework Toolkit
<p>Technology: 8.1.12.F.1</p> <p>Social Studies: 6.1.4.C.17</p> <p>English Language Arts: NJLSA.RST.11-12.1 NJLSA.RST.11-12.2 NJLSA.RST.11-12.4 NJLSA.RST.11-12.7</p>	<p>Google Docs Kingsway Teacher Website Online Forums National Forensics Databases Online Research</p>	<p><input checked="" type="checkbox"/> Global Awareness</p> <p><input checked="" type="checkbox"/> Civic Literacy</p> <p><input type="checkbox"/> Financial, Economic, Business, &amp; Entrepreneurial Literacy</p> <p><input type="checkbox"/> Health Literacy</p>	<p><input type="checkbox"/> Creativity &amp; Innovation</p> <p><input checked="" type="checkbox"/> Media Literacy</p> <p><input checked="" type="checkbox"/> Critical Thinking and Problem Solving</p> <p><input checked="" type="checkbox"/> Life and Career Skills</p> <p><input checked="" type="checkbox"/> Information &amp; Communication Technologies Literacy</p> <p><input checked="" type="checkbox"/> Communication &amp; Collaboration</p> <p><input checked="" type="checkbox"/> Information Literacy</p>

Resources:
<p><b>Texts/Materials:</b> Forensic Science: An Introduction (2<sup>nd</sup> Ed) – Saferstein Crime Scene Investigations: Real-Life Science Labs for Grades 6-12 – Walker and Wood Jumped, Fell or Pushed? – Koehler Teacher Developed PPT Teacher Developed Notes and Handouts Current Event Articles Leveled Reading- Newsela</p>

<b>Unit 4: Forensic Anthropology and Entomology</b>	<b>Recommended Duration: 2.5 weeks</b>
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**Unit Description:**  
 This unit will explore the use and value of anthropology and entomology in forensic investigation. Students will identify the characteristics of human remains that are most useful in identification and comparison. Students will demonstrate procedures used by forensic scientists when processing human remains. Students will identify the critical information that can be drawn from human remains, including but not limited to, time and cause of death, age, gender, race, height, and facial characteristics. In addition, students will explore the use of entomology in forensic science.

<b>Essential Questions</b>	<b>Enduring Understandings</b>
<ul style="list-style-type: none"> <li>• What is the role of forensic anthropology criminal investigations and how has that role developed over time?</li> <li>• What information can be collected from human remains?</li> <li>• How can the life cycle of certain insects help determine time of death?</li> </ul>	<ul style="list-style-type: none"> <li>• Human remains can provide a wide range of information in forensic investigations.</li> <li>• Human remains can be used to identify an individual’s characteristics, including facial characteristics, distinguishing skeletal features, race, gender, and height.</li> <li>• Human remains can also be used to help determine the manner, cause and time of death.</li> <li>• The life cycle of an insect, among many other things, can help determine how long human remains have been in a specific area.</li> </ul>

<b>Relevant Standards</b>	<b>Learning Goals</b>	<b>Learning Objectives</b>
<p><b>Content Standards:</b>  <b>Power (Primary):</b>            21<sup>st</sup> Century Life and Careers:</p> <p>9.3.LW.5            9.3.LW-ENF.12            9.3.ST.5            9.3.ST-SM.3            9.3.ST-SM.4            Science (NJSL-S):            HS-LS1-6</p>	<ul style="list-style-type: none"> <li>• Students will understand the importance of forensic anthropology and entomology in criminal investigations and will be able to analyze human remains in order to collect information critical to forensic investigation.</li> </ul>	<ul style="list-style-type: none"> <li>• Explain the role of anthropologists and entomologists in forensic science.</li> <li>• Identify the characteristics of human remains that can be used in determining the estimated time of death.</li> <li>• Explain how human remains are recovered and processed from a crime scene.</li> <li>• Analyze skeletal remains in order to determine the race, gender, height, and age of an individual.</li> </ul>



Relevant Standards	Learning Goals	Learning Objectives
HS-LS1-7 <b>Supportive (Secondary):</b> 21 <sup>st</sup> Century Life and Careers: NJSLS-CLKS.5 Utilize critical thinking to make sense of problems and persevere in solving them		<ul style="list-style-type: none"> <li>• Explain how dental remains can be used in forensic investigation.</li> <li>• Describe the role of forensic entomologists in crime scene investigation.</li> <li>• Describe the life cycle of various insects and how they can be used to help determine time of death.</li> </ul>

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/Assignments/Assessments (required)
KWL, Do Nows, Writing Breaks, Individual and Group White Boards, Questioning, Discussion, Self-Assessment, Case Analysis Studies, Quizzes, Application and Critical Thinking Questions, Lab Notebook  Varied case analysis studies  Highlight forensic scientists with various backgrounds	Forensic Anthropology and Entomology Test	Anthropology Labs Entomology Labs	Forensic Pathology and Anthropology Test Anthropology Labs (explaining differences in race vs. ancestry and sex vs. gender as it applies to determination of ancestry and sex of skeletal remains) Entomology Labs Case Analysis Studies  Journal Study on Anthropological Terminology Regarding Race

Possible Assessment Modifications/Accommodations
<ul style="list-style-type: none"> <li>• Vary test length and answer choices</li> <li>• Extended time on tests and quizzes</li> <li>• Underline or bold key words or phrases</li> <li>• Directions and/or questions read aloud</li> <li>• Oral responses</li> <li>• Provide word banks</li> </ul>

### **Instructional Strategies (refer to *Robert Marzano's 41 Elements*)**

- Cooperative Learning (DQ3:15; DQ4:21)
- Direct Instruction (DQ2:9,10)
- Compare/Contrast (DQ3:17)
- Notetaking and Summarizing (DQ2:10,12)
- Guided and Independent Practice (DQ3:15)
- Structured Academic Games (DQ3:14; DQ5:25)
- Building on Prior Knowledge (DQ2:7; DQ5:31)
- Modeling and Visual Representations of Knowledge (DQ2:12; DQ3:15)
- Critical Thinking Questioning (DQ4:22)

### **Possible Instructional Modifications /Accommodations/Differentiation**

#### Modifications:

- Provide options for expressing mastery of knowledge (i.e. modeling, drawing, writing, acting)
- Reduction in the amount of classwork and homework
- Simplified application and critical thinking questions

#### Accommodations:

- Provide extended time on assignments and activities
- Cueing to stay on task
- Preferential seating
- Guided learning during application and critical thinking questioning
- Provide one-on-one opportunities during SMART Lunch
- Provide opportunities for peer tutoring
- Provide modified notes when necessary
- Provide directions both written and verbally
- Assistance in organization
- Provide additional modes of interacting with new information (i.e. audio, pictures, video)

#### Differentiation:

- Organization of groups with assigned roles based on student strengths and weaknesses
- Vary levels of guided support and scaffolding based on student need
- Provide option of group work or individual work on certain assignments
- Assign critical thinking questions based on level of difficulty and student's mastery of content

<b>Unit Vocabulary</b>
<b>Essential:</b> pathology, anthropology, rigor mortis, algor mortis, liver mortis, autopsy <b>Non-Essential:</b> odontology, cranium, pelvis, femur, epiphyses, Caucasoid, Negroid, Mongoloid

<b>Interdisciplinary Connections (Applicable Standards)</b>	<b>Integration of Technology</b>	<b>21<sup>st</sup> Century Themes: P21 Framework Toolkit</b>	<b>21<sup>st</sup> Century Skills: P21 Framework Toolkit</b>
Technology: 8.1.12.F.1  Social Studies: 6.1.4.C.17  English Language Arts: NJLSA.RST.11-12.1 NJLSA.RST.11-12.2 NJLSA.RST.11-12.4 NJLSA.RST.11-12.7	Google Docs Kingsway Teacher Website Online Forums National Forensics Databases Online Research	<input checked="" type="checkbox"/> Global Awareness  <input checked="" type="checkbox"/> Civic Literacy  <input type="checkbox"/> Financial, Economic, Business, & Entrepreneurial Literacy  <input checked="" type="checkbox"/> Health Literacy	<input type="checkbox"/> Creativity & Innovation  <input checked="" type="checkbox"/> Media Literacy  <input checked="" type="checkbox"/> Critical Thinking and Problem Solving  <input checked="" type="checkbox"/> Life and Career Skills  <input checked="" type="checkbox"/> Information & Communication Technologies Literacy  <input checked="" type="checkbox"/> Communication & Collaboration  <input checked="" type="checkbox"/> Information Literacy

<b>Resources:</b>
<b>Texts/Materials:</b> Forensic Science: An Introduction (2 <sup>nd</sup> Ed) – Saferstein Crime Scene Investigations: Real-Life Science Labs for Grades 6-12 – Walker and Wood Jumped, Fell or Pushed? – Koehler Teacher Developed PPT Teacher Developed Notes and Handouts Current Event Articles  Leveled Reading- Newsela

<b>Unit 5: Serology</b>	<b>Recommended Duration: 2 weeks</b>
<b>Unit Description:</b> This unit is designed to address the use of body fluids in forensic investigation. Students will assess the main characteristics and composition of blood along with its proper collection and preservation. Students will identify techniques used in determining if a stain is composed of blood. Students will also describe how blood can be used to determine the relation of two individuals. In addition, students will discuss the characteristics of semen and seminal stains. Students will discuss the importance of evidence collection in cases of suspected sexual crime.	

<b>Essential Questions</b>	<b>Enduring Understandings</b>
What is the role of serology in forensic investigation?  What information can be derived from blood and semen samples found on a crime scene?	Stains can be analyzed to determine the body fluid that comprises them.  Forensic scientists can link body fluids to an individual through DNA fingerprinting. With the exception of identical twins, DNA is unique to each individual.  Blood typing can quickly and easily eliminate a link between a blood sample and an individual.

Relevant Standards	Learning Goals	Learning Objectives
<p><b>Content Standards:</b>  <b>Power (Primary):</b>            21<sup>st</sup> Century Life and Careers:            9.3.LW.5            9.3.LW-ENF.12            9.3.ST.5            9.3.ST-SM.3            9.3.ST-SM.4</p> <p>Science (NJSLS-S):            HS-LS1-1            HS-LS3-1</p> <p><b>Supportive (Secondary):</b>            21<sup>st</sup> Century Life and Careers:            NJSLS-CLKS.5 Utilize critical thinking to make sense of problems and persevere in solving them</p>	<ul style="list-style-type: none"> <li>Students will understand how serology can contribute to forensic investigation and will be able to describe and demonstrate techniques used in forensic serology.</li> </ul>	<ul style="list-style-type: none"> <li>List the antigens and antibodies found in the blood for each of the four blood types (A, B, AB, and O).</li> <li>Describe and demonstrate the process of blood typing.</li> <li>List and describe forensic tests used to characterize a stain as blood.</li> <li>Explain the concept of antigen-antibody interactions and how they are applied to species identification and drug identification.</li> <li>Explain how each individual contains a unique set of genetic material that is a combination of both parents' genetic material.</li> <li>List the laboratory tests necessary to characterize seminal stains.</li> <li>Explain how suspect blood and semen stains are properly preserved for laboratory examination.</li> <li>Describe the importance of the proper collection of physical evidence in a rape investigation.</li> </ul>

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/Assignments/Assessments (required)
<p>KWL, Do Nows, Writing Breaks, Individual and Group White Boards, Questioning, Discussion, Self-Assessment, Case Analysis Studies, Quizzes, Application and Critical Thinking Questions, Lab Notebook</p> <p>Varied case analysis studies</p> <p>Highlight forensic scientists with various backgrounds</p>	<p>Serology Test</p>	<p>Blood Typing Lab            Urinalysis Lab            Blood Typing Webquest</p>	<p>Serology Test            Blood Typing Lab (blood type distribution by ethnicity)            Urinalysis Lab            Blood Typing Webquest            Case Analysis Studies</p>

### **Possible Assessment Modifications/Accommodations**

- Vary test length and answer choices
- Extended time on tests and quizzes
- Underline or bold key words or phrases
- Directions and/or questions read aloud
- Oral responses
- Provide word banks

### **Instructional Strategies (refer to *Robert Marzano's 41 Elements*)**

- Cooperative Learning (DQ3:15; DQ4:21)
- Direct Instruction (DQ2:9,10)
- Compare/Contrast (DQ3:17)
- Notetaking and Summarizing (DQ2:10,12)
- Guided and Independent Practice (DQ3:15)
- Structured Academic Games (DQ3:14; DQ5:25)
- Building on Prior Knowledge (DQ2:7; DQ5:31)
- Modeling and Visual Representations of Knowledge (DQ2:12; DQ3:15)
- Critical Thinking Questioning (DQ4:22)

### **Possible Instructional Modifications /Accommodations/Differentiation**

#### Modifications:

- Provide options for expressing mastery of knowledge (i.e. modeling, drawing, writing, acting)
- Reduction in the amount of classwork and homework
- Simplified application and critical thinking questions

#### Accommodations:

- Provide extended time on assignments and activities
- Cueing to stay on task
- Preferential seating
- Guided learning during application and critical thinking questioning
- Provide one-on-one opportunities during SMART Lunch
- Provide opportunities for peer tutoring
- Provide modified notes when necessary

**Possible Instructional Modifications /Accommodations/Differentiation**

- Provide directions both written and verbally
- Assistance in organization
- Provide additional modes of interacting with new information (i.e. audio, pictures, video)

Differentiation:

- Organization of groups with assigned roles based on student strengths and weaknesses
- Vary levels of guided support and scaffolding based on student need
- Provide option of group work or individual work on certain assignments
- Assign critical thinking questions based on level of difficulty and student’s mastery of content

**Unit Vocabulary**

**Essential:** acid phosphatase, agglutination, allele, antibody, antigen, antiserum, aspermia, DNA, enzyme, erythrocyte, hybridoma cells, locus, luminol, monoclonal antibodies, oligospermia, plasma, polyclonal antibodies, precipitin, serology, serum, sperm

**Non-Essential:** gene, chromosome, heredity, whole blood, hemoglobin, gel diffusion, electrophoresis, DNA typing

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21 <sup>st</sup> Century Themes: P21 Framework Toolkit	21 <sup>st</sup> Century Skills: P21 Framework Toolkit
Technology: 8.1.12.F.1  Social Studies: 6.1.4.C.17  English Language Arts: NJLSA.RST.11-12.1 NJLSA.RST.11-12.2 NJLSA.RST.11-12.4 NJLSA.RST.11-12.7	Google Docs Kingsway Teacher Website Online Forums National Forensics Databases Online Research Blood Typing Webquest	<input checked="" type="checkbox"/> Global Awareness  <input checked="" type="checkbox"/> Civic Literacy  <input type="checkbox"/> Financial, Economic, Business, & Entrepreneurial Literacy  <input checked="" type="checkbox"/> Health Literacy	<input type="checkbox"/> Creativity & Innovation  <input checked="" type="checkbox"/> Media Literacy  <input checked="" type="checkbox"/> Critical Thinking and Problem Solving  <input checked="" type="checkbox"/> Life and Career Skills  <input checked="" type="checkbox"/> Information & Communication Technologies Literacy  <input checked="" type="checkbox"/> Communication & Collaboration

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21 <sup>st</sup> Century Themes: P21 Framework Toolkit	21 <sup>st</sup> Century Skills: P21 Framework Toolkit
			__X__ Information Literacy

Resources:
<p><b>Texts/Materials:</b>  Forensic Science: An Introduction (2<sup>nd</sup> Ed) – Saferstein  Crime Scene Investigations: Real-Life Science Labs for Grades 6-12 – Walker and Wood  Jumped, Fell or Pushed? – Koehler  Teacher Developed PPT  Teacher Developed Notes and Handouts  Current Event Articles  Leveled Reading- Newsela</p>

Unit 6: Forensic Investigation of Fires and Explosions	Recommended Duration: 2 weeks
<p><b>Unit Description:</b>  This unit is designed to explore the forensic investigation of fire and explosions. Students will describe and demonstrate how physical evidence is collected at the scene of an explosion or suspected arson. Students will identify the conditions necessary to initiate and sustain combustion and use these to recognize the telltale signs of an accelerant-initiated fire. Students will also describe laboratory procedures used in detecting hydrocarbon and explosive residues. In addition, students will investigate and compare forensic cases involving fire or explosions.</p>	

Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> <li>• What physical evidence remains after a fire or explosion that can give information about the crime?</li> <li>• What conditions are necessary for combustion to occur?</li> </ul>	<ul style="list-style-type: none"> <li>• Forensic scientists can use physical evidence from the scene of a fire or explosion to determine its origin, timeline, and probable cause.</li> <li>• There are three requirements to initiate and sustain combustion: a fuel must be present, oxygen must be available in sufficient quantity to combine with</li> </ul>



Essential Questions	Enduring Understandings
	the fuel, and heat must be applied to initiate the combustion. Sufficient heat must be generated to sustain the reaction.

Relevant Standards	Learning Goals	Learning Objectives
<p><b>Content Standards:</b>  <b>Power (Primary):</b>            21<sup>st</sup> Century Life and Careers:</p> <p>9.3.LW.5            9.3.LW-ENF.12            9.3.ST.5            9.3.ST-SM.3            9.3.ST-SM.4</p> <p>Science (NJSLS-S):            HS-PS1-4            HS-PS1-5            HS-PS1-6            HS-PS1-7</p> <p><b>Supportive (Secondary):</b>            21<sup>st</sup> Century Life and Careers:            NJSLS-CLKS.5 Utilize critical thinking to make sense of problems and persevere in solving them</p>	<ul style="list-style-type: none"> <li>Students will understand the value of various physical evidence commonly found at the scene of an explosion or fire and will be able identify origin, timeline, and probable cause of a fire or explosion given a set of physical evidence.</li> </ul>	<ul style="list-style-type: none"> <li>Identify the conditions necessary to initiate and sustain combustion.</li> <li>Describe the three mechanisms of heat transfer.</li> <li>Identify the telltale signs of an accelerant-initiated fire.</li> <li>Describe how to collect physical evidence at the scene of a suspected arson or explosion.</li> <li>Describe the laboratory procedures used to detect and identify hydrocarbon and explosive residues.</li> <li>Explain how explosives are classified.</li> <li>List common commercial, homemade, and military explosives</li> </ul>

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/Assignments/Assessments (required)
KWL, Do Nows, Writing Breaks, Individual and Group White Boards, Questioning, Discussion, Self-	Forensic Investigation of Fire and Explosions Test	Forensic Investigation of Fire Lab	Forensic Investigation of Fire and Explosions Test Forensic Investigation of Fire Lab

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/Assignments/Assessments (required)
<p>Assessment, Case Analysis Studies, Quizzes, Application and Critical Thinking Questions, Lab Notebook</p> <p>Varied case analysis studies</p> <p>Highlight forensic scientists with various backgrounds</p>			Case Analysis Studies

Possible Assessment Modifications/Accommodations
<ul style="list-style-type: none"> <li>• Vary test length and answer choices</li> <li>• Extended time on tests and quizzes</li> <li>• Underline or bold key words or phrases</li> <li>• Directions and/or questions read aloud</li> <li>• Oral responses</li> <li>• Provide word banks</li> </ul>

Instructional Strategies (refer to <i>Robert Marzano's 41 Elements</i> )
<ul style="list-style-type: none"> <li>• Cooperative Learning (DQ3:15; DQ4:21)</li> <li>• Direct Instruction (DQ2:9,10)</li> <li>• Compare/Contrast (DQ3:17)</li> <li>• Notetaking and Summarizing (DQ2:10,12)</li> <li>• Guided and Independent Practice (DQ3:15)</li> <li>• Structured Academic Games (DQ3:14; DQ5:25)</li> <li>• Building on Prior Knowledge (DQ2:7; DQ5:31)</li> <li>• Modeling and Visual Representations of Knowledge (DQ2:12; DQ3:15)</li> <li>• Critical Thinking Questioning (DQ4:22)</li> </ul>

Possible Instructional Modifications /Accommodations/Differentiation
Modifications:

- Provide options for expressing mastery of knowledge (i.e. modeling, drawing, writing, acting)
- Reduction in the amount of classwork and homework
- Simplified application and critical thinking questions

Accommodations:

- Provide extended time on assignments and activities
- Cueing to stay on task
- Preferential seating
- Guided learning during application and critical thinking questioning
- Provide one-on-one opportunities during SMART Lunch
- Provide opportunities for peer tutoring
- Provide modified notes when necessary
- Provide directions both written and verbally
- Assistance in organization
- Provide additional modes of interacting with new information (i.e. audio, pictures, video)

Differentiation:

- Organization of groups with assigned roles based on student strengths and weaknesses
- Vary levels of guided support and scaffolding based on student need
- Provide option of group work or individual work on certain assignments
- Assign critical thinking questions based on level of difficulty and student's mastery of content

### Unit Vocabulary

**Essential:** expert witness, Locard's exchange principle

**Non-Essential:** criminalistics, jurisprudence, odontology, pathology, anthropology, questioned documents, toxicology, civil, criminal, entomology

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21 <sup>st</sup> Century Themes: P21 Framework Toolkit	21 <sup>st</sup> Century Skills: P21 Framework Toolkit
<p>Technology: 8.1.12.F.1</p> <p>Social Studies: 6.1.4.C.17</p> <p>English Language Arts: NJSLA.RST.11-12.1 NJSLA.RST.11-12.2 NJSLA.RST.11-12.4 NJSLA.RST.11-12.7</p>	<p>Google Docs Kingsway Teacher Website Online Forums National Forensics Databases Online Research</p>	<p><input checked="" type="checkbox"/> Global Awareness</p> <p><input checked="" type="checkbox"/> Civic Literacy</p> <p><input type="checkbox"/> Financial, Economic, Business, &amp; Entrepreneurial Literacy</p> <p><input checked="" type="checkbox"/> Health Literacy</p>	<p><input type="checkbox"/> Creativity &amp; Innovation</p> <p><input checked="" type="checkbox"/> Media Literacy</p> <p><input checked="" type="checkbox"/> Critical Thinking and Problem Solving</p> <p><input checked="" type="checkbox"/> Life and Career Skills</p> <p><input checked="" type="checkbox"/> Information &amp; Communication Technologies Literacy</p> <p><input checked="" type="checkbox"/> Communication &amp; Collaboration</p> <p><input checked="" type="checkbox"/> Information Literacy</p>

**Resources:**

**Texts/Materials:**

Forensic Science: An Introduction (2<sup>nd</sup> Ed) – Saferstein  
 Crime Scene Investigations: Real-Life Science Labs for Grades 6-12 – Walker and Wood  
 Jumped, Fell or Pushed? – Koehler  
 Teacher Developed PPT  
 Teacher Developed Notes and Handouts  
 Current Event Articles  
 Leveled Reading- Newsela

<b>Unit 7: Trace Evidence</b>	<b>Recommended Duration: 4 weeks</b>
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**Unit Description:**  
 This unit will explore various types of trace evidence common to crime scene investigation. Students will perform various labs and analyze numerous case studies including glass analysis, hair, fibers, soil, metal, paint, and impressions. Students will be able to describe the physical and chemical properties of glass and compare fragments of glass. Students will also be able to use glass fragments to determine the direction of impact of a projectile toward the glass. Students will be able to distinguish between animal and human hair, recognize the parts of human hair, list the features that are used in the microscopic comparison of human hairs, and understand the role of DNA typing in hair comparisons. In addition, students will be able to understand the properties and different types of fibers. Students will be able to use trace elements in comparing physical evidence. Students will examine the elemental analysis of metals for comparison. Students will also be able to explain what methods are most useful in the forensic comparison of paint.

<b>Essential Questions</b>	<b>Enduring Understandings</b>
<ul style="list-style-type: none"> <li>• What is trace evidence?</li> <li>• What is the value of various types of trace evidence common to forensic investigations?</li> <li>• How can glass be used to determine the direction of a projectile at a crime scene?</li> <li>• What properties of metals, paint and soil make them useful in forensic investigation?</li> </ul>	<ul style="list-style-type: none"> <li>• By analyzing the radial and concentric fracture patterns in glass, a forensic scientist can determine the direction of impact of a projectile by applying the 3R rule: Radial cracks form a Right angle on the Reverse side of the force.</li> <li>• Features of human hair can be used to compare strands of hair, but all positive microscopic hair comparisons must be confirmed by DNA analysis. Microscopic comparison cannot provide individual identification with a high degree of certainty, but DNA analysis can.</li> <li>• Examination of fibers can be used to link clothing or fabric to the scene of a crime; however, it is only rarely that fibers recovered at a crime scene provide individual identification with a high degree of certainty.</li> <li>• The composition and physical properties of metals, paints, and soil can be used for comparison.</li> </ul>

<b>Relevant Standards</b>	<b>Learning Goals</b>	<b>Learning Objectives</b>
<p><b>Content Standards:</b>  <b>Power (Primary):</b>            21<sup>st</sup> Century Life and Careers:            9.3.LW.5            9.3.LW-ENF.12            9.3.ST.5            9.3.ST-SM.3</p>	<ul style="list-style-type: none"> <li>• Students will understand the physical and chemical properties of glass and will be able to use the properties of glass to compare glass fragments and determine the direction of a projectile.</li> <li>• Students will understand the features of different types of hair and fibers and will be</li> </ul>	<ul style="list-style-type: none"> <li>• Define and distinguish a physical and chemical property of matter.</li> <li>• Describe the differences between the wave and particle theories of light.</li> <li>• Explain the dispersion of light through a prism.</li> <li>• Define and understand the properties of density and refractive index.</li> </ul>

Relevant Standards	Learning Goals	Learning Objectives
<p>9.3.ST-SM.4</p> <p>Science (NJSLS-S):            HS-PS1-1            HS-PS1-8            HS-PS2-1            HS-PS2-2            HS-PS2-3            HS-PS4-1            HS-PS4-3            HS-LS1-1            HS-LS1-2</p> <p><b>Supportive (Secondary):</b>            21<sup>st</sup> Century Life and Careers:            NJSLS-CLKS.5 Utilize critical thinking to make sense of problems and persevere in solving them</p>	<p>able to use these features in order to compare different types of hair and fibers.</p> <ul style="list-style-type: none"> <li>Students will understand the features of metals, paints, and soils and will be able to use these features in order to compare different types of metals, paints and soils.</li> </ul>	<ul style="list-style-type: none"> <li>List and explain forensic methods for comparing glass fragments.</li> <li>Understand how to examine glass fractures to determine the direction of impact for a projectile.</li> <li>Identify the cuticle, cortex and medulla areas of hair.</li> <li>List the three phases of hair growth.</li> <li>Distinguish between animal and human hairs.</li> <li>Describe and understand the role of DNA typing in hair comparisons.</li> <li>Explain the proper collection of hair and fiber evidence.</li> <li>Understand the differences between natural and manufactured fibers.</li> <li>List the properties of fibers that are most useful for forensic comparisons.</li> <li>Describe the usefulness of trace elements for forensic comparison of various types of physical evidence.</li> <li>Explain how elements can become radioactive.</li> <li>List the most useful examinations for performing a forensic comparison of paint.</li> <li>Distinguish continuous and line emission spectra and understand the parts of a simple emission spectrograph.</li> <li>Explain the phenomenon of how an atom absorbs and releases energy in the form of light.</li> <li>Describe the collection and preservation of forensic paint and soil evidence.</li> <li>List the important forensic properties of soil.</li> </ul>

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/Assignments/Assessments (required)
KWL, Do Nows, Writing Breaks, Individual and Group White Boards, Questioning, Discussion, Self-Assessment, Case Analysis Studies, Quizzes, Application and Critical Thinking Questions, Lab Notebook Varied case analysis studies Highlight forensic scientists with various backgrounds	Trace Evidence Test	Comparison of Glass Fragments Analysis of Impact for a Projectile Comparison of Hair Comparison of Fiber Comparison of Metals Comparison of Paints Comparison of Soils	Trace Evidence Test Comparison of Glass Fragments Analysis of Impact for a Projectile Comparison of Hair (examination of hair from individuals of various ethnic backgrounds) Comparison of Fiber Comparison of Metals Comparison of Paints Comparison of Soils Case Analysis Studies

Possible Assessment Modifications/Accommodations
<ul style="list-style-type: none"> <li>• Vary test length and answer choices</li> <li>• Extended time on tests and quizzes</li> <li>• Underline or bold key words or phrases</li> <li>• Directions and/or questions read aloud</li> <li>• Oral responses</li> <li>• Provide word banks</li> </ul>

Instructional Strategies (refer to <i>Robert Marzano's 41 Elements</i> )
<ul style="list-style-type: none"> <li>• Cooperative Learning (DQ3:15; DQ4:21)</li> <li>• Direct Instruction (DQ2:9,10)</li> <li>• Compare/Contrast (DQ3:17)</li> <li>• Notetaking and Summarizing (DQ2:10,12)</li> <li>• Guided and Independent Practice (DQ3:15)</li> <li>• Structured Academic Games (DQ3:14; DQ5:25)</li> <li>• Building on Prior Knowledge (DQ2:7; DQ5:31)</li> <li>• Modeling and Visual Representations of Knowledge (DQ2:12; DQ3:15)</li> <li>• Critical Thinking Questioning (DQ4:22)</li> </ul>

### Possible Instructional Modifications /Accommodations/Differentiation

#### Modifications:

- Provide options for expressing mastery of knowledge (i.e. modeling, drawing, writing, acting)
- Reduction in the amount of classwork and homework
- Simplified application and critical thinking questions

#### Accommodations:

- Provide extended time on assignments and activities
- Cueing to stay on task
- Preferential seating
- Guided learning during application and critical thinking questioning
- Provide one-on-one opportunities during SMART Lunch
- Provide opportunities for peer tutoring
- Provide modified notes when necessary
- Provide directions both written and verbally
- Assistance in organization
- Provide additional modes of interacting with new information (i.e. audio, pictures, video)

#### Differentiation:

- Organization of groups with assigned roles based on student strengths and weaknesses
- Vary levels of guided support and scaffolding based on student need
- Provide option of group work or individual work on certain assignments
- Assign critical thinking questions based on level of difficulty and student's mastery of content

### Unit Vocabulary

**Essential:** Becke line, birefringence, concentric fracture, dispersion, electromagnetic spectrum, intensive property, laminated glass, laser, radial fracture, refraction, refractive index, sublimation, tempered glass, visible light, anagen phase, catagen phase, cortex, cuticle, follicular tag, manufactured fibers, medulla, mitochondrial DNA, monomer, natural fibers, nuclear DNA, polymer, telogen phase, alpha particle, beta particle, continuous spectrum, emission spectrum, excited state, gamma ray, line spectrum, mineral, pyrolysis, radioactivity

**Non-Essential:** photon, density, frequency, wavelength, x-ray, macromolecule



Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21 <sup>st</sup> Century Themes: P21 Framework Toolkit	21 <sup>st</sup> Century Skills: P21 Framework Toolkit
<p>Technology: 8.1.12.F.1</p> <p>English Language Arts: NJLSA.RST.11-12.1 NJLSA.RST.11-12.2 NJLSA.RST.11-12.4 NJLSA.RST.11-12.7</p>	<p>Google Docs Kingsway Teacher Website Online Forums National Forensics Databases Online Research</p>	<p><input checked="" type="checkbox"/> Global Awareness</p> <p><input checked="" type="checkbox"/> Civic Literacy</p> <p><input type="checkbox"/> Financial, Economic, Business, &amp; Entrepreneurial Literacy</p> <p><input checked="" type="checkbox"/> Health Literacy</p>	<p><input type="checkbox"/> Creativity &amp; Innovation</p> <p><input checked="" type="checkbox"/> Media Literacy</p> <p><input checked="" type="checkbox"/> Critical Thinking and Problem Solving</p> <p><input checked="" type="checkbox"/> Life and Career Skills</p> <p><input checked="" type="checkbox"/> Information &amp; Communication Technologies Literacy</p> <p><input checked="" type="checkbox"/> Communication &amp; Collaboration</p> <p><input checked="" type="checkbox"/> Information Literacy</p>

<b>Resources:</b>
<p><b>Texts/Materials:</b> Forensic Science: An Introduction (2<sup>nd</sup> Ed) – Saferstein Crime Scene Investigations: Real-Life Science Labs for Grades 6-12 – Walker and Wood Jumped, Fell or Pushed? – Koehler Teacher Developed PPT Teacher Developed Notes Leveled Reading</p>

<b>Unit 8: Ballistics</b>	<b>Recommended Duration: 1 week</b>
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**Unit Description:**  
 This unit is designed to explore the use of ballistics in forensic investigations. Students will have the opportunity to examine used bullets and discuss how markings on used bullets may be used to match them with a weapon. Students will also discuss procedures for determining how far from a target a weapon was fired. Students will assess the significance of the NIBIN database in forensic investigations involving weapons. Students will further investigate the role of ballistics in various case studies and determine the value of this type of physical evidence to forensic studies.

<b>Essential Questions</b>	<b>Enduring Understandings</b>
<ul style="list-style-type: none"> <li>• What is the value of ballistics in forensic investigations?</li> <li>• What information can be drawn from firearms, bullets and residue found at a crime scene?</li> </ul>	<ul style="list-style-type: none"> <li>• Examination of a target and physical evidence can help determine the distance from which a weapon was fired.</li> <li>• Databases are used to share and store information on guns and bullet markings connected with crimes.</li> <li>• Microscopic examination of used bullets may help connect them to the weapon from which they were fired.</li> </ul>

<b>Relevant Standards</b>	<b>Learning Goals</b>	<b>Learning Objectives</b>
<p><b>Content Standards:</b>  <b>Power (Primary):</b>            21<sup>st</sup> Century Life and Careers:            9.3.LW.5            9.3.LW-ENF.12            9.3.ST.5            9.3.ST-SM.3            9.3.ST-SM.4</p> <p>Science (NJSL-S):            HS-PS2-1            HS-PS2-2            HS-PS2-3</p> <p><b>Supportive (Secondary):</b>            21<sup>st</sup> Century Life and Careers:</p>	<ul style="list-style-type: none"> <li>• Students will understand the use of ballistics in forensic investigations and will be able to analyze used bullets in order to match them with the weapon from which they were fired.</li> </ul>	<ul style="list-style-type: none"> <li>• Describe the techniques for rifling a barrel.</li> <li>• Identify the class and individual characteristics of bullets and cartridge cases.</li> <li>• Describe the use of a microscope to compare bullets and cartridge cases.</li> <li>• Explain the concept of the NIBIN database.</li> <li>• Explain the procedure for determining how far from a target a weapon was fired.</li> <li>• Identify the laboratory tests for determining whether an individual has fired a weapon.</li> </ul>

Relevant Standards	Learning Goals	Learning Objectives
NJSLS-CLKS.5 Utilize critical thinking to make sense of problems and persevere in solving them		

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/Assignments/Assessments (required)
<p>KWL, Do Nows, Writing Breaks, Individual and Group White Boards, Questioning, Discussion, Self-Assessment, Case Analysis Studies, Quizzes, Application and Critical Thinking Questions, Lab Notebook</p> <p>Varied case analysis studies</p> <p>Highlight forensic scientists with various backgrounds</p>	Ballistics Test	Ballistics Labs (Bullet/Cartridge Comparison and Location of Shooter) Crime Scene Reconstruction	<p>Ballistics Test</p> <p>Ballistics Labs (Bullet/Cartridge Comparison and Location of Shooter)</p> <p>Crime Scene Reconstruction (examination of biases on crime scene reconstruction)</p> <p>Case Analysis Studies</p>

Possible Assessment Modifications/Accommodations
<ul style="list-style-type: none"> <li>• Vary test length and answer choices</li> <li>• Extended time on tests and quizzes</li> <li>• Underline or bold key words or phrases</li> <li>• Directions and/or questions read aloud</li> <li>• Oral responses</li> <li>• Provide word banks</li> </ul>

Instructional Strategies (refer to <i>Robert Marzano's 41 Elements</i> )
<ul style="list-style-type: none"> <li>• Cooperative Learning (DQ3:15; DQ4:21)</li> <li>• Direct Instruction (DQ2:9,10)</li> </ul>

- Compare/Contrast (DQ3:17)
- Notetaking and Summarizing (DQ2:10,12)
- Guided and Independent Practice (DQ3:15)
- Structured Academic Games (DQ3:14; DQ5:25)
- Building on Prior Knowledge (DQ2:7; DQ5:31)
- Modeling and Visual Representations of Knowledge (DQ2:12; DQ3:15)
- Critical Thinking Questioning (DQ4:22)

### **Possible Instructional Modifications /Accommodations/Differentiation**

#### Modifications:

- Provide options for expressing mastery of knowledge (i.e. modeling, drawing, writing, acting)
- Reduction in the amount of classwork and homework
- Simplified application and critical thinking questions

#### Accommodations:

- Provide extended time on assignments and activities
- Cueing to stay on task
- Preferential seating
- Guided learning during application and critical thinking questioning
- Provide one-on-one opportunities during SMART Lunch
- Provide opportunities for peer tutoring
- Provide modified notes when necessary
- Provide directions both written and verbally
- Assistance in organization
- Provide additional modes of interacting with new information (i.e. audio, pictures, video)

#### Differentiation:

- Organization of groups with assigned roles based on student strengths and weaknesses
- Vary levels of guided support and scaffolding based on student need
- Provide option of group work or individual work on certain assignments
- Assign critical thinking questions based on level of difficulty and student's mastery of content

### **Unit Vocabulary**

**Essential:** ballistics, bore, breechface, caliber, choke, distance determination, ejector, extractor, firearms identification, gauge, Greiss test, grooves, lands, rifling

**Non-Essential:** serial number, residue, barium, antimony, swabbing

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21 <sup>st</sup> Century Themes: P21 Framework Toolkit	21 <sup>st</sup> Century Skills: P21 Framework Toolkit
<p>Technology: 8.1.12.F.1</p> <p>English Language Arts: NJLSA.RST.11-12.1 NJLSA.RST.11-12.2 NJLSA.RST.11-12.4 NJLSA.RST.11-12.7</p>	<p>Google Docs Kingsway Teacher Website Online Forums National Forensics Databases Online Research</p>	<p><input checked="" type="checkbox"/> Global Awareness</p> <p><input checked="" type="checkbox"/> Civic Literacy</p> <p><input type="checkbox"/> Financial, Economic, Business, &amp; Entrepreneurial Literacy</p> <p><input checked="" type="checkbox"/> Health Literacy</p>	<p><input type="checkbox"/> Creativity &amp; Innovation</p> <p><input checked="" type="checkbox"/> Media Literacy</p> <p><input checked="" type="checkbox"/> Critical Thinking and Problem Solving</p> <p><input checked="" type="checkbox"/> Life and Career Skills</p> <p><input checked="" type="checkbox"/> Information &amp; Communication Technologies Literacy</p> <p><input checked="" type="checkbox"/> Communication &amp; Collaboration</p> <p><input checked="" type="checkbox"/> Information Literacy</p>

**Resources:**

**Texts/Materials:**

Forensic Science: An Introduction (2<sup>nd</sup> Ed) – Saferstein  
 Crime Scene Investigations: Real-Life Science Labs for Grades 6-12 – Walker and Wood  
 Jumped, Fell or Pushed? – Koehler  
 Teacher Developed PPT  
 Teacher Developed Notes  
 Leveled Reading

<b>Unit 9: DNA Profiling</b>	<b>Recommended Duration: 2.5 weeks</b>
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**Unit Description:**  
 This unit is designed to allow students the opportunity to investigate how DNA has become an “indispensable forensic science tool.” Students will understand basic concepts of DNA including its structure, function, and uniqueness to each individual. Students will compare and model various types of DNA typing. Students will also explore several case studies involving DNA evidence and cite the importance of properly handling and preserving physical evidence (especially DNA evidence) in forensic investigations. Students will discuss how mishandling of DNA evidence can severely diminish its value in the courtroom. Students will discuss DNA databases and their use in solving crimes, new and old. In this unit, students will compare case studies in which the limitations of DNA evidence are discussed.

<b>Essential Questions</b>	<b>Enduring Understandings</b>
<ul style="list-style-type: none"> <li>• What is DNA and how is unique to each individual?</li> <li>• What is the significance or value of DNA evidence to forensic investigation?</li> <li>• How has DNA profiling contributed to the development of the field of forensic science?</li> </ul>	<ul style="list-style-type: none"> <li>• DNA codes for all of an individual’s characteristics and is unique to that individual (except for identical twins).</li> <li>• DNA evidence is highly important as, upon proper handling, it can directly link an individual to a crime scene.</li> <li>• The development of technology able to create DNA profiles of individuals has greatly enhanced the ability of forensics scientists to provide ample evidence to convict suspects of crimes committed.</li> </ul>

<b>Relevant Standards</b>	<b>Learning Goals</b>	<b>Learning Objectives</b>
<p><b>Content Standards:</b>  <b>Power (Primary):</b>            21<sup>st</sup> Century Life and Careers:</p> <p>9.3.LW.5            9.3.LW-ENF.12            9.3.ST.5            9.3.ST-SM.3            9.3.ST-SM.4</p> <p>Science (NJSL-S):</p>	<ul style="list-style-type: none"> <li>• Students will understand the significance of the development of DNA technology to forensic science and will be able to compare segments of DNA and describe the use of DNA profiling in the court.</li> </ul>	<ul style="list-style-type: none"> <li>• Identify the parts of a nucleotide and explain how nucleotides are linked to form DNA.</li> <li>• Explain the concept of base pairing as it relates to the double-helix structure of DNA.</li> <li>• Contrast DNA strands that code for the production of proteins with strands that contain repeating base sequences.</li> <li>• Explain the technology of polymerase chain reaction (PCR) and how it applies to forensic DNA typing.</li> <li>• Contrast the newest DNA typing technique, short tandem repeats (STRs), with previous DNA typing technologies.</li> </ul>

Relevant Standards	Learning Goals	Learning Objectives
HS-LS1-1 HS-LS3-1 HS-LS3-2 HS-LS3-3  <b>Supportive (Secondary):</b> 21 <sup>st</sup> Century Life and Careers: NJSLS-CLKS.5 Utilize critical thinking to make sense of problems and persevere in solving them		<ul style="list-style-type: none"> <li>• Describe the difference between nuclear and mitochondrial DNA.</li> <li>• Explain the use of DNA computerized databases in criminal investigation.</li> <li>• List the necessary procedures for proper preservation of biological evidence for laboratory DNA analysis.</li> </ul>

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/Assignments/Assessments (required)
KWL, Do Nows, Writing Breaks, Individual and Group White Boards, Questioning, Discussion, Self-Assessment, Case Analysis Studies, Quizzes, Application and Critical Thinking Questions, Lab Notebook  Varied case analysis studies  Highlight forensic scientists with various backgrounds	DNA Profiling Test	PCR Paper Lab Gel Electrophoresis Lab Buccal Swab Lab DNA Modeling	DNA Profiling Test PCR Paper Lab Gel Electrophoresis Lab Buccal Swab Lab DNA Modeling Case Analysis Studies  Highlight historical contribution of scientists with various backgrounds to DNA knowledge

Possible Assessment Modifications/Accommodations
<ul style="list-style-type: none"> <li>• Vary test length and answer choices</li> <li>• Extended time on tests and quizzes</li> <li>• Underline or bold key words or phrases</li> <li>• Directions and/or questions read aloud</li> <li>• Oral responses</li> <li>• Provide word banks</li> </ul>

### **Instructional Strategies (refer to *Robert Marzano's 41 Elements*)**

- Cooperative Learning (DQ3:15; DQ4:21)
- Direct Instruction (DQ2:9,10)
- Compare/Contrast (DQ3:17)
- Notetaking and Summarizing (DQ2:10,12)
- Guided and Independent Practice (DQ3:15)
- Structured Academic Games (DQ3:14; DQ5:25)
- Building on Prior Knowledge (DQ2:7; DQ5:31)
- Modeling and Visual Representations of Knowledge (DQ2:12; DQ3:15)
- Critical Thinking Questioning (DQ4:22)

### **Possible Instructional Modifications /Accommodations/Differentiation**

#### **Modifications:**

- Provide options for expressing mastery of knowledge (i.e. modeling, drawing, writing, acting)
- Reduction in the amount of classwork and homework
- Simplified application and critical thinking questions

#### **Accommodations:**

- Provide extended time on assignments and activities
- Cueing to stay on task
- Preferential seating
- Guided learning during application and critical thinking questioning
- Provide one-on-one opportunities during SMART Lunch
- Provide opportunities for peer tutoring
- Provide modified notes when necessary
- Provide directions both written and verbally
- Assistance in organization
- Provide additional modes of interacting with new information (i.e. audio, pictures, video)

#### **Differentiation:**

- Organization of groups with assigned roles based on student strengths and weaknesses
- Vary levels of guided support and scaffolding based on student need
- Provide option of group work or individual work on certain assignments
- Assign critical thinking questions based on level of difficulty and student's mastery of content



<b>Unit Vocabulary</b>
<b>Essential:</b> amelogenin gene, buccal cells, complementary base pairing, deoxyribonucleic acid (DNA), electrophoresis, epithelial cells, human genome, hybridization, low copy number, mitochondria, multiplexing, nucleotide, pictogram, polymer, polymerase chain reaction (PCR), primer, replication, restriction enzymes, restriction fragment length polymorphisms (RFLPs), sequencing, short tandem repeats (STRs), substrate control, tandem repeat, touch DNA, Y-STRs
<b>Non-Essential:</b> chromosome, amino acids, proteins

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21 <sup>st</sup> Century Themes: P21 Framework Toolkit	21 <sup>st</sup> Century Skills: P21 Framework Toolkit
Technology: 8.1.12.F.1  English Language Arts: NJLSA.RST.11-12.1 NJLSA.RST.11-12.2 NJLSA.RST.11-12.4 NJLSA.RST.11-12.7	Google Docs Kingsway Teacher Website Online Forums National Forensics Databases Online Research	<input checked="" type="checkbox"/> Global Awareness  <input checked="" type="checkbox"/> Civic Literacy  <input type="checkbox"/> Financial, Economic, Business, & Entrepreneurial Literacy  <input checked="" type="checkbox"/> Health Literacy	<input type="checkbox"/> Creativity & Innovation  <input checked="" type="checkbox"/> Media Literacy  <input checked="" type="checkbox"/> Critical Thinking and Problem Solving <input checked="" type="checkbox"/> Life and Career Skills  <input checked="" type="checkbox"/> Information & Communication Technologies Literacy  <input checked="" type="checkbox"/> Communication & Collaboration  <input checked="" type="checkbox"/> Information Literacy

<p><b>Resources:</b></p> <p><b>Texts/Materials:</b>  Forensic Science: An Introduction (2<sup>nd</sup> Ed) – Saferstein  Crime Scene Investigations: Real-Life Science Labs for Grades 6-12 – Walker and Wood  Jumped, Fell or Pushed? – Koehler  Teacher Developed PPT  Teacher Developed Notes</p> <p>Leveled Reading- Newsela</p>
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<b>Unit 10: Drugs and Toxicology</b>	<b>Recommended Duration: 3.5 weeks</b>
<p><b>Unit Description:</b>  This unit is designed to explore the use of drug identification and toxicology in forensic investigation. Students will identify and classify commonly used drugs and describe the laboratory tests normally used to perform a routine drug identification analysis. Students will describe various techniques used to identify and classify substances, including chromatography, ultraviolet and infrared spectroscopy and mass spectroscopy. Students will also discuss proper collection of drug evidence. In addition, students will explore the field of forensic toxicology. Students will be able to explain how alcohol is absorbed into the bloodstream and excreted in the breath from the lungs. Students will also be able to list and contrast various laboratory procedures for determining blood alcohol level and levels of various poisons and drugs within the blood. Students will be able to identify the importance of forensic toxicology in investigating a crime.</p>	

<b>Essential Questions</b>	<b>Enduring Understandings</b>
<ul style="list-style-type: none"> <li>• What is the significance of drug identification to forensics?</li> <li>• How is toxicology used in forensic investigation?</li> <li>• What are the limits of toxicological analysis?</li> </ul>	<ul style="list-style-type: none"> <li>• Analysts use screening tests to determine the identity of the drugs present in a sample; this reduces the number of possibilities to a small and manageable number. After preliminary testing, further tests are done to identify the drug substance. Drug analysis can be used to link a person to a crime scene.</li> <li>• Forensic toxicology is used to detect and identify drugs and poisons in body fluids, tissues, and organs in matters that pertain to violations of criminal laws. The most commonly abused drug is alcohol. Toxicology can be used to determine a person’s physical and mental state at the time a crime was committed.</li> </ul>

Relevant Standards	Learning Goals	Learning Objectives
<p><b>Content Standards:</b>  <b>Power (Primary):</b>            21<sup>st</sup> Century Life and Careers:            9.3.LW.5            9.3.LW-ENF.12            9.3.LW-ENF.14            9.3.ST.5            9.3.ST-SM.3            9.3.ST-SM.4</p> <p>Science (NJSL-S):            HS-PS1-1            HS-PS1-2            HS-PS1-5            HS-PS1-6            HS-LS1-2            HS-LS1-3</p> <p><b>Supportive (Secondary):</b>            21<sup>st</sup> Century Life and Careers:            NJSL-CLKS.5 Utilize critical thinking to make sense of problems and persevere in solving them</p>	<ul style="list-style-type: none"> <li>Students will understand the significance of drug analysis and toxicology to forensic investigations and will be able to identify various drugs and describe methods drug analysts and toxicologists use in identifying substances.</li> </ul>	<ul style="list-style-type: none"> <li>Compare and contrast psychological and physical dependence.</li> <li>Name and classify commonly abused drugs.</li> <li>Describe the laboratory tests normally used to perform a routine drug identification analysis.</li> <li>Describe and explain the process of chromatography.</li> <li>Explain the difference between thin-layer chromatography and gas chromatography.</li> <li>Describe the utility of ultraviolet and infrared spectroscopy for the identification of organic compounds.</li> <li>Describe the concept and utility of mass spectrometry for identification analysis.</li> <li>Demonstrate the proper collection and preservation of drug evidence.</li> <li>Explain how alcohol is absorbed into the bloodstream, transported throughout the body, and eliminated by oxidation and secretion.</li> <li>Explain the process by which alcohol is excreted in the breath via the lungs.</li> <li>Explain the concepts of infrared and fuel cell breath testing devices for alcohol testing.</li> <li>Describe commonly employed field sobriety tests to assess alcohol impairment.</li> <li>List and contrast laboratory procedures for measuring the concentration of alcohol in the blood.</li> <li>Relate the precautions to be taken to properly preserve blood in order to analyze its alcohol content.</li> </ul>

Relevant Standards	Learning Goals	Learning Objectives
		<ul style="list-style-type: none"> <li>Analyze the significance of implied-consent laws and the Schmerber v. California case to traffic enforcement.</li> <li>Describe techniques that forensic toxicologists use to isolate and identify drugs and poisons.</li> <li>Explain the significance of finding a drug in human tissues and organs to assessing impairment.</li> </ul>

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/Assignments/Assessments (required)
<p>KWL, Do Nows, Writing Breaks, Individual and Group White Boards, Questioning, Discussion, Self-Assessment, Case Analysis Studies, Quizzes, Application and Critical Thinking Questions, Lab Notebook</p> <p>Varied case analysis studies</p> <p>Highlight forensic scientists with various backgrounds</p>	<p>Drugs and Toxicology Test</p> <p>Impairment and the Law Essay</p>	<p>Drug Analysis Labs</p>	<p>Drugs and Toxicology Test</p> <p>Impairment and the Law Essay</p> <p>Drug Analysis Labs</p> <p>Case Analysis Studies</p> <p>Discussion on importance of unbiased testing in drug and toxicological analysis (ex. Toxicologists are often unaware of circumstances around crime, simply asked to examine evidence)</p>

Possible Assessment Modifications/Accommodations
<ul style="list-style-type: none"> <li>Vary test length and answer choices</li> <li>Extended time on tests and quizzes</li> <li>Underline or bold key words or phrases</li> <li>Directions and/or questions read aloud</li> <li>Oral responses</li> <li>Provide word banks</li> </ul>

### **Instructional Strategies (refer to *Robert Marzano's 41 Elements*)**

- Cooperative Learning (DQ3:15; DQ4:21)
- Direct Instruction (DQ2:9,10)
- Compare/Contrast (DQ3:17)
- Notetaking and Summarizing (DQ2:10,12)
- Guided and Independent Practice (DQ3:15)
- Structured Academic Games (DQ3:14; DQ5:25)
- Building on Prior Knowledge (DQ2:7; DQ5:31)
- Modeling and Visual Representations of Knowledge (DQ2:12; DQ3:15)
- Critical Thinking Questioning (DQ4:22)

### **Possible Instructional Modifications /Accommodations/Differentiation**

#### Modifications:

- Provide options for expressing mastery of knowledge (i.e. modeling, drawing, writing, acting)
- Reduction in the amount of classwork and homework
- Simplified application and critical thinking questions

#### Accommodations:

- Provide extended time on assignments and activities
- Cueing to stay on task
- Preferential seating
- Guided learning during application and critical thinking questioning
- Provide one-on-one opportunities during SMART Lunch
- Provide opportunities for peer tutoring
- Provide modified notes when necessary
- Provide directions both written and verbally
- Assistance in organization
- Provide additional modes of interacting with new information (i.e. audio, pictures, video)

#### Differentiation:

- Organization of groups with assigned roles based on student strengths and weaknesses
- Vary levels of guided support and scaffolding based on student need
- Provide option of group work or individual work on certain assignments
- Assign critical thinking questions based on level of difficulty and student's mastery of content

**Unit Vocabulary**

**Essential:** anabolic steroids, analgesic, chromatography, confirmation, depressant, hallucinogen, infrared, microcrystalline test, monochromator, narcotic, physical dependence, psychological dependence, screening test, spectrophotometry, stimulant, ultraviolet, anticoagulant, fuel cell detector, oxidation, toxicologist

**Non-Essential:** ion, absorption, acid, alveoli, artery, base, capillary, catalyst, excretion, metabolism, preservative, vein, pH scale

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21 <sup>st</sup> Century Themes: P21 Framework Toolkit	21 <sup>st</sup> Century Skills: P21 Framework Toolkit
Technology: 8.1.12.F.1  English Language Arts: NJLSA.RST.11-12.1 NJLSA.RST.11-12.2 NJLSA.RST.11-12.4 NJLSA.RST.11-12.7	Google Docs Kingsway Teacher Website Online Forums National Forensics Databases Online Research	<input checked="" type="checkbox"/> Global Awareness  <input checked="" type="checkbox"/> Civic Literacy  <input type="checkbox"/> Financial, Economic, Business, & Entrepreneurial Literacy  <input checked="" type="checkbox"/> Health Literacy	<input type="checkbox"/> Creativity & Innovation  <input checked="" type="checkbox"/> Media Literacy  <input checked="" type="checkbox"/> Critical Thinking and Problem Solving <input checked="" type="checkbox"/> Life and Career Skills  <input checked="" type="checkbox"/> Information & Communication Technologies Literacy  <input checked="" type="checkbox"/> Communication & Collaboration  <input checked="" type="checkbox"/> Information Literacy

**Resources:**

**Texts/Materials:**

Forensic Science: An Introduction (2<sup>nd</sup> Ed) – Saferstein  
 Crime Scene Investigations: Real-Life Science Labs for Grades 6-12 – Walker and Wood  
 Jumped, Fell or Pushed? – Koehler  
 Teacher Developed PPT  
 Teacher Developed Notes  
  
 Leveled Reading- Newsela

<b>Unit 11: Document Examination</b>	<b>Recommended Duration: 1 week</b>
<p><b>Unit Description:</b>  This unit is designed to address the fundamental aspects of document examination as it applies to forensic science. Students will explore handwriting analysis as well as some guidelines for collecting known writings for comparison to a questioned document. Students will also discuss some of the class and individual characteristics of printers and photocopiers. Students will use document examination techniques to uncover alterations, erasures, obliterations, and variations in pen inks. Students will have the opportunity to create a “crime” for fellow classmates to solve using learned document examination skills.</p>	

<b>Essential Questions</b>	<b>Enduring Understandings</b>
<ul style="list-style-type: none"> <li>• How can handwriting comparison be used in the analysis of questioned documents?</li> <li>• What is a “questioned document” and what is the value of a questioned document in forensic investigation?</li> </ul>	<ul style="list-style-type: none"> <li>• Questioned documents and other collected documents can be analyzed for handwriting comparisons to determine if the author of each is the same.</li> <li>• Inks (printer, pen, and photocopier) can be compared to determine if they share a common source.</li> <li>• Questioned documents may be analyzed for alterations, obliterations, erasures, or variations in pen inks.</li> </ul>

<b>Relevant Standards</b>	<b>Learning Goals</b>	<b>Learning Objectives</b>
<p><b>Content Standards:</b>  <b>Power (Primary):</b>  21<sup>st</sup> Century Life and Careers:  9.3.LW.5  9.3.LW-ENF.12  9.3.ST.5  9.3.ST-SM.3  9.3.ST-SM.4</p> <p>Science (NJSLS-S):  HS-PS1-2</p> <p><b>Supportive (Secondary):</b>  21<sup>st</sup> Century Life and Careers:</p>	<ul style="list-style-type: none"> <li>• Students will understand the use of document examination in forensic science and will be able to analyze questioned documents for comparison and authenticity.</li> </ul>	<ul style="list-style-type: none"> <li>• Define questioned document.</li> <li>• Identify what common characteristics are associated with handwriting.</li> <li>• List important guidelines for collecting known writings for comparison to a questioned document.</li> <li>• Identify some of the class and individual characteristics of printers and photocopiers.</li> <li>• List some of the techniques document examiners use to uncover alterations, erasures, obliterations, and variations in pen inks.</li> </ul>

Relevant Standards	Learning Goals	Learning Objectives
NJSLS-CLKS.5 Utilize critical thinking to make sense of problems and persevere in solving them		

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/Assignments/Assessments (required)
KWL, Do Nows, Writing Breaks, Individual and Group White Boards, Questioning, Discussion, Self-Assessment, Case Analysis Studies, Quizzes, Application and Critical Thinking Questions, Lab Notebook Varied case analysis studies Highlight forensic scientists with various backgrounds	Document Examination Practical	Document Examination Practical Handwriting Analysis Lab Questioned Document Lab Chromatography Lab	Document Examination Practical Handwriting Analysis Lab Questioned Document Lab Chromatography Lab Case Analysis Studies

Possible Assessment Modifications/Accommodations
<ul style="list-style-type: none"> <li>• Vary test length and answer choices</li> <li>• Extended time on tests and quizzes</li> <li>• Underline or bold key words or phrases</li> <li>• Directions and/or questions read aloud</li> <li>• Oral responses</li> <li>• Provide word banks</li> </ul>

Instructional Strategies (refer to <i>Robert Marzano's 41 Elements</i> )
<ul style="list-style-type: none"> <li>• Cooperative Learning (DQ3:15; DQ4:21)</li> <li>• Direct Instruction (DQ2:9,10)</li> <li>• Compare/Contrast (DQ3:17)</li> <li>• Notetaking and Summarizing (DQ2:10,12)</li> <li>• Guided and Independent Practice (DQ3:15)</li> <li>• Structured Academic Games (DQ3:14; DQ5:25)</li> </ul>



### Instructional Strategies (refer to *Robert Marzano's 41 Elements*)

- Building on Prior Knowledge (DQ2:7; DQ5:31)
- Modeling and Visual Representations of Knowledge (DQ2:12; DQ3:15)
- Critical Thinking Questioning (DQ4:22)

### Possible Instructional Modifications /Accommodations/Differentiation

#### Modifications:

- Provide options for expressing mastery of knowledge (i.e. modeling, drawing, writing, acting)
- Reduction in the amount of classwork and homework
- Simplified application and critical thinking questions

#### Accommodations:

- Provide extended time on assignments and activities
- Cueing to stay on task
- Preferential seating
- Guided learning during application and critical thinking questioning
- Provide one-on-one opportunities during SMART Lunch
- Provide opportunities for peer tutoring
- Provide modified notes when necessary
- Provide directions both written and verbally
- Assistance in organization
- Provide additional modes of interacting with new information (i.e. audio, pictures, video)

#### Differentiation:

- Organization of groups with assigned roles based on student strengths and weaknesses
- Vary levels of guided support and scaffolding based on student need
- Provide option of group work or individual work on certain assignments
- Assign critical thinking questions based on level of difficulty and student's mastery of content

### Unit Vocabulary

**Essential:** charred document, erasure, exemplar, indented writings, infrared luminescence, natural variations, obliteration, questioned document

**Non-Essential:** chromatography, pigment

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21 <sup>st</sup> Century Themes: P21 Framework Toolkit	21 <sup>st</sup> Century Skills: P21 Framework Toolkit
<p>Technology: 8.1.12.F.1</p> <p>English Language Arts: NJSLSA.RST.11-12.1 NJSLSA.RST.11-12.2 NJSLSA.RST.11-12.4 NJSLSA.RST.11-12.7</p>	<p>Google Docs Kingsway Teacher Website Online Forums National Forensics Databases Online Research</p>	<p><input checked="" type="checkbox"/> Global Awareness</p> <p><input checked="" type="checkbox"/> Civic Literacy</p> <p><input type="checkbox"/> Financial, Economic, Business, &amp; Entrepreneurial Literacy</p> <p><input checked="" type="checkbox"/> Health Literacy</p>	<p><input type="checkbox"/> Creativity &amp; Innovation</p> <p><input checked="" type="checkbox"/> Media Literacy</p> <p><input checked="" type="checkbox"/> Critical Thinking and Problem Solving</p> <p><input checked="" type="checkbox"/> Life and Career Skills</p> <p><input checked="" type="checkbox"/> Information &amp; Communication Technologies Literacy</p> <p><input checked="" type="checkbox"/> Communication &amp; Collaboration</p> <p><input checked="" type="checkbox"/> Information Literacy</p>

Resources:
<p><b>Texts/Materials:</b> Forensic Science: An Introduction (2<sup>nd</sup> Ed) – Saferstein Crime Scene Investigations: Real-Life Science Labs for Grades 6-12 – Walker and Wood Jumped, Fell or Pushed? – Koehler Teacher Developed PPT Teacher Developed Notes Leveled Reading- Newsela</p>

<b>Unit 12: Bloodstain Pattern Analysis</b>	<b>Recommended Duration: 2.5 weeks</b>
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**Unit Description:**  
 This unit is designed to explore techniques and procedures used in analyzing bloodstains at a crime scene. Students will discuss how to determine the angle of impact of blood, velocity of impact, and convergence and origin of impact. Students will use information derived from bloodstain pattern analysis to reconstruct a crime scene. Students will have ample opportunity for hands-on experience during this unit, using fake blood to model the effects of velocity and direction on the formation of bloodstain patterns. Students will determine the location and movement of victim(s) and suspect(s) in a crime scene given bloodstain patterns. Students will continue to practice proper techniques for collecting physical evidence and documenting a crime scene.

<b>Essential Questions</b>	<b>Enduring Understandings</b>
<ul style="list-style-type: none"> <li>• Why is bloodstain analysis crucial to forensic investigations?</li> <li>• How can bloodstains provide information on the location of suspects and victims within a crime scene?</li> </ul>	<ul style="list-style-type: none"> <li>• Bloodstain analysis can give crucial evidence to forensic scientists including the location and movement of victims and suspects within a crime scene and the type of weapon used.</li> <li>• The velocity and direction of blood directly correlates to the type of bloodstain pattern created.</li> </ul>

<b>Relevant Standards</b>	<b>Learning Goals</b>	<b>Learning Objectives</b>
<p><b>Content Standards:</b>  <b>Power (Primary):</b>            21<sup>st</sup> Century Life and Careers:            9.3.LW.5            9.3.LW-ENF.12            9.3.ST.5            9.3.ST-SM.3            9.3.ST-SM.4</p> <p>Science (NJSLS-S):            HS-LS1-2            HS-LS1-3            HS-PS2-1</p> <p><b>Supportive (Secondary):</b></p>	<ul style="list-style-type: none"> <li>• Students will understand what information can be drawn from the analysis of bloodstain patterns and will be able to analyze bloodstain patterns to reconstruct events during a crime.</li> </ul>	<ul style="list-style-type: none"> <li>• Define crime scene reconstruction.</li> <li>• Discuss the information that can be gained from bloodstain pattern analysis about the events involved in a violent crime.</li> <li>• Explain how surface texture, directionality, and the angle of impact affect the shape of individual blood stains.</li> <li>• Calculate the angle of impact of a bloodstain using its dimensions.</li> <li>• Describe how the classifications of low, medium, and high velocity impact spatter and appreciate how these classifications should be used.</li> <li>• Discuss the methods to determine the area of convergence and area of origin for impact spatter patterns.</li> </ul>

Relevant Standards	Learning Goals	Learning Objectives
21 <sup>st</sup> Century Life and Careers: NJSLS-CLKS.5 Utilize critical thinking to make sense of problems and persevere in solving them		<ul style="list-style-type: none"> <li>Identify how various blood spatter types are created and which features of each pattern can be used to aid in reconstructing events at a crime scene.</li> <li>Describe the methods for documenting bloodstain patterns at a crime scene.</li> </ul>

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/Assignments/Assessments (required)
KWL, Do Nows, Writing Breaks, Individual and Group White Boards, Questioning, Discussion, Self-Assessment, Case Analysis Studies, Quizzes, Application and Critical Thinking Questions, Lab Notebook  Varied case analysis studies  Highlight forensic scientists with various backgrounds	Bloodstain Pattern Analysis Test Bloodstain Pattern Analysis Practical	Bloodstain Pattern Analysis Labs	Bloodstain Pattern Analysis Test Bloodstain Pattern Analysis Practical Bloodstain Pattern Analysis Labs Case Analysis Studies

Possible Assessment Modifications/Accommodations
<ul style="list-style-type: none"> <li>Vary test length and answer choices</li> <li>Extended time on tests and quizzes</li> <li>Underline or bold key words or phrases</li> <li>Directions and/or questions read aloud</li> <li>Oral responses</li> <li>Provide word banks</li> </ul>

### **Instructional Strategies (refer to *Robert Marzano's 41 Elements*)**

- Cooperative Learning (DQ3:15; DQ4:21)
- Direct Instruction (DQ2:9,10)
- Compare/Contrast (DQ3:17)
- Notetaking and Summarizing (DQ2:10,12)
- Guided and Independent Practice (DQ3:15)
- Structured Academic Games (DQ3:14; DQ5:25)
- Building on Prior Knowledge (DQ2:7; DQ5:31)
- Modeling and Visual Representations of Knowledge (DQ2:12; DQ3:15)
- Critical Thinking Questioning (DQ4:22)

### **Possible Instructional Modifications /Accommodations/Differentiation**

#### Modifications:

- Provide options for expressing mastery of knowledge (i.e. modeling, drawing, writing, acting)
- Reduction in the amount of classwork and homework
- Simplified application and critical thinking questions

#### Accommodations:

- Provide extended time on assignments and activities
- Cueing to stay on task
- Preferential seating
- Guided learning during application and critical thinking questioning
- Provide one-on-one opportunities during SMART Lunch
- Provide opportunities for peer tutoring
- Provide modified notes when necessary
- Provide directions both written and verbally
- Assistance in organization
- Provide additional modes of interacting with new information (i.e. audio, pictures, video)

#### Differentiation:

- Organization of groups with assigned roles based on student strengths and weaknesses
- Vary levels of guided support and scaffolding based on student need
- Provide option of group work or individual work on certain assignments
- Assign critical thinking questions based on level of difficulty and student's mastery of content

<b>Unit Vocabulary</b>
<b>Essential:</b> angle of impact, area of convergence, area of origin, arterial spray, back spatter, cast-off, crime-scene reconstruction, drip trail pattern, expired blood pattern, flow patterns, forward spatter, high-velocity spatter, impact spatter, low-velocity spatter, medium-velocity spatter, satellite spatter, skeletonization, transfer pattern, void
<b>Non-Essential:</b> surface texture, blow-back spatter, axis, target surface

Interdisciplinary (Applicable Standards)	Connections	Integration of Technology	21 <sup>st</sup> Century Themes: P21 Framework Toolkit	21 <sup>st</sup> Century Skills: P21 Framework Toolkit
Technology: 8.1.12.F.1  English Language Arts: NJLSA.RST.11-12.1 NJLSA.RST.11-12.2 NJLSA.RST.11-12.4 NJLSA.RST.11-12.7  Math: CCSS.Math.Content.HSA.REI.A.1 CCSS.Math.Content.HSA.REI.A.2		Google Docs Kingsway Teacher Website Online Forums National Forensics Databases Online Research	<input checked="" type="checkbox"/> Global Awareness  <input checked="" type="checkbox"/> Civic Literacy  <input type="checkbox"/> Financial, Economic, Business, & Entrepreneurial Literacy  <input checked="" type="checkbox"/> Health Literacy	<input type="checkbox"/> Creativity & Innovation  <input checked="" type="checkbox"/> Media Literacy  <input checked="" type="checkbox"/> Critical Thinking and Problem Solving <input checked="" type="checkbox"/> Life and Career Skills  <input checked="" type="checkbox"/> Information & Communication Technologies Literacy  <input checked="" type="checkbox"/> Communication & Collaboration  <input checked="" type="checkbox"/> Information Literacy

<b>Resources:</b>
<b>Texts/Materials:</b> Forensic Science: An Introduction (2 <sup>nd</sup> Ed) – Saferstein Crime Scene Investigations: Real-Life Science Labs for Grades 6-12 – Walker and Wood Jumped, Fell or Pushed? – Koehler Teacher Developed PPT Teacher Developed Notes Leveled Reading- Newsela

<b>Unit 13: Computer Forensics</b>	<b>Recommended Duration: 1.5 weeks</b>
<b>Unit Description:</b> This unit is designed to address various aspects of computer forensics. Students will gain an understanding of how computers work and continually store data. They will also explore procedures forensic scientists follow in order to preserve, acquire, extract, and interpret this data. Students will discuss the impact computer forensics can have on criminal investigations, especially as it applies to selected case studies.	

<b>Essential Questions</b>	<b>Enduring Understandings</b>
<ul style="list-style-type: none"> <li>What is the value of computers and technology as evidence in forensic investigations?</li> <li>How can computers be used to retrieve data useful to forensic investigations?</li> </ul>	<ul style="list-style-type: none"> <li>Computers store information throughout their use, leaving a trail of data that can be retrieved and used in forensic investigations.</li> </ul>

Relevant Standards	Learning Goals	Learning Objectives
<b>Content Standards:</b> <b>Power (Primary):</b> 21 <sup>st</sup> Century Life and Careers: 9.3.LW.5 9.3.LW-ENF.12 9.3.ST.5 9.3.ST-SM.3	<ul style="list-style-type: none"> <li>Students will understand the value of computers in forensic investigations and will be able to describe how computers work and are used to retrieve valuable information.</li> </ul>	<ul style="list-style-type: none"> <li>List and describe the hardware and software components of a computer.</li> <li>Compare read-only memory and random-access memory.</li> <li>Describe how a hard disk drive is partitioned.</li> <li>Describe the proper procedure for preserving computer evidence at a crime scene.</li> </ul>

Relevant Standards	Learning Goals	Learning Objectives
<p>9.3.ST-SM.4</p> <p>Technology: 8.1.12.F.1 8.1.12.F.2 8.1.12.A.1</p> <p><b>Supportive (Secondary):</b> 21<sup>st</sup> Century Life and Careers: NJSLS-CLKS.5 Utilize critical thinking to make sense of problems and persevere in solving them</p>		<ul style="list-style-type: none"> <li>• Explain the difference between the location of visible and latent data.</li> <li>• List the areas of the computer that will be examined to retrieve forensic data.</li> </ul>

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/Assignments/Assessments (required)
<p>KWL, Do Nows, Writing Breaks, Individual and Group White Boards, Questioning, Discussion, Self-Assessment, Case Analysis Studies, Quizzes, Application and Critical Thinking Questions, Lab Notebook</p> <p>Varied case analysis studies</p> <p>Highlight forensic scientists with various backgrounds</p>	<p>Computer Forensics Test</p>	<p>Computer Forensics Practical (Identifying Major Hardware Components)</p>	<p>Computer Forensics Test Computer Forensics Practical (Identifying Major Hardware Components) Case Analysis Studies</p>

Possible Assessment Modifications/Accommodations
<ul style="list-style-type: none"> <li>• Vary test length and answer choices</li> <li>• Extended time on tests and quizzes</li> <li>• Underline or bold key words or phrases</li> </ul>



- Directions and/or questions read aloud
- Oral responses
- Provide word banks

### **Instructional Strategies (refer to *Robert Marzano's 41 Elements*)**

- Cooperative Learning (DQ3:15; DQ4:21)
- Direct Instruction (DQ2:9,10)
- Compare/Contrast (DQ3:17)
- Notetaking and Summarizing (DQ2:10,12)
- Guided and Independent Practice (DQ3:15)
- Structured Academic Games (DQ3:14; DQ5:25)
- Building on Prior Knowledge (DQ2:7; DQ5:31)
- Modeling and Visual Representations of Knowledge (DQ2:12; DQ3:15)
- Critical Thinking Questioning (DQ4:22)

### **Possible Instructional Modifications /Accommodations/Differentiation**

#### Modifications:

- Provide options for expressing mastery of knowledge (i.e. modeling, drawing, writing, acting)
- Reduction in the amount of classwork and homework
- Simplified application and critical thinking questions

#### Accommodations:

- Provide extended time on assignments and activities
- Cueing to stay on task
- Preferential seating
- Guided learning during application and critical thinking questioning
- Provide one-on-one opportunities during SMART Lunch
- Provide opportunities for peer tutoring
- Provide modified notes when necessary
- Provide directions both written and verbally
- Assistance in organization
- Provide additional modes of interacting with new information (i.e. audio, pictures, video)

#### Differentiation:

- Organization of groups with assigned roles based on student strengths and weaknesses
- Vary levels of guided support and scaffolding based on student need

**Possible Instructional Modifications /Accommodations/Differentiation**

- Provide option of group work or individual work on certain assignments
- Assign critical thinking questions based on level of difficulty and student’s mastery of content

**Unit Vocabulary**

**Essential:** algor mortis, autopsy, buccal swab, chain of custody, finished sketch, livor mortis, physical evidence, rigor mortis, rough sketch, standard/reference sample, substrate control, class characteristics, comparison, identification, individual characteristics, product rule

**Non-Essential:** preliminary examination, cross-contamination, depressions, impressions, exonerated

<b>Interdisciplinary Connections (Applicable Standards)</b>	<b>Integration of Technology</b>	<b>21<sup>st</sup> Century Themes: P21 Framework Toolkit</b>	<b>21<sup>st</sup> Century Skills: P21 Framework Toolkit</b>
English Language Arts: NJSLSA.RST.11-12.1 NJSLSA.RST.11-12.2 NJSLSA.RST.11-12.4 NJSLSA.RST.11-12.7	Google Docs Kingsway Teacher Website Online Forums National Forensics Databases Online Research	<input checked="" type="checkbox"/> Global Awareness  <input checked="" type="checkbox"/> Civic Literacy  <input type="checkbox"/> Financial, Economic, Business, & Entrepreneurial Literacy <input checked="" type="checkbox"/> Health Literacy	<input type="checkbox"/> Creativity & Innovation  <input checked="" type="checkbox"/> Media Literacy  <input checked="" type="checkbox"/> Critical Thinking and Problem Solving <input checked="" type="checkbox"/> Life and Career Skills  <input checked="" type="checkbox"/> Information & Communication Technologies Literacy  <input checked="" type="checkbox"/> Communication & Collaboration  <input checked="" type="checkbox"/> Information Literacy

**Resources:****Texts/Materials:**

Forensic Science: An Introduction (2<sup>nd</sup> Ed) – Saferstein  
 Crime Scene Investigations: Real-Life Science Labs for Grades 6-12 – Walker and Wood  
 Jumped, Fell or Pushed? – Koehler  
 Teacher Developed PPT  
 Teacher Developed Notes  
 Leveled Reading- Newsela

<b>Unit 14: Careers in Forensic Science</b>	<b>Recommended Duration: 3.5 weeks</b>
<b>Unit Description:</b> This unit will provide students with the opportunity to explore various careers within forensic science. Students will discuss the impact each of these fields has on forensic investigation and will chronicle how its development has directly contributed to the expanding study of forensic science. Students will also engage in a final project in which they will build a mock crime scene and use acquired skills and knowledge to properly document the scene, collect physical evidence, explain techniques used to derive information from gathered physical evidence, and reconstruct the crime scene.	

<b>Essential Questions</b>	<b>Enduring Understandings</b>
<ul style="list-style-type: none"> <li>How have scientific advancements in various fields directly impacted the growth and development of forensic science?</li> <li>What careers are available in forensic science?</li> </ul>	<ul style="list-style-type: none"> <li>Scientific advancements have led to the improvement in techniques in analyzing physical evidence and the ability of forensic scientists to share data and physical evidence on databases.</li> <li>Many careers are available in the field of forensic science including, but not limited to: forensic pathology, anthropology, entomology.</li> <li>It takes many different types of forensic scientists to aid in forensic investigation, depending on the nature of the crime and physical evidence available.</li> </ul>

<b>Relevant Standards</b>	<b>Learning Goals</b>	<b>Learning Objectives</b>
<b>Content Standards:</b> <b>Power (Primary):</b> 21 <sup>st</sup> Century Life and Careers:	<ul style="list-style-type: none"> <li>Students will understand the significance of scientific advancements to forensic investigations and will be able to describe</li> </ul>	<ul style="list-style-type: none"> <li>Describe careers available in forensic science.</li> </ul>

Relevant Standards	Learning Goals	Learning Objectives
<p>9.3.LW.5 9.3.LW-ENF.12 9.3.ST.5 9.3.ST-SM.3 9.3.ST-SM.4</p> <p><b>Science (NJSL-S):</b> Dependent upon knowledge and skills cited in final project</p> <p><b>Supportive (Secondary):</b> 21<sup>st</sup> Century Life and Careers: NJSL-CLKS.5 Utilize critical thinking to make sense of problems and persevere in solving them NJSL.9.4.12.CT.2 Explain the potential benefits of collaborating to enhance critical thinking and problem solving</p>	<p>various careers available within forensic science.</p> <ul style="list-style-type: none"> <li>Students will be able to construct a crime scene and use knowledge and skills acquired throughout the year to properly document the scene, collect physical evidence, explain techniques used to derive information from gathered physical evidence, and reconstruct the crime scene.</li> </ul>	<ul style="list-style-type: none"> <li>Analyze how advancements within explored careers have a direct impact on the growth and development of forensic science.</li> <li>Use acquired knowledge and skills to:</li> <li>Properly document and sketch a crime scene.</li> <li>Collect physical evidence.</li> <li>Explain techniques used to derive information from gathered physical evidence.</li> <li>Reconstruct a crime scene.</li> </ul>

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/Assignments/Assessments (required)
<p>KWL, Do Nows, Writing Breaks, Individual and Group White Boards, Questioning, Discussion, Self-Assessment, Case Analysis Studies, Quizzes, Application and Critical Thinking Questions, Lab Notebook</p> <p>Varied case analysis studies</p> <p>Highlight forensic scientists with various backgrounds</p>	<p>Careers in Forensic Science Essay</p>	<p>Final Crime Scene Project</p>	<p>Careers in Forensic Science Essay Final Crime Scene Project Case Analysis Studies</p> <p>Highlight importance of having diversity in the field of forensics</p>

### **Possible Assessment Modifications/Accommodations**

- Vary test length and answer choices
- Extended time on tests and quizzes
- Underline or bold key words or phrases
- Directions and/or questions read aloud
- Oral responses
- Provide word banks

### **Instructional Strategies (refer to *Robert Marzano's 41 Elements*)**

- Cooperative Learning (DQ3:15; DQ4:21)
- Direct Instruction (DQ2:9,10)
- Compare/Contrast (DQ3:17)
- Notetaking and Summarizing (DQ2:10,12)
- Guided and Independent Practice (DQ3:15)
- Structured Academic Games (DQ3:14; DQ5:25)
- Building on Prior Knowledge (DQ2:7; DQ5:31)
- Modeling and Visual Representations of Knowledge (DQ2:12; DQ3:15)
- Critical Thinking Questioning (DQ4:22)

### **Possible Instructional Modifications /Accommodations/Differentiation**

#### Modifications:

- Provide options for expressing mastery of knowledge (i.e. modeling, drawing, writing, acting)
- Reduction in the amount of classwork and homework
- Simplified application and critical thinking questions

#### Accommodations:

- Provide extended time on assignments and activities
- Cueing to stay on task
- Preferential seating
- Guided learning during application and critical thinking questioning
- Provide one-on-one opportunities during SMART Lunch
- Provide opportunities for peer tutoring
- Provide modified notes when necessary
- Provide directions both written and verbally

**Possible Instructional Modifications /Accommodations/Differentiation**

- Assistance in organization
- Provide additional modes of interacting with new information (i.e. audio, pictures, video)

Differentiation:

- Organization of groups with assigned roles based on student strengths and weaknesses
- Vary levels of guided support and scaffolding based on student need
- Provide option of group work or individual work on certain assignments
- Assign critical thinking questions based on level of difficulty and student’s mastery of content

**Unit Vocabulary**

**Essential:** criminalistics, forensic engineering, forensic odontology, forensic pathology, forensic anthropology, forensic psychology and psychiatry, document examiners, forensic toxicology

**Non-Essential:** organic chemistry, molecular biology, genetics, population genetics, inorganic chemistry, physical chemistry, pharmacology, microbiology

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21 <sup>st</sup> Century Themes: P21 Framework Toolkit	21 <sup>st</sup> Century Skills: P21 Framework Toolkit
Technology: 8.1.12.F.1  English Language Arts: NJLSA.RST.11-12.1 NJLSA.RST.11-12.2 NJLSA.RST.11-12.4 NJLSA.RST.11-12.7	Google Docs Kingsway Teacher Website Online Forums National Forensics Databases Online Research	<input checked="" type="checkbox"/> Global Awareness  <input checked="" type="checkbox"/> Civic Literacy  <input type="checkbox"/> Financial, Economic, Business, & Entrepreneurial Literacy  <input checked="" type="checkbox"/> Health Literacy	<input checked="" type="checkbox"/> Creativity & Innovation  <input checked="" type="checkbox"/> Media Literacy  <input checked="" type="checkbox"/> Critical Thinking and Problem Solving <input checked="" type="checkbox"/> Life and Career Skills  <input checked="" type="checkbox"/> Information & Communication Technologies Literacy  <input checked="" type="checkbox"/> Communication & Collaboration  <input checked="" type="checkbox"/> Information Literacy

**Resources:****Texts/Materials:**

Forensic Science: An Introduction (2<sup>nd</sup> Ed) – Saferstein

Crime Scene Investigations: Real-Life Science Labs for Grades 6-12 – Walker and Wood

Jumped, Fell or Pushed? – Koehler

Teacher Developed PPT

Teacher Developed Notes

Leveled Reading- Newsela