Title	**Roxbury High School Forensics**
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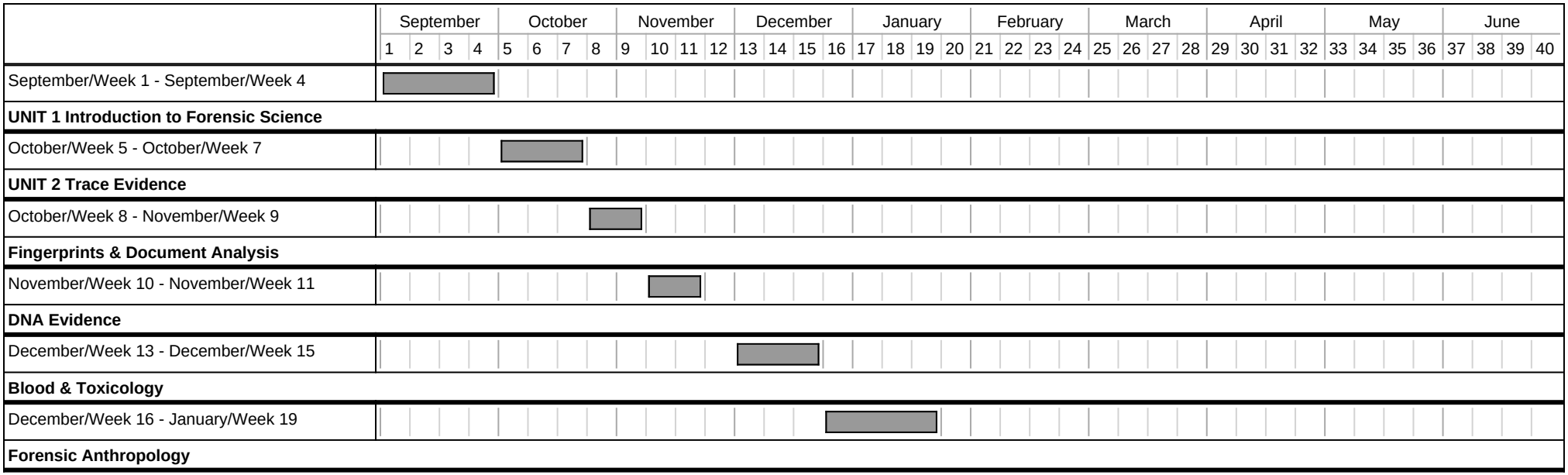
Curriculum Writing History	
Notes	
Attachments	

Title : Roxbury High School Forensics
Type : Consensus



Title : Roxbury High School Forensics
Type : Consensus

Duration: September/Week 1 - September/Week 4					
UNIT NAME: UNIT 1 Introduction to Forensic Science					
Enduring Understandings	**Essential Questions**	**Knowledge**	**Skills**	**Assessment**	**Standards**
• Science is the method of observation and investigation used to understand our world. • Scientific literacy includes the ability to search for and assess the relevance and credibility of scientific data. • Scientific literacy includes the ability to read, write, discuss, and present coherent ideas about science. • Scientists today apply theories and techniques developed by past scientists to solve crimes. • Scientists work together and share findings in order to effectively draw conclusions and solve real world problems. • Forensic science is the application of science to criminal investigations. • Forensic science involves the collaboration of many scientific specialists, both past and present.	• What is Forensic Science? • How have the developments and research of past scientists contributed to the development of the field of forensic science as we know it today? • How are crimes solved? • How is evidence collected and analyzed? • Who is involved in solving crimes and what roles do they play?	*Students will know …* • a brief history of forensic science • important steps in the crime scene investigation process • how to properly collect and classify forensic evidence • how to appropriately securing & processing the crime scene • several different types of search patterns • Locard's Exchange Principle • what is meant by chain of custody • the functions & equipment of a crime laboratory • about careers in forensic science and steps needed to be successful in those careers	*Students will be able to …* • utilize observational skills to process a crime scene • collect data from a crime scene • measure and record information collected from a crime scene • propose possible explanations for the evidence collected at a crime scene • critique and evaluate eye witness testimony • analyze primary documents in case study reviews • summarize the value of crime scene evidence in a written report • communicate information about a criminal investigation **<u>Suggested Activities:</u>** Mock "Intrusion" and Observation Test Crime Scene Processing / Mini Crime Scene Case Study Analysis Crime Scene Photography Kit		HS.LS1.1.SEP.1-Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS - LS1-1) (09-12) [Regional:Next Generation Science Standards (NGSS)] HS.LS1.2.SEP.1-Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-2) (09-12) [Regional:Next Generation Science Standards (NGSS)] HS.LS1.3.SEP.1-Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy

• Scientific problems, including crimes, must be solved by deductive reasoning: analyzing and synthesizing all observations and data in order to come to the most reasonable conclusion. • Crime scenes are extremely fragile; once disrupted or tampered with, they can never be regained. • Observation skills are critical when investigating crime scenes; the notes and photos taken and the sketches drawn are used to help forensic investigators reconstruct the crime and determine the course of events.			Police Visit / Guest Speaker Forensics Careers Research Project Locard's Exchange Principle Lab(s) Trace Evidence Glo Germ Lab		of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. (HS-LS1-3) (09-12) [Regional:Next Generation Science Standards (NGSS)] HS.LS1.3.CNS.1-Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity , skepticism, replicability of results, and honest and ethical reporting of findings. (HS -LS1-3) (09-12)[Regional:Next Generation Science Standards (NGSS)] HS.LS2.2.CNS.1-Most scientific knowledge is quite durable, but is, in principle, subject to change based on new evidence and/or reinterpretation of existing evidence. (HS-LS2-2) (09-12)[Regional:Next Generation Science Standards (NGSS)] HS.LS2.6.SEP.1-Evaluate the claims, evidence, and reasoning behind currently accepted explanations or solutions to determine the merits of arguments. (HS-LS2-6) (09-12)

					[Regional:Next Generation Science Standards (NGSS)] HS.LS2.6.CNS.1-Scientific argumentation is a mode of logical discourse used to clarify the strength of relationships between ideas and evidence that may result in revision of an explanation. (HSLS2-6), (HS-LS2-8) (09-12) [Regional:Next Generation Science Standards (NGSS)] HS.LS4.6.CCC.1-Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. (HS-LS2-8),(HS-LS4-6) (09-12) [Regional:Next Generation Science Standards (NGSS)] HS.LS3.1.SEP.1-Ask questions that arise from examining models or a theory to clarify relationships. (HS-LS3-1) (09-12)[Regional:Next Generation Science Standards (NGSS)] HS.LS3.2.SEP.1-Make and defend a claim based on evidence about the natural world that reflects scientific knowledge, and student-generated evidence. (HS-LS3-2) (09-12)[Regional:Next

					Generation Science Standards (NGSS)] HS.LS4.1.SEP.1-Communicate scientific information (e.g., about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally , graphically , textually, and mathematically). (HS-LS4-1) (09-12) [Regional:Next Generation Science Standards (NGSS)] HS.LS4.1.CCC.1-Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena. (HSLS4-1), (HS-LS4-3) (09-12) [Regional:Next Generation Science Standards (NGSS)] HS.LS4.5.SEP.1-Evaluate the evidence behind currently accepted explanations or solutions to determine the merits of arguments. (HS-LS4-5) (09-12)[Regional:Next Generation Science Standards (NGSS)] W.9–10.7-Conduct short as well as more sustained research projects to

					answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (09, 10) [State:New Jersey] W.9–10.8-Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation (MLA or APA Style Manuals). (09, 10) [State:New Jersey] SL.9–10.2-Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, qualitatively, orally) evaluating the credibility and accuracy of each source. (09, 10) [State:New Jersey] SL.9–10.4-Present information, findings and

					supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience. (09, 10)[State:New Jersey] NJSLSA.W.7-Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation. (06-12) [State:New Jersey] NJSLSA.W.8-Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism. (06-12)[State:New Jersey] RST.9–10.1-Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions. (09, 10) [State:New Jersey] RST.9–10.2-Determine the central ideas, themes, or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept;

					provide an accurate summary of the text. (09, 10)[State:New Jersey] RST.9–10.3-Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. (09, 10)[State:New Jersey] WHST.9–10.1-Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant sufficient textual and non-textual evidence. (09, 10)[State:New Jersey] WHST.9–10.2-Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (09, 10)[State:New Jersey]
Plans:					

Title : Roxbury High School Forensics
Type : Consensus

Duration: October/Week 5 - October/Week 7					
UNIT NAME: UNIT 2 Trace Evidence					
Enduring Understandings	**Essential Questions**	**Knowledge**	**Skills**	**Assessment**	**Standards**
• Matter, including forensic evidence such as hair and fibers, can be described, organized, classified, and analyzed and can be used to identify suspects. • Evidence can be analyzed for its chemical components to uncover characteristics that are not always directly observable and thus can give insight to a crime.	• What is the value of hair and fibers as trace evidence? • What information can be gained by studying hair and fiber evidence? • How are hair and fibers analyzed in a crime lab? • What are other forms of trace evidence used in criminal investigations.	*Students will know …* • the structure and basic biology of hair • several types of hair and how hair is classified • how hair is used in criminal investigations • the difference between synthetic vs natural fibers • how fiber analysis is used in Forensics • other forms of trace evidence such as pollen, soil, or sand • how impressions are used by forensic investigators.	*Students will be able to …* • observe and measure hair using a microscope • analyze hair structure to determine consistency with hair found on a suspect or at a crime scene • use a fiber counter to measure and record data about different fibers • experiment with different fibers using a burn test to classify fibers into groups • observe and classify soil or sand samples using a stereomicroscope • use reasoning to analyze the evidence collected at a crime scene • summarize the value of crime scene evidence in a written report **<u>Suggested Activities:</u>** Intro to Hair Microscope Lab CSI Hair Lab (5 Suspects) Fiber Analysis Lab		HS.LS1.1.SEP.1-Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS - LS1-1) (09-12) [Regional:Next Generation Science Standards (NGSS)] HS.LS1.1.DCI.LS1.A.1-Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1) (09-12) [Regional:Next Generation Science Standards (NGSS)] HS.LS1.2.DCI.LS1.A.1-Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2) (09-12)

			Burn Test for Fibers CSI Fiber Lab (4-5 Suspects) Sand & Soil CSI Lab Shoe/Tire Impressions Bite Mark Modeling		[Regional:Next Generation Science Standards (NGSS)] MS.ETS1.1-Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. (06-08) [State:Next Generation Science Standards (NGSS)] MS.ETS1.1.SEP.1-Define a design problem that can be solved through the development of an object, tool, process or system and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions. (MS-ETS1-1) (06-08) [State:Next Generation Science Standards (NGSS)] HS.ETS1.2.SEP.1-Design a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. (HS-ETS1-2) (09-12) [Regional:Next Generation

					Science Standards (NGSS)] HS.LS1.1.DCI.LS1.A.1- Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1) (09-12) [Regional:Next Generation Science Standards (NGSS)] HS.PS2.6.SEP.1- Communicate scientific and technical information (e.g. about the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically). (HS-PS2-6) (09-12) [Regional:Next Generation Science Standards (NGSS)] HS.PS1.2.SEP.1- Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' ow n investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-

					PS1-2) (09-12) [Regional:Next Generation Science Standards (NGSS)]
Plans:					

Title : Roxbury High School Forensics
Type : Consensus

Duration: October/Week 8 - November/Week 9					
UNIT NAME: Fingerprints & Document Analysis					
Enduring Understandings	**Essential Questions**	**Knowledge**	**Skills**	**Assessment**	**Standards**
• Biological evidence, such as fingerprints, contains discrete pieces of information that makes every organism unique. • Science ideas evolve as new information is uncovered. • Technology can be utilized to help answer questions and solve problems. • Matter, including forensic evidence such as fingerprints and handwriting, can be described, organized, classified, analyzed and used to determine the identity of a suspect.	• Why are fingerprints such a valuable piece of evidence? • How is fingerprint evidence collected and analyzed in order to determine the identity of a suspect? • How have computers made personal identification easier? • How do forensic specialists analyze handwriting?	*Students will know …* • how fingerprints form unique patterns • the basic structure & pattern types in fingerprints such as loops, whorls, and arches • traditional & advanced techniques for creating fingerprints • how fingerprint data is recorded and stored in databases • different characteristics of handwriting • how handwriting is analyzed	*Students will be able to ...* • record their own fingerprint and identify loops, whorls, arches, and deltas • analyze and compare their fingerprint to their classmates • develop a proper 'Ten Card' of fingerprints • locate and measure minutia and create algorithms between these in order to identify a fingerprint match • investigate different methods of collecting and analyzing latent prints found at a crime scene • model different forms of handwriting features • analyze handwriting of others and compare to a suspects handwriting **<u>Suggested Activities</u>** Human Fingerprinting Lab – Kit Fingerprint enlargement for study – balloon inflated to show detail Class Fingerprint Lab –		W.9–10.7-Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (09, 10) [State:New Jersey] W.9–10.9.b-Apply grades 9–10 Reading standards to nonfiction informational (e.g., "Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning"). (09, 10)[State:New Jersey] SL.9–10.4-Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.

			identify students based on fingerprint analysis Bertillion Measurement Activity Analysis of student created writing samples – match to known 'suspects' in class. Practice 'disguised' writing		(09, 10)[State:New Jersey] L.9–10.6-Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression. (09, 10) [State:New Jersey] MP.5-Use appropriate tools strategically. (KG-12) [State:New Jersey] MP.1-Make sense of problems and persevere in solving them. (KG-12) [State:New Jersey] MP.3-Construct viable arguments and critique the reasoning of others. (KG-12)[State:New Jersey] HS.ETS1.2-Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. (09-12) [Regional:Next Generation Science Standards (NGSS)] HS.LS1.2.SEP.1-Develop and use a model based on evidence to illustrate the relationships between

					systems or between components of a system. (HS-LS1-2) (09-12) [Regional:Next Generation Science Standards (NGSS)] HS.LS1.2.DCI.LS1.A.1- Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2) (09-12) [Regional:Next Generation Science Standards (NGSS)]
Plans:					

Title : Roxbury High School Forensics
Type : Consensus

Duration: November/Week 10 - November/Week 11					
UNIT NAME: DNA Evidence					
Enduring Understandings	**Essential Questions**	**Knowledge**	**Skills**	**Assessment**	**Standards**
• The DNA sequence of every organism is unique. • Techniques in biotechnology allow scientists to manipulate and analyze DNA in order to make connections between crime scenes and suspects. • Technology allows us to answer questions and find solutions to problems. • Science and technology are continually changing.	• What is the value of DNA as evidence? • How is DNA extracted and characterized? • How can DNA be analyzed to make connections between crime scenes and suspects? • When did the use of DNA and other biological evidence first become important in Forensics and how has its use changed over time? • How is DNA evidence stored and managed? • How can DNA be used to exonerate falsely accused individuals?	*Students will know …* • the basic structure and function of DNA • the role of DNA as evidence • proper procedures in the collection and handling of DNA evidence • how electrophoresis is used to sort and analyze DNA • what DNA fingerprints are and how they are made • the various government agencies that collect and store DNA evidence in databases • how the science and technology behind DNA fingerprinting or profiling has changed over time • what STR Analysis is and how it is utilized in criminal investigations • what the Innocence Project is and other ways that DNA evidence has affected once closed cases	*Students will be able to …* • model the structure of DNA • sort and analyze various DNA samples using gel electrophoresis technology • compare DNA fingerprints in order to match crime scene samples to possible suspects • use evidence to argue for or against a DNA match • use mathematics to measure and sequence DNA samples of different sizes • use reasoning to analyze the evidence collected at a crime scene • communicate the meaning and implication of crime scene evidence in a written or oral report **<u>Suggested Activities:</u>** Model DNA (Virtual Model or Manipulatives) DNA Puzzle Activity		MP.3-Construct viable arguments and critique the reasoning of others. (KG-12)[State:New Jersey] MP.5-Use appropriate tools strategically. (KG-12) [State:New Jersey] S.ID.4-Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. (09-12)[State:New Jersey] S.IC.1-Understand statistics as a process for making inferences about population parameters based on a random sample from that population. (09-12) [State:New Jersey] S.IC.6-Evaluate reports based on data. (09-12) [State:New Jersey] NJSLSA.R.1-Read closely to determine what the text says explicitly and to make logical inferences and relevant connections

			Gel Electrophoresis RFLP Modeling Lab DNA fingerprinting Lab STR Analysis Paper Lab Research Project / Case Study - The Innocence Project and the Use of DNA in past criminal cases		from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. (06-12) [State:New Jersey] NJSLSA.R.2-Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. (06-12) [State:New Jersey] NJSLSA.R.7-Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words. * (06-12) [State:New Jersey] NJSLSA.W.1-Write arguments to support claims in an analysis of substantive topics or texts using valid reasoning and relevant and sufficient evidence. (06-12) [State:New Jersey] NJSLSA.W.2-Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content. (06-12) [State:New Jersey] NJSLSA.W.6-Use technology, including the Internet, to produce and

					publish writing and to interact and collaborate with others. (06-12) [State:New Jersey] NJSLSA.W.7-Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation. (06-12) [State:New Jersey] NJSLSA.W.8-Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism. (06-12)[State:New Jersey]
Plans:					

Title : Roxbury High School Forensics
Type : Consensus

Duration: December/Week 13 - December/Week 15					
UNIT NAME: Blood & Toxicology					
Enduring Understandings	**Essential Questions**	**Knowledge**	**Skills**	**Assessment**	**Standards**
• Matter, including forensic evidence such as blood, can be described, organized, classified, and analyzed and can be used to determine the identity of a suspect. • Evidence such as drugs or drug residue can be analyzed for its chemical components to uncover characteristics that are not always directly observable and thus can give insight to a crime.	• What is the value of blood as evidence? • How is blood type determined? • What information can be obtained by analyzing blood spatter patterns? • How is drug evidence analyzed by the crime lab? • What is the role of toxicology testing in criminal investigations?	*Students will know …* • the main components of blood • the ABO blood groups in humans, as well as Rh factors • the differences between human and other animal blood • how scientists test for blood at a crime scene and how it is later processed in a crime lab • how blood type is used in criminal cases, paternity tests, and identifying human remains • the different patterns that blood spatter will leave behind during various forms of crime • various types of drugs and poisons that can be found in blood • how drugs, poisons and other toxins are analyzed and used in criminal investigations • how human remains such as blood and tissue samples are analyzed for drugs	*Students will be able to …* • properly collect and analyze blood from a crime scene • determine the blood type of an unknown sample and compare to a control sample • experiment and collect data regarding blood type • measure and record information regarding blood spatter height, velocity, angle of impact, and possible trajectory • use chemical indicators such as Luminol or Bluestar in order to determine the presence of blood invisible to the eye • hypothesize about the possible scenarios that took place at a crime scene referring to evidence • research various careers related to forensic toxicology and present findings in a written or oral report		MS.ETS1.2.DCI.ETS1.B.1-There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (MS-ETS1-2), (MS-ETS1-3) (06-08) [State:Next Generation Science Standards (NGSS)] MS.ETS1.3-Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. (06-08) [State:Next Generation Science Standards (NGSS)] MS.ETS1.3.SEP.1-Analyze and interpret data to determine similarities and differences in findings. (MS-ETS1-3) (06-08)[State:Next Generation Science Standards (NGSS)] HS.ETS1.1.SEP.1-Analyze complex real-world problems by specifying criteria and constraints for successful

		• how forensic toxicologists help to solve crimes	• use chemical indicators to determine the presence of unknown “drugs” on clothing, tissue samples, or money **<u>Suggested Activities:</u>** Guest Speaker from Police Department / Drug Enforcement / Hospital or Lab Blood Typing Lab Analyzing Blood Drops & Height (velocity) Lab Blood Trajectory / Angle of Impact Lab (cereal boxes) Presumptive Test for Blood Visualizing Hidden Blood (Luminol or Blue Star) Blood Spatter Analysis (wipes, arterial gush, low velocity, high velocity) Research Project /Case Studies - Forensic Toxicology Drug Evidence Lab		solutions. (HS-ETS1-1) (09-12)[Regional:Next Generation Science Standards (NGSS)] HS.ETS1.2-Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. (09-12) [Regional:Next Generation Science Standards (NGSS)] HS.LS1.1.DCI.LS1.A.1-Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1) (09-12) [Regional:Next Generation Science Standards (NGSS)] HS.LS1.2.DCI.LS1.A.1-Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2) (09-12) [Regional:Next Generation Science Standards (NGSS)] HS.LS1.3.CNS.1-Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity , skepticism, replicability of

					results, and honest and ethical reporting of findings. (HS -LS1-3) (09-12)[Regional:Next Generation Science Standards (NGSS)] HS.LS2.6.SEP.1-Evaluate the claims, evidence, and reasoning behind currently accepted explanations or solutions to determine the merits of arguments. (HS-LS2-6) (09-12) [Regional:Next Generation Science Standards (NGSS)] HS.LS3.3.SEP.1-Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible. (HS -LS3-3) (09-12) [Regional:Next Generation Science Standards (NGSS)] HS.LS3.3-Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population. (09-12) [Regional:Next Generation Science Standards (NGSS)] HS.LS3.3.CNS.1-Technological advances have influenced the

					progress of science and science has influenced advances in technology . (HSLS3-3) (09-12) [Regional:Next Generation Science Standards (NGSS)] HS.PS1.3.DCI.PS2.B.2-Attraction and repulsion between electric charges at the atomic scale explain the structure, properties, and transformations of matter, as well as the contact forces between material objects. (HS-PS1-1),(HS-PS1-3), (HSPS2-6) (09-12) [Regional:Next Generation Science Standards (NGSS)] HS.PS1.2.SEP.1-Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' ow n investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-PS1-2) (09-12) [Regional:Next Generation Science Standards (NGSS)] HS.PS2.1.SEP.1-Analyze

					data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution. (HSPS2-1) (09-12) [Regional:Next Generation Science Standards (NGSS)] HS.PS2.2.SEP.1-Use mathematical representations of phenomena to describe explanations. (HS-PS2-2), (HS-PS2-4) (09-12) [Regional:Next Generation Science Standards (NGSS)] RST.9–10.3-Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. (09, 10) [State:New Jersey] RST.9–10.4-Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. (09, 10)[State:New Jersey]

					RST.9–10.7-Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. (09, 10)[State:New Jersey] WHST.9–10.1-Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant sufficient textual and non-textual evidence. (09, 10)[State:New Jersey] WHST.9–10.1.b-Develop claim(s) and counterclaims using sound reasoning, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline- appropriate form and in a manner that anticipates the audience's knowledge level and concerns. (09, 10) [State:New Jersey] WHST.9–10.2-Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (09, 10)[State:New Jersey] G.SRT.7-Explain and use

					the relationship between the sine and cosine of complementary angles. (09-12)[State:New Jersey] G.SRT.8-Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. * (09-12) [State:New Jersey] N.Q.1-Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (09-12)[State:New Jersey]
Plans:					

Title : Roxbury High School Forensics
Type : Consensus

Duration: December/Week 16 - January/Week 19					
UNIT NAME: Forensic Anthropology					
Enduring Understandings	**Essential Questions**	**Knowledge**	**Skills**	**Assessment**	**Standards**
• Criminal cases are solved by the coordinated effort of many specialists, scientists, and departments. • Scientists work together and share findings in order to effectively draw conclusions and solve real world problems. • Scientific problems, including crimes, must be solved by deductive reasoning: analyzing and synthesizing all observations and data in order to come to a conclusion. • The physical, chemical, and biological condition of human remains can provide scientists with valuable information.	• What can scientists learn from examining human remains? • How can age, gender, and geographical origin be determined from examining skeletal remains? • How can other evidence at a crime scene be analyzed and used in criminal proceedings? • What is the role of the medical examiner in criminal investigations? • How is time of death determined?	*Students will know …* • the basic skeletal structure of humans • the features used by anthropologists in identifying human remains • the differences between height, genders, ages, and geographic origins as seen in skeletal remains • how to distinguish between human and animal remains • the value of dental evidence and the analysis of bite marks • the physical, biological and chemical changes that take place during human decomposition • how autopsies are performed and what information they can provide • several types of insects that are involved in decomposition and how they can provide clues about time of death	*Students will be able to …* • model the bones of the human skeleton • compare male and female skulls, pelvic bones and other skeletal remains • observe, measure and analyze differences in bones to estimate a “victim’s” age • apply mathematical models to estimate a victim’s height based on bone length • estimate time of death based on features such as rigor mortis, algor mortis, and lividity • investigate different methods used by medical examiners and describe their role in forensic science and the law • compare models such as x rays or dental impressions to the patterns of bite marks on a victim • classify different types of insects that can be found on or near human remains		N.Q.1-Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (09-12)[State:New Jersey] MP.3-Construct viable arguments and critique the reasoning of others. (KG-12)[State:New Jersey] MP.5-Use appropriate tools strategically. (KG-12) [State:New Jersey] WHST.9–10.1.a-Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. (09, 10)[State:New Jersey] WHST.9–10.1.b-Develop claim(s) and counterclaims using sound reasoning, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a

			• explain how forensic entomologists provide information in investigations **<u>Suggested Activities:</u>** Sherlock Bones Forensic Entomology Investigation Critters on Cadavers Kit Maggot Movie - Outdoor Lab Examine X-Rays (Bone & Dental) to match with missing persons reports Research Project - Performing a Modern Autopsy		discipline- appropriate form and in a manner that anticipates the audience's knowledge level and concerns. (09, 10) [State:New Jersey] WHST.9–10.9-Draw evidence from informational texts to support analysis, reflection, and research. (09, 10)[State:New Jersey] WHST.9–10.7-Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (09, 10) [State:New Jersey] NJSLSA.W.8-Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism. (06-12)[State:New Jersey] NJSLSA.W.6-Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others. (06-12)

					[State:New Jersey] NJSLSA.W.2-Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content. (06-12) [State:New Jersey] MS.ETS1.3-Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. (06-08) [State:Next Generation Science Standards (NGSS)] HS.ETS1.2-Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. (09-12) [Regional:Next Generation Science Standards (NGSS)] HS.LS1.3.DCI.LS1.A.1-Feedback mechanisms maintain a living system’s internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as

					external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3) (09-12)[Regional:Next Generation Science Standards (NGSS)] HS.LS1.3.CNS.1-Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity , skepticism, replicability of results, and honest and ethical reporting of findings. (HS -LS1-3) (09-12)[Regional:Next Generation Science Standards (NGSS)] HS.LS1.5.SEP.1-Use a model based on evidence to illustrate the relationships between systems or between components of a system. (HSLS1-5),(HS-LS1-7) (09-12)[Regional:Next Generation Science Standards (NGSS)] HS.LS1.2.DCI.LS1.A.1-Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous

					parts and is itself a component of the next level. (HS-LS1-2) (09-12) [Regional:Next Generation Science Standards (NGSS)] HS.LS1.4.DCI.LS1.B.1-In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that div ides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism. (HS-LS1-4) (09-12)[Regional:Next Generation Science Standards (NGSS)]
Plans:					