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| **UNIT 6: Serology / DNA**  **Forensic Science / Grade 12** | **Estimated Unit Length**: 4 Week  **Date Created**: August, 2016 |

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| **The students will understand . . .** | **Essential Questions:** |

**Unit Components/Sub-Headings**

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| **Introduction to Serology** | **The Nature of Blood** | **Immunoassay** | **Forensic Characterization of Bloodstains** | **Principles of Heredity** | **Forensics and DNA** | **Biological Evidence** |

**Knowledge—The students will know . . .**

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| **Concepts/Topics**  Introduction  The Grim Sleeper  Vocabulary  Acid Phosphatase  Agglutination  Allele  Antibody  Antigen  Antiserum  Aspermia  Chromosome  Buccal Cells  Human Genome  Hybridization | **Concepts/Topics**  Antigens and Antibodies  Blood Typing  Vocabulary  Enzyme  Erythrocyte  Geme  Genotype  Hemoglobin  Heterozygous  Serology  Chromosomes  Mitochondria  Multiplexing | **Concepts/Topics**  Collection and Evaluation Techniques  Vocabulary  Homozygous  Hybridoma Cells  Locus  Luminol  Monoclonal Anti..  Oligospermia  Base Pairing  DNA  Nucleotide  PCR | **Concepts/Topics**  Color tests  Luminol and Bluestar  Microcrystalline  Precioitin Test  Gel Diffusion  Vocabulary  Phenotype  Plasma  Polyclonal  Preciptin  Electrophoresis  Primer  Proteins | **Concepts/Topics**  Genes and Chromosomes  Paternity Testing  Semen  Rape Evidence  Vocabulary  Serum  Sperm  X-Chromosome  Y-Chromosome  Zygote  Epithelial Cells  Replication  Restriction Enzymes | **Concepts/Topics**  Understanding DNA  Replication of DNA  PCR  DNA Tandem Repeats  PCR  STRs  Electrophoresis  Sex Identification  Mitochondrial DNA  Vocabulary  Amelogenin  Amino Acids  RFLPs | **Concepts/Topics**  CODIS  Biological Evidence  Packing Evidence  DNA Specimens  Contamination of DNA  Vocabulary  Sequencing  STRs  Substrate Control  Tandem Repeat  Touch DNA  Y-STRs |

**Objectives and Standards: Skills---The students will be able to . . .**  **Assessments/Evidence**

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| List the A\_B\_O antigens and antibodies found in the blood for the each of the four blood types (HS-LS1-1)  Understand how whole blood is typed. (HS-LS1-1)  List and describe forensic tests used to characterize a stain of blood (HS-LS1-1)  Understand the concept of antigen-antibody interactions and how they are applied to species identification and drug identification (HS-LS1-3)  Contrast chromosome and Genes. (HS-LS4-2)  Learn how the Punnett square is used to determine the genotype and phenotypes of offspring. (HS-LS4-2)  List the laboratory tests necessary to characterize seminal stains (HS-LS1-2)  Explain how suspect blood and semen stains are properly preserved for laboratory examination (HS-LS1-2)  Describe the proper collection of physical evidence in a rape investigation (Hs-LS1-3) | * Bell-Ringer * Journal Activities * Exit-Slips * Exams * Quizzes * Small Group (Team Activities) * Experiments * Projects * Presentations * Case Studies * Vocabulary |

**Instructional Resources/Materials**

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| * Forensic Science: An Introduction, Second Edition * Forensic Science: From the Crime Scene to the Crime Lab, Third Edition * Criminalistics: An Introduction to Forensic Science, Eleventh Edition * Criminalistics; An Introduction to Forensic Science, Lab Manual (8th Edition) * Crime Science; Methods of Forensic Detection | * Forensic Science: An Introduction, Second Edition * Forensic Science: From the Crime Scene to the Crime Lab, Third Edition * Criminalistics: An Introduction to Forensic Science, Eleventh Edition * Criminalistics; An Introduction to Forensic Science, Lab Manual (8th Edition) * Crime Science; Methods of Forensic Detection |

**Highlight or bold at least one Reading and one Writing standard for each unit of study. Other content areas can replace their content area title in the text.**

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| **Science and Technology Literacy Standards Grades 9-10** | **Science and Technology Literacy Standards Grades 11-12** | **Writing Standards** |
| RST.9-10.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. | RST.11-CCR.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. | WHST. 1 Write arguments to support claims in an analysis of substantive topics or texts using valid reasoning and relevant and sufficient evidence. |
| RST.9-10.2 Determine the central ideas 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. | RST.11-CCR.2 Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. | WHST. 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. |
| 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. | RST.11-CCR.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. | WHST. 3 Write narratives to develop real or imagined experiences or events using effective techniques, well-chosen details and well-structured event sequences. |
| 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. | RST.11-CCR.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 11–12 texts and topics. | WHST. 4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. |
| RST.9-10.5 Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). | RST.11-CCR.5  Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. | WHST. 5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach. |
| RST.9-10.6 Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. | RST.11-CCR.6  Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. | WHST. 6 Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others. |
| 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. | RST.11-CCR.7  Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. | WHST. 7 Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation. |
| RST.9-10.8 Assess the extent to which the reasoning and evidence in a text support the author’s claim or a recommendation for solving a scientific or technical problem. | RST.11-CCR.8  Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. | WHST. 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. |
| RST.9-10.9 Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. | RST.11-CCR.9  Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. | WHST. 9 Draw evidence from literary or informational texts to support analysis, reflection, and research. |
| RST.9-10.10 By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently. | RST.11-CCR.10  By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently. | WHST.10 11-CCR Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. |