Unit 03: Ballistics and Firearms Analysis

Content Area: **Science**
Course(s):
Time Period: **Marking Period 2**
Length: **3 Weeks**
Status: **Published**

Summary

Introduction: This unit focuses on ballistics and firearms analysis. Topics covered include determining angle of impact of a bullet, differences between types of firearms, methods of matching a bullet to the gun that fired it, and methods of matching a cartridge case to the gun that fired it.

Revision Date: July, 2019

LA.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.
LA.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.
LA.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.
LA.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.
LA.WHST.9-10.1.D	Establish and maintain a style and tone appropriate to the audience and purpose (e.g., formal and objective for academic writing) while attending to the norms and conventions of the discipline in which they are writing.
LA.WHST.9-10.2.B	Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.
LA.WHST.9-10.2.D	Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.
LA.WHST.9-10.2.E	Establish and maintain a style and tone appropriate to the audience and purpose (e.g., formal and objective for academic writing) while attending to the norms and conventions of the discipline in which they are writing.
MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.

PFL.9.1.2.CR	Civic Responsibility
SCI.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.
SCI.HS-PS1-5	Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.
SCI.HS-PS1-4	Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.
SCI.HS-PS2-1	Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.
SCI.HS-PS2-2	Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.
SCI.HS-PS3-2	Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects).
SCI.HS-PS3-1	Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.
WRK.9.2.12.CAP	Career Awareness and Planning
WRK.9.2.12.CAP.4	Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment.
TECH.9.4.2.CT	Critical Thinking and Problem-solving
TECH.9.4.2.DC	Digital Citizenship
TECH.9.4.2.DC.6	Identify respectful and responsible ways to communicate in digital environments.

Essential Questions/Enduring Understandings

- What can be learned from firearm evidence?
- What can be learned from determining the angle of impact of bullets?
- What is ballistics and what role does it play in forensic investigation?
- How is the comparison microscope used to compare bullets and cartridge cases?

Objectives

Students will know…..

- the basic components of a firearm and how it operates.

Students will be skilled at…..

- Matching bullets to a firearm.
- Examining points of comparison: striations, cartridge case, firing pin, breach face marks, extractor marks.

- Using a comparison microscope.

Learning Plan

- Pre-assessment to determine the direction of work.
- Preview the essential questions and connect to learning throughout the unit.
- Provide lectures and opportunities for discussion about the guiding questions.
- Complete Firearms and Ballistics Lab – Students examine bullets and casings for individualizing marks and examine bullet holes for angle of impact.
- Virtual Comparison Microscope Lab – students use the virtual comparison microscope to compare cartridge casings
- Read and discuss Case studies

Assessment

Benchmark

- Pre-assessment to determine the direction of work.

Formative

- Meaningfully participate in guided question and answer sessions, group and individual discussions, show an understanding of the purpose of the unit lesson(s), and their key terms and concepts.
- Participate in classroom activities such as class discussion, question and answer session, cooperative group projects and presentation of research.

Summative

- Demonstrate the ability to identify bullets and cartridge casings based on class and individual characteristics.
- Demonstrate the ability to use a virtual comparison microscope to identify cartridge casings.
- Demonstrate understanding written quizzes and tests about subject materials.

Alternate

- Create a Slides presentation to communicate different class and individual characteristics of bullets and cartridge casings.

Materials

- Teacher-presented notes on PowerPoint
- United Streaming short videos

- CSI Season 1