02-Prints and Tool Marks

Content Area: **Science**
Course(s):
Time Period: **Full Year**
Length: **4 weeks**
Status: **Published**

General Overview, Course Description or Course Philosophy

In this course, you will apply the science you've learned throughout your high school years in a variety of ways to analyze and solve cases. Various aspects of chemistry, physics, biology and physiology, to name a few, will be utilized with this course. Many of the activities will be lab-base, as this course is an applied science course. This course should prove to be intriguing, through provoking and have a "gross-factor" that should keep you entertained!

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Students will understand that: the most important type of evidence involves prints left behind by the perpetrator. These prints, whether finger, foot, or mouth, can be used as individualistic evidence. The students will collect all three types of print and evaluate them. Tools can be used at a crime scene as a method of entry or as a means of committing assault. Students will examine how to determine what type of tool could leave certain marks. They will also discuss whether tool mark evidence is class evidence or individualistic evidence.

CONTENT AREA STANDARDS

G-CO.D.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).

G-MG.A.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).

ETS1-B When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts.

LA.WHST.11-12.1.A	Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence.
LA.WHST.11-12.1.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.11-12.2.A	Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding

	comprehension.
MA.E.DPS-2	Conduct simple probability experiments and characterize the outcomes in words, diagrams, or numerically.
MA.DPS-1	Gather and interpret data to answer questions related to a particular/single context. Formulate questions, gather data, and build representations; Identify and describe variation in data, and describe and compare shapes of distributions and measures of central tendency.
SCI.9-12.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.9-12.HS-ETS1-2.6.1	Design a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations.

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

TECH.9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
TECH.9.4.12.DC.3	Evaluate the social and economic implications of privacy in the context of safety, law, or ethics (e.g., 6.3.12.HistoryCA.1).
TECH.9.4.12.IML.3	Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8).

STUDENT LEARNING TARGETS

Refer to the 'Declarative Knowledge' and 'Procedural Knowledge sections.

Declarative Knowledge

Students will understand:

- brief history of the use of print analysis in forensic science
- how fingerprint matches can be classified as individualistic evidence
- that prints are based on secondary classifications (minutia)
- the difference between visible and latent prints
- individualizing marks based on footprint analysis
- how to identify types of teeth
- what type of mark a given tool would leave
- how the same type of tool can leave different, identifying marks
- whether tool mark evidence is class or individual evidence

Procedural Knowledge

Students will be able to:

- perform fingerprint analyses
- lift latent prints on both smooth and irregular surfaces
- analyze latent prints
- create both two and three dimensional footprint patterns
- create mouth impressions and find identifying characteristic
- identify and analyze prints based on secondary classifications (minutia)
- differentiate between visible and latent prints
- identify and analyze individualizing marks based on footprint analysis
- identify types of teeth
- identify and analyze tool marks

EVIDENCE OF LEARNING

Refer to the 'Formative Assessments' and 'Summative Assessments' sections.

Formative Assessments

observation exercises

do know

exit/entrance tickets

quizzes

homework

Summative Assessments

- Benchmarks – departmental benchmark given at the end of MP1, MP2, and MP3 based on lab practices
- Alternative Assessments
    - Lab inquiries and investigations
    - Lab Practicals
    - Exploratory activities based on phenomenon

- Gallery walks of student work
- Creative Extension Projects
- Build a model of a proposed solution
- Let students design their own flashcards to test each other
- Keynote presentations made by students on a topic
- Portfolio

RESOURCES (Instructional, Supplemental, Intervention Materials)

American Academy of Forensic Science (aafs.org/students/choosing-a-career/)
American Forensic Association (americanforensics.org/what.html)
NY Times Forensics Articles (nytimes.com/topic/subject/forensic-science)
Forensic Files (youtube.com/user/ForensicFilesChannel)
Forensic Science Experiments (thehomescientist.com/forensics/Illustrated_Guide_to_Home_Forensic_Science_Experiments.pdf)

INTERDISCIPLINARY CONNECTIONS

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.