Unit 5: Firearms, Tool Marks and Impressions

Content Area: **Science**
Course(s): **Forensics**
Time Period: **4th Marking Period**
Length: **10 Weeks**
Status: **Published**

Unit Overview

Introduction to firearms identification and ballistics. Discuss the significance of tool mark impressions in criminal investigation. Distinguish between the different types of impression evidence.

Transfer

Students will be able to independently use their learning to...

What kinds of long term, independent accomplilshments are desired?

Recognize the class and individual characteristics of bullets and cartridge cases.

Identify the laboratory tests for determining whether an individual has fired a weapon.

Determine the position of a shooter based on bullet trajectory.

Identify a tool marks and the instraments that produced them.

Describe how tool mark evidence is collected, preserved and documented.

Determine how new technology is helping tool experts in criminal investigations.

Explain how the various types of impressions can be used as evidence.

Compare bite marks to prepared dental impressions.

Meaning

Understandings

Students will understand that...

What specifically do you want students to understand?

What inferences should they make/grasp/realize?

The techniques for rifling a barrel.

The rifling on a gun barrel and how it affects the flight of a bullet.

The relationship between barrel size and caliber.

The role of ballistics and crime scene examination.

The significance of tool mark impression evidence.

The variations in the surface characteristics of tools.

The steps of tool mark examination and analysis.

The difference between latent, patent and plastic impressions.

How foot, shoe, dental and tire impression are used as evidence.

Essential Questions

Students will keep considering...

What thought provoking questions will foster inquiry, meaning making and transfer?

What is the technique for rifling a barrel?

How is the NDIN database used?

How does the gun barrel affect the flight of a bullet?

How are bullets and test-fired bullets matched?

How is the poistion of the shooter relavent in ballistics?

What types of crimes do you find tool mark impressions?

What are the major types of tool mark impressions.

How are tool mark impressions matched to the instrament that produced them.

How is tool mark evidence collected?

How is bite mark evidence collected?

How can the different types of impressions be used as evidence?

What are the field reagents used to enhance bloody footprints?

Application of Knowledge and Skill

Students will know...

Students will know...

What facts and basic concepts should students know and be able to recall?

The techniques for rifling a barrell.

The class and individual characteristics of bullets and cartridge cases.

The use of the comparison microscope and firearm identification.

The relationship between barrel size and caliber.

The role of ballistics recovery and examination at the crime scene.

The procedure for determining how far from a target a bullet was fired.

The position of the based on bullet trajectory.

The major types of tool mark impressions.

The steps of tool mark examination and analysis.

The process of collecting, preserving and documenting tool mark evidence.

The significance of class and individual characteristics of tire, footwear and dental impressions.

The difference between latent, patent and plastic impressions.

Students will be skilled at...

Students will be skilled at...

What discrete skills and processes should students be able to use?

Distinguishing the difference between a handgun, rifle and shotgun.

Discusing the rifling on a gun and how it affects the flight of the projectile.

Describe the techniques for rifling a barrel.

Using the NIBIN database.

Identify the laboratory tests used to determine whether an individual fired a weapon.

Discussing the role of balistics and examination at the crime scene.

Describing the variations in tool surface characteristics and their impressions.

Matching tool marks with the instrament that produced them.

Explaining how various types of impressions can be used as evidence.

Use track width and wheelbase information to identify vehicles.

Compare bite marks with prepared dental impressions.

Academic Vocabulary

ballistics, barrell, bore, breechface, bullet, caliber, cartridge, choke, distance determination, ejector, extractor, firearms identification, gauge, GSR, Greiss test, grooves, lands, muzzle, rifling, shell cassing, trajectory.

abrasion mark, cutting mark, indentation mark, tool mark.

latent impression, patent impression, plastic impression, sole, tire ridge, track width, tread pattern, wheelbase.

Learning Goal 1

Students will be able to discuss the role of firearms and ballistics in a criminal investigation.

NGSS Science and Engineering Practices Standards

1: Asking questions and defining problems.

2: Developing and using models.

3: Planning and carrying out investigations.

4: Analyzing and interpreting data.

5: Using mathematics and computational thinking.

6: Constructing explanations and designing solutions.

7: Engaging in argument from evidence.

8: Obtaining, evaluating, and communicating information.

SCI.HS-PS2-4	Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.
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.

Target 1

SWBAT will recognize the class and individual characteristics of bullets, cartridge cases and the gun barrel.

Target 2

SWBAT understand the use of the comparison microscope to compare bullets and cartridge cases.

Target 3

SWBAT discuss rifling a on a gun barrel and how it affects the flight of the projectile.

Target 4

SWBAT discuse the role of ballistics recovery and examination at the crime scene.

Target 5

SWBAT determine the position of the shooter based on bullet trajectory.

Learning Goal 2

Students will be able to discuss the significance of tool mark impressions in criminal investigations.

NGSS Science and Engineering Practices Standards

1: Asking questions and defining problems.

2: Developing and using models.

3: Planning and carrying out investigations.

4: Analyzing and interpreting data.

5: Using mathematics and computational thinking.

6: Constructing explanations and designing solutions.

7: Engaging in argument from evidence.

8: Obtaining, evaluating, and communicating information.

Target 1

SWBAT explaing the forensic significance of class and individual characterstics to the comparison of tool marks.

Target 3

SWBAT describe how tool mark evidence is collected, preserved and documented.

Learning Goal 3

Students will be able to discuss the significance of casts and impressions in criminal investigation.

NGSS Science and Engineering Practices Standards

1: Asking questions and defining problems.

2: Developing and using models.

3: Planning and carrying out investigations.

4: Analyzing and interpreting data.

5: Using mathematics and computational thinking.

6: Constructing explanations and designing solutions.

7: Engaging in argument from evidence.

8: Obtaining, evaluating, and communicating information.

Target 1

SWBAT distiguish between latent, patent and plastic impressions.

Target 2

SWBAT explaing the forensic significance of class and individual characterstics to the comparison of footwear and tire impressions.

Target 3

SWBAT prepare dental impressions and match them with bite marks.

Summative Assessment

Unit assessment, project based assessments, lab reports, tests and quizzes.

21st Century Life and Careers

CAEP.9.2.12.C.1	Review career goals and determine steps necessary for attainment.
CAEP.9.2.12.C.2	Modify Personalized Student Learning Plans to support declared career goals.
CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.

Formative Assessment and Performance Opportunities

Oral question & answer discussion, in-class observation, written exercises, classwork & homework assignments, power point w/ notes, lab reports, projects, portfolios, quizzes and tests.

Accommodations/Modifications

Specific to this unit, students will have access to addtional materials with simplified vocabulary and content specific videos.

Ex.

A Simplified Guide to Firearms Examination

Firearms and Toolmark Unit

All instruction, labs, activities, and assessments will be modified and enhanced to adhere to individual student's IEPs and 504s. Differentiated classroom management strategies will be utilized as to adhere to these students individual plans.

Unit Resources

- Textbook - Forensic Science: An Introduction – 2nd Edition
- supplemental textbook materials
- Internet resources
- teacher generated power points & notes and lab materials.

Interdisciplinary Connections

LA.RST.11-12.1	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.
LA.RST.11-12.7	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.
LA.RST.11-12.9	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.
MA.N-Q.A	Reason quantitatively and use units to solve problems.
MA.N-Q.A.2	Define appropriate quantities for the purpose of descriptive modeling.
MA.N-Q.A.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
MA.F-IF.C.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.4	Model with mathematics.
MA.S-ID.A.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).