Unit 1: Introduction to Crime Scene Investigation

Content Area: **Science**
Course(s): **Forensic Science**
Time Period: **Generic Time Period**
Length: **weeks**
Status: **Published**

Standards

Social Emotional Learning Standards

HE.9-12.2.1.12.EH.1	Recognize one's personal traits, strengths, and limitations and identify how to develop skills to support a healthy lifestyle.
HE.9-12.2.1.12.EH.3	Describe strategies to appropriately respond to stressors in a variety of situations (e.g., academics, relationships, shootings, death, car accidents, illness).
HE.9-12.2.1.12.SSH.4	Demonstrate strategies to prevent, manage, or resolve interpersonal conflicts without harming self or others (defining and understanding the laws of consent and dating violence).

Technology Standards

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.CI.2	Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).
TECH.9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).
TECH.9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
TECH.9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).
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).

Science Standards

SCI.HS.ETS1.B	Developing Possible Solutions
SCI.HS.ETS1.C	Optimizing the Design Solution
SCI.HS-ETS1	Engineering Design
SCI.HS-ETS1-3	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

Transfer Goals

The skill of observation is critical for the field of forensic science. Observation is how you perceive your surroundings. Your brain affects your observations by filtering the information you take in from your environment. Many factors effect eyewitness accounts of a crime. Investigators must understand these factors when determining the accuracy of a witness' testimony. Forensic science attempts to uncover factual evidence from a victim, suspect, and crime scene. Forensic scientists do not try to prove whether someone is innocent or guilty. They are only interested in collecting and examining evidence. Crime scene investigators recognize, document, collect, and organize evidence left at the scene of a crime. Investigators apply specific procedures and techniquesto collect trace evidence, a kind of circumstantial evidence. It is extremely important to preserve both direct and indirect evidence so that professionals can recreate as complete a picture as possible of what took place before, during, and after a crime. Investigators must secure the crime scene; separate witnesses; take photographs and sketch the scene; and search, secure, and properly package evidence.

*Transfer Goals taken from "Forensic Science: Fundementals & Investigations" by Anthony J. Bertino

Essential Questions

- 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?
- How reliable are our observation skills?
- Does perception cloud our judgment?

Understandings

- 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.
- investigations. • Forensic science involves the collaboration of many scientific specialists, both past and present.
- 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.

Critical Knowledge and Skills

Knowledge

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

Skills

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
- communicate information about a criminal investigation
- Make remarks about their powers of observation, detail, and dedication

Assessment and Resources

School Formative Assessment Plan (Other Evidence)

- Daily Do Nows
- Projects
- Homework
- Labs
- Worksheets
- In-Class Discussion (ex. Class Dojo Participation)

School Summative Assessment Pan

- History, Observation, and 7 S's of CSI Unit Test
- Forensics Final Exam and Performance Assessment

Primary Resources

Supplementary Resources

H. H. Holmes Biography Article

Textbook: "Forensic Science: Fundemantals and Investigations" by: Anthony J. Bertino

Technology Integration and Differentiated Instruction

Technology Integration

- **Google Products**
  - Google Classroom - Used for daily interactions with the students covering a vast majority of different educational resources (Daily Notes, Exit Tickets, Classroom Polls, Quick Checks, Additional Resources/ Support, Homework, etc.)
  - GAFE (Google Apps For Education) - Using various programs connected with Google to collaborate within the district, co-teachers, grade level partner teacher, and with students to stay connected with the content that is covered within the topic. Used to collect data in real time see results upon completion of the assignments to allow for 21st century learning.
- **One to One Student laptop** - All students within the West Deptford School District are given a computer, allowing for 21st century learning to occur within every lesson/topic.
- **Additional Support Videos** - The video websites below are just examples of videos that can be used to support each of the Lessons within this Topic
  - Bozeman Science, Amoeba Sisters, Khan Academy

Differentiated Instruction

- Gifted Students (N.J.A.C.6A:8-3.1)

    - Within each lesson, the Gifted Students are to be given the Enrichment Questions
    - These questions are to extend the knowledge of each portion of the lesson.
    - Performance Task
        - Additional practice was provided for students that provided a higher level of thinking for the concepts.
- English Language Learners (N.J.A.C.6A:15)
    - Within each lesson, the English Language Learners are given three levels of questioning. Each level is accommodating to the level of learning that the individual student(s) is learning at.
        - Beginning
        - Intermediate
        - Advanced
    - All assignments can be created in the student's native language if needed.
    - Work with ELL Teacher to allow for all assignments to be completed with extra time.
- Risk Students (N.J.A.C.6A:8-4.3c)
    - Work with the I&RS Team to reach the needs of students.
    - Mentors provided
    - Offer additional supports as needed (after school help, parent contacts, frequent checks for understanding, etc.)
- Special Education Students (N.J.A.C.6A:8-3.1)
    - Frequent checks for understanding
    - Preferred seating assignments
    - Multiple representations- Encourage and allow tables, graphic organizers, etc.
    - Hard copy of notes
    - Extend the time needed to complete assignments/assessments
    - Provide a copy of grading rubrics for projects/labs
    - Provide a copy of a model representation for projects
    - Clarification of directions/instructions
    - Use of technology when appropriate
    - Repeat/rephrase instructions as needed

Interdisciplinary Connections

MATH -

ELA - Article Readings and In-Class Discussion

SOCIAL STUDIES - History of Forensic Science; Famous Forensic Scientists (Edmund Locard); Case Studies (H. H. Holmes and the World's Fair in Chicago, Jon Benet Ramsey)

WORLD LANGUAGES -

VISUAL/PERFORMING ARTS - 7 S's of CSI Video Project

APPLIED TECHNOLOGY - 7 S's of CSI Project

BUSINESS EDUCATION - Research on Possible Forensic Science careers (toxicologist, blood splatter analyst, crime lab analyst)

GLOBAL AWARENESS - Discuss crimes that have been solved with Forensic Science in the past

Learning Plan / Pacing Guide

Week 1:

- Introduction to Forensics
- Forensics Placemat Activity
- Draw a Bike Observation Activity
- Notes on Observation Skills
- Memory Match Game
- Innocence Project Project
- Learning to See Activity
- History of Forensics Notes
- Anthopometry Discussion

Week 2:

- History of Forensics Notes
- Continue working on Innocence Project Project
- Present Innocence Project Projects
- Read H. H. Holmes Article as a Do Now
- Body Measuring Lab (Discuss H. H. Holmes)

Week 3:

- Quiz on History and Observation in Forensics
- Chapter 2 Notes
- "The Case Of: Jon Benet Ramsey"
- Class discussion about Jon Benet Ramsey
- Types of Evidence Lab

Week 4:

- 7 S's of CSI Notes
- 7 S's of CSI Video Project
- 7 S's of CSI Video Presentations
- History, Observation, and 7 S's Study Guide

Week 5:

- Finish 7 S's of CSI Project Presentations
- Go over study guide for unit test
- Histiory, Observation, and 7 S's Unit Test

Unit 2: Hair

Content Area: **Science**
Course(s): **Forensic Science**
Time Period: **Generic Time Period**
Length: **Approx. 4 weeks**
Status: **Published**

Standards

Technology Standards

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Social Emotional Learning Standards

HE.9-12.2.1.12.EH.1	Recognize one’s personal traits, strengths, and limitations and identify how to develop skills to support a healthy lifestyle.
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HE.9-12.2.1.12.SSH.4	Demonstrate strategies to prevent, manage, or resolve interpersonal conflicts without harming self or others (defining and understanding the laws of consent and dating violence).

Transfer Goals

Hair is an important structure found in most mammals, including humans. While all hairs have the same basic structure, differences in specific characteristicsof an individuals hair can help an investigator determine general characteristics of that individidual. Forensic investigators rely on their knowledge of hair structure, function, and variation when they use hair from a crime scene as evidence.

*Transfer Goals taken from "Forensic Science: Fundementals & Investigations" by Anthony J. Bertino

Concepts

Essential Questions

- What is the value of hair as trace evidence?
- How is hair analyzed in a crime lab?
- What information can be gained by studying hair evidence?

Understandings

- Forensic evidence such as hair can be described, organized, classified, and analyzed and can be used to aid in a forensic investigation 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.

Critical Knowledge and Skills

Knowledge

Students will know:

- How hair is used in criminal investigations
- The structure and basic biology of hair
- How to classify a hair as a human or animal hair

- How to uncover distinguishing characteristics of a hair to help forensic investigators narrow down the suspect pool

Skills

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
- distinguish between a human and animal hair using the medullary index
- observe distinguishing characteristics of a hair
- Draw and label the anatomy of a hair
- Use a compound microscope effectively to see specimens clearly using different magnifications.
- Find and recognize the medulla and cortex in various human races' hair.
- Work collaboratively to analyze results from observations.

Assessment and Resources

School Formative Assessment Plan (Other Evidence)

- Daily Do Nows
- Projects
- Homework
- Labs
- Worksheets
- In-Class Discussion (ex. Class Dojo Participation)

School Summative Assessment Pan

- Hair Unit Test
- Forensics Final Exam and Performance Assessment

Primary Resources

Supplementary Resources

Forensic Files: Within a Hair

Case Study: Leanne Tiernan (Article)

Textbook: "Forensic Science: Fundemantals and Investigations" by: Anthony J. Bertino

Technology Integration and Differentiated Instruction

Technology Integration

- **Google Products**
  - Google Classroom - Used for daily interactions with the students covering a vast majority of different educational resources (Daily Notes, Exit Tickets, Classroom Polls, Quick Checks, Additional Resources/ Support, Homework, etc.)
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  - These questions are to extend the knowledge of each portion of the lesson.
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- Special Education Students (N.J.A.C.6A:8-3.1)
    - Frequent checks for understanding
    - Preferred seating assignments
    - Multiple representations- Encourage and allow tables, graphic organizers, etc.
    - Hard copy of notes
    - Extend the time needed to complete assignments/assessments
    - Provide a copy of grading rubrics for projects/labs
    - Provide a copy of a model representation for projects
    - Clarification of directions/instructions
    - Use of technology when appropriate
    - Repeat/rephrase instructions as needed

Interdisciplinary Connections

MATH - Use ratios to determine whether a hair is human or animal using the medullary index

ELA- Readings and in-class discussion

SOCIAL STUDIES - History of hair anaylsis, case studies

WORLD LANGUAGES -

VISUAL/PERFORMING ARTS - Draw and label a hair

APPLIED TECHNOLOGY -

BUSINESS EDUCATION -

GLOBAL AWARENESS -

Learning Plan / Pacing Guide

Week 1:

- Hair Vocabulary
- Hair Notes
- Introduction to Hair Worksheet

- "Forensic Files: Within a Hair"

Week 2:

- Continue Hair Notes throughout the week
- Anatomy of a Human Hair Lab (12 total hairs)
- Hair Quiz #1

Week 3:

- Continue Hair Notes throughout the week
- Animal Hair Lab
- Case Study: Leanne Tiernan Article and In-Class Discussion
- Hair Quiz #2

Week 4:

- Unknown Animal Hair Lab
- Hair Unit Test

Unit 3: Blood and Blood Spatter

Content Area: **Science**
Course(s): **Forensic Science**
Time Period: **Generic Time Period**
Length: **Approx 5 weeks**
Status: **Published**

Standards

Technology Standards

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Transfer Goals

Blood is composd of red blood cells, white blood cells, platelets, and plasma. Red blood cells transport oxygen to, and carbon dioxide away from, all parts of the body; white blood cells fight diseases that threaten the body; and platelets help blood clot. Scientists have been analyzing blood-spatter patterns since the late 1800s. When investigators find dark stains at a crime scene, they first confirm whether the stains are blood. They even have methods of finding blood after a scene has been cleaned. Once the presence of blood is confirmed, investigators test to see if the blood is human. Sceintists can run tests on blood found a crime scene to determine the blood type and the DNA fingerprint of the person who shed the blood. By studying blood-spatter patterns, investigators can tell the direction in which the blood was traveling, the angle of impact, and the point of origin.

*Transfer Goals taken from "Forensic Science: Fundementals & Investigations" by Anthony J. Bertino

Concepts

Essential Questions

- How can knowing the blood type of a suspect help with an investigation?
- How does blood typing work?
- What is the value of blood as evidence?
- What information can be obtained by analyzing blood spatter patterns?

Understandings

- Forensic evidence such as blood, can be described, organized, classified, and analyzed and can be used to determine the identity of a suspect

Critical Knowledge and Skills

Knowledge

Students will know:

- Serology is the study of blood. Red blood cells have antigens on their surface - A and B. There are four blood types: A, B, AB and O. Humans have antibodies against antigens not present in our bodies. Blood typing determines the blood type of an individual by exposing a sample of blood to antibodies. Agglutination occurs when those antibodies and antigens are combined.
- Blood-spatter evidence can be analyzed by calculating/observing various aspects.
- Point of origin helps investigators to compare bloodspatter evidence with testimonial evidence of witnesses and victims. Inconsistencies between the two can be determined. The PO is used to calculate the height about the floor level where the wound was inflicted.
- Blood typing can help exclude suspects, however, further testing needs to be done in order to use the blood as individual evidence.
- Forensic scientists use various methods to test for the presence of blood. Luminol is used to detect blood at a crime scene that has been cleaned up.

Skills

Students will be able to:

- Identify components and physiology of blood: red cells, white cells, platelets, plasma, A and B proteins, Rh factor, antibodies, agglutination.
- Perform blood typing test (simulated) to recognize agglutination.
- Recognize blood type as class evidence.
- Identify forces of cohesion, adhesion, surface tension, gravity, directional propulsion as affecting patterns of spatter.
- Read case study, historical or current, and/or career and write summary using topic vocabulary.

Assessment and Resources

School Formative Assessment Plan (Other Evidence)

- Blood and Blood Spatter Unit Test
- Forensics Final Exam and Performance Assessment

School Summative Assessment Pan

- Daily Do Nows
- Projects
- Homework
- Labs
- Worksheets

- In-Class Discussion (ex. Class Dojo Participation)

Primary Resources

Supplementary Resources

- "CSI: Let it Bleed" episode found on Amazon. Synopsis: During the course of an investigation, the CSIs discover that their victim, a young woman who was murdered and found with several different blood types in her system, is the daughter of a wanted criminal.

- "CSI: Blood Drops" episode found on Amazon. Synopsis: The CSI's use blood-spatter patterns to aid in crime scene recreation.

- Lindy Chamberlain Article (Questions attached below)

- Textbook: "Forensic Science: Fundemantals and Investigations" by: Anthony J. Bertino

Technology Integration and Differentiated Instruction

Technology Integration

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  - Hard copy of notes
  - Extend the time needed to complete assignments/assessments
  - Provide a copy of grading rubrics for projects/labs
  - Provide a copy of a model representation for projects
  - Clarification of directions/instructions
  - Use of technology when appropriate
  - Repeat/rephrase instructions as needed

Interdisciplinary Connections

MATH - Calculate the angle of impact

ELA - Article Readings, questions, and in-class discussion

SOCIAL STUDIES - Case Studies (Chamberlain Case)

WORLD LANGUAGES -

VISUAL/PERFORMING ARTS - Draw and describe different blood-spatter patterns during a lab

APPLIED TECHNOLOGY -

BUSINESS EDUCATION - Discuss future blood-spatter analyst careers, hematologist (scientist that studies blood)

GLOBAL AWARENESS -

Learning Plan / Pacing Guide

Week 1:

- Blood Notes
- Blood Vocabulary and Introductory Questions
- Blood Notes
- Blood Book Review Questions
- Blood Typing Simulation Webquest
- Blood Typing Whodunit Lab

Week 2:

- Finish Blood Typing Whodunit Lab
- "CSI: Let it Bleed"
- Blood-Spatter Notes
- Blood-Spatter Webquest

Week 3:

- Blood-Spatter Notes throughout the week
- Blood-Spatter Lab (Parts A, B, and D)
- Blood-Spatter Patterns Research

Week 4:

- Finish Blood-Spatter Lab
- Lindy Chamberlain Article and In-Class Discussion
- Blood Test Study Guide

Week 5:

- Blood Review Game
- Blood Unit Test

Unit 4: The Study of Fibers and Textiles

Content Area: **Science**
Course(s): **Forensic Science**
Time Period: **Generic Time Period**
Length: **Approx 3 weeks**
Status: **Published**

Standards

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HE.9-12.2.1.12.SSH.4	Demonstrate strategies to prevent, manage, or resolve interpersonal conflicts without harming self or others (defining and understanding the laws of consent and dating violence).

Transfer Goals

Fibers can easily be transferred between people or between people and their environments. A close study of these fibers can prove contact between victim and suspect, or between a person and a crime scene. Textiles are created by weaving , or intertwining, yarns that run in opposite directions. Weave patterns vary depending on the number of threads that are "jumped" as fibers wind over and under each other. Weave patterns can be used to identify sources of textile fragments found at crime scenes. Fiber types can be identified by physical and chemical analysis. Microscopic examination, burning, and dissolving in chemical solvents are some of the analytical methods used.

*Transfer Goals taken from "Forensic Science: Fundementals & Investigations" by Anthony J. Bertino

Concepts

Essential Questions

- Why do forensic scientists employ many different types of microscopes?
- What unique characteristics can be used to characterize a fiber?
- How does one perform this analysis using a typical microscope?
- What unique characteristics can be used to characterize fibers?

Understandings

- Forensic evidence such as 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

Critical Knowledge and Skills

Knowledge

Students will know:

- How to collect fibers from various surfaces.
- How to classify fibers

- How to examine and analyze fibers microscopically.

Skills

Students will be able to:

- Identify fibers as trace, class evidence.
- Distinguish between direct and secondary transfer.
- Describe various fiber collection techniques.
- Compare and contrast various types of fibers using physical (macro and micro) and chemical properties (eg color, shape, weave, synthetic vs natural, source, burn test, solubility test).
- Prepare slides and use a microscope.

Assessment and Resources

School Formative Assessment Plan (Other Evidence)

- Daily Do Nows
- Projects
- Homework
- Labs
- Worksheets
- In-Class Discussion (ex. Class Dojo Participation)

School Summative Assessment Pan

- Fibers Unit Test
- Forensics Final Exam and Performance Assessment

Primary Resources

Supplementary Resources

Case Study: Claire Josephs

Case Study: Candace Newmaker

Textbook: "Forensic Science: Fundemantals and Investigations" by: Anthony J. Bertino

Technology Integration and Differentiated Instruction

Technology Integration

- **Google Products**
  - Google Classroom - Used for daily interactions with the students covering a vast majority of different educational resources (Daily Notes, Exit Tickets, Classroom Polls, Quick Checks, Additional Resources/ Support, Homework, etc.)
  - GAFE (Google Apps For Education) - Using various programs connected with Google to collaborate within the district, co-teachers, grade level partner teacher, and with students to stay connected with the content that is covered within the topic. Used to collect data in real time see results upon completion of the assignments to allow for 21st century learning.
- **One to One Student laptop** - All students within the West Deptford School District are given a computer, allowing for 21st century learning to occur within every lesson/topic.
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- Gifted Students (N.J.A.C.6A:8-3.1)
  - Within each lesson, the Gifted Students are to be given the Enrichment Questions
  - These questions are to extend the knowledge of each portion of the lesson.
  - Performance Task
    - Additional practice was provided for students that provided a higher level of thinking for the concepts.
- English Language Learners (N.J.A.C.6A:15)
  - Within each lesson, the English Language Learners are given three levels of questioning. Each level is accommodating to the level of learning that the individual student(s) is learning at.
    - Beginning
    - Intermediate
    - Advanced
  - All assignments can be created in the student's native language if needed.
  - Work with ELL Teacher to allow for all assignments to be completed with extra time.

- Risk Students (N.J.A.C.6A:8-4.3c)
    - Work with the I&RS Team to reach the needs of students.
    - Mentors provided
    - Offer additional supports as needed (after school help, parent contacts, frequent checks for understanding, etc.)
- Special Education Students (N.J.A.C.6A:8-3.1)
    - Frequent checks for understanding
    - Preferred seating assignments
    - Multiple representations- Encourage and allow tables, graphic organizers, etc.
    - Hard copy of notes
    - Extend the time needed to complete assignments/assessments
    - Provide a copy of grading rubrics for projects/labs
    - Provide a copy of a model representation for projects
    - Clarification of directions/instructions
    - Use of technology when appropriate
    - Repeat/rephrase instructions as needed

Interdisciplinary Connections

MATH -

ELA - Article Readings, analysis questions, in-class discussion

SOCIAL STUDIES - History of fiber analysis; case studies

WORLD LANGUAGES -

VISUAL/PERFORMING ARTS - Draw and Label different fibers using a microscope.

APPLIED TECHNOLOGY - Microscope fiber analysis

BUSINESS EDUCATION - Discuss career as a fiber analyst

GLOBAL AWARENESS -

Learning Plan / Pacing Guide

Week 1:

- Fibers Notes throughout the week
- Natural and Synthetic Fibers Project
- Fibers Book Questions

Week 2:

- Fibers Notes throughout the week

- Fibers Lab
- Case Study: Claire Josephs Murder
- "CSI: Overload"
- Fibers Study Guide

Week 3:

- Fibers Review for Unit Test
- Test on Fibers

Unit 5: Fingerprints

Content Area: **Science**
Course(s): **Forensic Science**
Time Period: **Generic Time Period**
Length: **Approx. 4 weeks**
Status: **Published**

Transfer Goals

There is a long historybehind the science of fingerprinting. A person's fingerprintsdevelop in the womb. The ridges on our fingers in the shapes of loops, whorls, and archesare different from anyone else's. Forensic examiners look for certain characteristics, such as core and deltas. There are three types of prints that might be found at a crime scene: patent, plastic, or latent prints. The IAFIS, developed by the FBI, is used to match prints found at the scene. Fingerprints can be collected using tape, powders, or other chemicals, and photography, and they can then be compared with criminal fingerprint cards on file.

*Transfer Goals taken from "Forensic Science: Fundementals & Investigations" by Anthony J. Bertino

Standards

Science Standards

SCI.HS.ETS1.B	Developing Possible Solutions
SCI.HS.ETS1.C	Optimizing the Design Solution
SCI.HS-ETS1	Engineering Design
SCI.HS-ETS1-3	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

Technology Standards

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.CI.2	Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).
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TECH.9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).
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).

Social Emotional Learning Standards

HE.9-12.2.1.12.EH.1	Recognize one's personal traits, strengths, and limitations and identify how to develop skills to support a healthy lifestyle.
HE.9-12.2.1.12.EH.3	Describe strategies to appropriately respond to stressors in a variety of situations (e.g., academics, relationships, shootings, death, car accidents, illness).
HE.9-12.2.1.12.SSH.4	Demonstrate strategies to prevent, manage, or resolve interpersonal conflicts without harming self or others (defining and understanding the laws of consent and dating violence).

Concepts

Essential Questions

- Can my FP be different from my twin sister's?
- Can my FP be altered?
- Are FP conclusive evidence if found at a crime scene?
- Should everyone be FP at birth so crimes can be solved later? Why or why not?
- Why are fingerprints considered individual evidence even though there are only 3 general ridge patterns?
- Can fingerprints identify a criminal with absolute certainty? What should be the standard of proof?
- 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?

Understandings

- Fingerprints contain discrete pieces of information that make every organism unique.
- Science ideas evolve as new information is uncovered
- Fingerprints can be described, organized, classified, analyzed and used to determine the identity of a suspect.
- Classification systems are important in validating evidence.
- Fingerprints (FP) are used in criminal investigations when found.
- FP can provide a great amount of information that can link a suspect to a crime.

Critical Knowledge and Skills

Knowledge

Students will know:

- History of FP use extends back 3000 years ago to China.
- The classification system for FP designed in the 1800's is still in use today.
- When and how FP form and develop in the human and their function.
- How to identify the minutiae, hooks, deltas, bifurcations, etc. that gives more strength to identification in the legal system.
- That FP can form in a variety of substances and can be made apparent and lifted with extreme care.
- That printing evidence also includes lip prints, foot and tire impressions.
- 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
- How fingerprints form unique patterns

Skills

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
- Investigate different methods of collecting and analyzing latent prints found at a crime scene
- Classify FP into one of the three main categories.
- Recognize and identify 8 points of minutiae to further link a suspect
- Dust and lift latent prints using powder and lifting tape.

Assessment and Resources

School Formative Assessment Plan (Other Evidence)

- Daily Do Nows
- Projects
- Homework
- Labs

- Worksheets
- In-Class Discussion (ex. Class Dojo Participation)

School Summative Assessment Pan

- Fingerprint Unit Test
- Forensics Final Exam and Performance Assessment

Primary Resources

Supplementary Resources

Technology Integration and Differentiated Instruction

Technology Integration

- **Google Products**
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Differentiated Instruction

- Gifted Students (N.J.A.C.6A:8-3.1)
    - Within each lesson, the Gifted Students are to be given the Enrichment Questions
    - These questions are to extend the knowledge of each portion of the lesson.
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        - Additional practice was provided for students that provided a higher level of thinking for the concepts.
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    - Hard copy of notes
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    - Provide a copy of grading rubrics for projects/labs
    - Provide a copy of a model representation for projects
    - Clarification of directions/instructions
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Interdisciplinary Connections

MATH - Measuring the area between the core and the delta for fingerprint identification

SCIENCE -

SOCIAL STUDIES - History of fingerprints and fingerprint analysis

WORLD LANGUAGES -

VISUAL/PERFORMING ARTS -

APPLIED TECHNOLOGY - Discuss the technolohical apprehension of fingerprints from a suspect

BUSINESS EDUCATION - Discuss possible career choices in the fingerprint analyst field

GLOBAL AWARENESS - Fingerprints are used in many different cultures around the world for ex. in India,

fingerprints were used to sign legal documents

Learning Plan / Pacing Guide

Week 1:

- Introduction to fingerprints vocabulary and questions
- History of Fingerprints Notes throughout the week
- The Story of Smilin' Gus reading and questions (in textbook)
- Activity 6-1 (Study your Fingerprints)

Week 2:

- Physiology of fingerprints notes throughout the week
- Activity 6-2 (Giant Balloon Fingerprint; page 151 in text)
- Fingerprint practice on the big paper (distinguish between loop, whorl, and arch)
- Compare fingerprints between group members
- Ten Card Lab (Students will create a ten card of the prints of their partner. They will be graded on the neatness of the prints they are able to collect)

Week 3:

- Physiology of Fingerprints Notes (throughout the week)
- Extract fingerprints from a nonporous surface (glass beaker) using fingerprint powder and tape
- Fingerprint Study Guide

Week 4:

- Fingerprint Review Game (BINGO)
- Fingerprint Unit Test

Unit 6: Fraud

Content Area: **Science**
Course(s): **Forensic Science**
Time Period: **Generic Time Period**
Length: **Approx. 2 weeks**
Status: **Published**

Standards

Science Standards

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HE.9-12.2.1.12.SSH.4	Demonstrate strategies to prevent, manage, or resolve interpersonal conflicts without harming self or others (defining and understanding the laws of consent and dating violence).

Transfer Goals

Document Analysis is an area of forensics that compares questioned documents with known, authentic ones. One element that experts look at is the handwriting in a document. These experts use 12 major categories of handwriting characteristics when examining a sample. These include shape of letters, angle, or slant of letters, size of letters, and use of connecting lines between letters. Besides their expertise, document experts also use techniques such as infared spectrometry and computerized handwriting analysis to determine the authenticity of a sample. Check forgery and counterfeit currency are growing problems. To prevent check forgery, banks are changing how they print checks, and some are trying to eliminate paper checks all together. The U.S. government has changed printing and paper-making techniques to try and stop counterfeiting.

*Transfer Goals taken from "Forensic Science: Fundementals & Investigations" by Anthony J. Bertino

Concepts

Essential Questions

- Can a person be convicted with only a match of their handwriting?
- How can forgery and fraud cause problems?
- Do you think you can tell the difference between a real 10$ bill and a fraudulent 10$ bill? How do you think this is done?
- With all of the available technology, do you think forgery is an increasing problem? Why or why not?
- What is some possible forgery you know about?
- Who was Frank Abagnale and how was he able to get away with fraud and con so many people?
- Could Frank Abagnale get away with what he did today?
- What are some things he would have to change in order to get away with it today?

Understandings

- Handwriting cannot be a single piece of evidence that can connect a suspect with a crime. It is class evidence not individual
- There can be many different types of fraud

Critical Knowledge and Skills

Knowledge

Students will know:

- The different techniques used by handwriting experts to match handwriting samples
- Different types of Fraud
- About Frank Abagnale and how he was able to get away with fraud so many times

Skills

Students will be able to:

- Match handwriting samples using the textbook and prior knowledge
- Explain the different types of fraud and how each one affects society
- Research a case where fraud and handwriting analysis were major parts of the case
- Discuss the case of Frank Abagnale

Assessment and Resources

School Formative Assessment Plan (Other Evidence)

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- Projects
- Homework
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- Worksheets
- In-Class Discussion (ex. Class Dojo Participation)

School Summative Assessment Pan

- Fraud Project and Presentation
- Forensics Final Exam and Performance Assessment

Primary Resources

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Supplementary Resources

"Catch Me if You Can" DVD

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    - Repeat/rephrase instructions as needed

Interdisciplinary Connections

MATH -

ELA -

SOCIAL STUDIES - Fraud Case Studies (Research Project)

WORLD LANGUAGES -

VISUAL/PERFORMING ARTS - "Catch Me if You Can"

APPLIED TECHNOLOGY - Discussion of cyber crimes

BUSINESS EDUCATION -

GLOBAL AWARENESS -

Learning Plan / Pacing Guide

Week 1:

- Fraud Case Study
    - Handwriting, fraud, art forgery, cyber fraud
- Fraud Case Study Presentations

Week 2:

- Counterfitting and Handwriting Activities

- Watch "Catch Me if You Can" and answer the questions
- Have in-class discussion about Frank Abagnale. Discuss the types of fraud depicted in the movie.

Week 3:

- **Serial Killer Project (Encompasses each unit we have covered throughout the semester)**
- **Forensics Final Exam and Performance Assessment**