Unit 3: Handwriting Analysis and Toxicology

Content Area: **Science**
Course(s):
Time Period: **MP2**
Length: **23 days**
Status: **Published**

NJSLS - Science

9-12.HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
9-12.HS-PS2-6	Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.

Science and Engineering Practices

Developing and Using Models

Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-2)

Obtaining, Evaluating, and Communicating Information

Communicate scientific and technical information (e.g. about the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically). (HS-PS2-6)

Disciplinary Core Ideas

LS1.A: Structure and Function Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1) All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1)

PS2.B: Types of Interacons Aracon and repulsion between electric charges at the atomic scale explain the structure, properes, and transformaons of maer, as well as the contact forces between material objects. (HS-PS2-6)

Crosscutting Concepts

Systems and System Models

Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—

including energy, matter, and information flows—within and between systems at different scales. (HS-LS1-2)

Structure and Function

Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and the connections of components to reveal their function and/or solve a problem. (HS-PS2-6)

Rationale and Transfer Goals

Along with other forms of trace evidence, the art of handwriting analysis provides forensic scientists with another tool for detecting crimes such as fraud and forgery. Students will concentrate on identifying different characteristics found in handwriting styles, along with how to spot a forgery. Other criminal acts concerning fraud will be covered during this me. Students will be expected to be able to analyze and interpret data, as well as distinguish patterns and construct explanations for what they observe in each crime scene and sample.

Illicit drugs are those that are either legitimately manufactured drugs taken for purposes other than what they were made for, or drugs that have no medical use. Illicit drugs fall into four classes by major effects. Students will name and classify commonly abused drugs, as well as compare and contrast physical and psychological drug evidence. Illicit drugs are analyzed by forensic chemists who develop protocols for analysis that take into account the form and quantity of the drug present. Students will demonstrate proper techniques for the collection and preservation of drug evidence. Forensic toxicologists determine the presence and amounts of drugs and poisons in people and interpret their effects.

Enduring Understandings

Documents can be authenticated using specific unique and identifiable handwriting characteristics as well as the types of ink and paper and other artifacts from the creation process.

The concentration of a substance determines its toxicity. The same substance may be helpful or harmful to a person, depending on the dose.

Essential Questions

What does a person’s handwriting say about them?

Can an investigator use handwriting samples in a court of law?

Can handwring samples identify a person?

What makes a substance poisonous?

Content - What will students know?

Handwriting samples show unique characteristics known as class characteristics and individual characteristics that help investigators use samples in a court of law.

Handwriting experts examine handwriting using predetermined characteristics.

There are three types of forgery: blind, simulated, and traced.

Forgeries include erasures of words or leers which are evident by examining the paper's surface. This is known as obliteration and they can either be physical or chemical.

Inks from suspected forgeries can be analyzed using the method of chromatography.

Counterfeiting is one of the oldest crimes in the world and has been decreasing due to changes in the materials used to create our currency.

The dosage of a substance determines whether it is poisonous and how poisonous it is.

Toxicology can be characterized based on elements such as delivery and me of exposure.

The lethal dose (LD50) is used to measure toxicity.

Drugs can affect the function and structure of living systems.

The use and purchase of controlled drugs can lead to increased violence, crime, and health and social problems.

Skills - What will students be able to do?

- Read and interpret tables
- Practice safety in the laboratory science
- Use a case study to identify the connections between hair analysis and toxicology.
- Prepare tests to identify chemicals
- Compare and contrast legal issues to support an opinion and defend an argument
- Summarize drug analysis techniques using a case study.
- Using handwriting analysis data to identify patterns
- Collaborate with peers to perform an invasion
- Design an experiment using the method of paper chromatography
- Draw conclusions based on experimental evidence

Activities - How will we teach the content and skills?

Acvity 16.1 Analyze your handwriting

Case study 16.1: Anonymous Writing

Activity 16.2: Simulated Forgery

Acvity 16.3: Blind, Simulated, and Traced Forgery

Laboratory AcvityFinding erasures

Laboratory Acvity- Ink comparisons Using Paper chromatography

Lab Acvity- Know your money

Group researchPoison/Toxin

Lab Activity- Spot Test Lab

Lab Activity- Is it Ibuprofen

Evidence/Assessments - How will we know what students have learned?

Quizzes ● Forensics Benchmark #2

Spiraling for Mastery

Content or Skill for this Unit	Spiral Focus from Previous Unit	Instructional Activity
Counterfeiting is one of the oldest crimes in the world and has been decreasing due to changes in the materials used to create our currency The dosage of a substance determines whether it is poisonous and how poisonous it is Toxicology can be characterized based on elements such as delivery and me of exposure.	Trace evidence is any evidence that is too small to make physical matches but large enough to be analyzed (i.e. powders, metals, paint, lipstick). ● The use of qualitative analysis can be used to identify unknown powders.	Lab Acvity- Know your money Group research- Poison/Toxin Lab Acvity- Spot Test Lab Lab Acvity- Is it Ibuprofen

Key Resources

Document Analysis Lab Acvity

Ink Chromatography Acvity

Discovery Streaming: Trace Evidence, Toxicology, and DNA

Intro to Toxicology Lab Activity

Drug Identification Chart

Career Readiness, Life Literacies, & Key Skills

9.4.12.CT.3	Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice).
9.4.12.CT.4	Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.
9.4.12.GCA.1	Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political. economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).
9.4.12.IML.2	Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources (e.g., NJSLSA.W8, Social Studies Practice: Gathering and Evaluating Sources.
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).
9.4.12.IML.4	Assess and critique the appropriateness and impact of existing data visualizations for an intended audience (e.g., S-ID.B.6b, HS-LS2-4).
9.4.12.IML.5	Evaluate, synthesize, and apply information on climate change from various sources appropriately (e.g., 2.1.12.CHSS.6, S.IC.B.4, S.IC.B.6, 8.1.12.DA.1, 6.1.12.GeoHE.14.a, 7.1.AL.PRSNT.2).
9.4.12.IML.6	Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLSA.SL5).

Interdisciplinary Connections/Companion Standards

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.WHST.11-12.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.