Unit 01: Fingerprints

Content Area: **Science**
Course(s):
Time Period: **Marking Period 1**
Length: **4 Weeks**
Status: **Published**

Summary

Introduction: This unit focuses on fingerprint evidence. In this unit students will learn fingerprint characteristics, methods of detecting fingerprints and preservation of fingerprints. Students will also learn how to collect fingerprints from a suspect and how to compare an unknown fingerprint to known standards.

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9.2.12.CAP	Career Awareness and Planning Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches. Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments. Career planning requires purposeful planning based on research, self-knowledge, and informed choices.
9.2.12.CAP.5	Assess and modify a personal plan to support current interests and post-secondary plans.
9.2.12.CAP.6	Identify transferable skills in career choices and design alternative career plans based on those skills.
9.2.12.CAP.8	Determine job entrance criteria (e.g., education credentials, math/writing/reading

	comprehension tests, drug tests) used by employers in various industry sectors.
	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	An individual's income and benefit needs and financial plan can change over time.
HS-PS1-2	Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.
	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(x - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
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.
LA.WHST.9-10.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

LA.WHST.9-10.9	Draw evidence from informational texts to support analysis, reflection, and research.
HS-PS4-2	Evaluate questions about the advantages of using a digital transmission and storage of information.
HS-LS3-1	Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.
HS-LS3-2	Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.
HS-LS3-3	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.
HS-LS4-4	Construct an explanation based on evidence for how natural selection leads to adaptation of populations.
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.
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.
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.
CRP.K-12.CRP11	Use technology to enhance productivity.
CAEP.9.2.12.C.1	Review career goals and determine steps necessary for attainment.
CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.

Essential Questions/Enduring Understandings

- What are the basic principles underlying the use of fingerprints in criminal investigations?
- What are fingerprints and their significance in forensic investigation?
- How are fingerprints collected, preserved, analyzed and processed?

Objectives

Students will know…..

- why we fingerprint and how fingerprints are used to solve crimes.
- fingerprints are a reproduction of friction skin ridges found on the palm side of the fingers and thumbs.
- no two fingers have been found yet that possess identical ridge characteristics.
- a fingerprint will remain unchanged during an individual's lifetime.
- how latent prints are made when perspiration and body oils transfer to a surface leaving an impression of the finger's ridge pattern.

Students will be skilled at…..

- Identifying general ridge patterns that permit fingerprints to be systematically classified.

- Individualize minutiae on fingerprints.

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.
- Read and discuss Case studies
- Fingerprint rolling activity
- Lab on classifying fingerprint patterns
- Lab on locating and identifying fingerprint minutiae
- Lab on dusting for fingerprints – students use powder to lift fingerprints off of different surfaces
- Lab on visualizing and lifting latent fingerprints – students use a cyanoacrylate fuming chamber, iodine fuming oven and ninhydrin to develop latent fingerprints off of different surfaces

Assessment

Benchmark

- Pre-assessment to determine the direction of work.

Formative

- Participate in classroom activities such as class discussion, question and answer session, cooperative group projects and presentation of research.
- 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.

Summative

- Demonstrate the ability to perform the proper fingerprint rolling technique.
- Demonstrate the ability to analyze and identify fingerprint patterns.
- Demonstrate the ability to locate and identify minutiae in fingerprints.
- Demonstrate the ability to properly dust surfaces for fingerprints.
- Demonstrate the ability to visualize and lift latent fingerprints using various techniques.
- Demonstrate understanding written quizzes and tests about subject materials.

Alternative

- Create a slides presentation on fingerprint patterns and analysis

Materials

- Teacher-presented notes on PowerPoint
- United Streaming short videos
- CSI Season 1