Fingerprint Analysis

Part of: **Dartmouth Rural STEM Educator Partnership**
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Driving Question	Overview
Single big question addressed by this lesson. How can we classify fingerprints and use them to identify a suspect?	Brief (1-2 sentence) description of the lesson. In this lesson, students will observe that fingerprints are unique and can be used to identify individuals.

NGSS Standards	Objectives
MS-LS1-3. Use arguments supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. **DCI's:** MS-LS1-3. In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions. **CCC's:** MS-LS1-2. Structure and Function ▪ Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function. **SEP's:** MS-LS1-8. Obtaining, evaluating, and communicating information in 6-8 builds on K-5 experiences and progresses to evaluating the merit and validity of ideas and methods. ▪ Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence.	Through this lesson, students will (2-3 measurable objectives): ● Students will identify different fingerprint structures ● Students will classify different fingerprint ● Students can recover an unknown fingerprint and match it to a set of known fingerprints

Materials
What materials are needed to run the lesson?

- Fingerprint worksheet
- Pencils
- Plain computer paper
- Mug with fingerprint(s) planted - teacher running lesson and culprit
- Hand lotion
- Cocoa powder
- Brush (small paintbrush or makeup brush)
- Scotch tape, packing tape
- Hand magnifying glasses (optional)
- Permission slips distributed beforehand
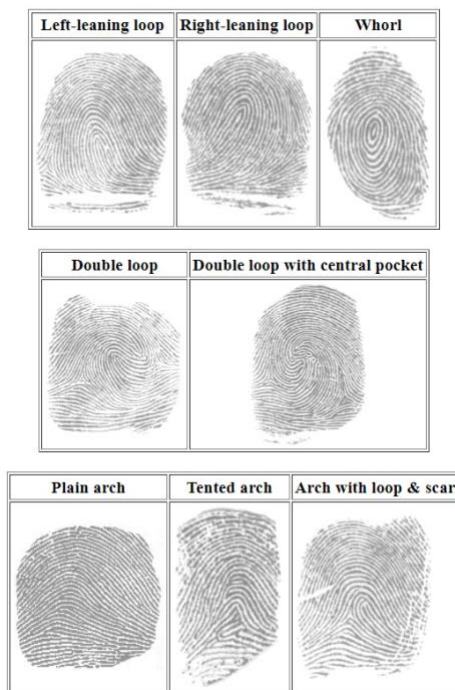
Preparation
What needs to be prepared before the lesson?

- Print and distribute fingerprinting worksheets, pencils, plain white paper, magnifying glasses, paper plates with cocoa powder, brushes, tape
- Plant fingerprints on mug (teacher running lesson and colleague culprit) while wearing hand lotion

Background information
Any background information that may be helpful to the teachers?

Fingerprint Patterns

Left-leaning loop	Right-leaning loop	Whorl

Double loop	Double loop with central pocket

Plain arch	Tented arch	Arch with loop & scar

http://www.reachoutmichigan.org/funexperiments/agesubject/lessons/handouts/print_patterns.html

Story line to frame the lesson

It's a normal Monday morning and our lovely teacher is getting ready for the day with their nice steaming cup of coffee/tea. "Ahh, what a wonderful day it will be!" they exclaim as they take their first sip…

WHAT'S THIS?! Somebody has swapped the drink with (lemon juice? something gross).

Our teacher begins to suspect all of their colleagues who frequent the teacher's lounge, where their drink was prepared. Who could have done this?! And how to find out?

But then, our brilliant teacher remembers - they recently washed their favorite mug. The only fingerprints that should be on the mug are their own and the culprit's.

It's time to get to business and figure out who the trickster is.

Lesson

the 5-E model (engage, explore, explain, elaborate, evaluate)

Detailed description of the lesson with sub-headings as needed.
Engage:
1. Students find teacher in distress
    a. Teacher tells story about coffee prank
2. Brainstorming session about how they could determine who played the prank
Explore:
3. Find fingerprints throughout the room - get up and get active
    a. Start to compare fingerprints
4. Use worksheet to take own fingerprints
    a. Teacher does own fingerprints on worksheet too
Explain:
5. Content
    a. Types of fingerprint patterns
    b. How fingerprints are obtained from crime scene
    c. Databases for law enforcement use
Elaborate:
6. Optional: We can make our own database of prints - we will need to add additional teacher/suspects' prints.
    a. Pseudonyms to obscure student identity
    b. Worksheets hung on wall for display
7. Dust for fingerprints on coffee mug
    a. Compare prints to teacher's
    b. Teacher will explain that she will demand fingerprints from colleges - comparison of prints to prints collected from the mug will take place next time class meets.
Evaluate:
8. Next class: Compare remaining prints to colleagues' prints to identify culprit
    a. Red herring - another student prints from when they helped the teacher out
9. Students make a case to present their findings to teacher/culprit

Evidence of Learning

How will students demonstrate their learning? Exit questions?

CER - Could use warrant model to demonstrate understanding

1. How do fingerprints help us identify somebody?
2. What are the shortcomings of this practice?

Opportunity for interdisciplinary lessons with writing.

Extensions

How could this lesson be extended?

Glossary of terms

Include a glossary of terms if needed.

Appendices

References or other materials as needed.