



Forensic Scientist: Fingerprints

Time: 45 Minutes

Skill Level: Elementary (age 6-11), Middle School (age 12-14)

Background

What is Science Inquiry?

Children are natural scientists. From a very early age they explore the world, ask questions and seek answers. This journey of exploration and discovery is Science Inquiry. Science Inquiry helps young people understand their environment, solve problems and gain knowledge about scientific ideas and processes.

Next Generation Science Standards (NGSS)

Science and Engineering Practices

3. Planning and carrying out investigations
6. Constructing explanations
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

Disciplinary Core Ideas

LS1: From molecules to organisms: Structures and processes

Crosscutting Concepts

1. Patterns
2. Cause and effect: Mechanism and explanation

Objective

In this activity, students will collect and analyze their fingerprints.

About the Scientist

Forensic scientists study evidence from crime scenes. This may include analyzing fingerprints, blood, or even bullets. Some forensic scientists specialize in collecting and cataloging this evidence at a crime scene, whereas others are trained to analyze and identify the evidence using scientific methods in a laboratory. Technical writing is also a critical skill for this career. Forensic scientists must summarize their findings accurately and clearly in reports for law enforcement, as well as the legal system.

The Science of Fingerprints

When we touch a surface, the skin on our fingers secretes sweat and oil which remains on the surface even after we remove our fingers. These prints can be extremely detailed, showing the pattern of ridges on each finger. This pattern is different for every person, therefore fingerprints

The Science of Fingerprints (*continued*)

are often used for identification purposes. Techniques for analyzing fingerprints have evolved greatly and may utilize chemical or digital methods, powder, or alternative light sources.

Fingerprints are classified by the features present in the pattern. The three main types of features are loops, arches, and whorls. A *loop* is the most common feature and is formed by several *U-shaped ridges*. An *arch* is the least common feature and is formed by several *curved ridges*. A *whorl* is often easiest to distinguish, since the central ridges forms at least one *complete circle*.

Materials List:

- CDs
- Clear tape
- Highlighters
- Wet wipes
- Fingerprint characteristic worksheets

Discuss ...What do students know about fingerprints? Discuss the uniqueness of fingerprints and why they can be used for identification. Discuss the common patterns and characteristics present in fingerprints. Ask students if they know what type of fingerprints they have. Can you tell by just looking at your fingers?

Predict ...Generate Ideas. Select a Solution.

Experience “What to Do”- What is the plan for the investigation? While fingerprints may be difficult to see on the fingers themselves, they are relatively easy to see when lifted from an object. Have students make a fingerprint on a CD, then expose the fingerprint using graphite powder. Students can then lift the exposed fingerprint from the CD with a piece of tape, and tape the fingerprint to their worksheet for analysis. Students can do additional fingerprints if time permits. It’s recommended to have students perform the graphite dusting over a folded sheet of paper to collect excess graphite, which they can return to the original container. *Note: Do not collect the fingerprint worksheets at the end of the activity. Allow students to keep their prints or you can shred them.*

Share ...Encourage students to discuss their observations as they analyze the fingerprints.

Reflect ...**Analyze and interpret the data and results. Discuss among the group.** Ask students to reflect on the process. Were they surprised they could obtain fingerprints so easily using household products? Is just obtaining fingerprints enough? Why not? Encourage students to discuss the analysis aspect of the activity. Was it challenging to analyze patterns? How accurate is this approach?

Generalize ...**to real world examples. Construct explanations.** Is this how forensic scientists or law enforcement collect fingerprints? Why or why not? Discuss how the graphite/tape approach is a *model* representing a simplified version of a more complex process. Discuss how the graphite/tape is similar to the more complex process of dusting for fingerprints.

Apply ...**outside the classroom or club meeting.** What additional steps do forensic scientists need to consider when collecting and analyzing evidence? Why is accuracy important? Encourage students to think about the human aspect of the scientists’ findings, such as when the prints are used in the criminal justice system.

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