

Fingerprinting Lab

Target audience 9-12



Background: Ask students to list some types of physical evidence that might be found at a crime scene that would help to solve a crime. Help them understand that fingerprints, hair samples, fibers from fabric, the remains of soil, and blood are all examples of physical evidence. Using the tools of science, trained professionals can analyze these samples to learn more about the person or persons who may have left evidence behind. Ask students what information might be obtained from each type of physical evidence. For example, by analyzing fingerprints, professionals can identify the type of fingerprint and match it to a person who has committed a crime in the past and has fingerprints on file. Hair and fiber samples can be looked at under a microscope, revealing if it is human or animal or even natural hair. Soil samples can be analyzed to determine whether the person has been present at a crime scene.

Knowledge and Skills:

- Students should know how to use a microscope
- Students should know the importance of details when gathering evidence in forensic science

Fundamental Understanding:

- Understand the relationship of chemistry, physics, and biology to forensic science.
- Understand the use of the scientific method to solve crimes.

Essential Question

What characteristics of fingerprints can be used to identify different people

Purpose: To determine characteristics of fingerprints in order to be able to match fingerprints from a crime scene to a suspect.



Materials:

1. White paper
2. Ink Pads
3. Reference pictures of loops, whorls and archs
4. Magnifying glass
5. White balloons if time allows
6. Fingerprinting powder
7. Scotch tape, preferably clear large packing tape

Procedure I - Inked Fingerprints:

1. Divide the students into groups of four students.
2. Have students follow the steps listed below to make their fingerprints. Each student will make fingerprints of all five fingers of at least one hand, if time allows, do both hands.
3. Using ink pads, place their fingerprints on a blank piece of white paper. This takes some practice before they have a nice set of prints.
4. Label each finger using the following abbreviations:
5. T for thumb
6. I for index finger
7. M for middle finger
8. R for ring finger
9. L for little finger
10. Have students look at their fingerprints with the hand lens and try to identify what type they have. The Federal Bureau of Investigation categorizes prints by three main patterns-archs, loops, and whorls. The pictures from many websites or from the Fingerprint Discovery Kit cards will enable student to identify these characteristics of fingerprints.

Procedure II - Latent Fingerprints:

1. Students can place their fingerprints on different objects in the room, the lab tables, desks, beakers pieces of glass or mirror.
2. Students then use fingerprint powder with brush to cover the prints, then place a large piece of scotch tape, or clear packing tape, carefully peel off the fingerprint and place on an index

card or piece of white paper.

3. Students then can identify the archs, loops, and whorls within the lifted latent fingerprints.

Questions:

1. Based on what you learned during the lesson, identify the different types of evidence investigators could look for at a crime scene.
2. How is the evidence gathered and stored? What is "Chain of Custody"?
3. What do investigators do to ensure that the crime scene does not get contaminated?
4. How can a biologist, a chemist, and/or a physicist help at a crime scene? What types of evidence would they analyze?
5. What skills does each type of scientist bring to forensic science?
6. The technology currently used by forensic scientists is DNA testing. What are the advantages of DNA testing? Are there any disadvantages?
7. What tools does the Federal Bureau of Investigation (FBI) use when investigating a crime?
8. How does the FBI synthesize the data it collects and analyze it in order to solve a crime?
9. How do you think detectives solved crimes 100 years ago?
10. What tools did they have available back then?
11. Do you think they were able to solve the majority of crimes correctly?
12. What personality traits do you think a detective needs to have?
13. What skills help make detectives successful at their work?

Lab Resources:

"Criminalistics" Lab Manual, seventh edition by Clifton E. Melon, Richard E. James and Richard Saperstein, Prentice Hall 2001. (p. 103, Fingerprinting).

Fingerprinting supplies: <http://www.sirchie.com/>

Taking Legible fingerprints: <http://www.fbi.gov/hq/cjisd/takingfps.html>

Interesting information:

<http://www.correctionhistory.org/html/chronicl/dcjs/html/nyidbur2.html>



Teacher Notes:

1. Fingerprints can also be made on a partially blown up balloon, white works well. Then, the student can blow up the balloon larger in order to identify fingerprint characteristics.

2. You may want permission to keep the student fingerprints from their parents or just let them keep any of their prints that they make in order to avoid any parental complaints.

An additional activity, the **Bertillon Activity**: By using measuring tapes, students can measure the length of their torsos from the top of their head to the bottom of their seat in a chair, the length of their arm from elbow to middle finger and their hand from wrist to middle finger. This data is recorded and then the averages for each are calculated for males and females in the class. Students can do this simple activity before actual fingerprinting analysis. They enjoy this. It is easy and they understand characterizing needs to be consistent and systematic.