Carolina Quick Tips®

Leave Your Print: Basic Fingerprinting

Imprint your science expertise on the topic of dactyloscopy, the study of fingerprints. Fingerprints are completely unique, and no two people have ever been discovered to have identical prints. Using fingerprinting supplies and materials from Carolina, you can bring this activity into your classroom and introduce forensics in an exciting way. This activity supports three-dimensional learning and builds toward the following:

- NGSS Scientific and Engineering Practices: Analyzing and Interpreting Data
- NGSS Core Idea: Life Science 3: Heredity: Inheritance and Variation of Traits
- HS CTE, Chapter 130.339.C (8) (A) compare the three major fingerprint patterns

Materials Required

Carolina® Fingerprint Ink Pad (211932)
Fingerprint Record Cards (211935)
Carolina® Fingerprint Ink Towelette Wipes (211936)
Black Magnetic Powder (211955)
Carolina® Magnetic Powder Applicator (211952)
Glass Slide (631920)
Weighing Boats (optional)

Activity Procedure

Part 1

1. Look closely at the area of your finger between the tip and bend of the first knuckle. This is the pad of your finger and what you use to create a fingerprint.
2. Record your name and date on the fingerprint record card.
3. Touch the pad of one of your fingers to the ink pad.
4. Then, lightly touch the surface of the fingerprint card without rolling your finger.
5. Use the provided towelette to clean your finger.
6. Using the Fingerprint Reference Sheet on the back of this page and the Fingerprint Comparison reference card on the table, attempt to identify some common structures.

Part 2

1. Hold a glass slide by the sides, being careful not to touch the middle of the slide. Press one finger firmly in the center of one side of the glass slide.
2. Obtain a magnetic applicator and magnetic powder.
3. Apply magnetic powder to your slide, as follows:
   a. Draw a plume of powder onto the end of the magnet.
   b. Carefully sweep the surface of the glass slide with the powder. Do not scrape the magnet on the surface. Contact with the applicator can destroy fingerprint ridge detail.

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   c. Once the print is visible, release the remaining powder plume back into the container or weigh boat.
   d. Carefully sweep the magnet over top of the latent print and the surface to remove any excess powder. Avoid touching the surface of the slide. Discard the excess back into the container or weigh boat.
4. Then, lightly touch the surface of the fingerprint card without rolling your finger.
5. Use the provided towelette to clean your finger.
6. Using the Fingerprint Reference Sheet on the back of this page and the Fingerprint Comparison reference card on the table, attempt to identify some common structures.

Results/Summary

Look for different types of general and specific patterns using the fingerprint reference sheet on the back of this page. Compare the patterns you identified to that of others. Consider the use of ink or powder to develop prints. Does one method provide more details then the others? When would it be best to use either method?

Additional Information

Fingerprinting makes a great starting point for any forensics-based lesson plan, or you can combine fingerprinting with hair and fiber analysis to create a complete evidence analysis lab. View more information, content links, and products related to this activity at www.carolina.com/takeaways.

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How to Analyze a Fingerprint

Scan QR code or go to knowledge.carolina.com/labskills for videos and more!

Directions

1. Identify the core and delta(s), if present, for the primary types of fingerprint patterns. Check answers at bottom of page.
2. Complete a 10-card of your fingerprints.
3. Identify the general and specific patterns for each of your digits.
4. Identify minutiae in your prints. Why are minutiae more valuable than patterns for matching prints?



Core: Where ridges form a loop or the center of a loop.



Delta: A triangular ridge pattern with ridges that run in different directions.



This whorl has 1 core and 2 deltas.

Three Primary Types of Fingerprint Patterns

Loops



One or more ridges enter from one side, curve, and then exit on the same side.

Specific Loops:

Radial Loop
Loop opens towards thumb



Ulnar Loop
Loop opens towards pinky



Arches



Ridges enter from one side, rise slightly, and exit on the opposite side.

Specific Arches:

Plain Arch
Gentle ridges



Tented Arch
Steep ridges, forming a triangle



Whorls



Circular ridge arrangement forms a pattern that spirals inward. Includes 2 prominent triangular ridge formations on both edges.

Specific Whorls:

Plain Whorl
A line between deltas that crosses through whorl



Central Pocket Whorl
A line between deltas that does not cross through whorl



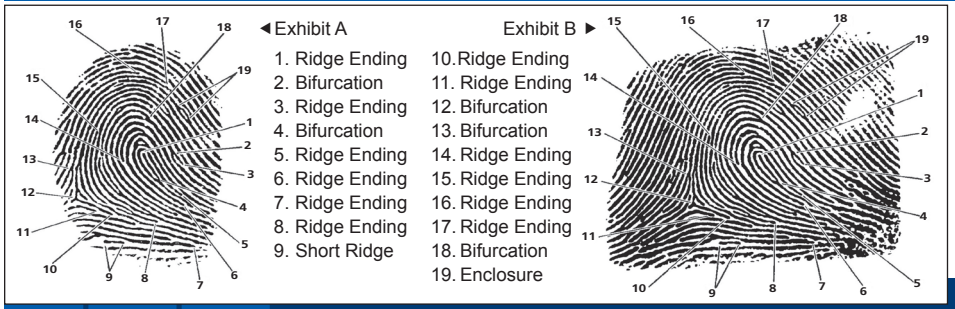
Double Loop Whorl
Made of 2 loops



Accidental Whorl
Made of 2 different patterns



Minutiae Patterns



courtesy of Sirchie

To confirm a fingerprint match:

1. Patterns must match
2. 10–15 minutiae must match

Answers for activity 1: 1. Loop has 1 core and 1 delta. Arches have no delta or core. 2. Whorls have 1 core and 2 deltas.

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