Name:_____ Date:_____

Arches, Loops, and Whorls of Fun Fingerprint Lab 1: Classifying Fingerprints

Student Lab

Materials Needed:

Fingerprint Identification Practice Sheet, Crime Fighting Challenge worksheet, magnifying glass, highlighter

Essential Question:

How do fingerprint examiners identify and classify fingerprints?

Background Research:

Fingertips are made up of friction ridges, which are raised strips of skin. These strips help us to grip things. To see how this works, try this quick demonstration. Have a friend hold a piece of paper between two fingertips. Try to pull the paper out of his grip. Notice this is very hard to do. Now have that same friend hold the paper between two knuckles or the sides of two fingers. Pull the paper now. It should easily be pulled away because the sides of our fingers do not have friction ridges. It is the impression of these ridges that we see when searching for a fingerprint.

There are three main types of fingerprint patterns: loops, whorls, and arches. Loops are found in 65% of the population, while 30% of the population has whorls, and 5% of the population has arches.

A fingerprint is identified as a loop when the ridges begin and end on the same side of the fingertip they started out on. On a whorl fingerprint, the ridges form a spiral that does not seem to begin or end on either side. The ridges in an arch print begin on one side of the fingertip and end on the opposite side, arching up in the middle like a hill.

Whorl

Arch

Loop

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When fingerprint examiners compare two fingerprints they look for common characteristics. If the two prints have at least eight points that are the same, they can conclude that the prints match. Figure 1 includes some of the distinct characteristics they look for. Figure 2 provides an example of each characteristic as it might appear in a fingerprint.

Characteristic	Example
Fork (Bifurcation)	
Dot	
Ending Ridge	
Short Ridge	
Enclosure	

Figure 1. Fingerprint characteristic chart

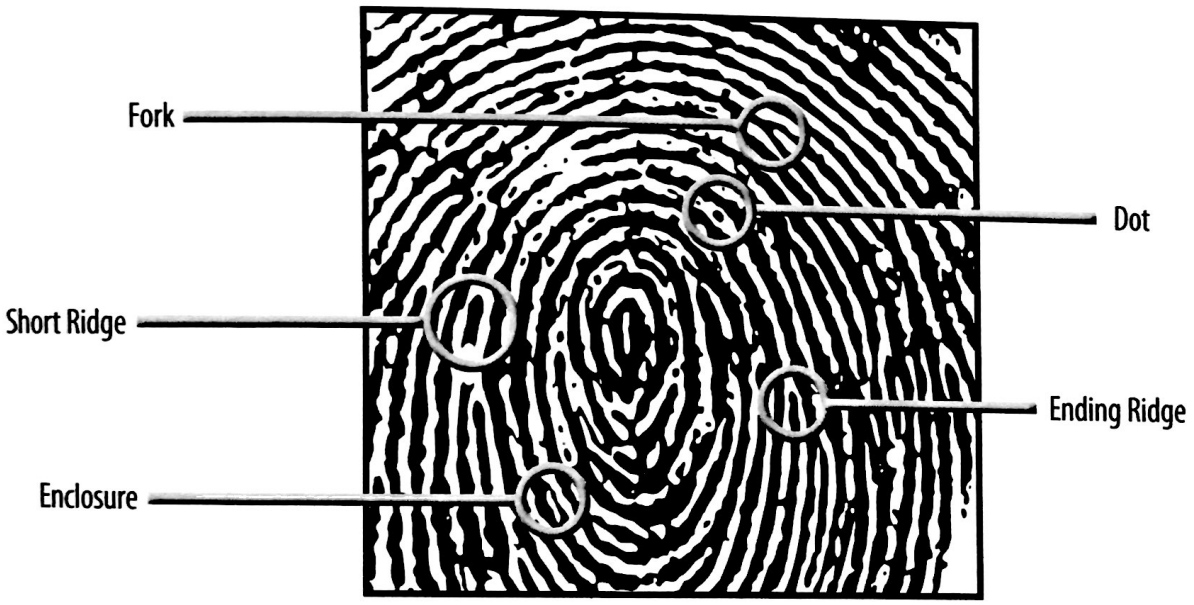

Figure 2. Fingerprint characteristics sample

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The ridges on our fingers contain perspiration, oils, and amino acids, which are present on our skin. When a person touches an object, the perspiration, oils, and amino acids from the fingertips are left behind on the object. Most of the time these prints are invisible and cannot be seen by the naked eye. These types of prints are called *latent prints*. *Visible prints* are prints that can be seen. They might form because a finger comes into contact with paint, ink, or blood and then touches a surface.

To find latent prints, investigators will lightly dust a surface with a special type of powder. When the powder adheres to the oils left behind from the fingertip, the hidden fingerprint becomes visible.

Crime Fighting Challenge

Mrs. Schulz's classroom was broken into over the weekend. When she arrived at school on Monday, she discovered the glass window next to the door was broken. The police believe the thief broke the window, put his arm through the open area, and turned the knob from the inside to open the door. Police dusted the doorknob and recovered one print. Security cameras at the school identified several suspects walking through the hallway over the course of the weekend. Prints were gathered from those suspects. Carefully examine each print and compare them to the print found at the crime scene to determine whose print was left on the doorknob.

Experiment Procedures:

1. Read through the background research and look closely at the examples provided using a magnifying glass when needed.
2. Practice identifying types of fingerprints and characteristics of fingerprints by completing the Fingerprint Identification Practice Sheet. Follow the specific directions as listed on the worksheet. Be prepared to turn in this paper to your teacher if requested.
3. Look at the fingerprint samples found on the Fingerprints for Crime Fighting Challenge worksheet. Follow the directions on the paper to solve the crime fighting challenge.

CASE CLOSED

Which staff member left the print on the doorknob? Describe how you know, using vocabulary such as arch, loop, whorl, fork, dot, ending ridge, and more.

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Fingerprint Identification Practice Sheet

1. Identify each print below as an arch, a loop, or a whorl by writing the correct name of the print on each line.

1._____

2._____

3._____

4._____

5._____

6._____

7._____

8._____

9._____

Fingerprint examiners identify several different characteristics when examining fingerprints. (See the Fingerprint Characteristic Chart given under background research on the lab procedures page.)

2. On the fingerprint at the bottom of the page, identify one example of each characteristic (fork, dot, ending ridge, short ridge, enclosure) by using a highlighter or yellow marker to highlight or trace over the characteristic in the print. From that characteristic, draw a line to the side of the fingerprint and then identify what the characteristic (fork, dot, enclosure, etc.) represents.

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Fingerprints for Crime Fighting Challenge

Directions:

Carefully examine the print that was recovered from Mrs. Schulz's doorknob and the prints that were taken from the known suspects. Compare the prints, looking for fingerprint types such as arch, loop, whorl, and unique features such as forks, dots, and enclosures. You may need to use a magnifying glass during your examination. Determine which suspect's print matches the print left at the crime scene. Describe and justify your findings under the Cased Closed section on your lab procedures packet.

The print above was recovered from the doorknob of Mrs. Schulz's classroom door.

Prints taken from suspects:

Mrs. Brandt

Dr. Batenhorst

Mrs. Lombardi

Mrs. Siefert

Mrs. Ahrens

Ms. Fallert