

Fingerprint Analysis: A Family Case Study

Are you ready to be a detective for science? Then get out your magnifying glass and start studying fingerprints! In this project, you'll investigate fingerprints' swirls and swoops -- and you'll need your family's help to get to the bottom of this dizzying mystery. What do you say, detective? Will you take the case?

Problem:

Do family members have the same fingerprints?

Materials:

- Pencil
- Colored highlighters
- White paper
- Wide, clear tape
- Notebook
- Magnifying glass
- Family members

Procedure:

1. Place your hand on a sheet of white paper.
2. Trace the outline of your hand with a pencil.
3. Use the pencil to scribble on a separate sheet of paper. This scribble patch should be larger than your finger. Keep scribbling until the patch is completely dark with no gaps.
4. Press your pinky into the scribble patch. Make sure the front of the finger -- not the finger tip -- is blackened. You might want to try rolling your finger from left to right over the scribble patch.
5. Place a piece of wide, clear tape over your pinky finger. Press down gently.
6. Slowly remove the piece of tape. There should be a dark circle where your fingerprint was.
7. Put the tape on the outline of the pinky that you made earlier.
8. Repeat this process with the other four fingers on your hand.
9. Once your traced hand is filled with tape fingerprints, study your work with a magnifying glass. Can you see the different types of swirls and swoops in your fingerprints? Those wavy and curly lines are classified as arches, loops and whorls. Arches look like miniature mountains; loops enter on one side of the finger before curving back and exiting on the same side; and whorls look like circles.
10. Do you think your family members will have the exact same fingerprints as you -- complete with matching arches, loops and whorls? Write down your guess, or **hypothesis**, in your notebook.
11. Repeat the same fingerprint process you did for yourself with your family members. Don't worry if you can't get everyone together at one time. Since the process takes a few minutes, you can take fingerprints from each family member one at a time.
12. Once you finish, it's time to study the fingerprints. Take out your magnifying glass again and start comparing your family members' fingerprints.
13. Remember arches, loops and whorls? Use your highlighters to indicate each one.
14. Did any of the two people you looked at have the same fingerprints?

Results:

None of your family members will have the exact same fingerprints. There may be similarities -- especially among siblings -- but if you look very, very carefully, some small differences in the arches, loops or whorls will be present.

Why?

What we see as fingerprints are actually a pattern of ridges and valleys underneath the layers of our skin. Imagine if you put a huge bed sheet over the Grand Canyon or a mountain range. The result would be similar to our fingerprints -- just on a much, much larger scale. Every human being has a unique set of ridges and valleys under their skin that is completely unique. In the same way that no two personalities can ever be exactly the same, no two fingerprints can ever be the same either.

Did you know that police officers and detectives use fingerprints to solve crimes? Since we all have different fingerprints, we can actually identify people by their fingerprints. Do you think you can do the same? Use your new knowledge of fingerprint analysis to test this out. Never stop guessing and testing. Real scientists and detectives guess and test their theories everyday -- and you can too!

