

DETECTIVE NOTES

Case File: 05



Fingerprints

Key Questions:

- What are fingerprints?
- What are the four types of fingerprints?
- How can fingerprints lead to an arrest?

Desired Outcomes:

- Students can explain what fingerprints are and how they are formed.
- Students can analyse a fingerprint and identify the four types.
- Students can explain how fingerprints can lead to an arrest.

Activities and Timelines (30 minutes)

Introduction	5 minutes
What are fingerprints?	
Main Activities	15 minutes
Fingerprint types	5 minutes
Examining Our Fingerprints	10 minutes
Conclusion	10 minutes
Fingerprint PowerPoint	5 minutes
Labelling Fingerprints	5 minutes

Resources

- Resource 5-1: Fingerprint Types
- Resource 5-2: Fingerprint Template
- Resource 5-2 a: Fingerprint Template for Blank Paper
- Resource 5-3: Fingerprint PowerPoint

Extension Activity

- Fingerprint dusting activity

Introduction

5 minutes

- **Ask and Discuss:** An alien has landed on earth and is interested in your fingerprints. How would you describe them to the alien, and can you explain how they develop?
- **Write** student contributions up on the board and then come up with a class definition of fingerprints.
- **Explain** to the students that forensic science is the use of scientific methods to study evidence relating to a crime that will then be used as a testimony in a court of law. Analyzing fingerprints is one of those scientific methods that can be useful in solving crimes.



- **Explain the following:**
 - ▷ Fingerprints refer to the tiny ridges, known as friction ridges, on the tip of each finger.
 - ▷ Fingerprints are developed in the womb as the baby’s fingers move around.
 - ▷ Each ridge builds up sweat and oil, which are the substances that actually leave marks on anything that is touched.
 - ▷ No two people have been found to have the same fingerprints; they are unique. Not even identical twins have the same fingerprints (even though their DNA is the same). Therefore, police officers can use fingerprints to link a suspect to a crime.
- **Ask:** When you are born your fingers are very tiny, but they get larger as you grow older. Do your fingerprints change as you grow?
 - ▷ **Answer:** No, they always stay the same. Think about an image on a computer. If you want to make that picture larger, you can make it grow but the image does not change. Fingerprints work the same way. They grow with you, but the prints themselves stays the same.
- **Review** the names for each of the fingers (thumb, index (forefinger), middle, ring and pinkie)
- **Observe:** Use your eyes to examine your own fingerprints.
 - ▷ What patterns do you see?
 - ▷ How are they different from the person sitting next to them? Compare.
- **Ask and discuss:** If I had a fingerprint that was found at the crime scene and everyone in this classroom was a suspect, how could this help me link someone to the crime?
 - ▷ **Answer:** If you took all the fingerprints of the people in our classroom and compared them to the fingerprint found at the crime scene, you could identify whose fingerprint matched. However, do you think this means the owner of the matching fingerprint committed the crime? Not necessarily! It is only one part of the puzzle.

Main Activity

15 minutes

Fingerprint Types

5 minutes

- **Materials:**
 - ▷ Resource 5-1
- **Teacher Prep:**
 - ▷ Print or open Resource 5-1
- **Show and explain** to students the four main fingerprint patterns from Resource 5-1: Fingerprint Types
 - **ARCH:** the lines (ridges) enter at one side and exit the other
 - **TENTED ARCH:** a type of arch that looks steeper – a mountain instead of a hill with a “tent pole” in the centre
 - **LOOP:** the ridges enter and exit at the same side of the fingertip
 - **WHORL:** form a circular or spiral pattern
- ▷ As you discuss it, **draw** the following symbols on the board as a simplified example of what they are:

Arch



Tented Arch



Loop



Whorl





Teacher's note: Reference the following if students are writing the PATs, as it may be a question found on there: **Discuss** composite (a print composed of two or more separate patterns) but explain that forensic officers don't use this classification anymore. Those prints are now lumped with whorls.

- **Say:** Let's analyze what types of fingerprints we have!

Examining our Fingerprints

10 minutes

- **Materials:**

- ▷ Resource 5-2 or 5-2a
- ▷ Pencil for each student
- ▷ Scotch Tape

- **Teacher Prep:**

- ▷ Print Resource 5-2, or open Resource 5-2a

- **Hand out** Resource 5-2: Fingerprint Template. Students will be working individually to take a copy of their fingerprints.



Teacher's note: Do a demonstration of this for the students as you explain the instructions.

- **Instruct the students:**

- ▷ Heavily colour in the circle at the bottom of the page with a pencil.
- ▷ Have them roll their finger back and forth, completely covering the whole pad of their finger.
- ▷ When they feel they have covered their whole finger pad, they can take a piece of scotch tape and place it over the finger pad, lifting the print.
- ▷ They will then place the piece of tape into the correct box on their page.
- ▷ Repeat until all fingerprints have been taken.



Teacher's note: Students may have to reapply their pencil to the circle on the page after a few prints are taken.



Teacher's note: This can also be done on a blank piece of paper if you choose to not print the template. Instructions for how students can create this template can be found in Resource 5-2a: Fingerprint Template for Blank Paper

Conclusion

10 minutes

Fingerprint PowerPoint

5 minutes

- **Materials:**

- ▷ Resource 5-3

- **Teacher Prep:**

- ▷ Open Resource 5-3

- **Utilize** Resource 3-3: Fingerprint PowerPoint to work as a class and identify each fingerprint type as review.

Labelling fingerprints

5 minutes

- **Ask** students to label their fingerprints from the main activity, writing whether they have a loop, whorl, arch, or tented arch under each print



Teacher's note: This activity can be used as an assessment tool or exit pass from the lesson.



• Materials:

- ▷ Hand lotion
- ▷ Baby powder (you can also use corn-starch or cocoa powder for light-coloured surfaces)
- ▷ Scotch tape
- ▷ Small brush, like a feather duster
- ▷ Black construction paper for each student

• Instruct:

- ▷ Rub a small amount of lotion onto your hands, as this will make your fingerprints easier to find.
- ▷ Find a small surface area in the classroom (top of desk or ledge, etc). Press your fingers to the surface, leaving behind your prints.
- ▷ Sprinkle a small amount of powder onto the surface that you touched.
- ▷ Using a brush, gently brush away the excess powder, being careful to leave the exposed fingerprint(s) intact.
- ▷ Place a piece of scotch tape on top of the powdery prints, then lift the tape (the fingerprint should stick to it) and place it onto a piece of black construction paper to see it more clearly.

Curriculum Links

Science: Evidence and Investigation*General Learner Expectations:*

- 6-8: Apply observation and inference skills to recognize and interpret patterns and to distinguish a specific pattern from a group of similar patterns.
- 6-9: Apply knowledge of the properties and interactions of materials to the investigation and identification of a material sample.

Specific Learner Expectations:

- SLE 1: Recognize evidence of recent human activity.
- SLE 3: Recognize that evidence found at the scene of an activity may have unique characteristics that allow an investigator to make inferences about the participants and the nature of the activity and give examples of how specific evidence may be used.
- SLE 4: Investigate evidence and link it to a possible source; e.g. by classifying fingerprints collected from a variety of surfaces.

