STEM Sims™

Fingerprinting

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Do you need an idea for a scientific study?
Try out one of our ideas or make one of your own.

Start right now learning about how law enforcement agencies use fingerprints to help solve crimes. Take the following brief quiz to see how much you already know about the process of fingerprint identification. See the bottom of page 4 to check your answers.

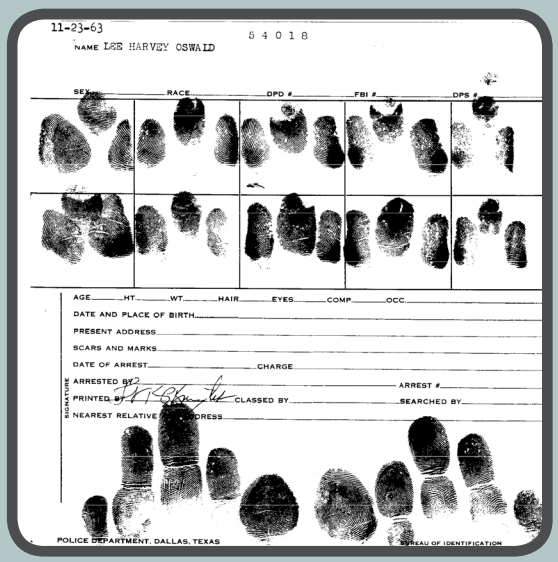
1. All of the following are major patterns of fingerprints *except*:
   a. arches
   b. loops
   c. islands
   d. whorls

2. Which major fingerprint pattern is most common?
   a. arches
   b. loops
   c. islands
   d. whorls

3. What is the study of fingerprints called?
   a. dactyloscopy
   b. digitoscopy
   c. phalangoscopy
   d. tarsaloscopy

4. Which animal has fingerprint patterns most similar to humans?
   a. chimpanzee
   b koala
   c. orangutan
   d. squirrel monkey

5. Identical twins have identical fingerprints.
   a. true
   b. false



Making an Impression

In this activity, you'll make and classify your fingerprints into one of the eight categories shown on page 4.

Materials (for each group)

3" x 5" index card
nontoxic ink stamp pad
magnifying glass

Procedure

1. Open the ink stamp pad, press and roll your thumb on the pad.
2. Place and roll your inked thumbprint on the index card. Be careful not to smudge the ink.
3. Let the thumbprint dry for a couple of minutes.
4. Use the magnifying glass and the information on page 4 of this brochure to categorize your thumb print into one of the eight patterns.
5. Classify your thumbprint into one of the three major print patterns: arches, loops, or whorls.
6. Survey your classmates and record the number of each type of print in Table 1 (Type 1 = arches, Type 2 = loops, and Type 3 = whorls). Calculate the percentage of each type of print.

	Type 1	Type 2	Type 3	Total Number of Students
Number of students with this type				
Percentage of students with this type				100%

Questions for You

1. Compare your class results with the expected percentages shown at the bottom of page 4. Discuss whether your class results matched the expected results.

2. Did any fingerprint not fit into one of the eight categories shown on page 4?

Look, No Hand...Prints!

Fingerprints are created by the raised surfaces on the tips of fingers. When a person touches a surface, oils from their skin make a fingerprint as the fingertip ridges leave an oil impression on the surface. Fingertips that are too dry or too wet reduce the quality of fingerprints left on a surface. Fingerprints can be classified into three major categories: arches, loops, or whorls.

As people age, some of their skin wears away and reduces the depth of the ridges. For this reason, their fingerprints cannot be used to identify some people since not enough of a ridge remains to create the print. Certain diseases, such as leprosy, can also change a person's fingerprints.

An even more unusual case is the rare medical condition called adermatoglyphia. People with this disorder do not have fingerprints, but have no other side effects other than the lack of fingerprints. There are only four families in the entire world that exhibit this disorder. Scientists discovered that individuals with this disorder have a genetic mutation that affects a protein found in skin.

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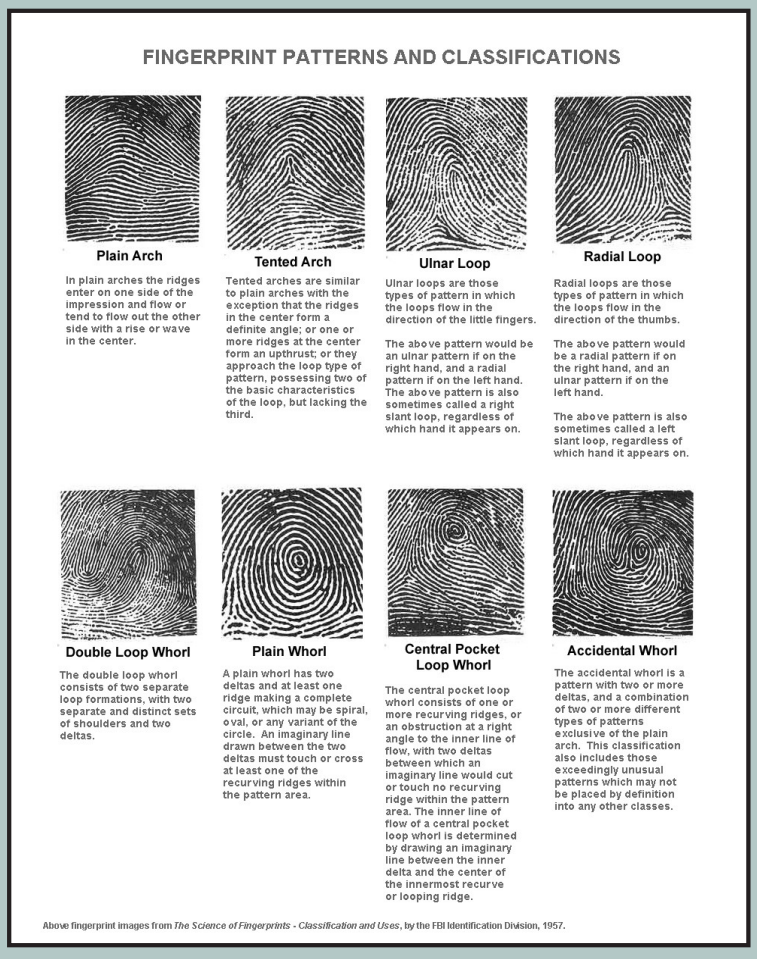
Expanding the Major Patterns

Although there are three major patterns of human fingerprints, forensic scientists have created more classifications to better categorize prints. The eight patterns and classifications are shown below.



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Answers: Page 2 Answers: 1) c. 2) b. 3) a. 4) b. 5) b, They are very similar, but not identical. Page 3 Making an Impression Answer: Expected frequency of fingerprints = 5% arches, 30% whorls, and 65% loops.

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