

Integumentary System

Uniquely You: A Fingerprint Activity

Name: _____

Everyone on earth has a unique set of fingerprints, even identical twins! Learn about the various types of fingerprint patterns, and determine which pattern is yours.

Objective: To determine your unique fingerprint pattern and look at the distribution of patterns among your classroom population.



Here's what you'll need to conduct this activity:

Uniquely You Fingerprint Worksheet

Pencils

Scotch Tape

Background Information:

Your fingerprints are not just an identifying mark on your body, they're nature's gripping surface - allowing you to hold objects better. At the surface of the skin are tiny patterns that form when you're in your mother's womb. They get their distinct arrangement from pressure and finger movements when you're still a fetus and are visible by the time you are 20 weeks old.

Your fingerprints are even more unique than your DNA. Identical twins have nearly identical DNA but can have completely different fingerprints. However, fingerprint patterns can be inherited from your family members so chances are, you may have some of the same patterns as your mom or dad.

Your prints are made of a configuration of ridges called friction, dermal, or papillary ridges. Each ridge is created by dermal papillae and made of pores which secrete sweat and oil. You leave prints behind on things you touch because of the sweat and oil. Now a small injury won't affect the ridges because your skin will regrow in the same pattern. But, if the injury is deep enough, the ridges can be destroyed and scars will show in your prints. However, even with age, your fingerprints never change.

Fingerprinting is an inexpensive form of biometrics used to identify individuals by using their physical characteristics. The technique of fingerprinting is called dactyloscopy. When comparing fingerprints of a crime scene and possible suspect, examiners look at the shape of ridges and where the ridges start, end, join, and split.

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Fingerprint Examples:

The most common types of prints are loops, whorls, arches, and combinations of the three.

Loop



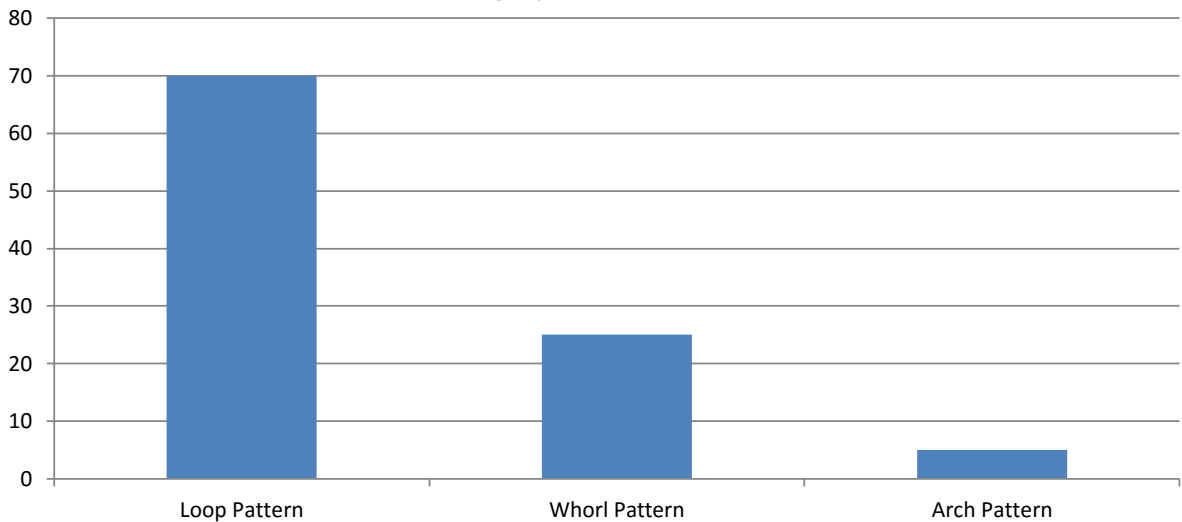
Whorl



Arch



National Fingerprint Pattern Distribution



Using the data in the graph above:

1. What percentage of individuals in the national population have loops? _____
2. What percentage have whorls? _____
3. What percentage have arches? _____
4. Which is greater, the percentage of individuals with loops or the percentage of individuals with whorls plus arches? _____

Hypothesis:

What do you think will be the MOST common kind of fingerprint amongst your classmates? _____ Why? _____

What do you think will be the LEAST common? _____ Why? _____

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What you do:

1. Create an "ink pad" by rubbing the graphite of your pencil on your "Inspector's Ink Pad" until it turns dark grey. Refill your "ink pad" as needed.
2. Using your right hand, rub your pointer finger on your "ink pad" until it's completely grey.
3. Take a small piece of scotch tape and place it over your fingertip, pressing down carefully so as not to smudge the print.
4. Remove the tape and place it in the appropriate part of your data table.
5. Repeat for your remaining fingers and thumbs on your right and left hand.
6. Using your hand lens, identify the type of fingerprints you have by comparing to the examples provided. Locate odd marks or scars as well - these make your prints uniquely you!

Data Table: Right Hand

Finger Name	Right Thumb	Right Pointer	Right Middle	Right Ring	Right Pinky
Fingerprint					
Fingerprint Type/Name					

Data Table: Left Hand

Finger Name	Left Thumb	Left Pointer	Left Middle	Left Ring	Left Pinky
Fingerprint					
Fingerprint Type/Name					

What you might find is that your thumbs and fingers vary in the type of pattern they have. Classify your prints and record the number of fingers with each pattern (remember your total should equal 10):

Loops: _____ Whorls: _____ Arches: _____

Now take the totals of each pattern and divide by 10 to get your percentage for each pattern.

Percent Loops: _____ Percent Whorls: _____ Percent Arches: _____

How do YOUR prints compare to the national average? _____

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The Results: What Happened?

Now that you know YOUR fingerprint patterns, let's look at how the patterns are distributed in the classroom population! Share your pattern count with the class so your teacher can total them up. Determine the percentages for each pattern by taking the total number of fingers with the pattern and dividing by the total number of fingerprints in the class.

Total fingers with Loop pattern:		Percent of classmates with Loop:	%
Total fingers with Whorl pattern:		Percent of classmates with Whorl:	%
Total fingers with Arch pattern:		Percent of classmates with Arch:	%
Total Fingerprints:			

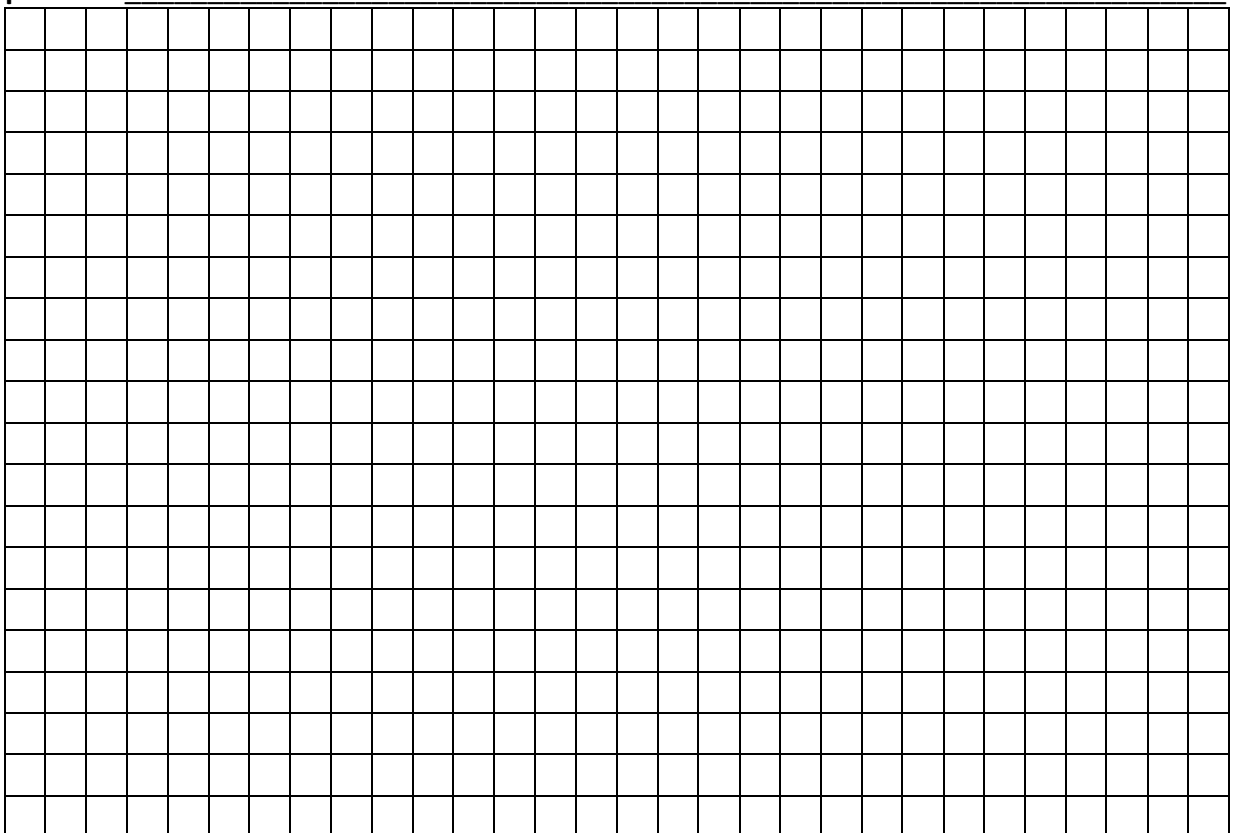
What is the most common type of fingerprint pattern in your class? _____

Take your CLASSROOM percentage data and graph it below. Label the x-axis and y-axis.

What type of graph should you use to best display this data? _____

Why? _____

Graph Title: _____



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Extension Questions:

Answer the following questions using the information you collected from the fingerprinting activity

1. Using your graph, what is the ratio of fingerprint patterns within your classroom that are a Loop: Whorl: Arch? _____
2. Does your class graph resemble the graph of the national population? _____
How? _____

3. How would you predict your graph of fingerprint patterns would compare to that of another class? _____
How would you test this prediction? _____

4. If you could do this activity over again, how might you improve your data so your results would be more reliable? _____

5. There are several ways for obtaining fingerprints from a crime scene - Iodine fuming, dusting, and Cyanoacrylate fuming. Why do you think it must be necessary to use different fingerprinting methods at crime scenes? _____

7. If you had a clone, do you think they would have the same fingerprint patterns as you? _____ Would they be EXACTLY the same? _____
Why? _____

8. Ask your family to do this activity and look at their patterns. Explain what your data shows about familial inheritance regarding fingerprints. _____

