

## Evidence and Investigation Study Guide

How do police and investigators solve crimes?

**Observations** are information gathered through our senses (see, smell, touch, taste, hear)

**Inferences** are a conclusion about something based on an observation.

Example: Jim observed that there was a broken window in the classroom. The glass was on the inside of the classroom. Jim inferred that the window was broken from the outside of the classroom.

**Classify** means to arrange things in groups according to similar qualities. Dichotomous keys are an easy way to help to identify things.

**Evidence** is any bit of information, physical markings or objects that give people a reason to believe something.

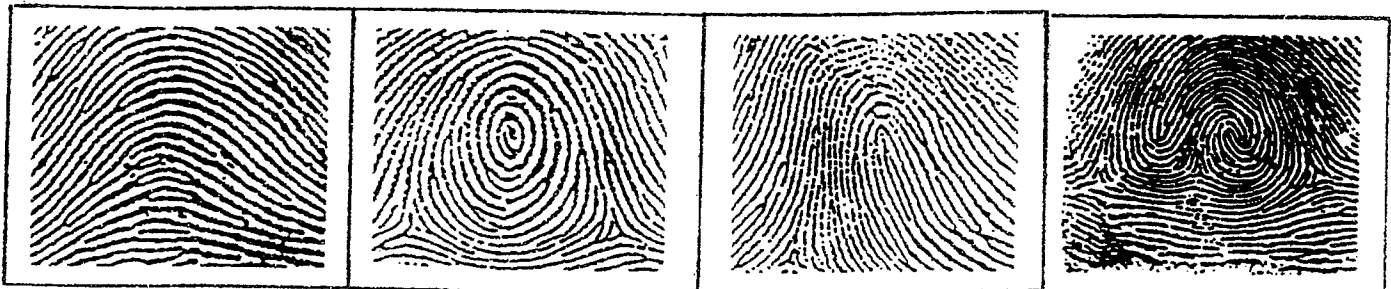
### **Common types of evidence are**

- ◆ Fingerprints
- ◆ Materials and fibers
- ◆ Tire tracks
- ◆ Animal tracks
- ◆ Shoeprints or footprints
- ◆ Soil samples
- ◆ Hand writing samples
- ◆ Witness identification

### Fingerprints

**Fingerprints** are a mark left by the tiny ridges of your finger tip. These markings are left by dust or other particles on the oil of your skin.

There are 4 main types of fingerprints



Arch

Whorl

Loop

Composite

**The arch** fingerprint goes from one side of the finger to the other

**The whorl** fingerprint has a central circle area with ridges circling around it.

The whorl ridges do not go from one side to the other.

**The loop** fingerprint begins at one side of the finger, loops around and the ridge ends at the same side of the finger that it began.

**The composite** fingerprint is a combination of the whorl, arch or loop together on the finger.

Within a fingerprint, there are characteristics that help investigators match up fingerprints. These are **ridge characteristics**. These might include:

- ◆ Forks (bifurcation) - here 1 ridge splits to form 2 ridges
- ◆ A island- a short ridge is by itself in not attached to any other ridges
- ◆ A ridge ending- where a ridge just ends

**Fingerprints can be lifted** off of surfaces using powders, brushes and tape.

Smooth surfaces are easier to lift prints off of than rough surfaces. Some surfaces are not good for lifting prints off of.

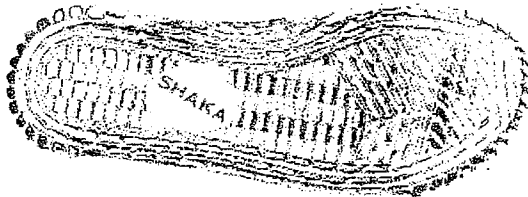
Good surfaces: glass, mirrors, smooth plastic, smooth metal

Bad surfaces- bricks, materials, wood

**Fingerprints can only be matched** if they have a suspect to compare samples to or if the suspect has fingerprints in a database.

## Shoeprints

Shoeprints can be classified by size, pattern of the print, wear of the pattern.



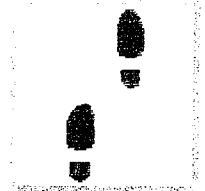
- ◆ *Lots of tread on shoe*
- ◆ *Different tread on toes than on middle and back*
- ◆ *Heavy tread on outside on heel and toe*
- ◆ *Shaka Logo in middle of shoe*
- ◆ *Right shoe*

When trying to identify specific wear patterns, look for wear on the heel, on the toes, and the wear on the treads

**Looking at the tread** on a shoeprint can give investigators an idea of what type of shoe it is

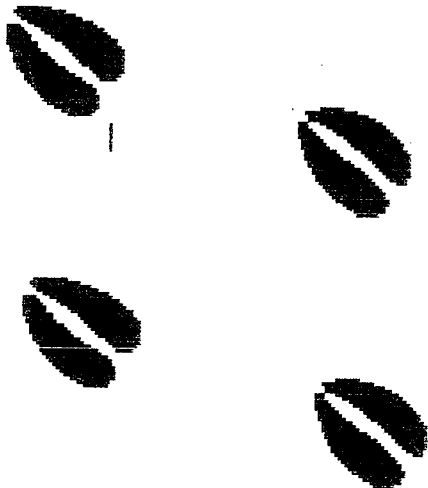
Example: hiking shoe- lots of deep tread  
 Dress shoe- no tread

Looking at the direction of the shoeprints and the depth of the shoe prints can help investigators figure out which direction the person was going. Looking at the spacing between the shoeprints can tell investigators if the person was running (large space) or walking (smaller space) →



Running	Walking
<ul style="list-style-type: none"> <li>◆ Large space between prints</li> <li>◆ Deeper prints</li> <li>◆ Outline may not be as clear (dirt kicked up)</li> <li>◆ Line of prints are straighter- no as parallel</li> </ul>	<ul style="list-style-type: none"> <li>◆ Smaller spaces between prints</li> <li>◆ Shallower prints</li> <li>◆ Outline clearer</li> <li>◆ Less of a straight line – more parallel</li> </ul>

Animal prints can also be identified based on the pattern left in the soil.

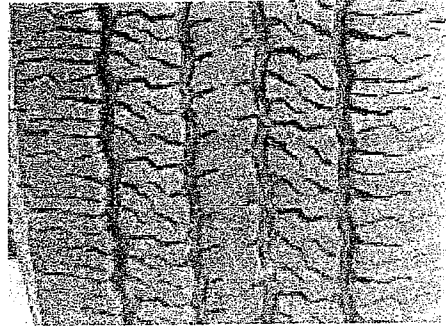


Observation	Inference
<ul style="list-style-type: none"> <li>◆ Hoofed animal</li> <li>◆ 2 hooves on foot</li> <li>◆ 4 feet same size</li> </ul>	Deer

## Tire tracks

Tire tracks can be classified based on

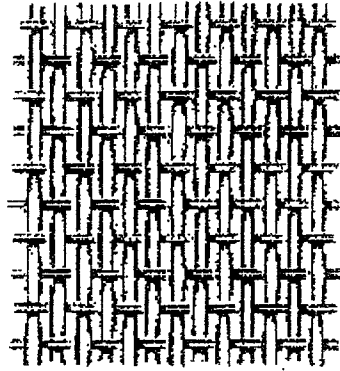
- ◆ type of tread
- ◆ size of tread
- ◆ wear of tread



## Fibers and Fabric

Investigators classify fibers and fabrics by:

- ◆ color
- ◆ pattern of weave
- ◆ texture
- ◆ strength
- ◆ flammability



## Soil samples

Soil samples can be classified based on:

- ◆ color
- ◆ pH
- ◆ smell
- ◆ make up (composition)
- ◆ size of particles

## Handwriting Samples

Handwriting samples can be compared by looking at:

- ◆ the loops in the letters
- ◆ the crosses on the t
- ◆ the spaces between the letters and the words
- ◆ the slant of the letters
- ◆ the size of the letters
- ◆ the dotting of letters ( i , j )
- ◆ a combination of writing and printing
- ◆ the pressure on the page

Investigators can also use **chromatography** to compare sample of ink by separating them into the colors that they are made up of.

Permanent inks (**solute**) will not separate in water (**solvent**). Permanent inks are **insoluble** in water. They will separate in other solvents.

Non-permanent inks (**solute**) will separate in water (**solvent**). Non-permanent inks are **soluble** in water.

Witness identification uses the characteristics of a person to help identify him or her. These characteristics might include:

- ◆ hair color
- ◆ eye color
- ◆ height
- ◆ shape of face
- ◆ weight
- ◆ distinguishing marks (tattoos, scars)