

Name \_\_\_\_\_ Period \_\_\_\_\_ Date \_\_\_\_\_

**Forensic Science**

**Chapter 16 – TOOL MARKS**

**Directions: Fill in the information from the Classroom Chart or the Online Chart.**

***Forensic Science Standard and element:***

**SFS4. Students will evaluate the role of ballistics, tool marks and evidence of arson in forensic investigation.**

**a.) Recognize the forensic significance of tool marks, footwear and tire impressions in an investigation.**

- 1.) Put chart in Science Notebook behind the Charts section after it has been checked. \_\_\_\_yes \_\_\_\_no
  - 2.) All parts were accurate and complete with no abbreviations. \_\_\_\_yes \_\_\_\_no
  - 3.) Handwriting was neat. \_\_\_\_yes \_\_\_\_no
  - 4.) Information was dark enough to be easily read, and chart was neat. \_\_\_\_yes \_\_\_\_no
- (Part of Notebook Grade)*

**Tool Mark-any impression, abrasion, or cut made when contact occurs between a tool and an object.**

- **Tool marks are an example of physical evidence**
- **Even mass-produced tools have minor differences**
- **The impressions can link the tool to a crime scene and potentially to the owner**

**3 MAIN KINDS OF TOOL MARK IMPRESSIONS**

**INDENTATION MARKS:**

- **Result when a tool is pressed against a softer surface**
- **Tools usually leave distinctive marks**
- **The hardness of a tool influences the resulting marks left in the softer object**
- **May indicate the size of the tool used in a crime**


**ABRASION MARKS:**







- **An object's surface can be ground or worn away by a tool**
- **The harder object causes abrasions on the softer surface**
- **Indentation and abrasion marks sometimes occur at the same time**

**CUTTING MARKS:**

- **Edged instruments can penetrate a softer object and separate it into parts**
- **Cut marks are produced along the edge as a surface is cut**

**SAW MARKS ON BONE**

TYPE OF SAW	CUT CHARACTERISTICS	TEETH MARK PATTERNS	EXAMPLE
Styker	Circular areas of short radius; some overlapping marks	Few teeth marks	

<b>Band saw</b>	<b>Very smooth cut</b>	<b>Few teeth marks; straight fine cut; seldom overlapping marks</b>	
<b>Hack saw</b>	<b>Overlapping marks</b>	<b>Tiny tic-tac-toe board look with thousands of squares</b>	
<b>Chain saw</b>	<b>Blade goes directly through bone; messy cut</b>	<b>Roughened edge</b>	
<b>Table saw</b>	<b>Parallel, curved striations</b>	<b>Ridge grooves</b>	
<b>Hand saw</b>	<b>Rough cut with overlapping marks</b>	<b>Irregular cut</b>	
<b>Circular saw</b>	<b>Parallel curved striations</b>	<b>Ridged grooves</b>	

## **DOCUMENTING THE EVIDENCE**

- **The best way to document tool marks is to photograph them next to a measuring device to show appropriate scale**
- **When photographing a tool, the focus should be on scratches, indentations, or gouges on the surface**
- **If possible, tool mark evidence should be collected and preserved for analysis by using casting materials appropriate for the tool mark**

## DOCUMENTING EVIDENCE (CONTINUED)

- Always dust for fingerprints before applying casting material – Use magnetic dusting powder and silicone material
- The size of the impression should be measured and recorded

## COLLECTING AND PRESERVING CASTING SAMPLES

- Correctly label evidence
- Wrap small objects with clean paper and place them in small containers or plastic bags
- Pack large objects in cartons or boxes
- Record who, where, when and why
- Maintain the chain of custody by making sure all information is recorded accurately with no gaps in time

## TYPES OF CASTING MATERIAL

MATERIAL	DESCRIPTION
AccuTrans auto-mix casting system	Silicone base material applied by extruder gun
Mikrosil casting material	Putty that requires a separate catalyst to harden; applied by spatula
DuraCast	Compound that requires a separate catalyst; applied with a spatula
Liquid silicone	Applied by extruder gun to form tube
Room-temperature silicone vulcanizing rubber	Silicone mold rubber; requires a separate catalyst to harden at room temperature

## ANALYZING TOOL MARKS

- The purpose of tool mark analysis is to identify the type of tool or weapon that caused a mark on the victim or at the crime scene
- The main goal of analyzing tool marks is to find peculiar characteristics that make that tool different from any other tool and therefore can individualize the tool or weapon
- Identify unique characteristics, such as nicks and blemishes, that help distinguish one tool from another

## NEW TECHNOLOGY IN TOOL MARK IDENTIFICATION

- Algorithms are now available which statistically analyze tool mark patterns (*an algorithm is a process or set of rules to be followed in calculations or other problem-solving operations, especially by a computer*)

### **NEW TECHNOLOGY (CONTINUED)**

- Law enforcement agencies now have access to *tool mark databases* that have images acquired using forensic comparison microscopes
- New scanning tools measure the depth or height of tool marks

### **TOOL MARK EVIDENCE IN THE COURTROOM**

- Tool mark witness experts must prepare a written report to present to jurors
- If possible, they must also provide original evidence, castings, and magnified images of tool mark comparisons
- Tool mark evidence may be used to link a series of crimes