



Casts and Impressions





Casts and Impressions

People, vehicles, and objects leave evidence of their presence at an accident or crime scene.

- **Patient impressions** are **two-dimensional**
- **Latent impressions** are **hidden to the eye**
- **Plastic impressions** are **three-dimensional**





Class or Individual Evidence?

Depending on how it is made, impression evidence may be either class evidence or individual evidence.

- o A particular tread pattern in shoes or in tires may identify the **brand** and **size**, but it does not identify a specific individual or tire.





Class or Individual Evidence?

- Distinguishing characteristics, such as a split on a shoe sole or unusual wear on a car tire, can be used as **individual** evidence.
- Dental impressions are typically considered **individual** evidence and have a long history of use to identify individuals, especially during wartime to identify remains.



Shoe Impressions

- Shoeprint size indicates the **foot size**
- The depth of a foot or shoe impression indicates a **person's weight**
- The type of shoe can tell something of the person's **job** or **personality**



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Shoe Wear Patterns

Factors that personalize a person's footwear:

- Body weight
- The way a person walks
 - **Weight distribution**
 - **Direction of toes** (straight, pointing out or in)
- The surface on which the person walks
- Unique **holes**, **cuts**, and **debris** embedded in the tread



Collection of Shoe Impression Evidence



Why would the following steps be important?

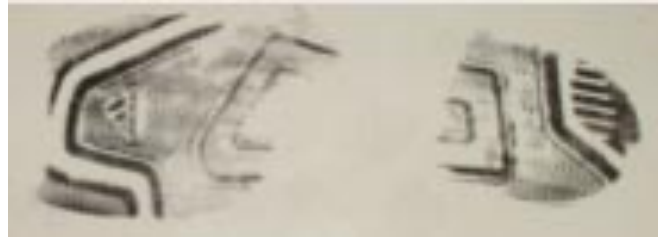
1. Take **photos** as soon as possible from at least **two** different orientations
2. Place an identifying label and a **ruler** in position with the impression for the photo
3. Use **oblique** lighting when possible



Lifting Latent Impressions

Different methods to make latent prints visible:

- **Luminol** makes bloody footprints visible for photography
- **Dusting** the latent print reveals an impression for lifting or photography
- **Electrostatic** lifting and gel lifting (image below) techniques can capture hidden impressions





Electrostatic Dusting and Lifting

- Electrostatic dusting reveals dust left with each step and creates an impression
- Electrostatic charges can lift impressions from

paper	carpeting
wood surfaces	linoleum
asphalt	concrete

- Gel lifters also recover latent impressions



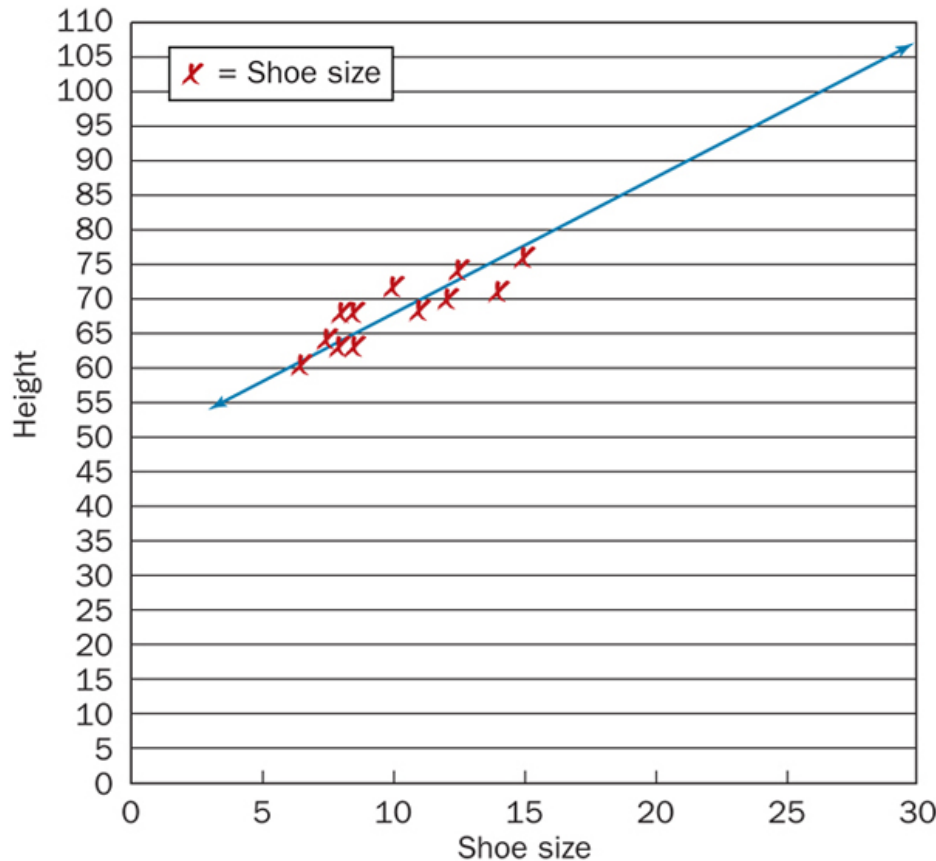
Comparing Foot length and US Shoe Size

Foot Length (Inches)	9	9 $\frac{1}{8}$	9 $\frac{1}{4}$	9 $\frac{3}{8}$	9 $\frac{1}{2}$	9 $\frac{5}{8}$	9 $\frac{3}{4}$	9 $\frac{7}{8}$	10	10 $\frac{1}{8}$	10 $\frac{1}{4}$	10 $\frac{1}{2}$	10 $\frac{3}{4}$	11	11 $\frac{1}{4}$	11 $\frac{1}{2}$	
Shoe Size	M	3 $\frac{1}{2}$	4	4 $\frac{1}{2}$	5	5 $\frac{1}{2}$	6	6 $\frac{1}{2}$	7	7 $\frac{1}{2}$	8	8 $\frac{1}{2}$	9	10 $\frac{1}{2}$	11 $\frac{1}{2}$	12 $\frac{1}{2}$	14
	W	5	5 $\frac{1}{2}$	6	6 $\frac{1}{2}$	7	7 $\frac{1}{2}$	8	8 $\frac{1}{2}$	9	9 $\frac{1}{2}$	10	10 $\frac{1}{2}$	12	13	14	15 $\frac{1}{2}$

The shoe model must first be identified in order to gauge the correct shoe size to obtain an estimate of the foot size. A person's height is generally related to his or her foot size, but it is impossible to predict someone's exact height from foot size. The figure above compares mens' and womens' shoe sizing.



Comparing Shoe Size and Height



A person's height is generally related to his or her foot size, but it is impossible to predict someone's exact height from foot size.



Tire Treads and Impressions

- Tire treads—**ridges** and **grooves** channel water away and provide traction
- *Patent* tread patterns—impressions made after tire runs through a **fluid** material
- *Latent* tread patterns—impressions from **tire oils** used to keep tires soft and pliable
- *Plastic* tread patterns—three dimensional impressions left in **soft surfaces**



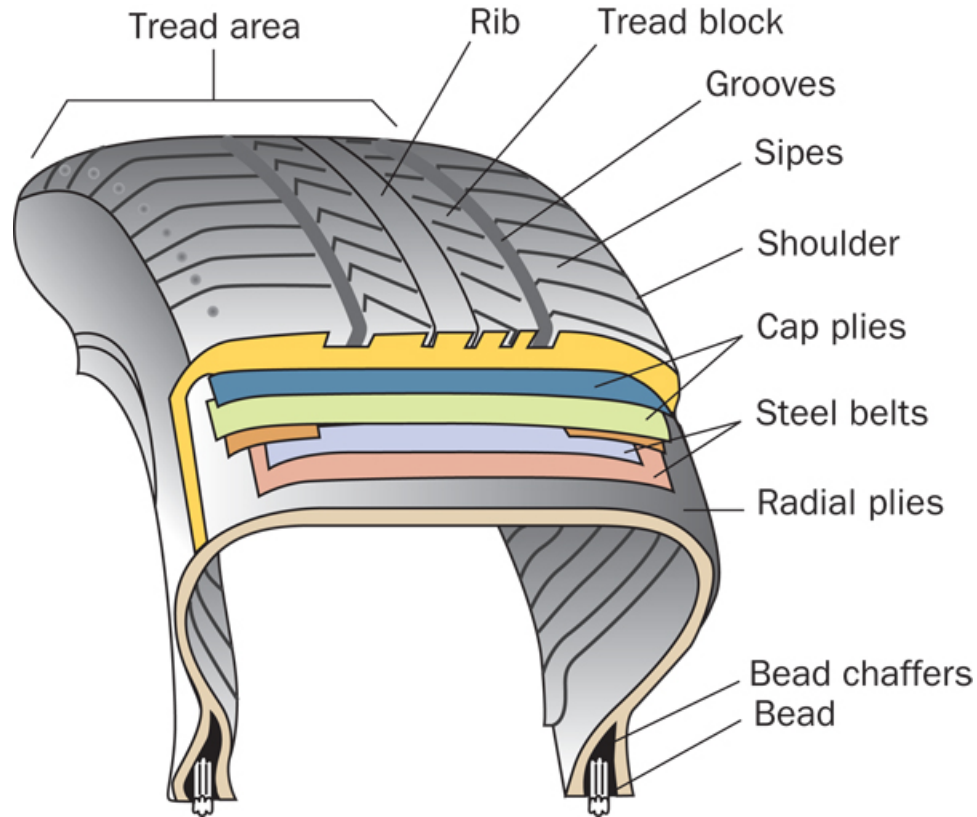
Tire Treads and Impressions

- Tread patterns can indicate the **type of vehicle** that left the mark
- Link a **suspect** or **victim** to a crime scene
- Reveal **events** that took place at the scene





Anatomy of a Tire





Recording Tread Impressions

- Count **ridges** and **grooves** across the tire width
- Note unique characteristics—**wear** or **pebbles** embedded in the grooves
- Create a **print** of the suspect's tire impressions through one revolution
- **Compare** impressions from the crime scene and suspect's tire
- Identifying tread patterns may not be enough to link a suspect with a crime scene



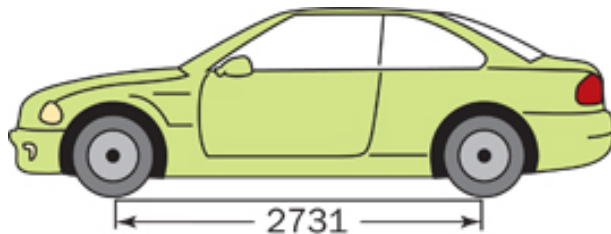
Identifying a Vehicle

Track widths—

From **center** of tire to **center** of tire

Wheelbase length—

From center of **front** axle to center of **rear** axle



Side view



Front view



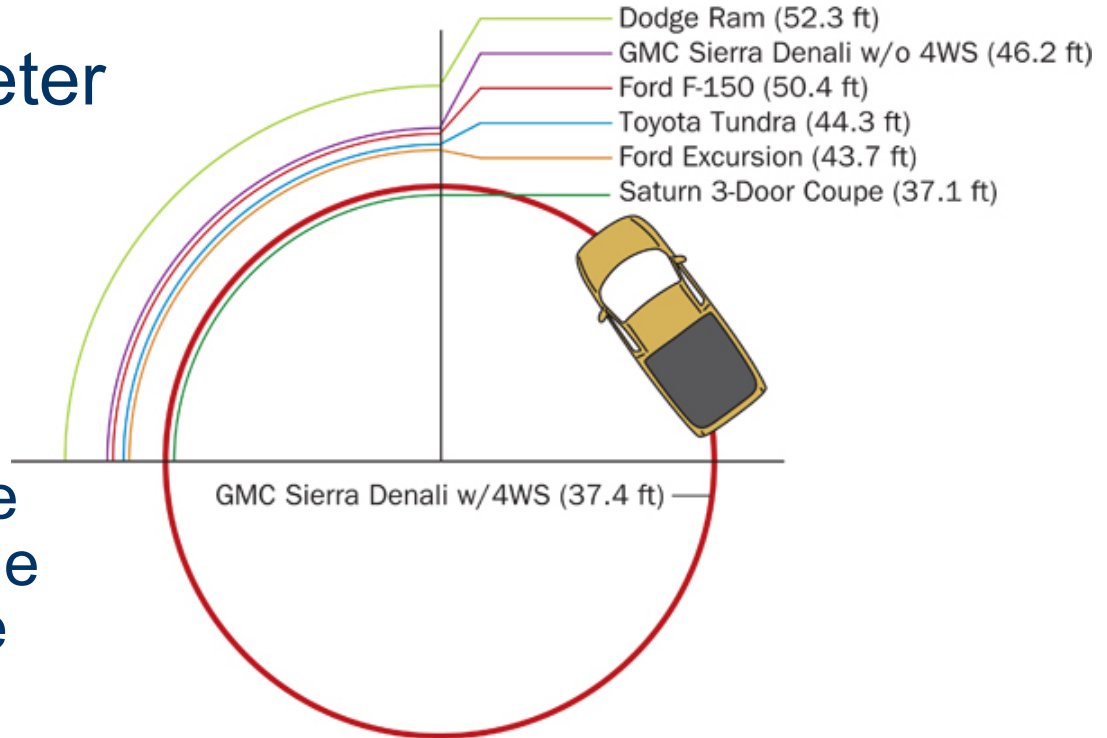
Rear view



Identifying a Vehicle

o Turning diameter

Databases can be checked to find the vehicle with these specifications



Accident Reconstruction



Drivers may not recall the exact series of events before, during, and after an accident

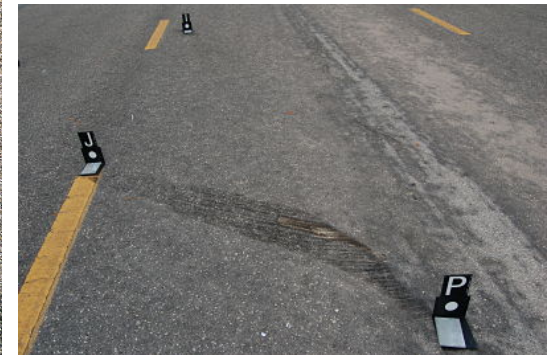
- People, vehicles, and objects, however, can leave evidence of their actions at the scene of an accident
- Debris patterns and tire marks can be clues to **speed**, **direction**, and **vehicle** identification



Accident Reconstruction

There are three basic types of tire marks:

- Skid marks—clues to the **distance traveled** after brakes are applied and the vehicle's speed
- Yaw marks—shows a **sideways** skid
- Tire scrub—determines the area of **impact**





Dental Impressions

- Occasionally a perpetrator will leave behind a bite mark—considered **individual** evidence
- Factors that contribute to the individuality of our teeth include the **number, size, coloration, alignment, unique fillings, crowns, caps, the distance between teeth, and the overall condition** of our teeth.

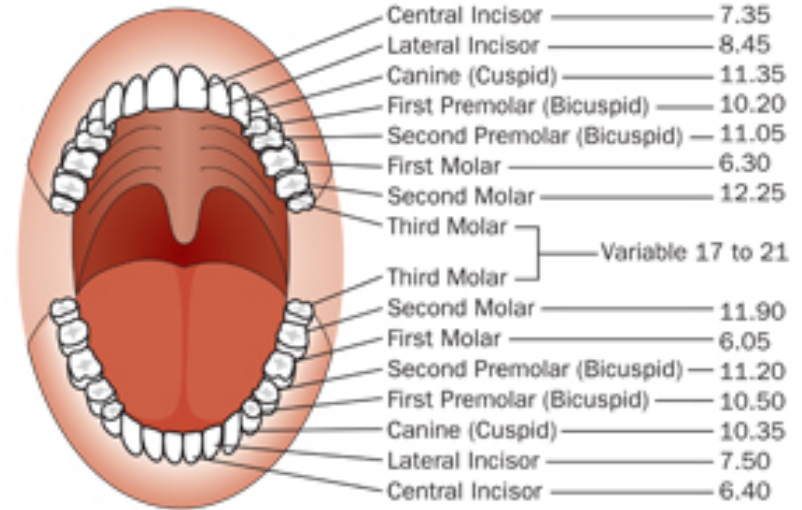


Development of Teeth



Baby teeth

When teeth "come in"	When teeth "fall out"
7-12 mos.	6-8 yrs.
9-13 mos.	7-8 yrs.
16-22 mos.	10-12 yrs.
13-19 mos.	9-11 yrs.
25-33 mos.	10-12 yrs.
20-31 mos.	10-12 yrs.
12-18 mos.	9-11 yrs.
16-23 mos.	9-12 yrs.
7-16 mos.	7-8 yrs.
6-10 mos.	6-8 yrs.

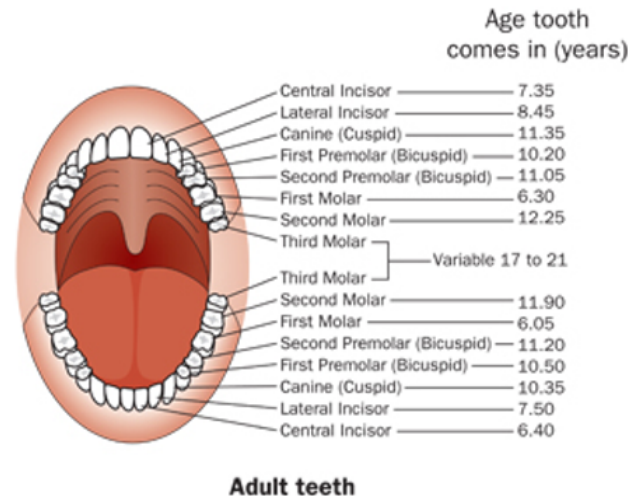


Adult teeth



Purpose of Teeth

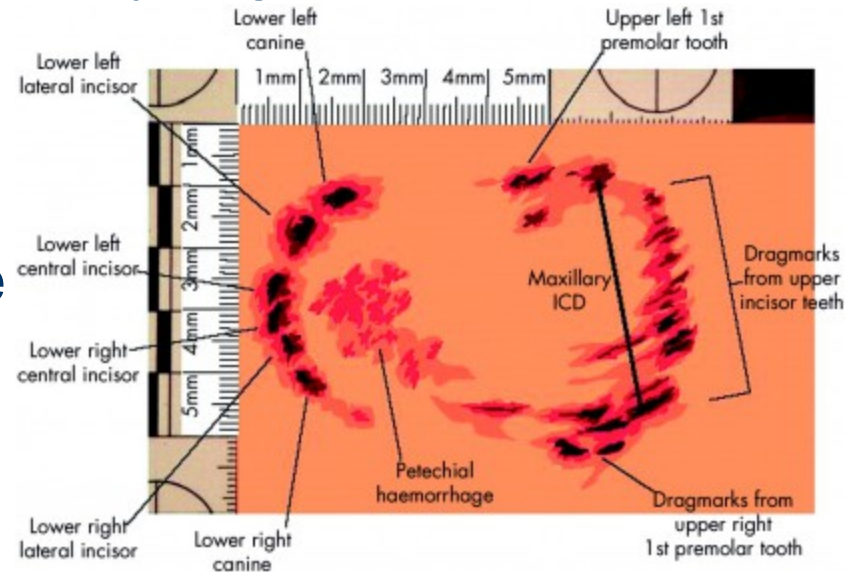
- Incisor = used to **bite into item**
- Canine = sharpest teeth and are used for **ripping and tearing apart**
- Molar = used for **chewing and grinding**





Dental Patterns in Forensics

- o The investigation consists of recognizing, documenting, collecting, and analyzing evidence
 - There are **76** points of comparison when comparing a suspect's dental patterns with bite marks left at a crime scene





Dental Patterns in Forensics

- Photographs should include a ruler
- When an attacker bites a victim, saliva may be left on the victim's skin
 - DNA can be collected and analyzed



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