



“Impressive”

Evidence

Good Morning!
Please take out your
impression notes!

Quiz tomorrow! We will be in room 3326 tomorrow.



What is impression evidence?

Impression evidence- can be defined as **objects** or **materials** that have retained the characteristics of other objects through **direct contact**.

Impressions are created when one object is pressed against another material with enough **force** to leave an impression of the object.

Shoeprints, tool marks, tire tracks, bite marks, and marks on a fired bullet are several examples of impression evidence.

Impressions may be found in or on many different types of **materials**. The **quality** of the impression depends on the object making the impression and the surface conditions, such as how hard or soft it is and what type of material it is (soil, mud, dust, concrete, grass, skin, etc.)



CSI &
Impressions



TYPES OF IMPRESSIONS

- **Patent impressions-** are visible, two-dimensional impressions produced as an object moves through soil, dust, paint, blood, or other fine particles and leaves a trace
- **Latent impressions-** are hidden impressions (made by oils, fine soil and other minute debris) that can be obtained with special techniques
 - special dusting and electrostatic techniques
 - Chemical developers
- **Plastic impressions-** are 3-dimensional imprints. These impressions can be left in soft materials such as snow, mud, soil ect...



INDIVIDUAL OR CLASS EVIDENCE

- **Depending on how they are made, impressions may be either class evidence or individual evidence**
 - A particular tread pattern in shoes or in tires may identify the brand and size, but does not identify a specific individual
 - Distinguishing characteristics, such as cut or nick on a shoe sole or unusual wear on a car tire, can make impressions very distinctive and can be used as individual evidence



SHOE IMPRESSIONS

SHOE WEAR PATTERNS

- **Although two different people may purchase the same type of shoes, the wear pattern on the shoes can appear quite different and can individualize the impression evidence.**
 - **Some factors that can personalize our footwear include:**
 - The size of the foot and the wearer's activities
 - Size of foot also correlated with person's height
 - Body weight
 - Depth of impression
 - Pigeon toed or duck footed or straight
 - Whether a person walks on their toes or heels
 - The surface on which the person normally walks
 - Unique holes, cuts, or debris that may become embedded in the shoe
 - The type of shoe can tell something of the person's job or personality



SHOE IMPRESSIONS

GAIT AND TRACKS

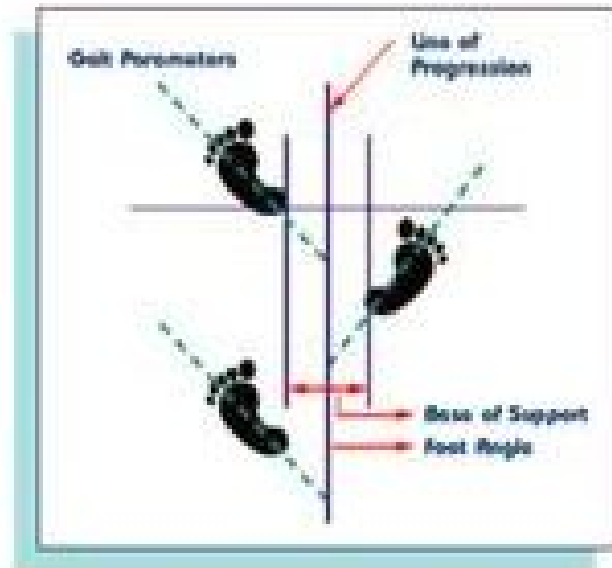
- Numerous prints together tell an investigator about the person's *gait*, or walking habit
 - Limp or injury = asymmetrical gait
 - One foot angle differently than other
 - Also may be a sign that person was carrying heavy weight
 - Stride- Height and Walking or running
 - Trail of prints may also provide the movements of individuals at a crime scene
 - Help Reconstruct events
 - Occurrences or what happened
 - Entrance and exit to crime scene
 - Number of people at the crime scene



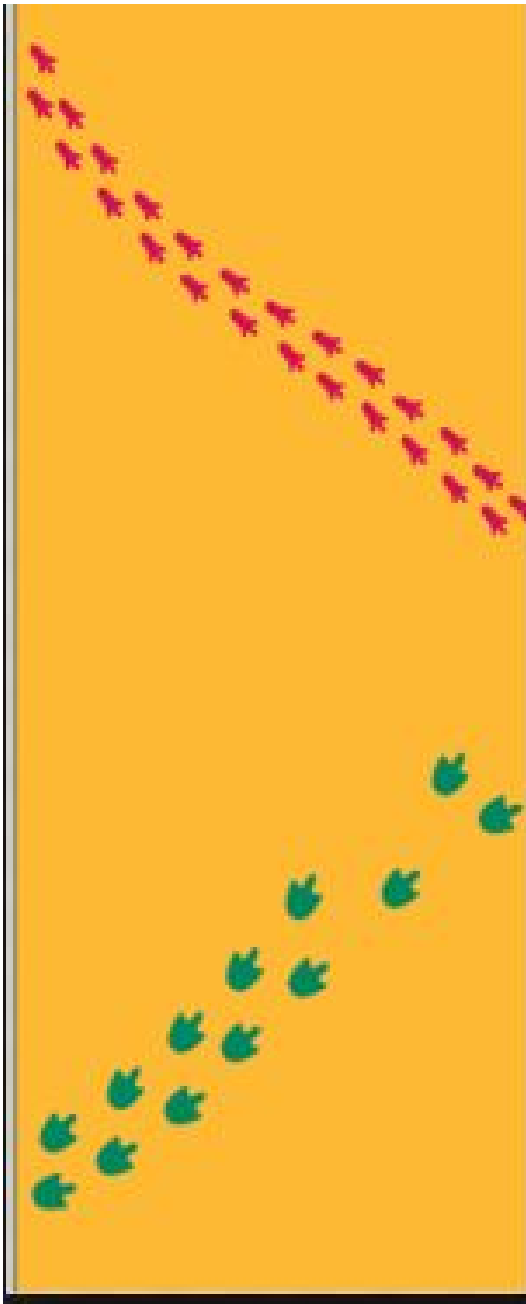
Footprints in the Sand

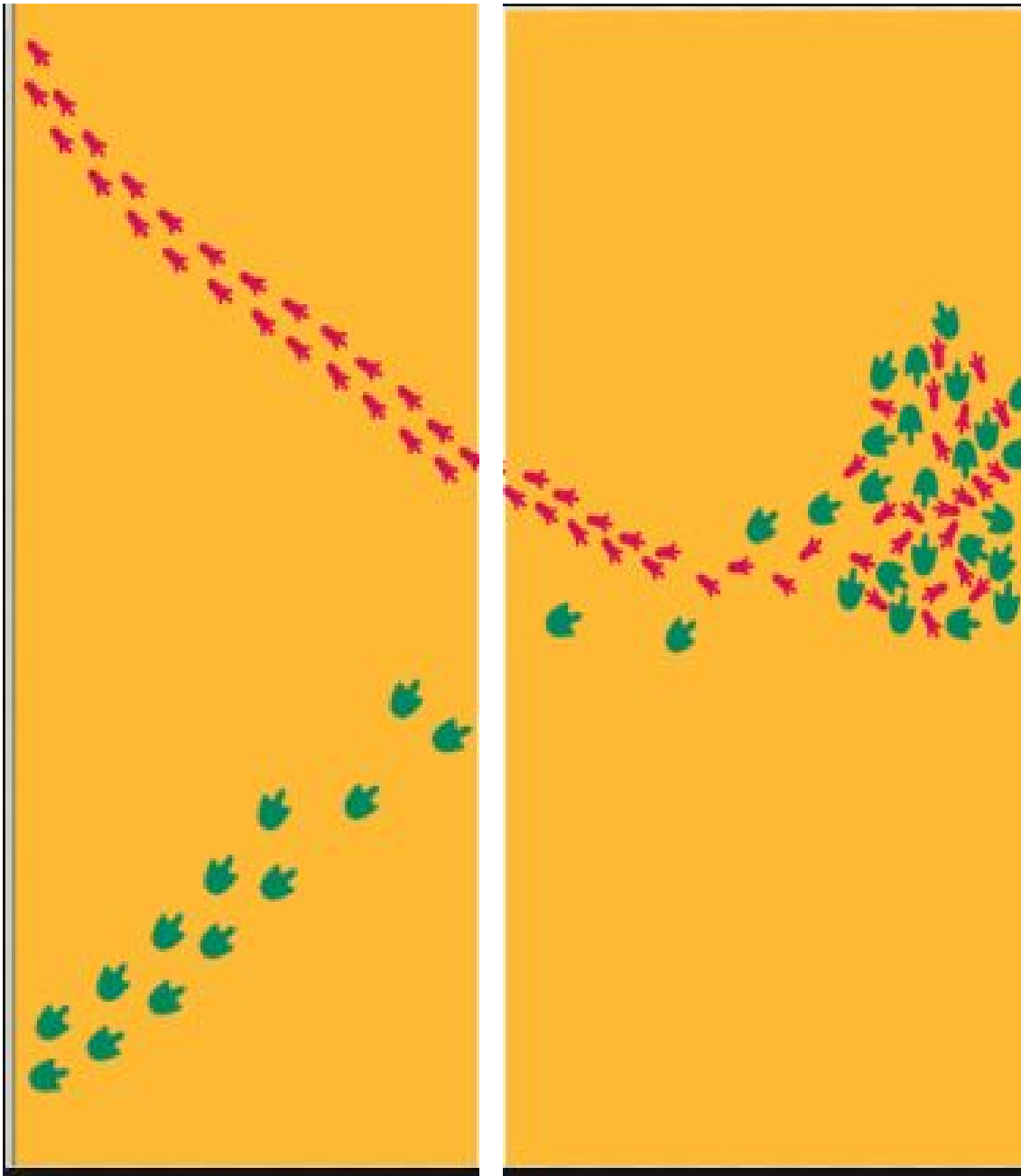
Activity 2D

- **Base of Support:** the distance between the two parallel lines that are intersecting the midpoint of each heel.
- **Line of Progression:** the line located approximately at the center point between both feet along the walker's path of progression.
- **Foot Angle:** angle formed by the intersection of the line of progression and a second line drawn through the midpoint of the heel and the space between the 2nd and 3rd tarsal.



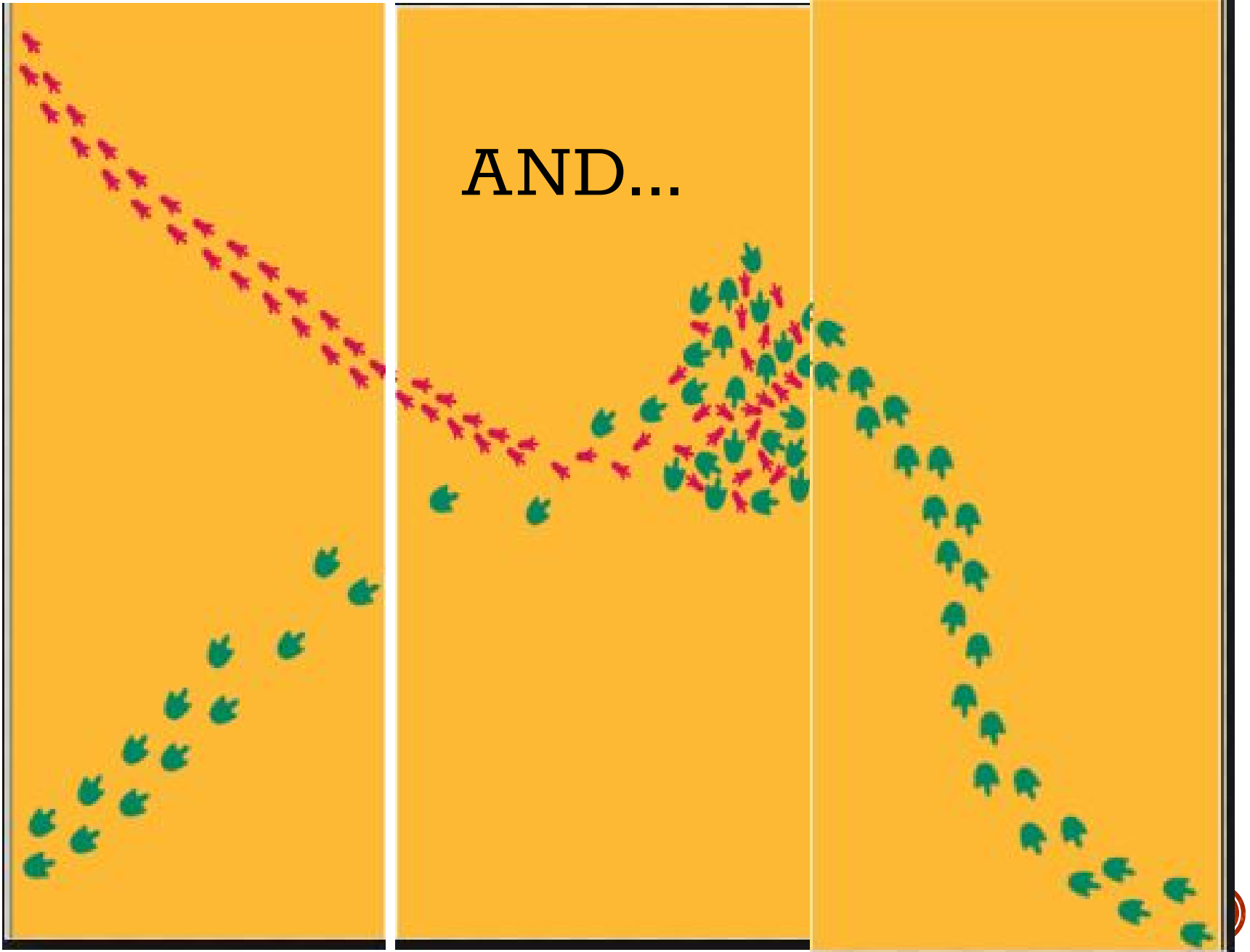
What do these
prints tell you?





NOW...
What
do
these
prints
tell
you?





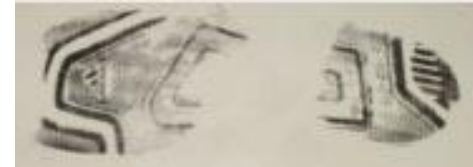
COLLECTION OF SHOE IMPRESSION EVIDENCE

- **Guidelines for Photographing Impressions**
 - Take photos before anyone touches or alters impression
 - Fill cameras viewfinder with the impression for close ups
 - Multiple photographs at different angles
 - Identifying label and ruler included in picture
 - Shaded or indirect lighting to avoid glare
 - Photograph relationship of impression to the whole crime scene
- **Patent prints will only be photographed, latent prints will be photographed and can be lifted (sometimes), plastic prints will be photographed and cast**



LIFTING LATENT PRINTS

- **Latent = invisible to naked eye**
 - Luminol to make bloody footprints visible and able to be photographed
 - Dusting of the latent print, similar to dusting for fingerprints, to reveal an impression and make it visible to be photographed and lifted
 - Electrostatic lifting and gel lifting techniques to capture invisible impressions
- **Electrostatic lifting-** electrostatic charge applied to lifting film and then placed over latent print
 - Fine dust can be detected
 - Paper, flooring including carpet, wood, linoleum, asphalt
- **Gel Lifting**
 - Best on oily or moist prints
 - Print is first dusted with powder, gel templated with cardboard backing is then used to lift print



CASTING PLASTIC PRINTS

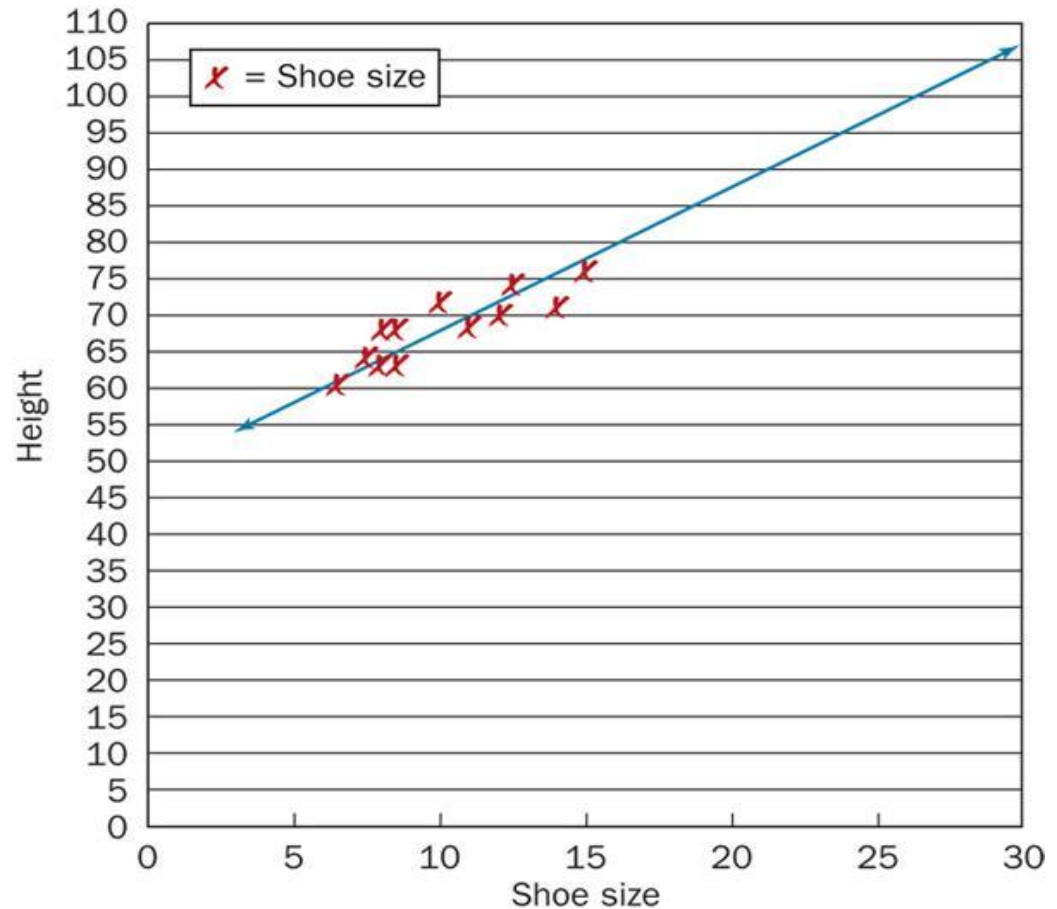
- **Plastic or 3-Dimensional impressions are cast, after photographing, to preserve the physical evidence**
 - Casting materials and techniques vary with the conditions of the crime scene
 - Sand/dirt- Plaster of Paris
 - Light layer of hair spray deposited first to avoid collapse of the print due to weight of the plaster of paris
 - Snow- spray wax applied first and instantly freezes to preserve border of imprint, then dental stone used to cast impression



HEIGHT VS SHOE SIZE

- **Direct relationship between a person's height and shoe size**

- Increase shoe size equals increased height
 - Height of suspect can be estimated
 - Some margin of error





TIRE TREADS AND IMPRESSIONS

- **Motor vehicles can leave patent, latent, and plastic impressions.**
- **Treated much the same as shoeprints**
- **Class characteristics involve design, size, type, and model.**
- **Wear and damage cause defects that can lead to individualization**

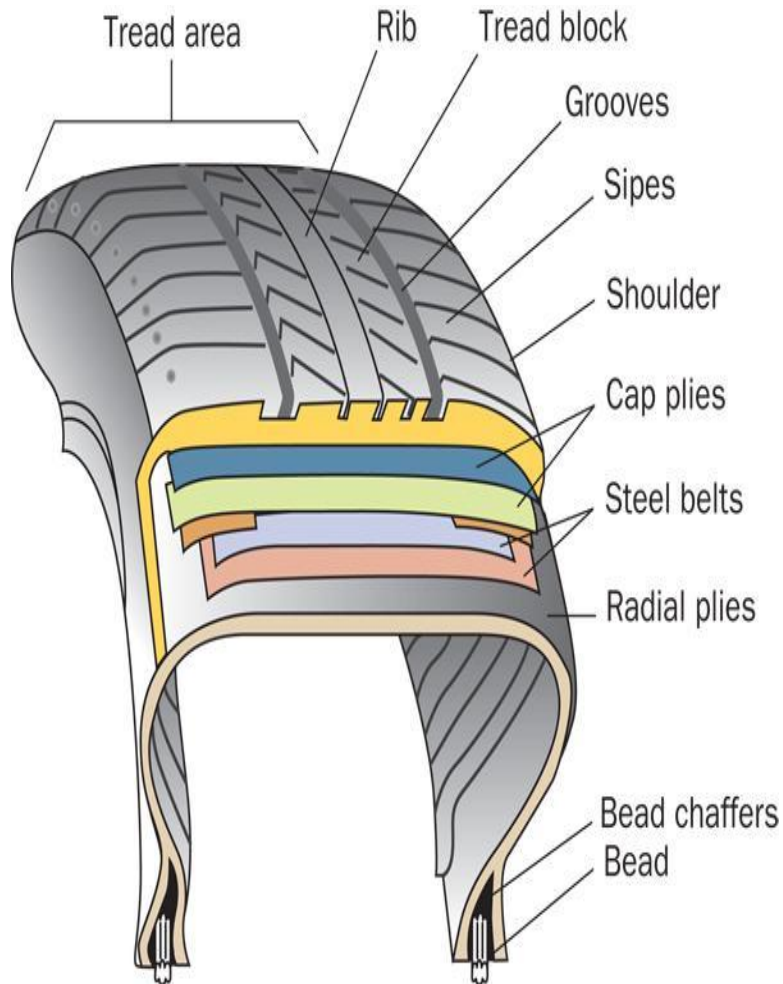


TIRE TREADS AND IMPRESSIONS

- **Tire evidence can be used to link a suspect to a crime scene**
 - Tire pattern and measurements can be used to identify the type of tire and perhaps make and model of car
 - A large database contains track width, wheelbase, and turning diameter measurements for all makes and models of vehicles
 - Can be easily checked to identify the vehicle that left impressions
- **Tire evidence can reveal events that took place**
 - Nature of Impression can be used to determine how the vehicle was driven
 - Tire marks may indicate speed at which a car was traveling
 - Skids marks at an accident may be used to determine who was at fault



TREAD IMPRESSIONS

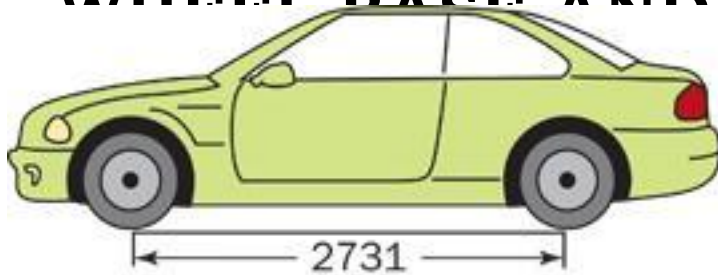


- Tread Pattern
 - Ridges (raised sections) and Grooves can be counted and measured for identification of Brand of Tire
 - Ribs (raised section) can be odd or even
 - Width of ribs and grooves differs from tire to tire
 - Sipes and tread blocks also leave unique tread pattern/impression
- Imperfections such as wear patterns or embedded pebbles can individualize tire evidence

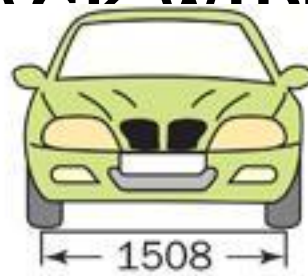


IDENTIFYING A VEHICLE

WHEEL BASE AND TRACK WIDTH



Side view



Front view

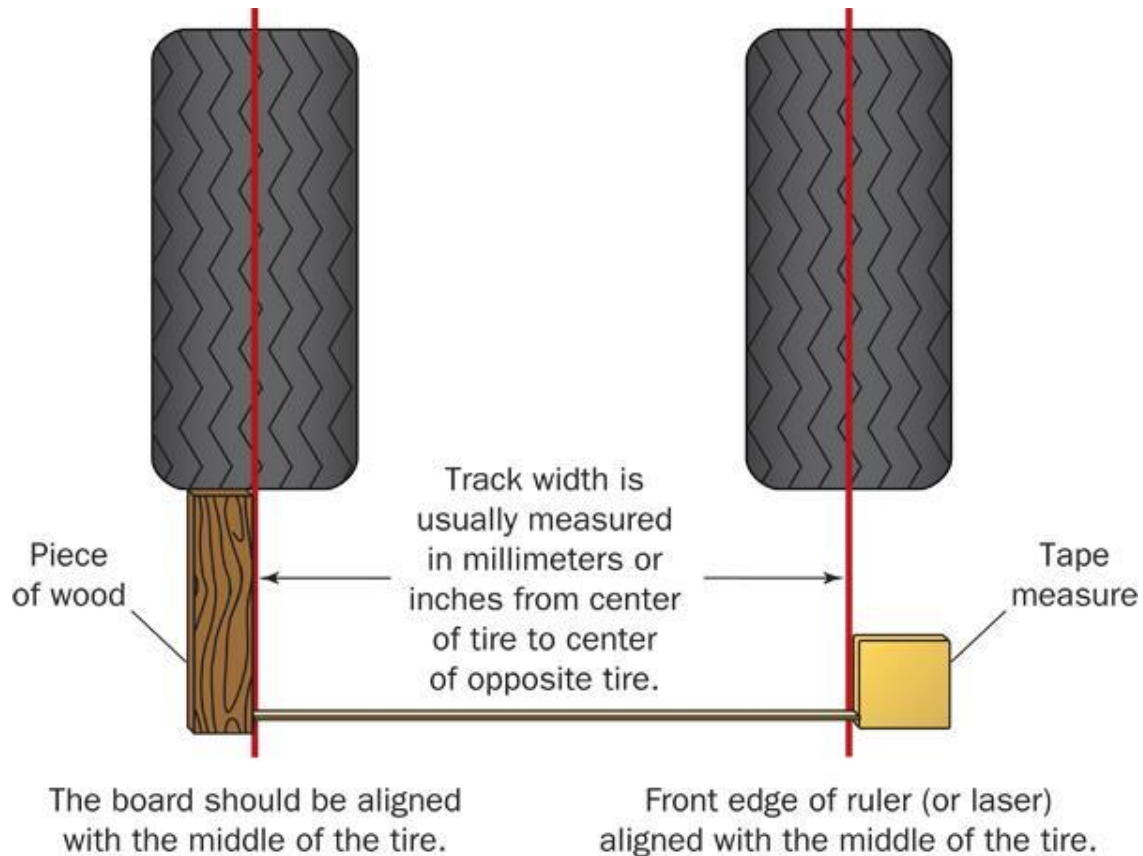


Rear view

- **Wheel Base and Track Width Measurements may help identify make and model**
 - Wheel Base- is the distance from the center of the front axle to the center of the rear axle
 - Track Width- is the distance from the center of a tire on the passenger side of vehicle to the center of a tire on the driver side of the vehicle
 - The front and rear track width measurements may differ

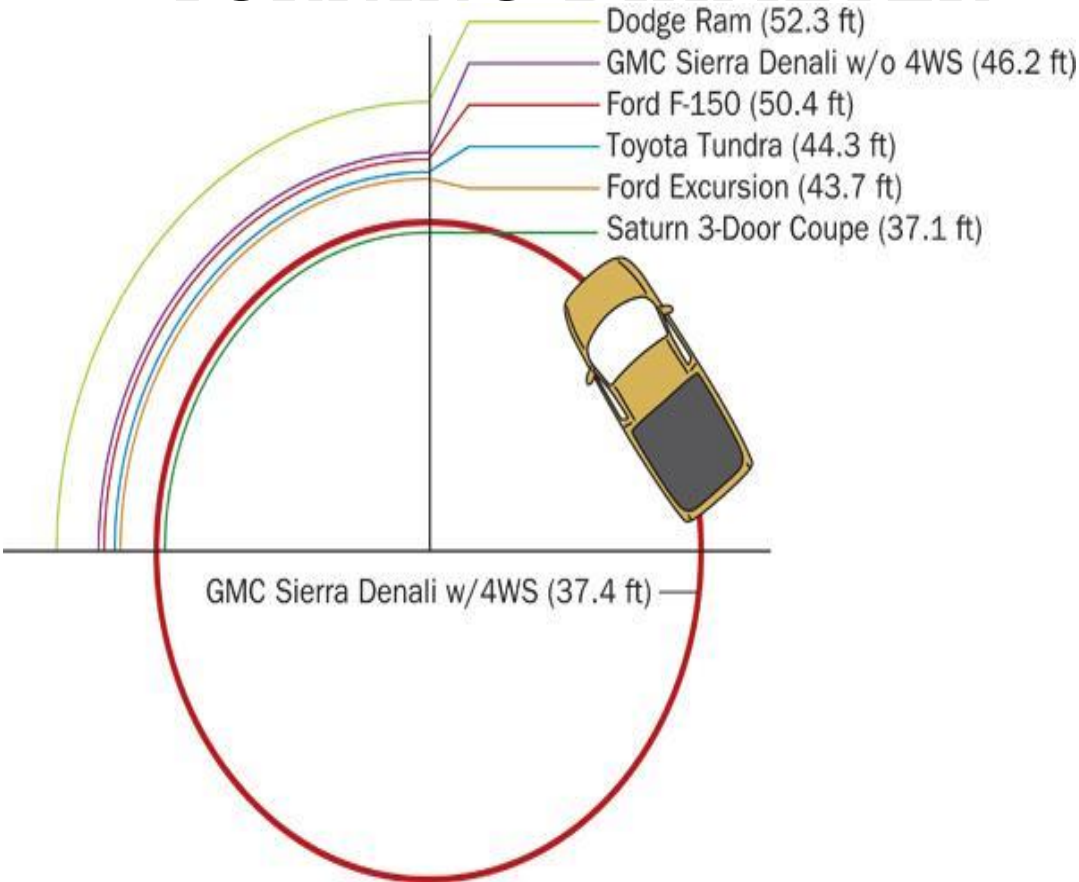


MEASURING TRACK WIDTH



IDENTIFYING A VEHICLE

TURNING DIAMETER



- Also commonly known as turning radius
- Imprint Seen when cars make U turns
- How tight a circle can be driven by vehicle?
 - Longer wheel base equals a longer turning diameter



changed pants



no skid marks



ACCIDENT RECONSTRUCTION

■ Skid Marks

- Formed when someone breaks suddenly and lock the brakes
- Provides evidence of the distance brakes were applied
- Calculation of velocity (speed) can be made from skid marks
- Tires melt on road due to extreme temps caused by friction, audible squeal and often smoke occurs



Yaw Marks

- **Yaw Marks**
 - Produced when vehicle travels in a curved path faster than the vehicle can handle and skids
 - Tires melt on road due to extreme temps caused by friction, audible squeal and often smoke occurs



Scrub Marks

Tire scrubs are caused by a damaged or overloaded tire.

They happen during or immediately after a collision.

Usually curved or irregular width.



Analyzing Skid Marks

Each tire can leave it's own skid mark and should be measured seperately. If four skid marks are present measure each one and divide by 4 to get the average skid legnth.

Drag factor: tires will slide on some surface easier than others and this must be taken into consideration when analyzing skid marks.

Ex:

Asphalt: 0.50 to 0.90

Gravel: 0.40 to 0.80

Ice: 0.10 to 0.25

Snow: 0.10 to 0.55



Braking Efficiency

- Each wheel provides a certain percentage of braking power.
- If all 4 wheels are braking evenly the efficiency is 100% or 1.00
- In rear wheel drive cars the front wheels provide 30% each (.30) and the rear wheels 20% (.20)
-
- For a total of 100% braking efficiency.



Tire Skid Formula

S= speed
(mph)

30= constant

D= distance
of skid in
feet

f= drag
factor

n= braking
efficiency
(decimal
form)

$$S = \sqrt{30Dfn}$$

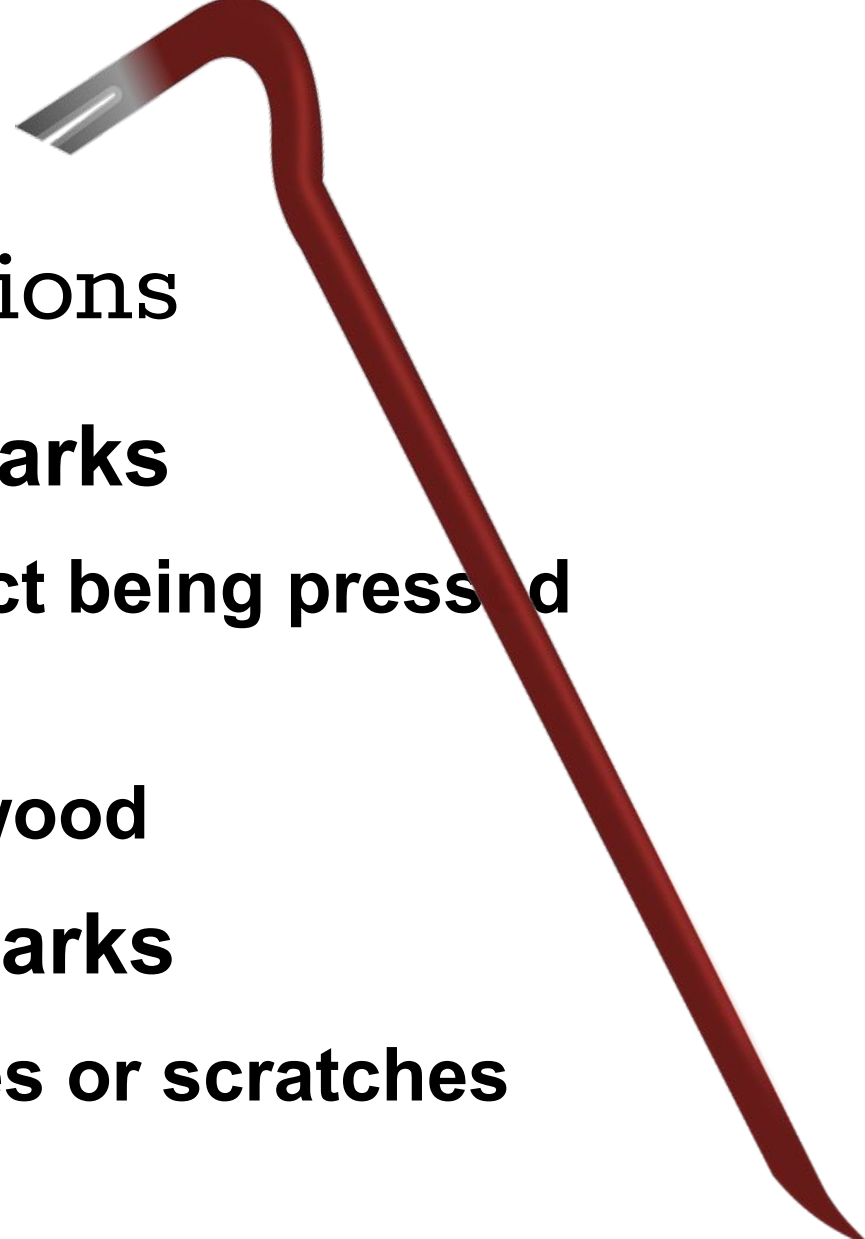


Example



A car skids to a stop, leaving four skid marks with an average length of 60 feet. Since all four wheels are braking, the braking efficiency is 100% or 1.00. The road is asphalt. Skid tests reveal a drag factor of 0.75. How fast was the car traveling?





Tool Mark Impressions

Static (“impressed”) marks

–Caused by a harder object being pressed into another softer object

–Example: crow bar into wood

Dynamic (“striated”) marks

–Caused when a tool slides or scratches across another surface

Example: sliding a key along the side of a car





Cutting (“crushed”) marks

- Caused by pressure being applied to both sides of an object**
- Examples: pliers or wire cutters**

Multi-stroke marks

- Caused by repetitive actions**
- Example: a saw moving back and forth**



Analyzing Tool Marks

1. Photograph and data collected
2. Tool mark can possibly be collected
3. Casting made (silicone or rubber)
4. Area should be dusted for prints before cast is made



DENTAL IMPRESSIONS

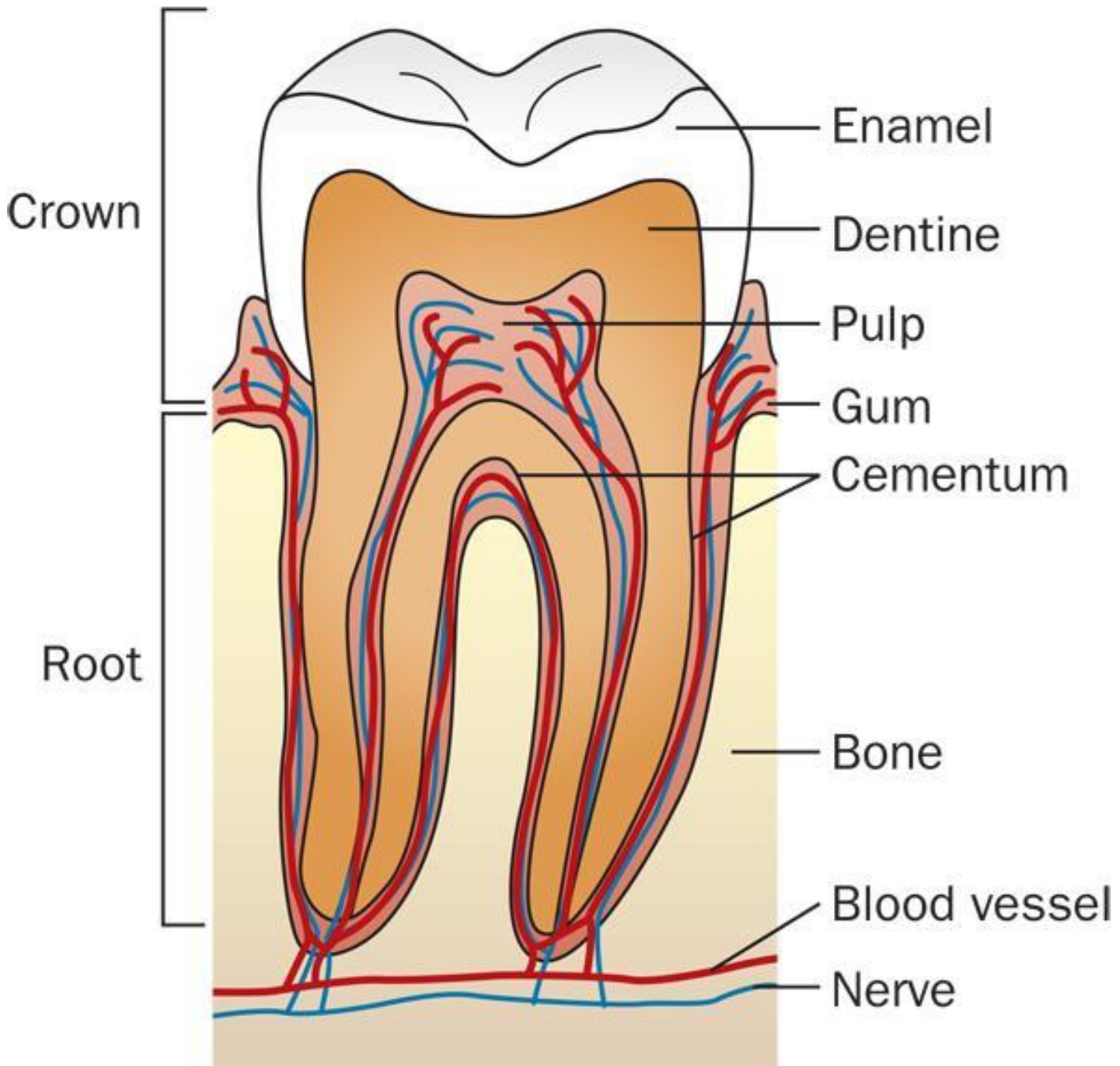
- Dental Impressions, like fingerprints, are generally considered to be individual evidence
 - Factors leading to individuality of teeth
 - Number of teeth/Missing teeth
 - Coloration of teeth
 - Size of teeth
 - Alignment of teeth and distance between teeth
 - Unique fillings, crowns, caps
 - Overall condition of teeth (breakage/chipped teeth, grinded teeth ect...)

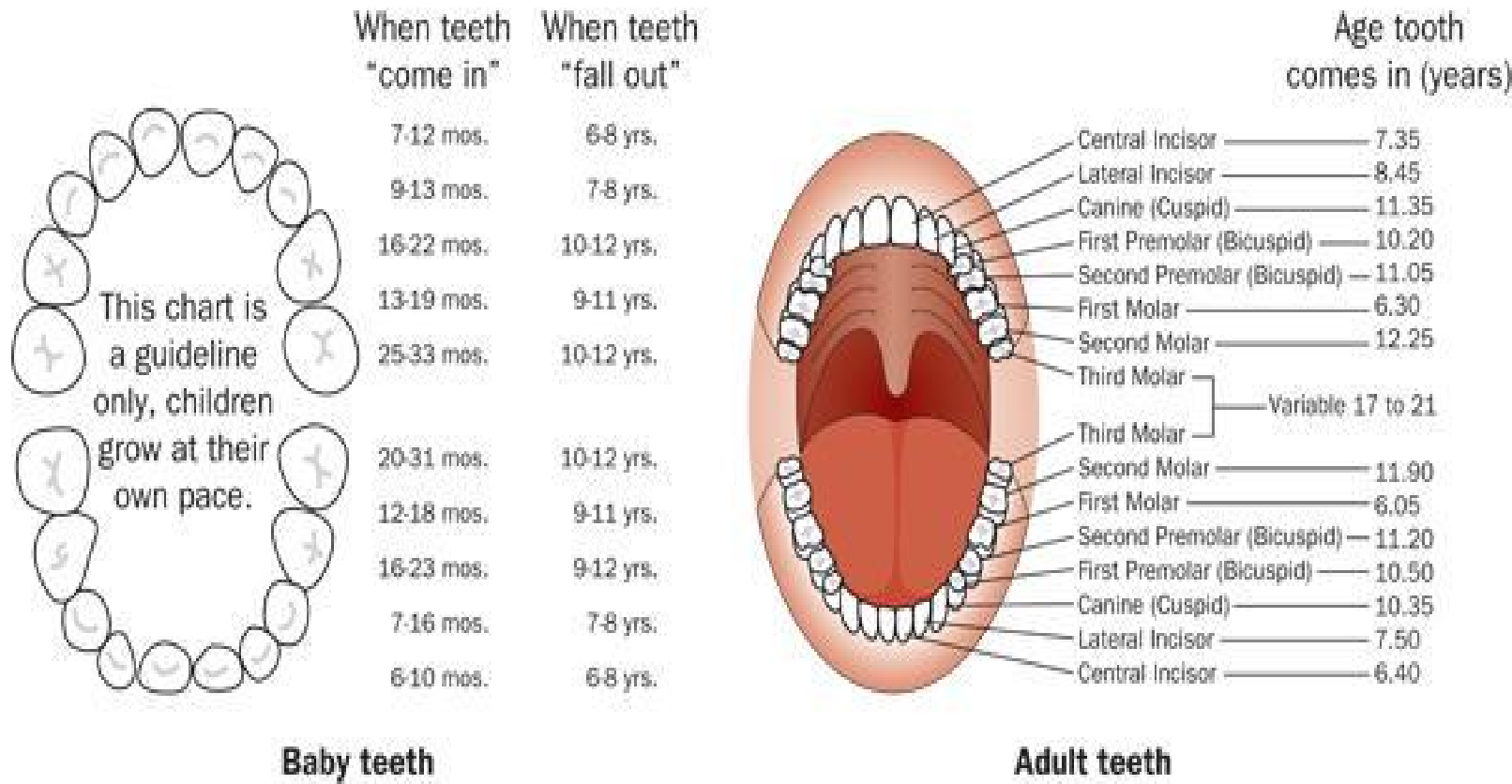


DENTAL IMPRESSIONS/EVIDENCE

- Can be used to identify remains of deceased
- Can be used in profiling and identifying a suspect from unique patterns or bite marks left at the scene of a crime







- Number and type of adult/baby teeth present can be used to approximate age in children



DENTAL IMPRESSIONS

- 32 total teeth (**including 4 wisdom teeth)
 - 16 teeth on top and bottom in adults
 - Central incisors (2) – front, cutting
 - Lateral incisors(2) – both sides of central incisors, cutting
 - Canines (2) – cutting and tearing
 - First premolar (2) - hybrid
 - Second premolar (2) - hybrid
 - First molar (2) – chewing and grinding
 - Second molar (2) – chewing and grinding
 - 3rd molar, wisdom teeth (2)- ***can be variable, not everyone has them
 - Genetics
 - Surgical Removal



BITE MARK COMPARISONS

- **Up to 76 points of comparison**
 - Places where locations on bite where impressions are often detailed
- **Comparison includes:**
 - Dental chipping, surface indentations, distances between teeth, alignment of teeth, angle of mouth arch, absence of teeth
- **Bite mark should be photographed with ruler included as soon as possible**
- **Bite mark should be swabbed, may contain DNA from saliva**



FAMOUS CASES

▪ **Ted Bundy**

- Serial killer who killed over an estimated 50 women
- Bite marks obtained from Florida State University sorority attack
 - 4 attacked, 2 killed
- Escaped from police twice, bite mark evidence led to conviction
- Executed in 1989

▪ **OJ Simpson (Simpson-Goldman Murders)**

- Bloody shoe print (patent) left at crime scene
- Shoe never found
- OJ Verdict not guilty in criminal trial
- Found liable of wrongful death in civil suit after pictures surfaced of OJ wearing the exact type of shoe that made imprint (ALONG with ALOT of other EVIDENCE)

