

FORENSIC SCIENCE FOR YOUNG CSI'S

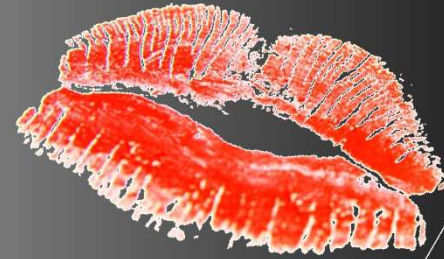


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Portage Northern HS
MSTA March 10, 2012

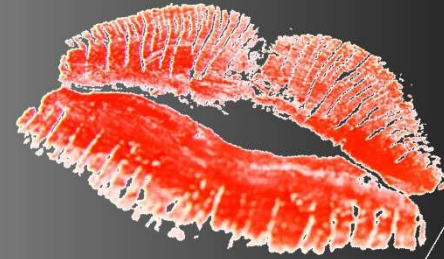


APPROPRIATE TOPICS

- Paper Chromatography
- Fingerprint Identification
- Footwear Patterns
- Fiber Identification
- Blood Typing
- Others



PAPER CHROMATOGRAPHY

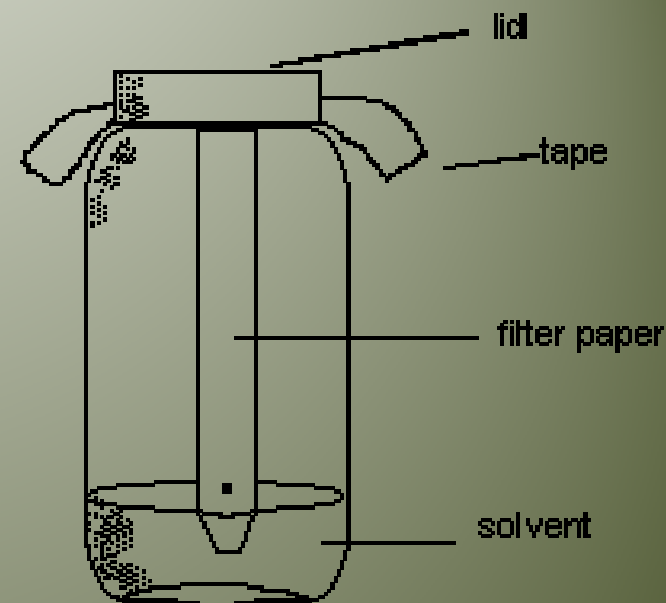
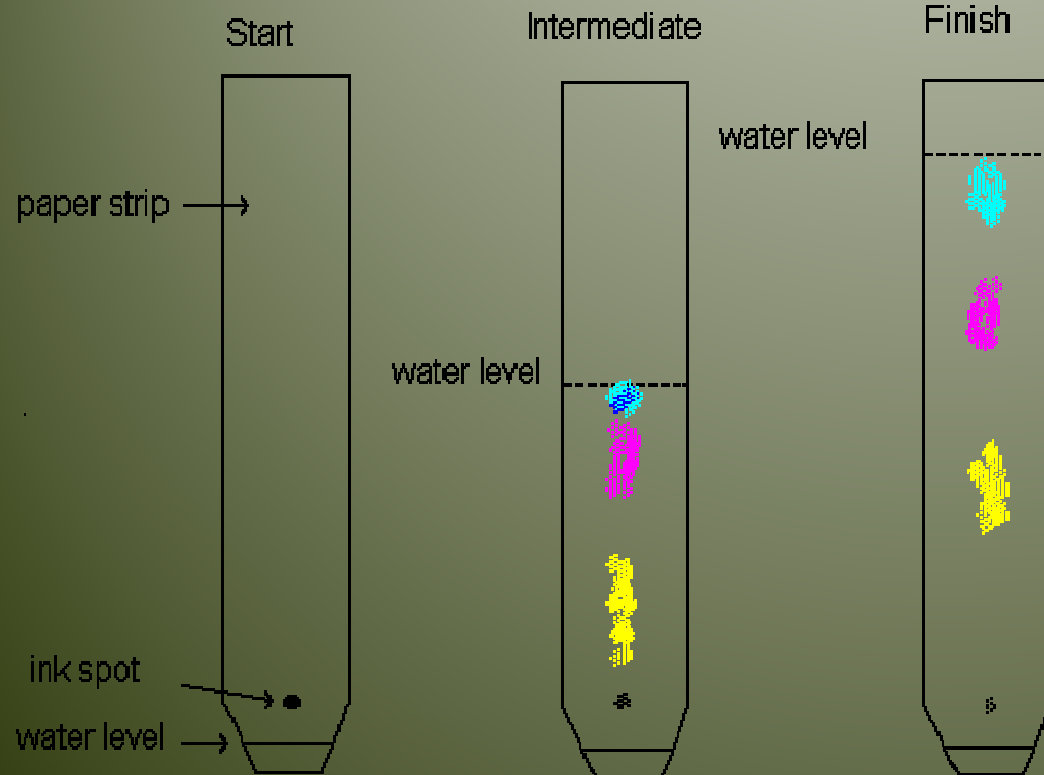


- Chemistry—Separation Science
 - Use watercolor markers
 - Black ink is a mixture of colors
 - Dissolve with water and colors separate based on chemical properties
 - Not all black pens are the same!
- STEM: Mathematics—Retention Factor



PAPER CHROMATOGRAPHY

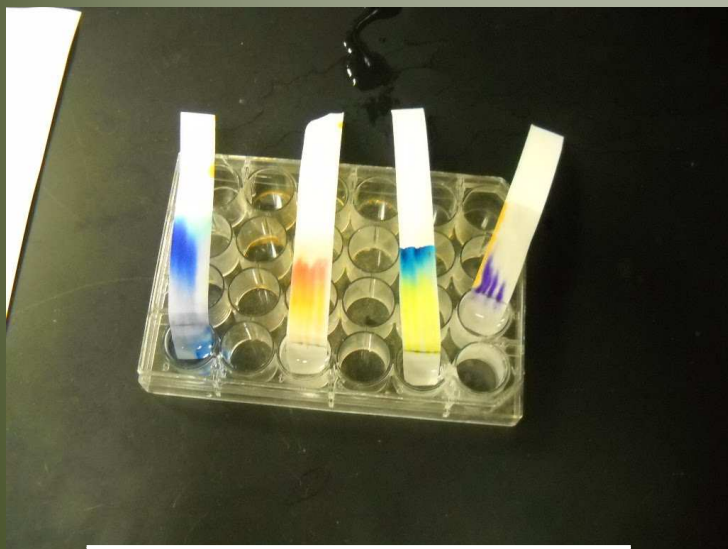
Chromatographic Separation of Black Ink



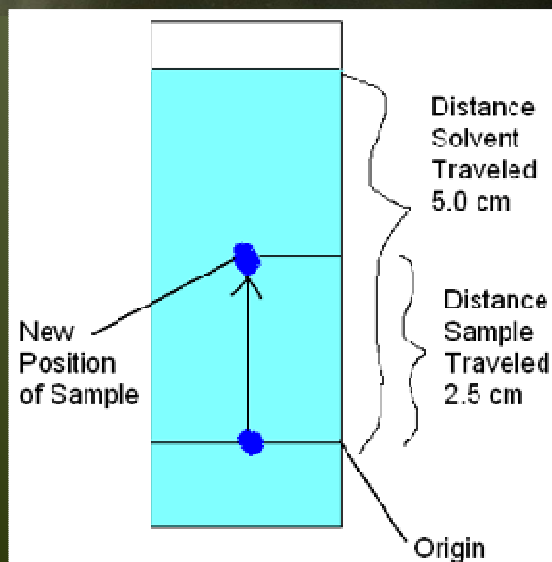
Black Marker Suggestions:

- Mr. Sketch
- Vis A Vis
- Papermate Flair
- Others (test first):
Office Max, Crazy Art,
Office Depot, etc.

ANALYSIS: QUALITATIVE AND QUANTITATIVE



Qualitative

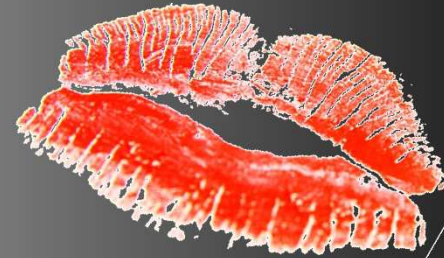


Quantitative

$R_f = \frac{\text{distance traveled by the sample component}}{\text{distance traveled by the solvent}}$

$$R_f = \frac{2.5\text{cm}}{5.0\text{cm}} = 0.5 \text{ (no units, they cancel)}$$

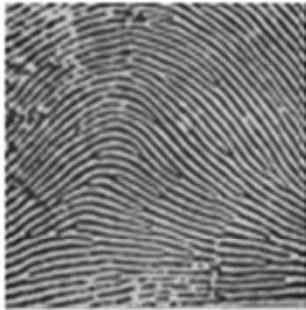
FINGERPRINT IDENTIFICATION



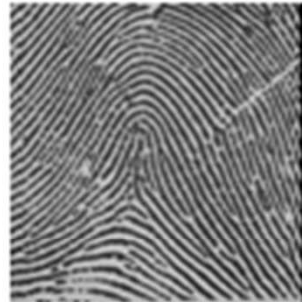
- Biology—Individual differences
 - No 2 people have identical fingerprints, even maternal twins (same DNA)
 - 3 categories of FP: Arch, Loop, Whorl
 - 8 types of Fingerprints
 - Individual characteristics or Minutiae
- STEM: Computer Usage—Live Scan and AFIS (Automated Fingerprint Identification System)



TYPES OF FINGERPRINTS



plain arch



tented arch



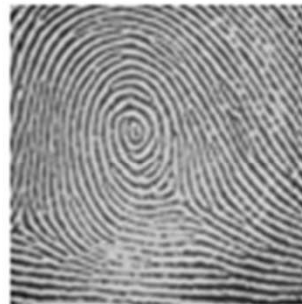
radial loop
left hand



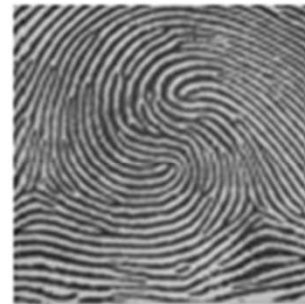
ulnar loop
left hand



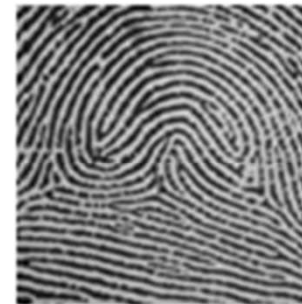
plain whorl



central pocket
loop whorl



double loop
whorl



accidental
whorl

MINUTIAE



a. Bifurcation



b. Dot



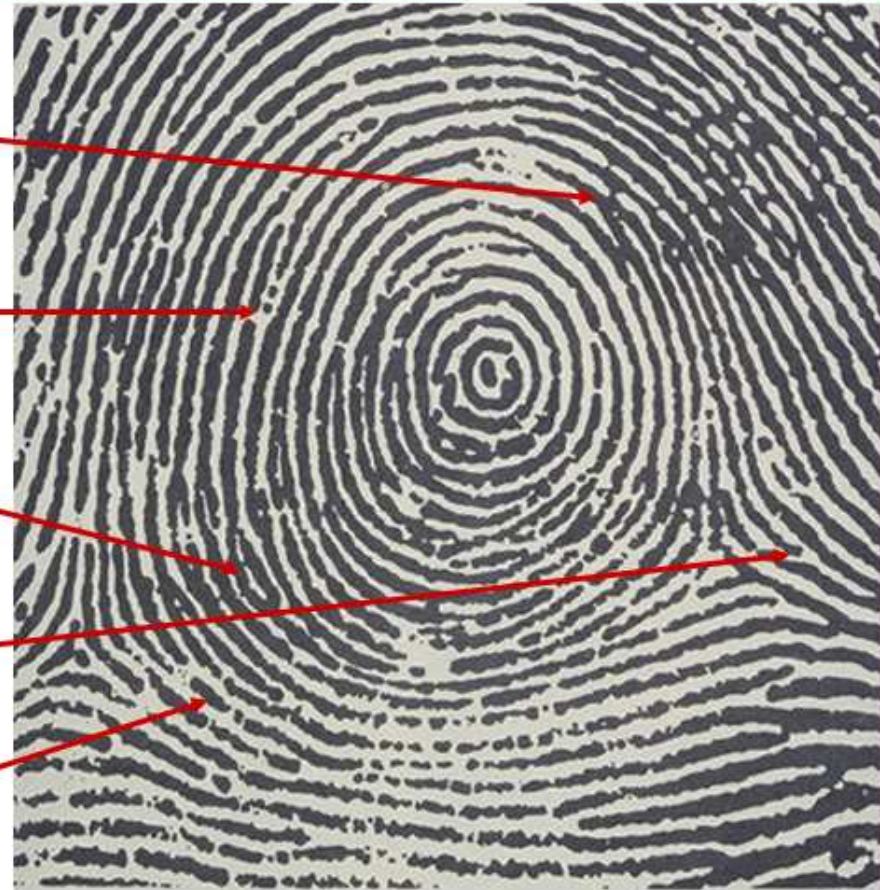
c. Enclosure



d. Ending ridge



e. Short ridge



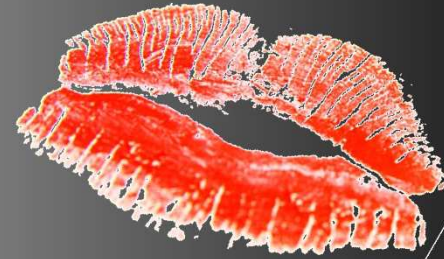
ACTIVITY: ROLLING FINGERPRINTS

- Perfect Print Ink Pads
- Method:
 - Paper at edge of table
 - Hand and wrist parallel to table
 - Roll ENTIRE fingertip; from nail bed to nail bed and fingertip to knuckle crease*
 - Thumb: fingerside to outside
 - Fingers: thumbside to outside



- (a) Rolled Fingerprint
- (b) Plain Fingerprint
- (c) Latent Fingerprint

FOOTWEAR

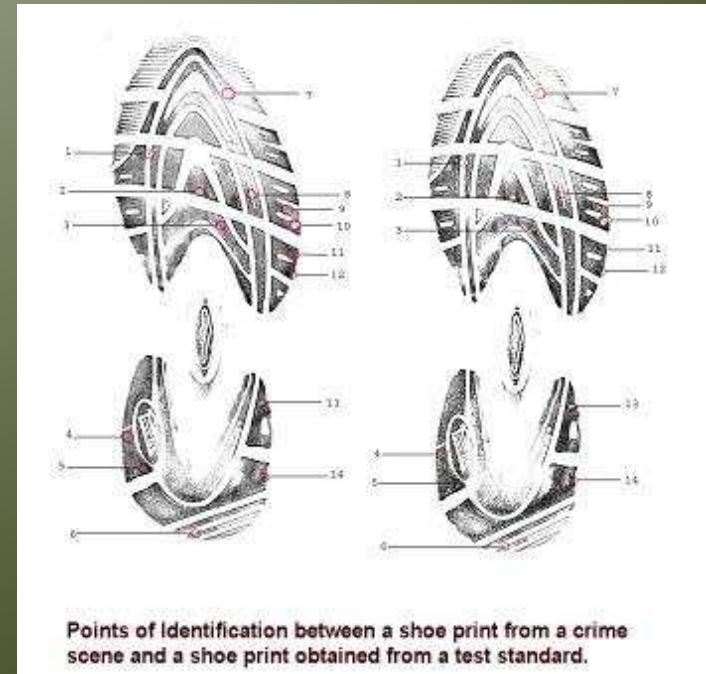


- Physics, Biology, Chemistry, Earth Science
- An identical set of footwear changes as soon as it is worn.
 - Wear pattern (force of body, body mechanics)
 - Additives: glass, gum, rocks, soil, etc.
 - Forensic applications: treadprints; footwear impressions; analysis of glass, soil or other residue (trace evidence)



FOOTWEAR ACTIVITY: TREADPRINTING

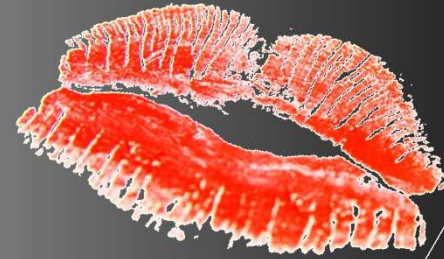
- Use tempera paint (washable paint), white computer paper
- Less is more—too much paint fills in patterns
- Additional Activity: Bio-Foam



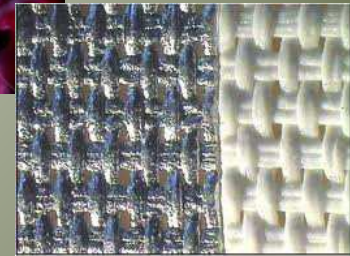
Points of identification between a shoe print from a crime scene and a shoe print obtained from a test standard.

FIBER IDENTIFICATION

- Weave Patterns
- Burn Testing
- Microscopic look at fibers
- Chemical Testing



ACTIVITIES



Burn Testing Supplies:

Goggles

Metal tweezers

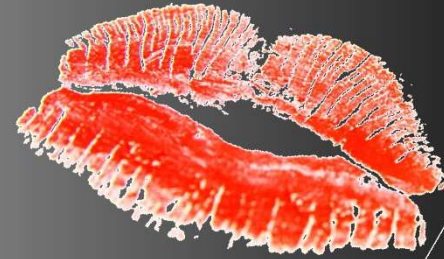
Tea light candles

Fabrics: 100% of various types

Natural : wool, cotton, silk

Artificial: nylon, polyester

BLOOD TYPING



- Biology: blood types are inherited
- 4 Basic Types: A, B, AB, O
- Punnet Squares using blood types
- Simulated blood readily available



BASIC BLOOD TYPE INHERITANCE

Type A: AA, AO

Type B: BB, BO

Type AB: AB

Type O: OO

O is recessive (not strong)

A and B are dominant (strong)

	A	A
A	AA	AA
O	AO	AO

	A	A
B	AB	AB
B	AB	AB

Dad's blood type

Mom's blood type

	A	O
A	AA	AO
O	AO	OO

	A	O
B	AB	BO
O	AO	OO

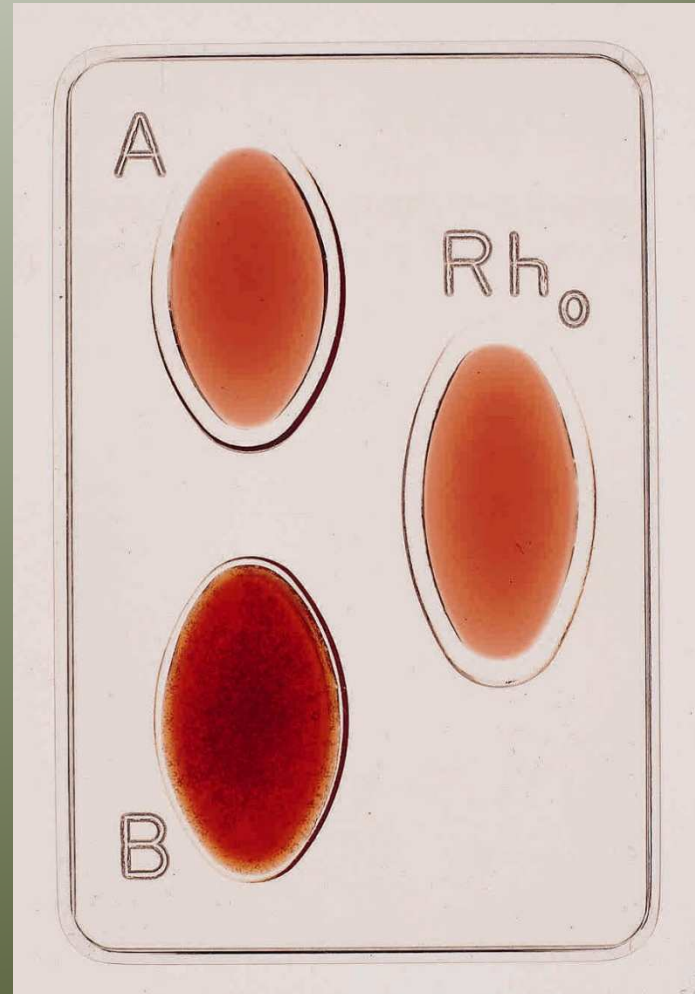
4 possible offspring blood types

BLOOD TYPING LAB

Agglutination

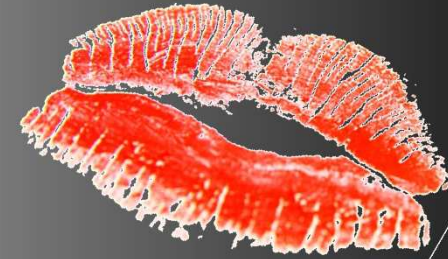
Agglutination Reaction of Blood Typing Sera

Anti-A Serum	Anti-B Serum	Blood Type
Agglutination	No Agglutination	A
No Agglutination	Agglutination	B
Agglutination	Agglutination	AB
No Agglutination	No Agglutination	O



THANK YOU!

HAVE FUN USING FORENSIC SCIENCE TO TEACH SCIENCE



- Contact Information

- kmirakovits@gmail.com

- Website: www.forensicscience-ed.com

- Summer Workshops for Teachers

- Textbook: *Forensic Science, The Basics*

Jay A. Siegel & Kathy Mirakovits

2nd Edition, www.crcpress.com

