

Forensic Science Webinar

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Tasks and Goals for Today

- ▶ Introductions
- ▶ Format for Webinar
- ▶ Sharing Ideas for At Home & Online Instruction
 - ▶ Introductory Activity for a Forensic Science (FS) Course
 - ▶ Fingerprinting
 - ▶ DNA
 - ▶ Serology—Blood Detection, Typing, Spatter
 - ▶ Firearms ID
 - ▶ Mock Crime Scene Online Assessment
- ▶ Other Good Stuff!

A bit about me....

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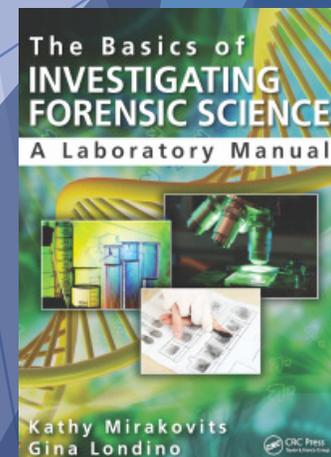
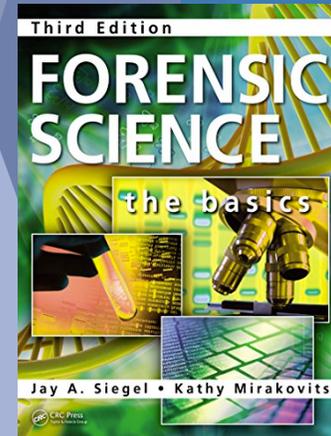
my website: www.forensicscience-ed.com



Greetings from cold, snowy West Michigan!



- ▶ Certified to teach all sciences.
- ▶ Got the FS bug in ~1995. no textbooks, no online groups, no lab materials.
- ▶ Grants, trainings by AAFS, Dr. Neal Haskell, Paul Kish-bloodstain course, 2 summers at Connecticut State Crime Lab and met Dr. Jay A. Siegel.
- ▶ Hired by Portage Public Schools as physics teacher (IB HL Physics)
- ▶ Developed and taught two semester FS courses at PPS for 20+ years.
- ▶ Have conducted summer FS workshops across the U.S. since ~2005, state and national conferences.
- ▶ Developed lab kits for Wards: Blood Spatter (2), Glass Analysis, Magnetic FP, and Accident Reconstruction
- ▶ *Forensic Science, The Basics* (4th Edition out later this year)
- ▶ *The Basics of Investigating Forensic Science* (lab book); 2nd Ed later this year
- ▶ Retired from high school teaching and now teach part time at Kalamazoo Valley Community College (physics and forensic science)
- ▶ Best job ever...Grandma!



Solving a Puzzle ↔ Investigating a Crime Scene

Online Puzzle Activity: Introduction to Crime Scene Analysis

Go to the following website: <https://www.jigsawplanet.com/?rc=play&pid=3234a955bf9b>

Choose a 35-piece puzzle that you would like to complete.

Put it together SLOWLY, NOT LOOKING AT THE FINAL PRODUCT PICTURE, thinking about and answering the questions listed below as you work.

1. What types of strategies/processes/steps do you use as you put it together? List below:
2. How would it affect your success if you had to turn over the pieces (not be able to see the picture)? How would your strategies change?
3. If there were one or two pieces missing, what *actions* would you normally do if not working online and doing the puzzle in person?
4. One piece has the right colors, *but does not fit*. How do you determine it is not part of the puzzle?
5. Compare solving this puzzle to *reconstructing* a crime scene. How is it similar? How is it different?

Teacher Comments (what I am looking for)

- ▶ Strategies: edges, corners, color coordination, shapes
- ▶ Turned over: less obvious, harder to put together, takes longer, loss of traits, must only use shape
- ▶ Loss of piece(s): look on floor, in box, check partner
- ▶ Doesn't fit: wait till finished, do not force
- ▶ Comparisons:
 - ▶ Similar: protocol (process), team work (when in groups), get basics (outline), fill in-fit evidence, some evidence not clear where goes, do not get all the evidence (missing pieces), go back to source when need more evidence, some evidence is not relevant (does not fit)
 - ▶ Different: never get the 'answer', usually do not work alone, have to look for all the pieces and know what to look for, etc.

Fingerprinting

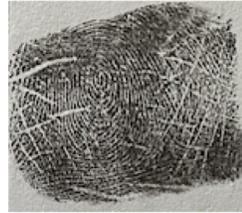


Rec App: [Magnifier w/ Light...FREE](#)

▶ Rolling/inking fingerprints

- ▶ Perfect Print Ink Pads
- ▶ Graphite pencil [example](#)
- ▶ Tempura Paint (Dollar Store)

Ink



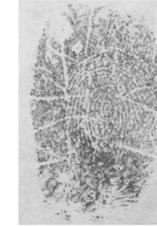
Graphite



Acetate/Graphite



Paint



▶ Henry System of Filing FP [Worksheet](#)

▶ Dusting/Lifting FP at home

- ▶ Fingerprint dust & nylon brush
- ▶ Cocoa powder & makeup brush
- ▶ Cornstarch & makeup brush
- ▶ Eye shadow & makeup brush



▶ Comparing Lifted FP and Exemplars: PowerPoint or Google Slides

- ▶ [Mirakovits Comparison FP](#)

Prints on the Cheap using washable paints

Fingerprints, shoe prints, tire impressions

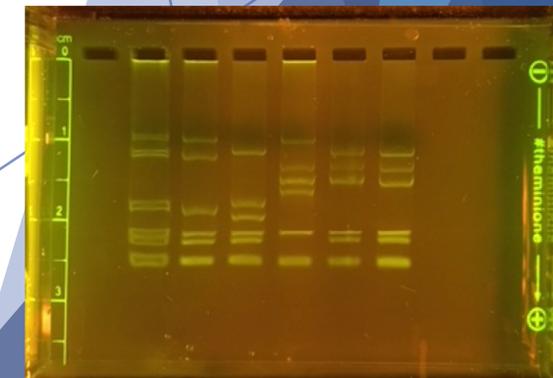
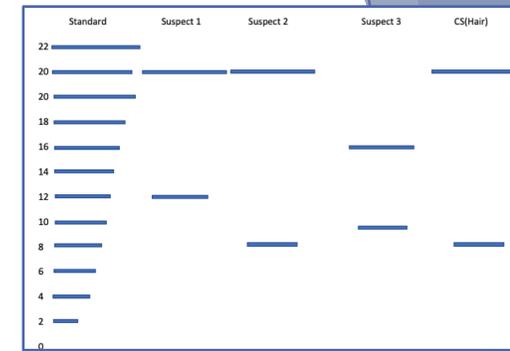
- ▶ Washable paint
 - ▶ Prang 8 oz.
 - ▶ Dollar Tree
 - ▶ red & black
- ▶ Poster paper roll
- ▶ Cotton balls



DNA Activities

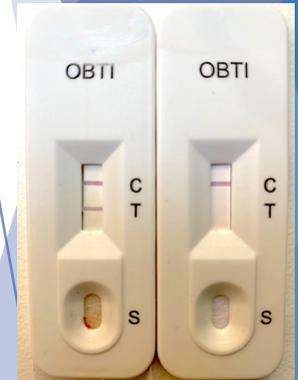
- ▶ Paper-pencil gel electrophoresis [P/P DNA Handout](#) (very basic)
- ▶ Gel electrophoresis animations online
 - ▶ Very detailed (adv bio): <https://www.youtube.com/watch?v=saJIWFUGEbw>
 - ▶ Learning Link: <https://learninglink.oup.com/access/content/life-12e-student-resources/hillis12e-life-chapter-15-animation-1>
 - ▶ Uses MiniOne system: https://www.youtube.com/watch?v=Swrr_EW8z9Y
- ▶ Biointeractive online activity: <https://www.biointeractive.org/classroom-resources/dna-profiling-activity>
- ▶ DNA Simplified Website (very basic)
<http://www.forensicsciencesimplified.org/dna/index.htm>
- ▶ DNA Electropherograms: <https://projects.nfstc.org/fse/01/01-13b.html> (videos no longer work-flash, but I like the diagrams here)
- ▶ Research Project: Analyze a case; either Innocence Project or GED Match
- ▶ Video MiniOne operation: can embed questions (Edpuzzle) and/or use results for crime scenes

(Dr. Suris Edpuzzle: <https://edpuzzle.com/media/5fda0feeceb26b4215d7f838>)



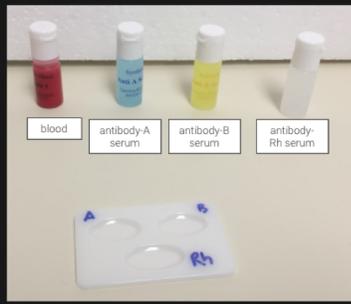
Serology: Blood Activities

- ▶ Is it blood? Is it human or animal?
 - ▶ Kastle-Meyer Phenolphthalein Test and Hexagon OBTI Test
 - ▶ Did as demo: videotaped myself doing the tests and they completed worksheet
- ▶ Blood Typing
 - ▶ Loss of Adobe Flash: Blood Typing Game on nobelprize.org
 - ▶ Alabama website:
 - ▶ https://accessdl.state.al.us/AventaCourses/access_courses/anatomy_ua_v17/04_unit/04-05/04-05_introduction.htm
 - ▶ Have to mix A, B and Rh Sera and blood samples, then read test. Determine transfusion.
 - ▶ Worksheet that goes along with the site. I made a KEY for the worksheet.
 - ▶ Not as fun as Nobel Prize, but it works in a similar manner.



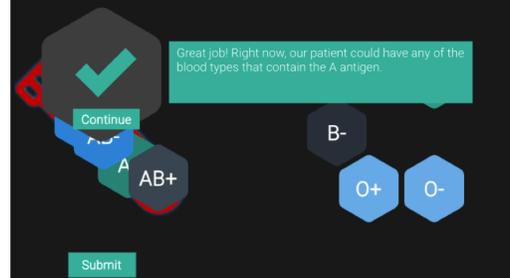
Start the Test

Start by adding the blood sample to each of the three marked wells in the sample tray. Click the blood sample in the picture to begin.



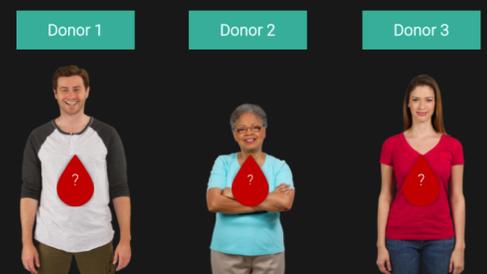
Possible Blood Types

You know that A antigens are present. So, what blood types could our patient have? Drag them into the vial.



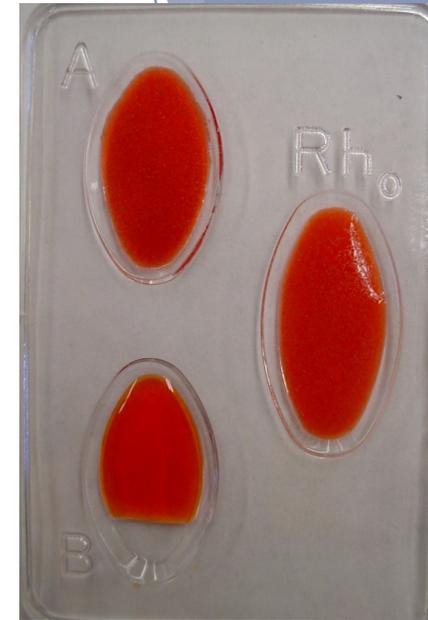
The Potential Donors

The doctor has three potential donors. Before she can decide on a donor, she needs to know their blood types. Choose a donor to test.

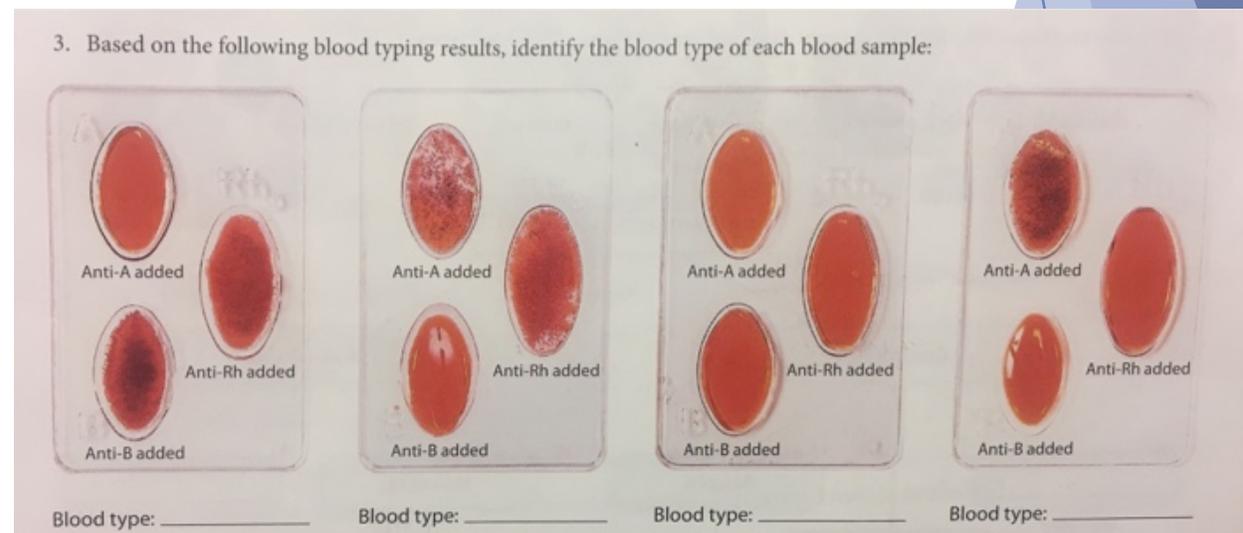


Serology: Blood Activities

- ▶ Blood Typing Kit (Wards Whodunit)
 - ▶ Run the tests, photograph, and students read results
 - ▶ My students had the reagents and ran the tests
- ▶ Fake Blood Recipes:
<http://sciencespot.net/>
- ▶ Edpuzzle Google Form Blood Typing Game
(credit to FS Teacher Tribe)
<https://edpuzzle.com/media/601229e41a30314261a18f1a>
- ▶ Punnet Squares



taken from Internet

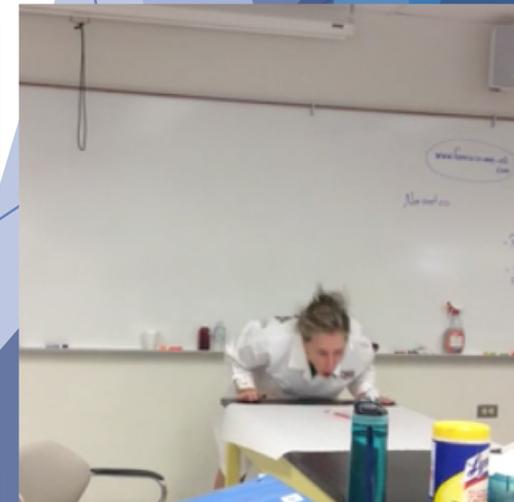
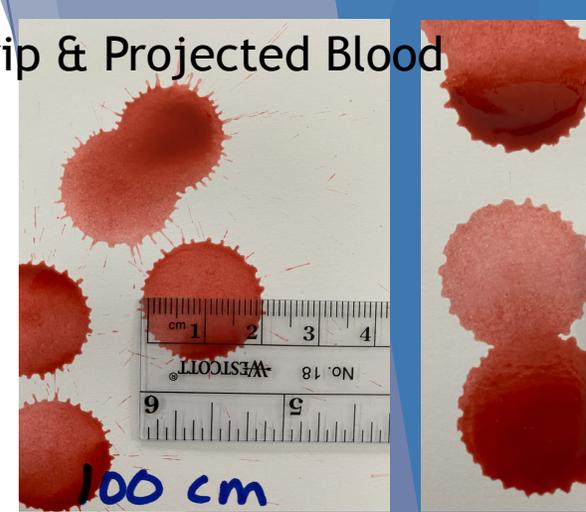


Serology: Blood Activities

- ▶ Bloodstain Pattern Analysis (aka Blood Spatter)
 - ▶ Vertical & Angled Blood Photo Lab (using home lab kit drip & projected blood)
 - ▶ If do not have blood, made a worksheet with 10 cm-200 cm blood drops w/scale
 - ▶ Can you make fake blood spatter blood?
 - ▶ Results are questionable for accuracy
 - ▶ I did 2 ml paint to 8 ml water (1:4 Ratio)
 - ▶ Halloween blood too thick...must thin to get spines/satellites
 - ▶ Analyzing bloodstains at home (Graphs, Trig for angles and Photo Evidence)
 - ▶ Making transfer bloodstains with the red paint (shoe prints and fingerprints)
 - ▶ Students watched the demo videos (6) of various bloodstain patterns and how they are created, sketching them and making note of what kinds of crime scene activity could create them
 - ▶ Great link for slow motion videos (~200) of blood spatter and gunshot:

<https://alvideo.ameslab.gov/archive/bpa-videos/>

Drip & Projected Blood



Firearms ID

- ▶ Lots of animations on semi-automatic weapon operation on YouTube <https://www.youtube.com/watch?v=qDKOq509YiU>
- ▶ Really good source for lab materials: www.precisionforensictesting.com
Chris Monturo...If you order, use code “KATHY” & get a **10% discount!** 😊
- ▶ What I did online:
 - ▶ Background information: Textbook and overview-[Firearms ID Module Overview](#)
 - ▶ Firearmsid.com webquest. Worksheet shared.
 - ▶ Photographs for identification lab. Shared.
(used iPhone mount for stereo scope)

Bullet 4



Bullet 4 L&G Count

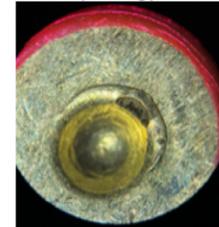
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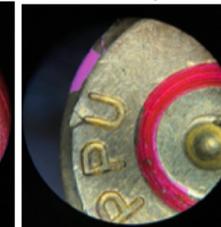
Cartridge #5



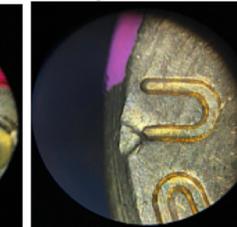
close up of firing pin



mark near rim by "U".



close up of mark



mark on side near rim



close up of rim mark



Mock Crime Scene

- ▶ I did two mock crime scenes in this semester course. Midterm & Final
- ▶ Midterm CS
 - ▶ Group and Individual Assessment. [Rubric](#) [Peer Eval "Rat Out" Form](#)
 - ▶ Student Instructions in Canvas. [Canvas Module Overview](#)
 - ▶ One week
 - ▶ Zoom Chat Team midway
 - ▶ PowerPoint (or Google Slides) Presentation
 - ▶ A BRIEF summary of the crime including photos/sketch, if appropriate.
 - ▶ All the evidence each team member processed and how it relates to the crime.
 - ▶ A flow chart or timeline of events for the crime as determined by your team.
 - ▶ Your team's summary of the crime: Can you determine a suspect or suspects who you would recommend be arrested and for what crime? What is your basis for this recommendation?
 - ▶ Tips
 - ▶ First day: What evidence do you see? What would you collect? Sketch scene/label evidence
 - ▶ Give out evidence a little at a time (DNA is always last!).
 - ▶ Students ask for evidence/exemplars. Never GIVE them everything, make them think!
 - ▶ Red Herrings



Photos-Midterm CS

Photos Case #MTCS201710



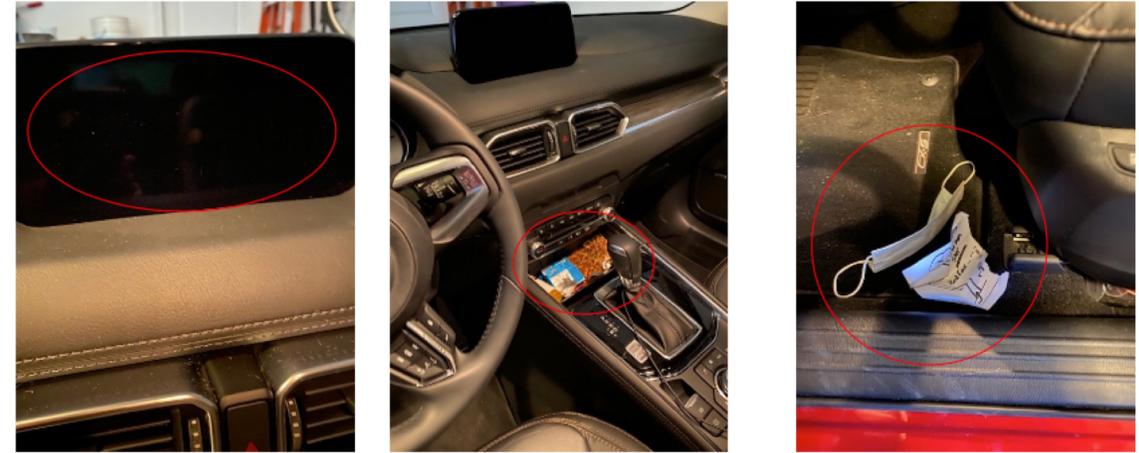
Recovery of vehicle 17 October 2020. Construction site of 3956 Meadow View Trail.

Photos Case #MTCS201710



Treadwear impressions outside driver's side door. Investigators found three different tread prints. Two are pictured here.

Photos Case #MTCS201710

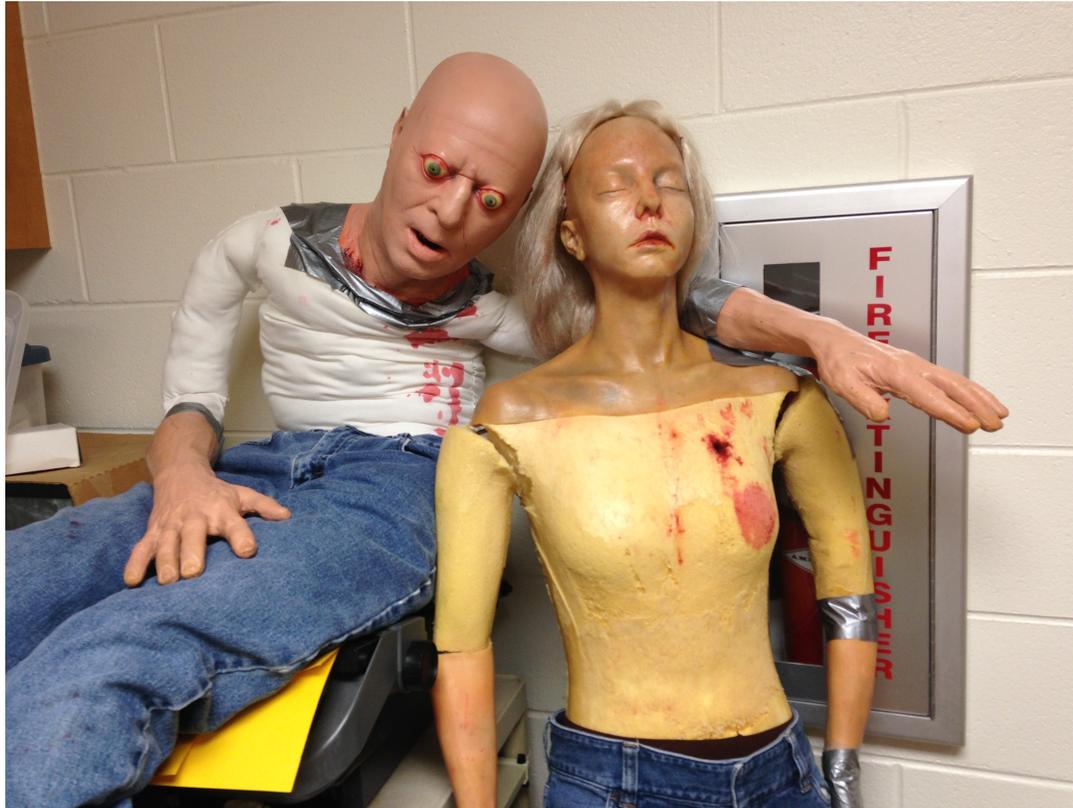


Items of interest in car (left to right):
Touchscreen on console, items in front storage bin, items found driver's side floor near door opening.

Photos-Final Exam CS



Survey Time (we will wait for you) 😊



Other

- ▶ Facebook Groups
 - ▶ Forensic Science Teachers
 - ▶ Forensic Science Teacher Tribe
- ▶ The Forensic Teacher Magazine—FREE
 - ▶ <http://www.theforensicteacher.com/intro.html>
- ▶ Where can you find Videos/Documents we talked about?
 - ▶ www.forensicscience-ed.com Click the tab “Texas Workshop 2021”
 - ▶ Please do not put out on the Internet for public use
- ▶ Summer 2021 Teacher Workshops
 - ▶ Western Michigan University in Kalamazoo, Michigan
 - ▶ July 12-16 OR August 2-6
 - ▶ Info at www.forensicscience-ed.com and how to register your interest