



Forensic Science Activities Teacher's Guide

This teachers' guide is intended to provide specific information about how to implement the forensic science activities described in the accompanying materials.

All accompanying materials are available online at

<http://www.colorado.edu/Outreach/BSI/k12activities/forensics.html>

Goals for implementing forensic science activities:

- Expose students to attention-grabbing science activities that will spark greater interest in the sciences
- Help students understand the processes of scientific investigation (*Standard One*)
- Help students develop better laboratory and data-collection techniques
- Help students understand the inter-relationships among science, technology, and human activity as it applies to forensic science and the criminal justice system (*Standard Five*)
- Help students learn how crime scenes and evidence are processed and analyzed so that they are able to be better informed citizens and potential jury members

Materials:

1.) Props to construct crime scene.

Props can be real or constructed from various other materials. For instance, a cardboard box painted to look like a TV can substitute for a television.

For all crime-scene scenarios:

- plastic tarp to cover floor
- masking and labeling tape to mark location of crime scene "walls"

Crime Scene A: "Burglarized Bronco Fan":

- couch
- fabric cover for the couch
- coffee table
- wall hanging hook, on which one could hang a clothes hanger
- clothes hanger
- television
- something to represent one door frame and one window frame (could be cardboard cut-out of a door)
- clear plastic or blue cellophane cut into pieces to represent broken window glass
- two different pairs of men's shoes

- one pair of women's shoes
- powder for making footprints (cornstarch, baby powder, chalk, etc.)
- hair (some human, some cat)
- pizza sauce
- animal blood
- cigarette butt with lipstick print
- anything else you want to include

Crime Scene B: "Cyanide Cocktail":

- couch
- coffee table
- something to represent one door frame (could be cardboard cut-out of a door)
- one pair of men's shoes
- one pair of women's shoes
- powder for making footprints (cornstarch, baby powder, chalk, etc.)
- hair (some human, some cat)
- red food coloring
- animal blood
- 4 martini glasses (one with lipstick print)
- martini shaker (optional)
- chalk or tape to make outline of body
- table to represent kitchen bar
- cutting board and knife (can use a cardboard "knife" covered with foil)
- napkin
- vial containing white powder (flour or cornstarch)
- lemon cut into wedges
- anything else you want to include

Crime Scene C: "Hacked High –Tech Lab":

- desk
- desk chair
- computer
- box of tissues
- crumpled tissue with lipstick print
- garbage can
- something to represent one door frame (could be cardboard cut-out of a door)
- clear plastic or blue cellophane cut into pieces to represent broken window glass
- three different pairs of women's shoes
- powder for making footprints (cornstarch, baby powder, chalk, etc.)
- hair (some human, some cat)
- red food coloring
- animal blood
- anything else you want to include

2.) Materials for processing the crime scene:

- Protective clothing for student crime scene investigators to wear – booties, gloves, hair covers, lab coats – Gloves are the most important to stress the importance of avoiding contact with potentially contaminated blood, even though

in this activity students will not be using any human blood. It is all simulated or of animal origin. The other protective gear is optional.

- Re-sealable plastic bags to serve as evidence bags
- paper (printer paper or butcher paper) and tape for making paper bindles
- envelopes
- evidence labels or tags
- Cotton squares or threads to collect liquid stains
- Flashlights to illuminate footprints
- Forceps
- Rulers, pencils, graph paper to make sketches
- Disposable cameras
- Permanent markers

3.) Materials for blood stain activity

- animal blood
- cotton squares or threads to collect blood
- red food coloring
- crushed fresh red berries or beets or other red vegetable
- tomato sauce or ketchup
- red paint
- hydrogen peroxide
- phenolphthalein (powdered)
- potassium hydroxide (powdered)
- zinc (powdered)
- 95% ethanol
- eye droppers *or* pasteur pipettes and bulbs
- blood typing kit (Wards Simulated ABO and Rh Blood Typing kit # 36 W 0019, \$36, 1-800-962-2660)

4.) Materials for lipstick and lip print activity

- Four different tubes of lip stick , all the same color or very close (recommended brands include Covergirl, Wet’N’Wild, and Revlon)
- Filter paper (Whatman Number 1 works well) in sheets or circles large enough to cut-out 8 inch x 1/2 inch strips
- pencils
- small glass beakers (25 ml or 50 ml)
- small petri dishes or other loose covers for beakers
- graduated cylinders (50 ml or 100 ml)
- acetone (can be purchased at a hardware store)
- rubbing alcohol (70% isopropanol)
- squares or white paper for “lip prints”
- envelopes

5.) Materials for hair analysis

- Cat hair
- Human hair (from at least four different people with relatively different hair, e.g. long black, short blonde, medium length curly red, medium length straight brown)

- Other animal hair (dog, rabbit, deer, horse, etc.)
- Microscope slides
- Microscopes
- Water in dropper bottles *or* small beakers with eye droppers
- coverslips

Outline:

1.) Provide students with information about how to process and analyze a crime scene. You may wish to visit the following web sites for specific information on how to process a crime scene.

U.S. Department of Justice
 Federal Bureau of Investigation
 HANDBOOK OF FORENSIC SERVICES, Revised 1999
<http://www.fbi.gov>

“Collection and Preservation of Evidence”
 by George Schiro
 Forensic Scientist, Louisiana State Police Crime Laboratory
<http://www.mnsinc.com/dfettero/f2cont.html>

You may wish to demonstrate some of these techniques or ask a law enforcement official to visit your class and discuss or demonstrate these techniques. Local police officers are often very receptive to appearing as guest speakers, and students enjoy hearing about techniques from someone who actually uses them in “real life” situations.

2.) Choose one of the three crime scene scenarios provided or invent your own. Only one of the three scenarios provided includes a murder. If you wish to modify either of the other scenarios by including a murder, that could easily be done by adding a tape or chalk diagram of the body and a description of the victim. I have purposefully attempted to minimize violence in these scenarios.

3.) Set-up the crime scene in an area of the school in which you can prevent disturbance or tampering. Refer to the crime scene diagrams for instructions. You may add any extraneous materials that you want. Crime scenes are full of items that have no relevance to the crime.

4.) Distribute the handouts (“**The Case of the Burglarized Bronco Fan**”, “**The Case of the Cyanide Cocktail**”, or “**The Case of the Hacked High-Tech Lab**”) that accompany the crime scene you have set-up. If you are creating your own, write a brief summary of the crime scene and description of the victim. Allow students to investigate the crime scene according to the guidelines that have been provided. In a best case scenario, students should have 2 hours to investigate a complex crime scene. You may consider having students complete it over the span of two days or keeping the amount of extraneous material in the crime scene to a minimum. Collect the evidence they retrieve from the scene and put it aside.

5.) Distribute the handouts (“**The Case of the Burglarized Bronco Fan – continued**”, “**The Case of the Cyanide Cocktail – continued**”, or “**The Case of the Hacked High-Tech Lab – continued**”), which describe the three suspects in the crime. Discuss with students what steps they might consider doing next.

6.) Have students complete the three analysis activities (lipstick, blood, and hair). Instead of returning the actual evidence that they collected from the crime scene, distribute packets of evidence and samples from suspects that you have prepared according to the instructions for each activity. It is recommended that you attempt only one activity per day. The lipstick analysis requires samples to sit overnight. The hair analysis may also require two class periods.

7.) Ask students to present their results. This can be done in a variety of ways. a.) Students may turn in written reports. b.) Students may have a class discussion of the evidence in which they decide which suspect is most likely guilty, or c.) students may stage a mock trial in which they act as expert witnesses presenting the evidence.