

# SciGirls Activity 12

## Forensic Science



### Icebreaker

Observe how the appearance of ink changes when viewed by an infrared camera!

#### SciGirls Skill: Observing

#### Guide your girls as they

- 1) Write their first name and the type of pen they're using at the top of a blank sheet of paper.
- 2) Take another marker, and write their name and new marker type below the first sample. Continue with as many different markers as they wish.
- 3) Go into a room that can be darkened. Set the video camera to "night vision."
- 4) Turn out the room lights, making the room as dark as possible. View the paper through the camera's viewfinder.
- 5) Study the writing samples on the page. Which samples show up clearly in the viewer? Which samples are so faint they are hard to read or disappear completely?
- 6) Take a pen that shows up clearly in the camera viewer, and write a message on a new sheet of paper. Now take a marker that seems to go invisible, and scribble over the message. Take the paper into the darkened room, and view it with the night vision camera. You should be able to read the message just fine!



**SciGirls Suggestion:** You'll want to explain how the light spectrum goes beyond light that we can see with our eyes. Girls have likely heard the terms *ultraviolet* and *infrared*, but they may not understand them well. Use this activity to introduce girls to the full light spectrum.



#### You'll need:

- a home video camera with "night vision" option
- several brands and varieties of black ink pens and markers
- varieties of markers of various colors
- white office paper
- a darkened room

## Investigation

### Forensic Science

We're Kalia and Carolyn. Carolyn's sister Lizzy was about to celebrate her birthday when a crime took place. Somebody trashed Lizzy's party set-up! We found traces of fingerprints, hairs and fibers, and even spit (gross!). We wondered how we could analyze the hairs to identify the culprit. Our question: How can we match the hairs from a crime scene to one of our suspects?



For each group of 4 girls, you'll need:

- a laser pen and laser safety goggles
- stiff construction paper or a Manila folder
- white office paper
- scissors
- cellophane or masking tape
- a marking pen
- a meter stick or standard carpenter's tape measure
- a centimeter ruler
- a dimly lit room
- a notebook



Find out more about Carolyn and Kalia's investigation at [pbskidsgo.org/dragonflytv/show/forensics.html](http://pbskidsgo.org/dragonflytv/show/forensics.html)



Check out this investigation on the SciGirls DVD. Select "Forensic Science" from the main menu.



## SciGirls Want to Know

How can we match the hairs from a crime scene to one of our suspects?

Guide your girls as they

- 1) Carefully cut out small "frames" from the construction paper or Manila folder.
- 2) Carefully cut off a single hair from their head. Tape the hair so it stretches across the window of the frame.

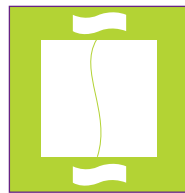


figure 1

- 3) Tape a white sheet of paper onto vertical surface (wall or other surface the won't be marred by the tape), to act as a viewing screen.
- 4) Put on the laser goggles. From a distance of about 6 feet away from the paper screen, turn on the laser, and hold the frame with the hair right up to the laser, putting the hair directly into the beam.

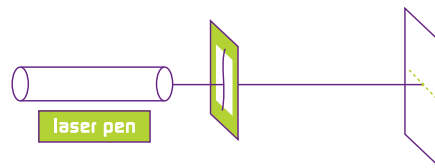


figure 2

- 5) Use a marking pen to trace the pattern of light and dark spaces that appear on the screen. Here's how the drawing might come out.



figure 3

- 6) Each girl should make her own drawing. Be sure that the distance from each girl's frame to the screen is always the same. Do not expect the spacing of the drawn dashes to be the same for each girl.



### SciGirls Secret

Notice that the spacing of the laser light spots changes as the distance from the laser to the viewing screen changes. Pick a distance that is manageable, then stick with it throughout all the measurements. And don't forget the laser-safe goggles!



## SciGirls Synthesize Data and Analysis

- 1) Use the centimeter ruler to measure the spacing of the dashes in the drawing. See the two samples below. Measurements are made from center to center.

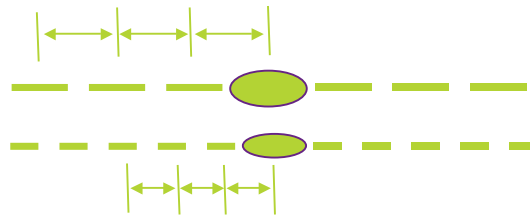


figure 4

- 2) Notice how the spaces in the top drawing are wider than the spaces in the bottom drawing. The spacing is a function of hair thickness. It's possible there will be two girls with similar spacing in their drawings, but to a great extent, each girl's measurement will be unique. Thicker hair results in a closer spacing (bottom sample), while thinner hair results in a wider spacing (upper sample).
- 3) You can set up a mystery exercise with some prepared samples of hair already in frames. Designate one as the "crime scene" hair, and the remainder as "suspect" samples. Only one of the suspect samples should match the crime sample. Give the girls the challenge of matching the crime scene fiber to the correct suspect.

## Keep Exploring!

Use a black light as a way to explore how "hidden" evidence comes to light under different parts of the light spectrum. Collect samples of various hand lotions and creams. Put a small dab of each onto a piece of white paper. Go into a darkened room, and turn on the black light. Look for samples of lotions which fluoresce (glow) under black light. Read the ingredient label of the lotion to try to identify the ingredient that is responsible for the glow.