Crime Scene Investigations (CSI)

Activity #1: Finger Printing (15 min)

Supplies:
Ink pad
Blank paper or paper with square for the thumb print
Glass mirror, glass cup or other glass object
Dusting powder
Transparent tape
Fingerprint classification guide (see next page)
Wet Ones/cleansing cloth

Procedure:
1. Have student write his or her name on front of the square.
2. Have students practice making a finger print by first placing the thumb on the ink pad, and then rolling it from left to right (if using the right hand) onto a piece of scrap paper. If using the left hand, roll from right to left.
3. When the student feels comfortable with making a GOOD print, have the student roll it onto the back (white side) of the provided square of paper.
4. Have student clean off his or her thumb with a Wet One or some other cleansing cloth.
5. Time permitting, have the student make a print on a glass surface using the other (uncleaned) thumb.
6. Ask the volunteer to dust the thumbprint with the dusting powder. Blow off or tap off the excess powder. Use a piece of transparent tape to 'lift' the print off of the mirror and put the tape and print onto the dark square on the front of the paper.
7. Study it with the magnifying glass.
8. Classify the print (ink or dust powder version) as one of the four types: arch, whorl, loop or 'accidental'.
9. Go to board and put a check mark under the category that matches either (but not both) of the thumb prints.
10. Give labeled squares to volunteers who will laminate and return after class.
11. Have a student volunteer make a bar graph and tabulate the responses for the class.

Types of Fingerprints

The FBI classifies fingerprints into 4 main patterns.

The Arch

The Whorl

The Loop

The Accidental

The ***Arch*** is shaped like a hill and can be either high or low. The ***Whorl*** is a pattern of circles that looks like a target. The ***Loop*** looks like an upside down U and can slant left or right. The ***Accidental*** is made up of odd patterns, usually a combination of the other 3 patterns.

Possible Suspects: ____________________

____

Date: ____________________

- ☐ Loop
- ☐ Whirl
- ☐ Arch
- ☐ Accidental

Notes:

Possible Suspects:

Date:

- ☐ Loop
- ☐ Whirl
- ☐ Arch
- ☐ Accidental

Notes:

Possible Suspects:

Date:

- ☐ Loop
- ☐ Whirl
- ☐ Arch
- ☐ Accidental

Notes:

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Date:

- ☐ Loop
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- ☐ Arch
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Notes:

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Date:

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- ☐ Whirl
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Notes:

Possible Suspects:

Date:

- ☐ Loop
- ☐ Whirl
- ☐ Arch
- ☐ Accidental

Notes:

Activity #2: Glo Germ Hand Lotion and Invisible Ink Clues (15 min)

Supplies:
Glo Gel Germ Hand Lotion (Steve Spangler Science)
Invisible pen (Steve Spangler Science)
Black lights (UV lights)
Sticky note paper

Goal of the mystery is to find out WHO left the notes –who is the criminal?!

Before you start the game:

- Prepare 'clues' using math formulas that match a decoding alphabet (see below) written with invisible ink on sticky notes. Plan on at least THREE clues/hall, 3 halls, for a total of 9 clues.
- Make a fingerprint using goop on each clue note (note, you need to use a lot of goo to leave a good fingerprint—try a few test runs first).
- Put stickies in an envelope (one per hall) and label A, B and C.
- Give envelopes to a volunteer parent to distribute in each hall (not in the classrooms) while the students are busy doing another activity.

Start the game:
Start by explaining how a black (UV=ultraviolet) light works. Here are some tips.

- The ink in the invisible ink pen contains *phosphors.*
- Phosphors are substances that absorb and are energized by different kinds of light or radiation.
- In this case, the phosphors in the ink are energized by the UV light waves from the black light. The phosphors in the ink releases all this extra energy by emitting visible light, which YOU can see when the invisible ink glows in the dark room.

1. Now explain some one has been playing with the invisible ink pen and has left clues around the school.
2. Split the kids up into three teams (8-9 kids) and give them black lights
3. The 'criminal' pretends to get a call on a cell phone and excuses him or herself from the room; then he or she goes to the classroom and goops up his or her hands with the germ lotion
4. Have them spread out to look for clues (Team 1 goes to A Hall, Team 2 goes to B Hall, and Team 3 goes to C hall)
5. Reconvene downstairs outside the office after 5 minutes.
6. Share the clues and work together to solve the mystery (5 minutes)
7. Head to suspect's classroom for the final piece of evidence: the glowing hands
8. Shine the light on the suspect's hands – ah ha, proof that s/he was the one—see, the hands are glowing in the dark!

CODE FOR THE MATH CLUES: Circle the ones you find then unscramble the code

A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**
22	40	36	10	15	49	60	13	18	42	90	16	25

N	**O**	**P**	**Q**	**R**	**S**	**T**	**U**	**V**	**W**	**X**	**Y**	**Z**
64	32	11	19	28	5	21	17	26	29	14	7	31

ANSWER :

__ __ __ __ __ __ __ __ __

Invisible Ink Pen & Black Light Combo

Pretend you're a spy — leave a secret message.

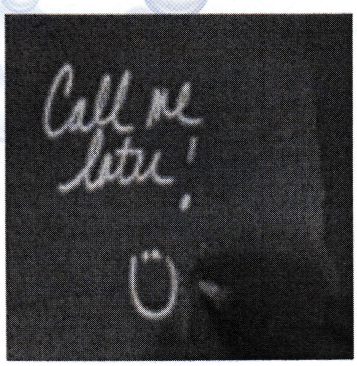

Figure 1

Here's What You'll Need

black light
invisible ink pen
piece of paper (U-Get-It)
friend (U-Get-It)
darkened room (U-Get-It)

Black Light Safety

Never shine the black light (or any light) in your eyes or anyone else's! Shortwave light is harmful to the eyes, but since portable UV lights emit long waves, there is no harm in using the light *as directed* in this activity guide.

Go With the Glow

1. Pretend you are a spy, ready to dispense secret information to your contact. On the piece of paper, write a secret message with the invisible ink pen. *figure 1*

2. Hand your friend the special light that will make it possible for someone to read your message.Warn your contact to find a dark, secret place before he or she reads it!

3. Write a message on your palm or on the inside of your arm and challenge your fellow spy to find the secret message with the black light.Watch out, this could make you squirm!
figure 2 and figure 3

Figure 2

4. You can also use ordinary highlighters as "black light pens." Under the black light, the fluorescent ink glows!

Figure 3

Science After Dark

The ink in your invisible ink pen contains *phosphors*. Phosphors are substances that absorb and are energized by different kinds of light or radiation. In this activity, the phosphors are energized by ultraviolet light waves (when you shine the black light on the secret message). The phosphors in the ink release all this extra energy by emitting visible light, which you see when the invisible ink glows in the dark room.

The invisible Ink Pen will illuminate with any black light source.
The ink can be washed off with soap and water from most surfaces.

Dictionary of Glowing Things

Luminescence

Luminescence is a general term that describes the process that causes light to shine from a material. Things that "luminesce" usually do so without needing or producing heat, though they may need some sort of material to help activate the process. You might think of luminescence as "self-generated" light.

Fluorescence

This type of luminescence occurs when some form of radiation, such as black (UV) light, causes an object to glow. For example, fluorescent papers and poster boards glow in the daylight. They may seem to glow even brighter under black light (ultraviolet), but in either case, as soon as the light is removed, the glow stops. Fluorescent things do not glow in the dark all by themselves —they require some other form of energy such as ultraviolet light to activate or "excite" them.

Phosphors

A phosphor is a material that gives off visible light when exposed to radiation, like a beam of electrons or ultraviolet light. Fluorescent colors are phosphors — they absorb invisible ultraviolet light and emit visible light in the form of colors you can see.

Phosphorescence

Phosphorescence is just like fluorescence, except that the glow continues even after the light used to activate it is removed. "Phosphorescent" objects glow for a while after having been exposed to black light and continue to glow even after the black light is removed. They are often labeled as *glow-in-the-dark* materials or products.

Triboluminescence

In a two-part process, light is produced when objects (such as rocks or sugar crystals) are broken, cratched, or pulled apart. You'll find out more about triboluminescence a little later, when you crack your own Wint-O-Green Lifesaver between your teeth!

Black Light Basics

Ultraviolet light is an invisible, natural component of the sun's light, but can also be produced artificially, as it is in the portable black light in your kit. *Ultraviolet light* is invisible in daylight but can be detected by the fluorescence it creates in certain materials when the lights go off. The particular long wavelength of "black" light causes materials with fluorescent pigments to light up with an awesome glow.

Black Light Safety

Never shine the black light (or any light) in your eyes or anyone else's! Shortwave light is harmful to the eyes, but since portable UV lights emit long waves, there is no harm in using the light *as directed* in this kit.