

Tech Detective (Detective Badge)

Grade Levels: 4-5 (Girl Scout Juniors)

Educational Outcomes:

1. Girl Scouts will be able to practice their observation skills and examine puzzles logically
2. Girl Scouts will be able to examine and identify their own fingerprints and analyze and categorize fingerprints by their patterns.
3. Girl Scouts will be able to describe the importance of DNA to a criminal investigation

Estimated Time: 2 hours

- Introduction: 10 min.
- Activity 1 – Powers of Observation: 20 min.
- Activity 2 – Fingerprint Science: 45 min.
- Activity 3 – DNA Spooling: 40 min.
- Wrap Up: 5 min.

Girl Scout Badge Connections:

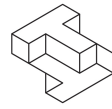
Detective Badge, *It's Your Planet-Love it! Junior Journey*

- Step 1: Practice the Power of Observation (Powers of Observation)
- Step 3: Fingerprint for Fun (Fingerprint Science)
- Step 4: Try Out Detective Science (DNA Spooling)

Pre-Visit Vocabulary

These are words and concepts that we will discuss in the lab. Your students' experience will be enhanced if they are familiar with these terms prior to your visit.

- Observation: The act of perceiving or noticing.
- Fingerprint: The impression left by ridges on the human finger.
- Plain arch: an even flow of ridges from one side of a finger to the other with a small rise or wave in the middle.
- Tented arch: an even flow of ridges from one side of a finger to the other with a prominent rise or pinched wave in the middle.
- Ulnar loop: ridges that flow in a loop pattern beginning on the thumb side of the finger looping towards the pinky side of the finger
- Radial loop: ridges that flow in a loop pattern beginning on the pinky side of the finger looping towards the thumb side of the finger.
- Plain whorl: ridges that flow in a concentric circular pattern forming a target like shape.
- Central pocket loop: ridges that form a spiral like pattern with a central "pocket" or circle at the center of the print.
- Double loop whorl: ridges that form an "s" shape of two distinct loop shapes.
- Accidental whorl: ridges that form two separate fingerprint patterns on one finger.
- Cell: The basic structural unit of all organisms.



- DNA (deoxyribonucleic acid): The genetic material of living organisms, located in the chromosomes of each cell; the “blueprint” or “recipe” for life.
- Gene: The basic physical unit of heredity.
- Nucleus: A large, membrane-bound structure within a living cell, containing the cell's hereditary material and controlling its metabolism, growth, and reproduction.
- Trait: A genetically determined characteristic or condition, like hair-color, dimples, or sex.

Post-Lab Activities

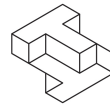
This lab only covers Steps 1, 3, and 4 of the Detective Badge. To complete this badge, Steps 2 and 5 will need to be completed separately. Below are some resources to help troop leaders to complete the Detective badge with their troop. You may also find additional resources and activities in the Junior Badge Booklet: Detective.

Step 2: Communicate in Code

- *Learn to communicate in Morse code.* Using the key on the next page, girls can learn write secret messages to their friends using Morse code. Below you will also find useful and interesting links about Morse code and other secret modes of communication.
 - This article by the History Channel gives a great overview and history of Morse code and the Telegraph. <http://www.history.com/topics/inventions/telegraph>
 - This page gives 10 examples of types of codes and cyphers used to create secret messages. Have girls choose one and write a secret message to their friends.
 - This article by the History Channel highlights the importance of coded messages during war-time, particularly focusing on the Choctaw Indians in World War I. <http://www.history.com/news/world-war-is-native-american-code-talkers>

Step 5: Follow the clues to solve a real mystery!

- *Solve a cyber-mystery down in The Tech's Cyber Detectives exhibit.* Learn all the skills necessary for protecting cyber data at the available training stations. Then put your cyber sleuthing skills to the test in one of the mission rooms to protect the ACME Recycling Company from cyber sabotage!
- *PBS Kids CSI-mysteries.* This site has three short games that are CSI themed and kid-friendly. Follow the clues to solve the mysteries presented in Hat Snatcher, Tugboat Thug, and Squeak Sneak. <http://pbskids.org/fetch/games/index.html>
- Interview a real CSI agent! This site has a Q and A interview with a real forensic expert in the field of forensic archaeology. She gives a lot of great information on what it's really like in the field of forensics and what you need to do to pursue forensics as a career. <http://www.planet-science.com/categories/over-11s/careers/2010/09/real-life-csi-abi-carter.aspx>



International Morse Code

1. The length of a dot is one unit.
2. A dash is three units.
3. The space between parts of the same letter is one unit.
4. The space between letters is three units.
5. The space between words is seven units.

A • —
B — • • •
C — • — •
D — • •
E •
F • • — •
G — — •
H • • • •
I • •
J • — — —
K — • —
L • — • •
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R • — •
S • • •
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U • • —
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X — • • —
Y — • — —
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1 • — — —
2 • • — —
3 • • • — —
4 • • • • —
5 • • • • •
6 — • • • •
7 — — • • •
8 — — — • •
9 — — — — •
0 — — — — —