girl scouts river valleys

CADETTE SPECIAL AGENT BADGE – MEETING 2

Badge Purpose: When you've earned this badge, you'll know secrets from the worlds of forensic science and criminal psychology.

Activity Plan Length: 1.5 hours

Time	Activity	Materials Needed
10 minutes	Getting Started • Begin the meeting by reciting the Girl Scout Promise + Law.	☐ (Optional) Girl Scout Promise and Law poster
15 minutes	Code Jewelry • Make an accessory with a secret message.	☐ Plastic pony beads in at least two colors ☐ Plastic drinking straws, cut into 1" pieces ☐ Yarn, string or ball chain in desired length ☐ Scissors ☐ Morse Code chart (at the end of this activity plan)
25 minutes	Mystery, She Wrote • Explore handwriting analysis and chromatography to learn how investigators use these tools to help solve mysteries.	☐ Paper ☐ Writing utensils ☐ Tracing paper ☐ Ruler ☐ 5 different black pens (not ballpoint) ☐ Paper towels ☐ Scissors ☐ Bowl filled with 1" of water ☐ Tape
25 minutes	The Case of the Stolen Lunch Money • Solve a mock crime that has been committed in the classroom using all your new special agent skills.	☐ Girls' fingerprints (from previous meeting) ☐ Scissors ☐ Plastic bags ☐ Paper ☐ Writing utensils
10 minutes	Snack Chat • Discuss what you learned about solving mysteries while having a healthy snack.	☐ Healthy snack
5 minutes	Wrapping Up	☐ (Optional) Make New Friends lyrics poster

Getting Started

Time: 10 minutes

Materials Needed: (Optional) Girl Scout Promise and Law poster

Welcome everyone to the meeting, recite the Girl Scout Promise and Law.

Activity #1: Code Jewelry

Time: 15 minutes

Badge Connection: Step 1 – Investigate investigation and Step 5 – Practice the art of detection
Materials Needed: Plastic pony beads in at least two colors; plastic drinking straws cut into 1" pieces; yarn, string or ball chain in desired length; scissors; Morse Code Chart (at the end of this activity plan)
Prep Needed:

- Cut the plastic straws into 1" pieces.
- Print the Morse Code Chart (at the end of this activity plan).

1. Secret agents and spies use secret codes to communicate in stories and movies. But did you know that Morse code is a legitimate secret code that is still taught in the FBI and military today? It was first developed to send messages via telegraph. It isn't used as frequently today, but still has practical purposes in emergency and espionage situations. (Yes, spies still exist!)
2. Morse code is comprised of "dots" and "dashes" that represent how long the beep is transmitted (or how many taps are made on a surface, if transmitting a message without technology in a shared physical space). One short beep and one long beep is the letter A, one long beep and three short beeps is the letter B, and so on. Refer to the Morse Code Chart at the end of this activity plan for the complete alphabet in code.
3. For this activity, you can make a dot-and-dash accessory (necklace, bracelet, zipper pull, or key ring) with a special code in Morse code. The beads represent the dots, and the straws represent the dashes. Choose one color bead for the letters, and another color bead for the spaces between the letters.
4. You can choose to write your name in Morse code on your item, or a secret message.

Activity #2: Mystery, She Wrote

Time: 25 minutes

Badge Connection: Step 1 – Investigate investigation and Step 3 – Try the science
Materials Needed: Paper; writing utensils; tracing paper; ruler; 5 different black pens (not ballpoint); paper towels; scissors; bowl filled with 1" of water; tape

1. A handwritten note can become a piece of evidence in a mystery, particularly if forgery is suspected. Everyone's handwriting contains unique characteristics that make it difficult to completely forge, and forensic investigators are skilled in sleuthing out the phonies from the real thing.
2. The first step in identifying forgeries is to know what you're looking for. Bottom-analysis compares the lowest parts of each letter for consistency. Write your name or a phrase on a piece of paper two times (give yourself some space between each time). Place the tracing paper over what you wrote. Make a small mark on the tracing paper at all the lowest points of each letter. Use the ruler to connect these marks. Repeat this for the second name or phrase you wrote, and then compare the zig-zag lines. Are they consistent?
3. Slant-analysis reviews the slant in each letter. Write your name or a phrase on a fresh sheet of paper two times again. Place the tracing paper over the words, but this time, draw a straight line through each letter that runs parallel to the way the letter slants. Repeat this for the second word you wrote on this page. Compare the two sets of lines. Are your slants consistent from writing to writing? Do you think that an investigator would start to recognize a pattern in your writing?

4. Forensic scientists also use chemistry to analyze written words found at crime scenes. Chromatography is the science of separating parts of a mixture. It relates to detecting poisons or drugs present in a body, or finding traces of explosives used, but in this case, you'll be experimenting with the ink used to write a note (imagine a ransom note or a phone number jotted down quickly before fleeing the scene).
5. Black ink may seem like it's just *black* ink. But it's actually made up of many different colors, and different pens have different "recipes" for their ink. To start your chromatography experiment, cut a paper towel into 1" wide strips. Then, draw a squiggly line across the strip of paper towel, about an inch up from the bottom, using one of the black pens. Repeat this process for the other pens. Be sure to label the strips with which pen you used.
6. Hang the strips over a bowl of water. The water should touch the very end of the paper towel, but not the ink. Tape the paper towels in place and wait to see what happens. The water will creep up the paper towel strips and separate each ink mark into a unique dye pattern.
7. What makes this happen?! When the water reaches the ink on the paper towel, it dissolves some of the dyes in the ink, and the dyes travel up the paper towel with the water.
8. How do you think knowing about the chemical makeup of ink from a pen could help forensic investigators solve a mystery?

Activity #3: The Case of the Stolen Lunch Money

Time: 25 minutes

Badge Connection: Activity connects to multiple badge steps
Materials Needed: Girls' fingerprints from previous meeting; scissors; plastic bags; paper; writing utensils; magnifying glass; (optional: microscope)
Prep Needed:

- **Leaders:** Collect a hair sample and a thread sample from each girl as they enter the meeting (see below). Place the samples in a plastic bag labeled with each girl's name. The two sets of fingerprints that were collected from the girls during the previous meeting for this badge should be used for this activity. Give one set of fingerprints back to the girls for their investigation, and keep one set of fingerprints with their hair and thread samples. Every girl is a suspect in this mock investigation. While the girls are doing their investigative work, randomly select one set of evidence (from one girl) to be the culprit. Keep this secret!

1. Now it's time to put all your new special agent skills together to solve a mystery!
   Your classroom was vandalized overnight! The perpetrator ransacked the teacher's desk, throwing supplies to the floor. The teacher's lunch money was stolen from the drawer. Evidence was gathered at the scene of the crime including fingerprints, a hair sample, and a thread from a piece of clothing. The evidence has been placed in a plastic bag. There was a window left open and a footprint in the dirt below the window. Now it's up to you to solve the mystery!
2. All the girls in the room are suspects because everyone had access to the classroom.
3. Each girl should collect a hair sample and thread sample from herself. To collect a thread sample, use a scissors to snip a small thread from inside the clothing or use a piece of tape to collect a thread from the clothing. Tape these samples to a sheet of paper and label them. Retrieve your fingerprint sample from the last meeting.
4. Using a magnifying glass or microscope (if available), examine the hair and thread samples. Record the following details on a sheet of paper:
   - Color
   - Length/Size
   - Texture
   - Other features
5. Re-examine your fingerprint sample from the first meeting. Look for patterns:
   - Arches
   - Loops
   - Whorls

6. During the time that the girls are investigating their samples, the leaders should decide which girl committed the mock crime, and post this girl's hair/thread/fingerprint samples for everyone to see (mount on a poster board, the wall, or set on a table). Do not share the identity of the girl yet!
7. Girls should compare their own evidence to the culprit's sample, and see if they can make a match to solve the mystery. For more fun, trade evidence between girls and compare against the culprit samples again.
8. Discuss how the open window with the footprint in the dirt below could relate to the crime. How would an investigator use that piece of evidence to confirm their suspect?

Activity #4: Snack Chat

Time: 10 minutes

Badge Connection: Questions connect to multiple badge steps
Materials Needed: Healthy snack

1. While having a healthy snack, discuss the methods you learned about for solving mysteries:
    - How might investigators question an eyewitness?
    - What other evidence can be collected from crime scenes?
    - Do you think it's possible for investigators to tell if someone is lying? Why or why not?
    - What other tools can investigators use to analyze evidence?

Wrapping Up

Time: 5 minutes

Materials Needed: (Optional) Make New Friends song lyrics poster

Close the meeting by singing Make New Friends and doing a friendship circle.

More to Explore

- Field Trip Ideas:
    - Visit a police station to find out more about fingerprinting suspects and collecting evidence.
    - Go to your library to learn about the different branches of forensic science: criminology, digital and multimedia science, engineering science, forensic dentistry, forensic pathology, forensic anthropology, and toxicology.

- Speaker Ideas:
    - Ask a law-enforcement officer, judge, lawyer, or other expert to speak to your troop about stories of people who were wrongly convicted based on inaccurate eyewitness accounts.
    - Learn more about The Innocence Project, a group that uses DNA evidence to free prisoners who were wrongly convicted before DNA technology was available. https://www.innocenceproject.org/

Morse Code Chart

Alphabet Character Code	Telephony/Phonetic	Morse Code
A	ALPHA	. _
B	BRAVO	_ . . .
C	CHARLIE	_ . _ .
D	DELTA	_ . .
E	ECHO	.
F	FOXTROT	. . _ .
G	GOLF	_ _ .
H	HOTEL	. . . .
I	INDIA	. .
J	JULIET	. _ _ _
K	KILO	_ . _
L	LIMA	. _ . .
M	MIKE	_ _
N	NOVEMBER	_ .
O	OSCAR	_ _ _
P	PAPA	. _ _ .
Q	QUEBEC	_ _ . _
R	ROMEO	. _ .
S	SIERRA	. . .
T	TANGO	_
U	UNIFORM	. . _
V	VICTOR	. . . _
W	WHISKEY	. _ _
X	XRAY	_ . . _
Y	YANKEE	_ . _ _
Z	ZULU	_ _ . .